

(Rev. 16 10/09)



PERRY NUCLEAR POWER PLANT

Control Rod Assembly
Original Equipment Design

Figure 4.2-1

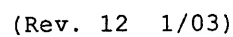
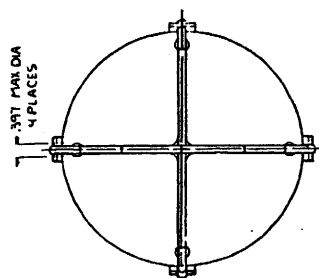
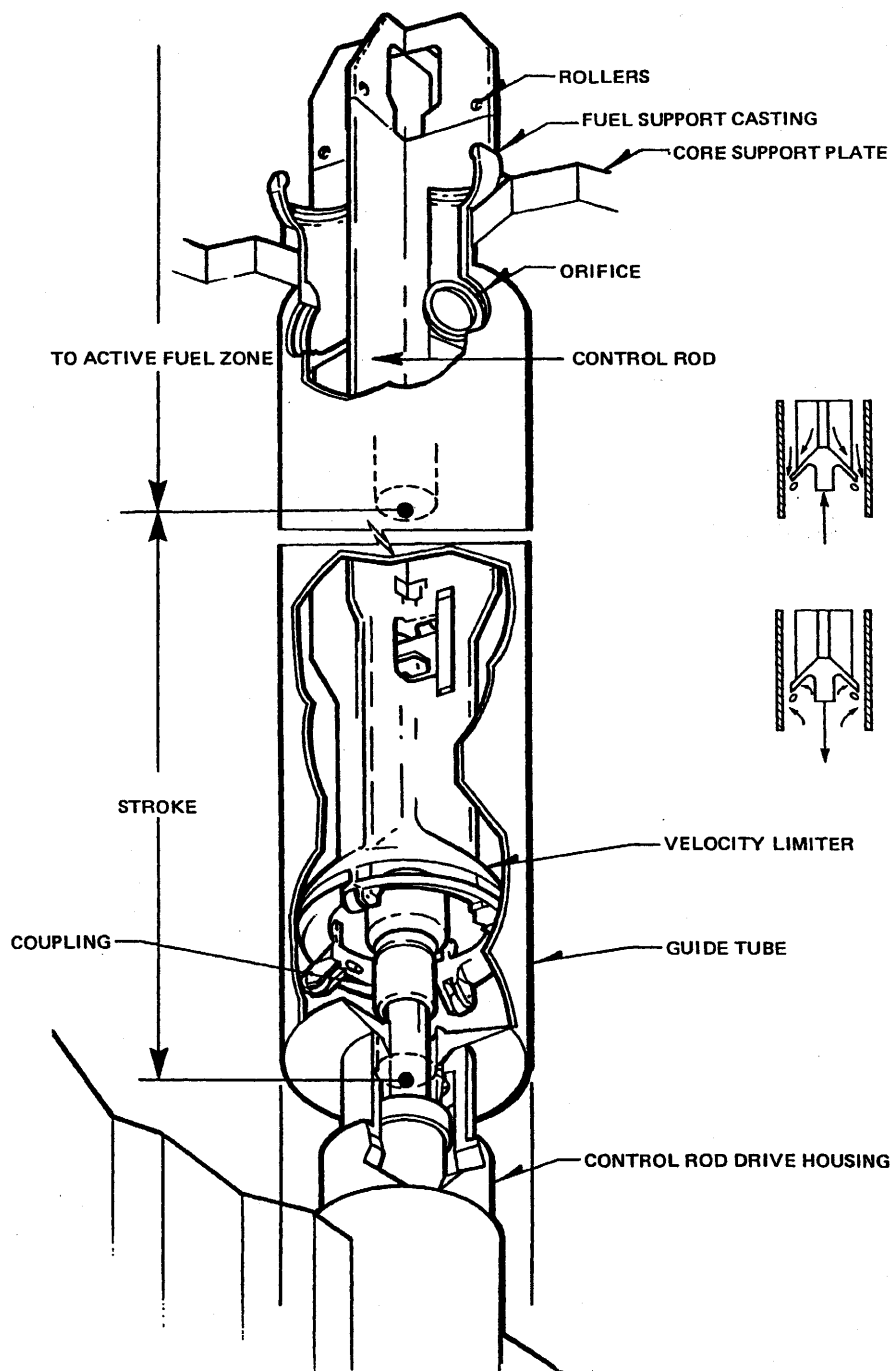


Figure 4.2-2



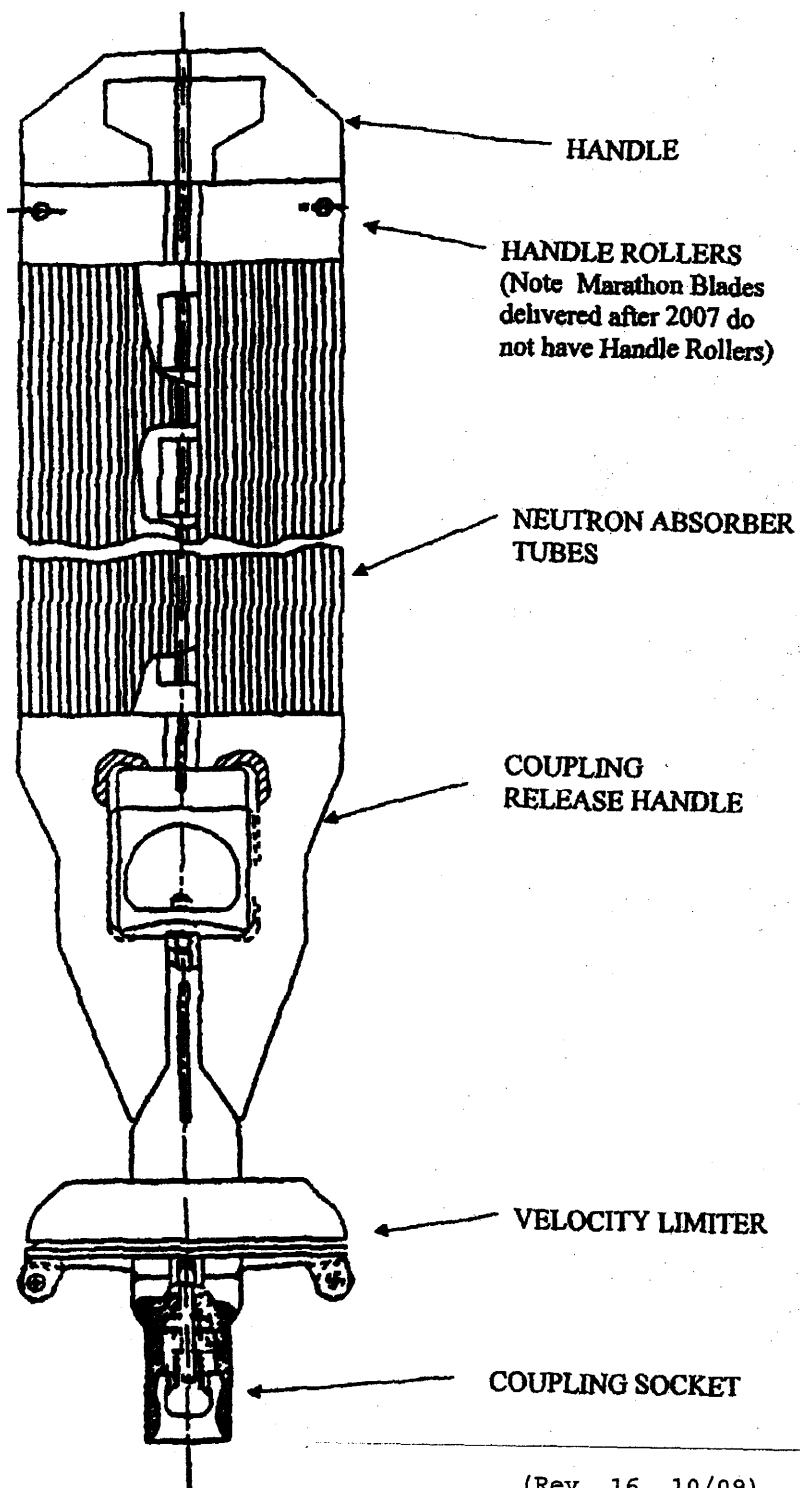
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Control Rod Velocity Limiter

Figure 4.2-3



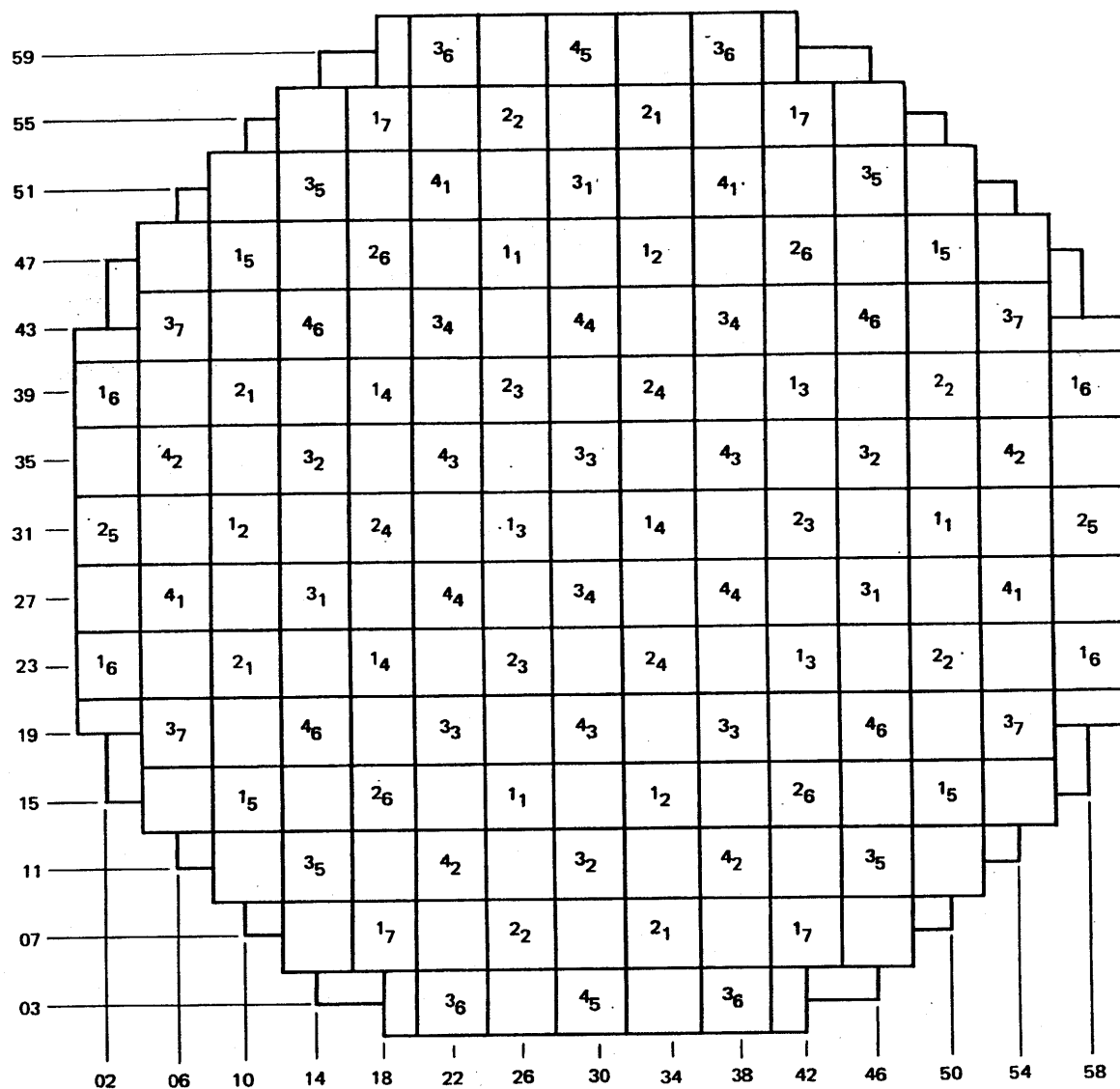
(Rev. 16 10/09)



PERRY NUCLEAR POWER PLANT

Control Rod Assembly
Marathon Design

Figure 4.2-4



N_M
 N = GROUP
 M = SUBGROUP (GANG)

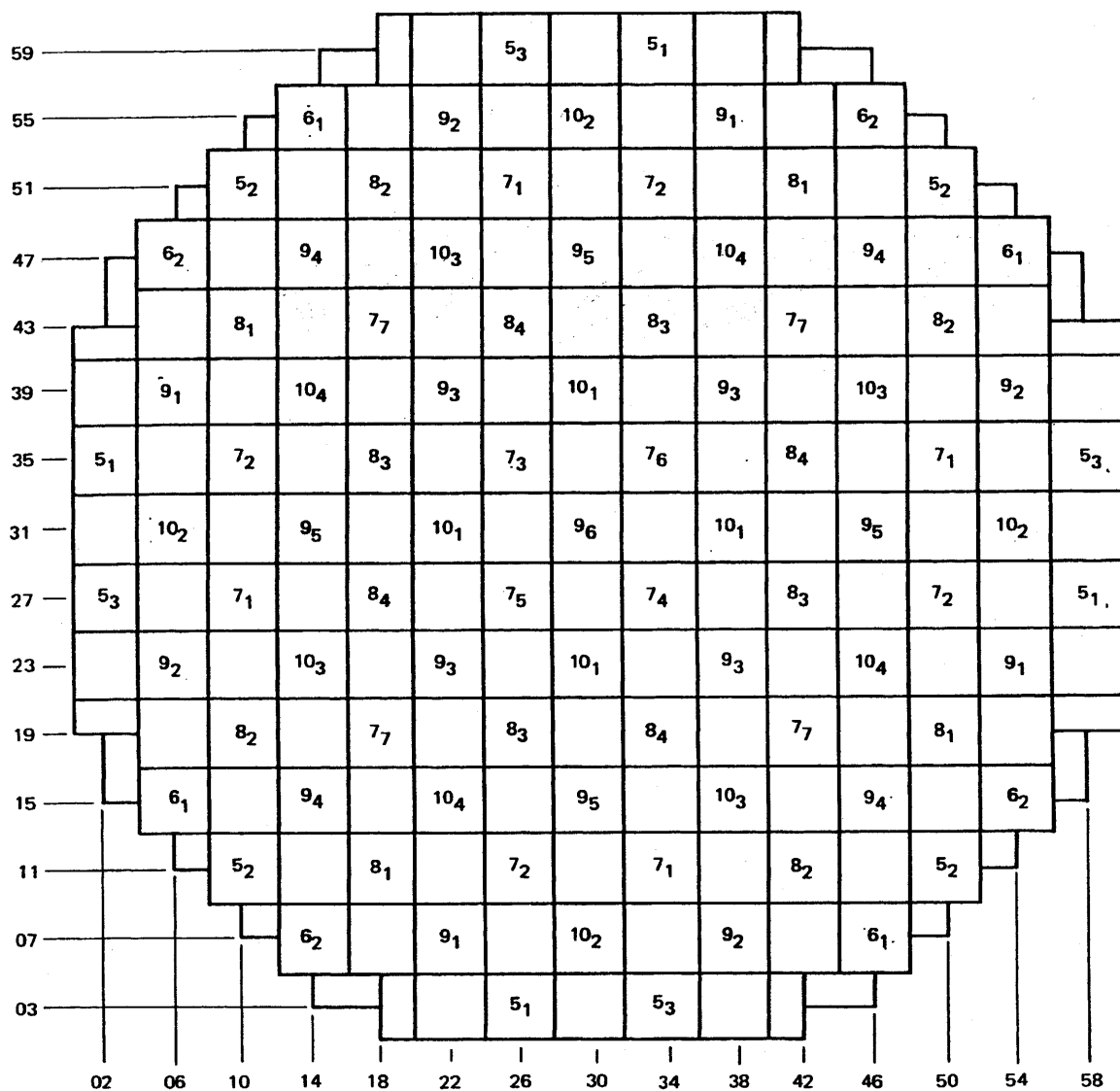
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PERRY NUCLEAR POWER PLANT

Banked Position Withdrawal
 Sequence RPCS, Groups 1 Through 4,
 Sequence A (238-748)

Figure 4.3-4



N_M N = GROUP
M = SUBGROUP (GANG)

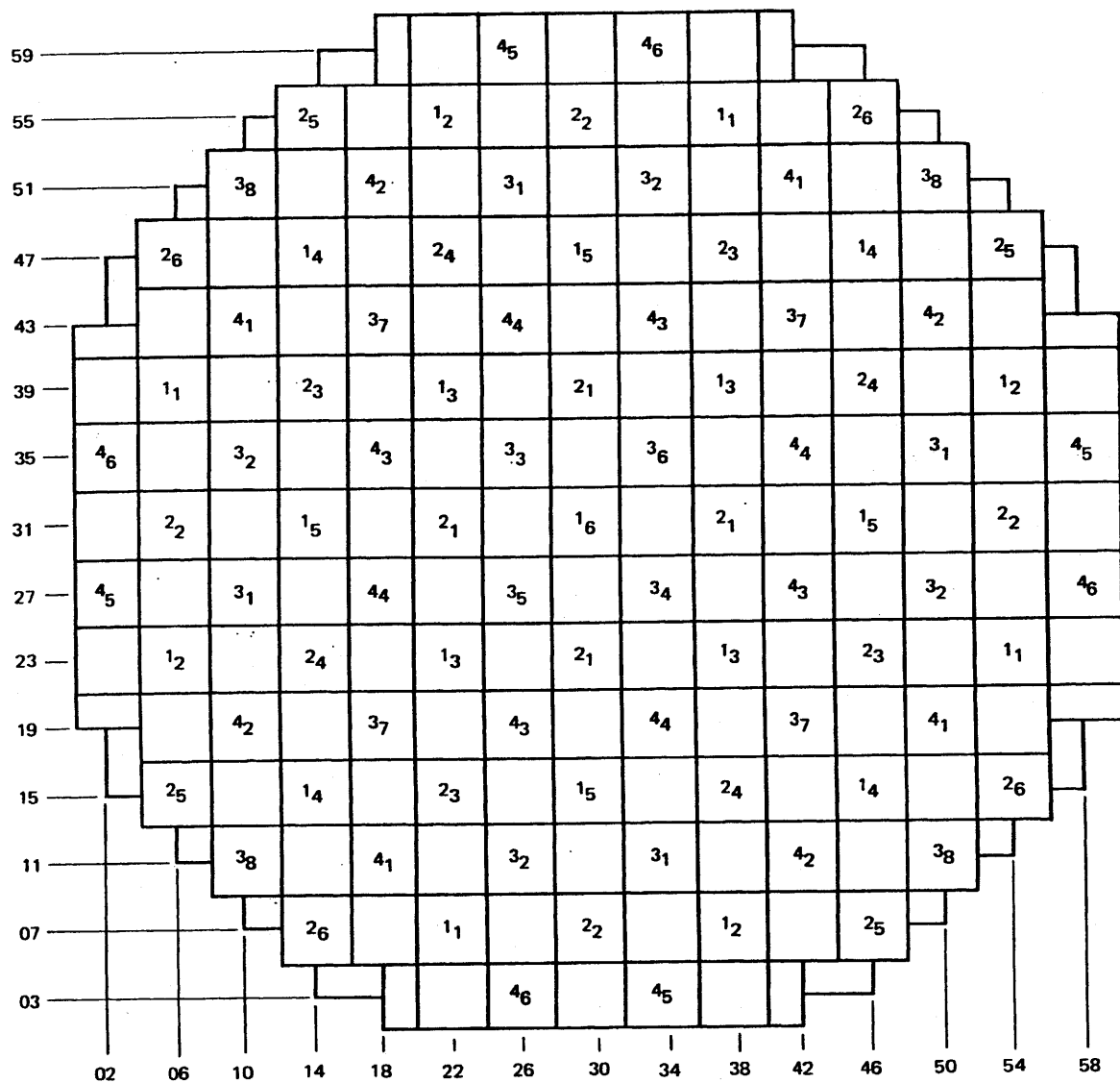
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Banked Position Withdrawal
Sequence RPCS Groups 5 Thru 10,
Sequence A (238-748)

Figure 4.3-5



N_M N = GROUP
 M = SUBGROUP (GANG)

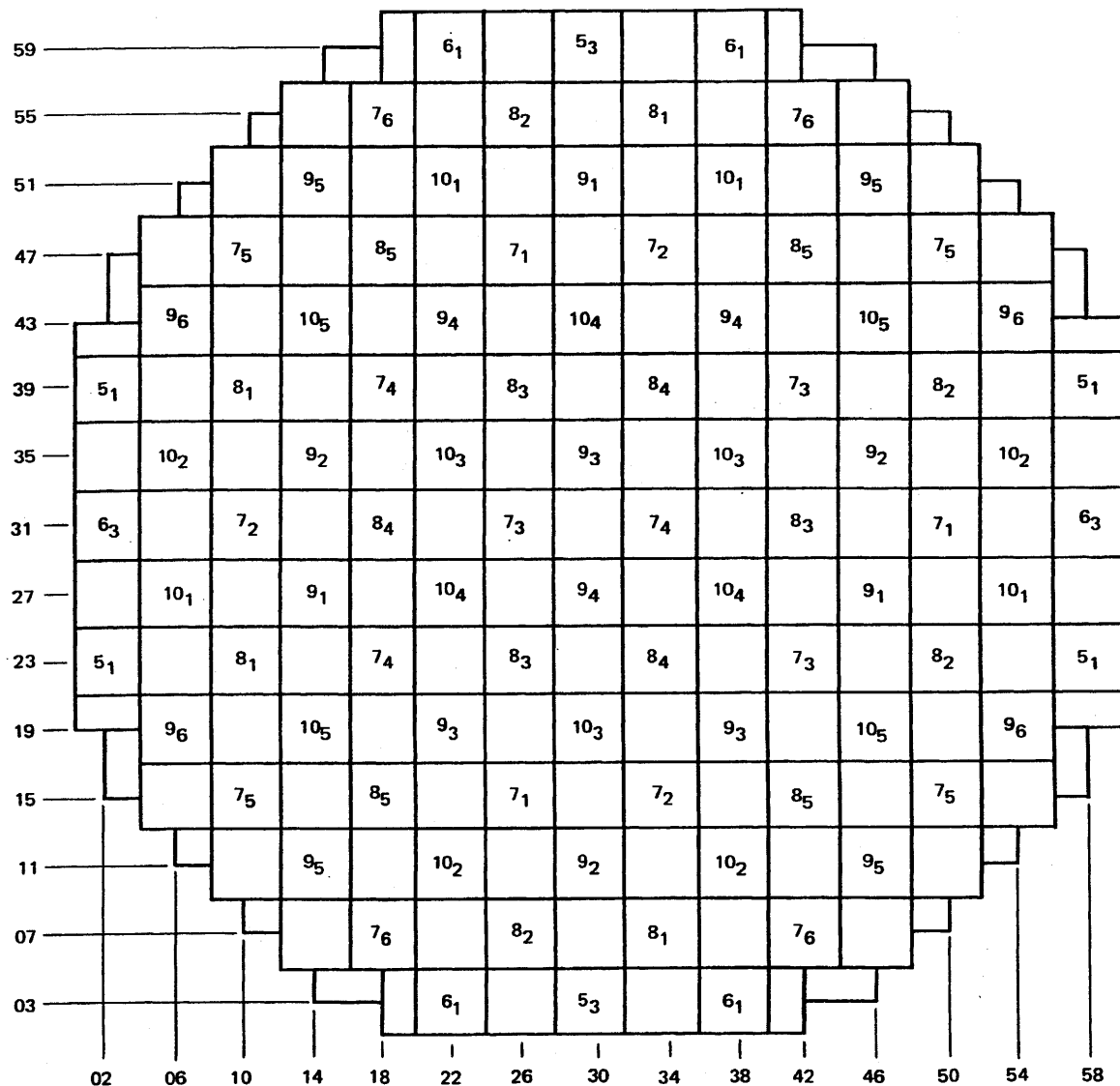
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PERRY NUCLEAR POWER PLANT

Banked Position Withdrawal
 Sequence, RPCS Groups 1 thru 4,
 Sequence B (238-748)

Figure 4.3-6



N_M N = GROUP
M = SUBGROUP (GANG)

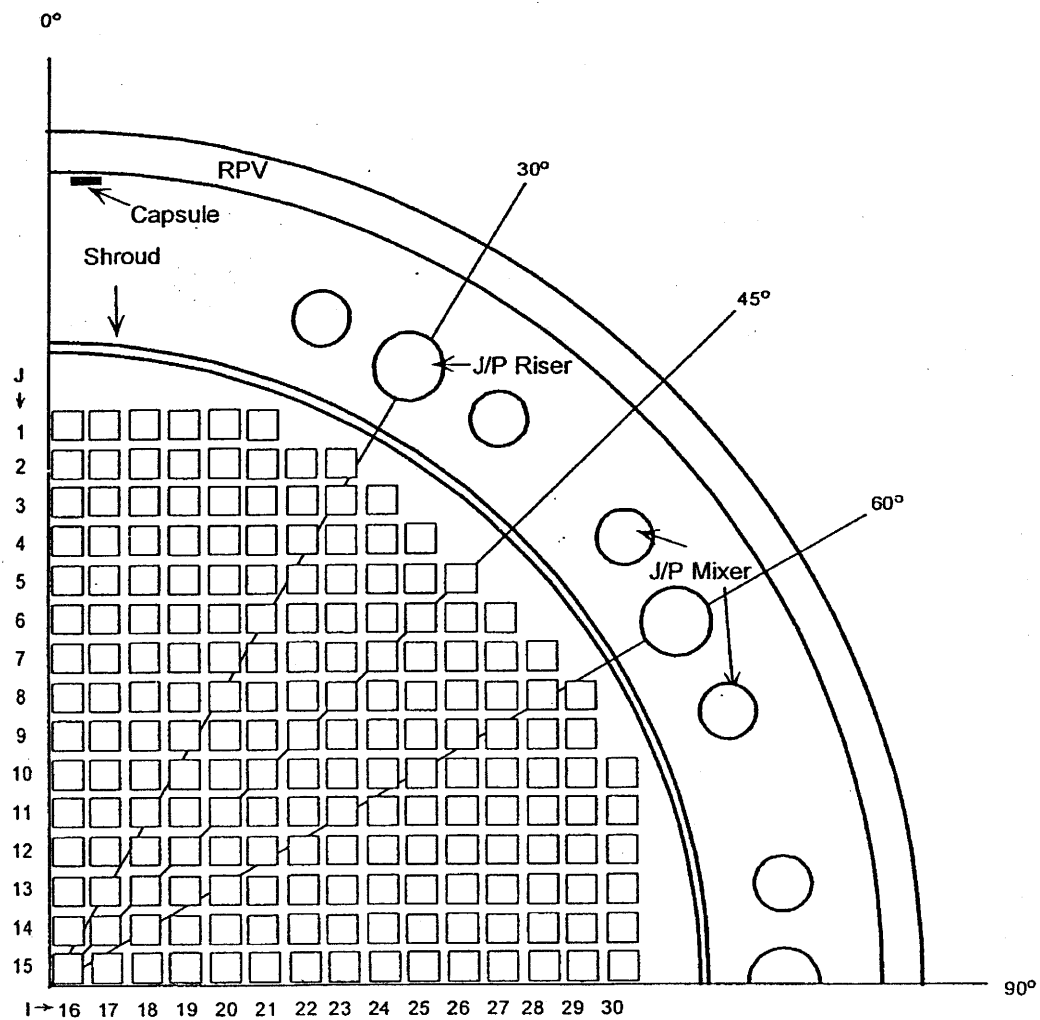
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Banked Position Withdrawal
Sequence RPCS Groups 5 thru 10,
Sequence B (238-748)

Figure 4.3-7



(Rev. 13 12/03)

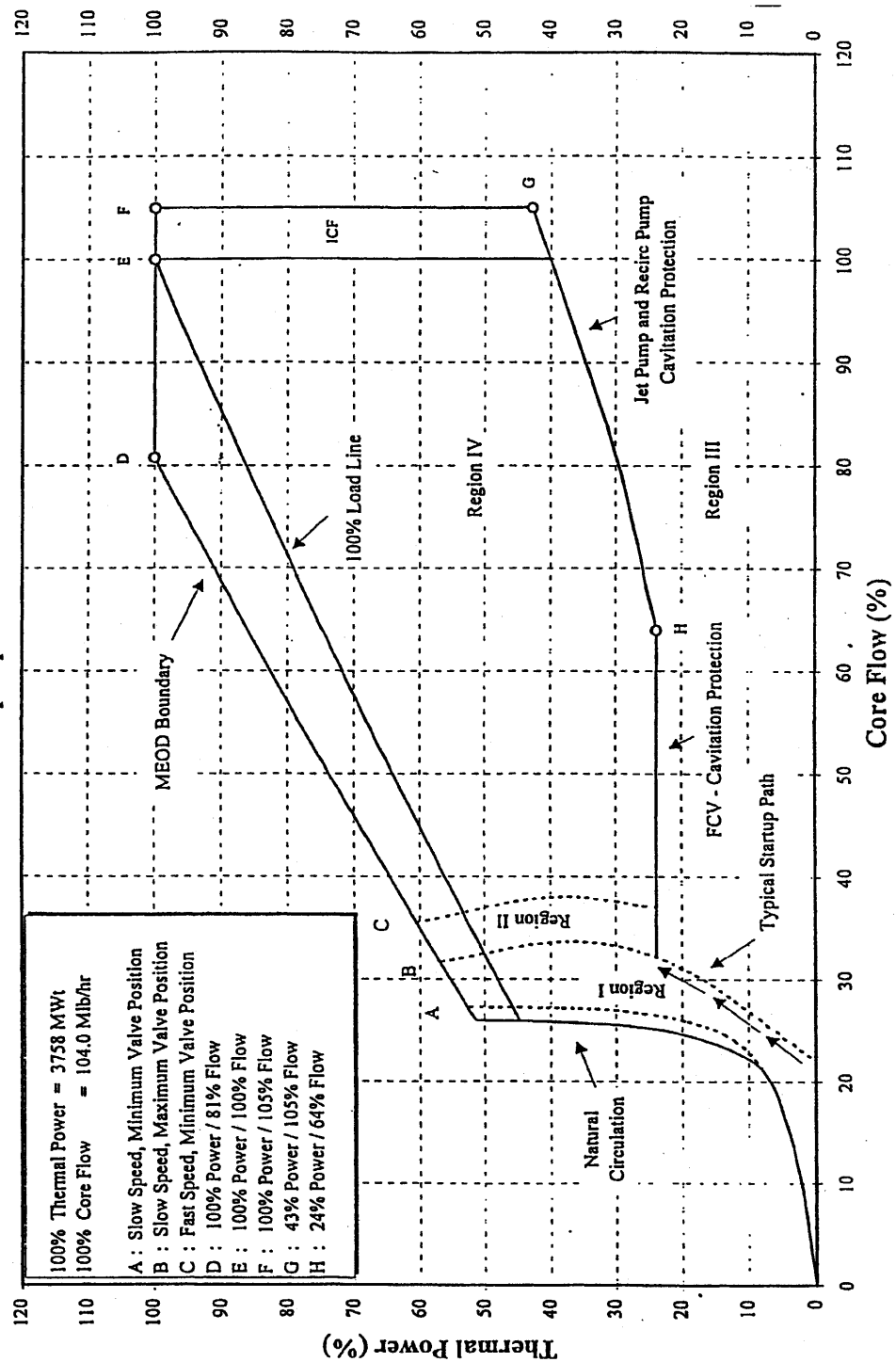


PERRY NUCLEAR POWER PLANT

Model for Neutron
Transport Analysis
of Vessel Fluence, Unit 1

Figure 4.3-9

Perry Power/Flow Map Two Loop Operation



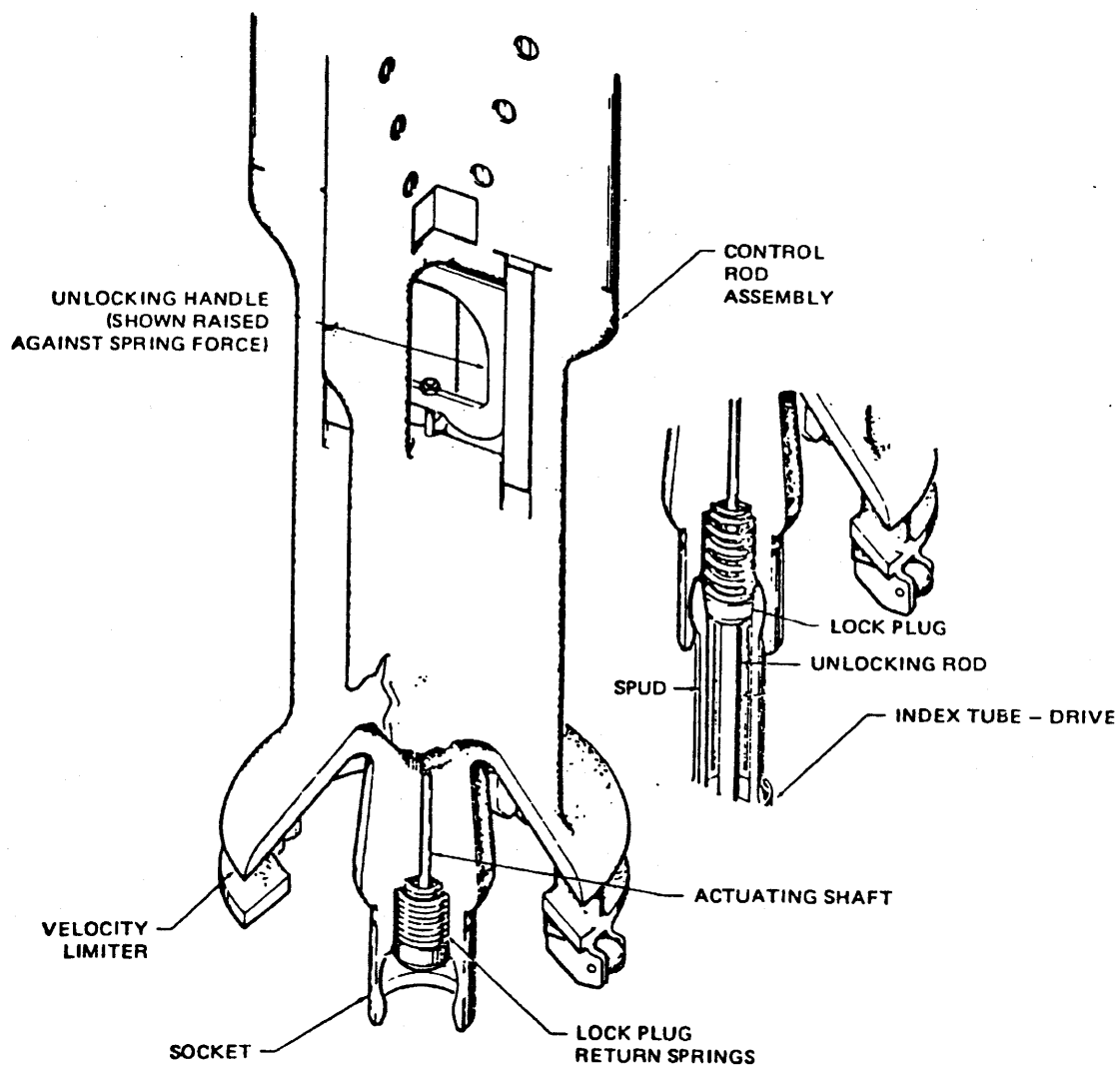
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PERRY NUCLEAR POWER PLANT

Standard Power-Flow
Operating Map
(Typical)

Figure 4.4-2



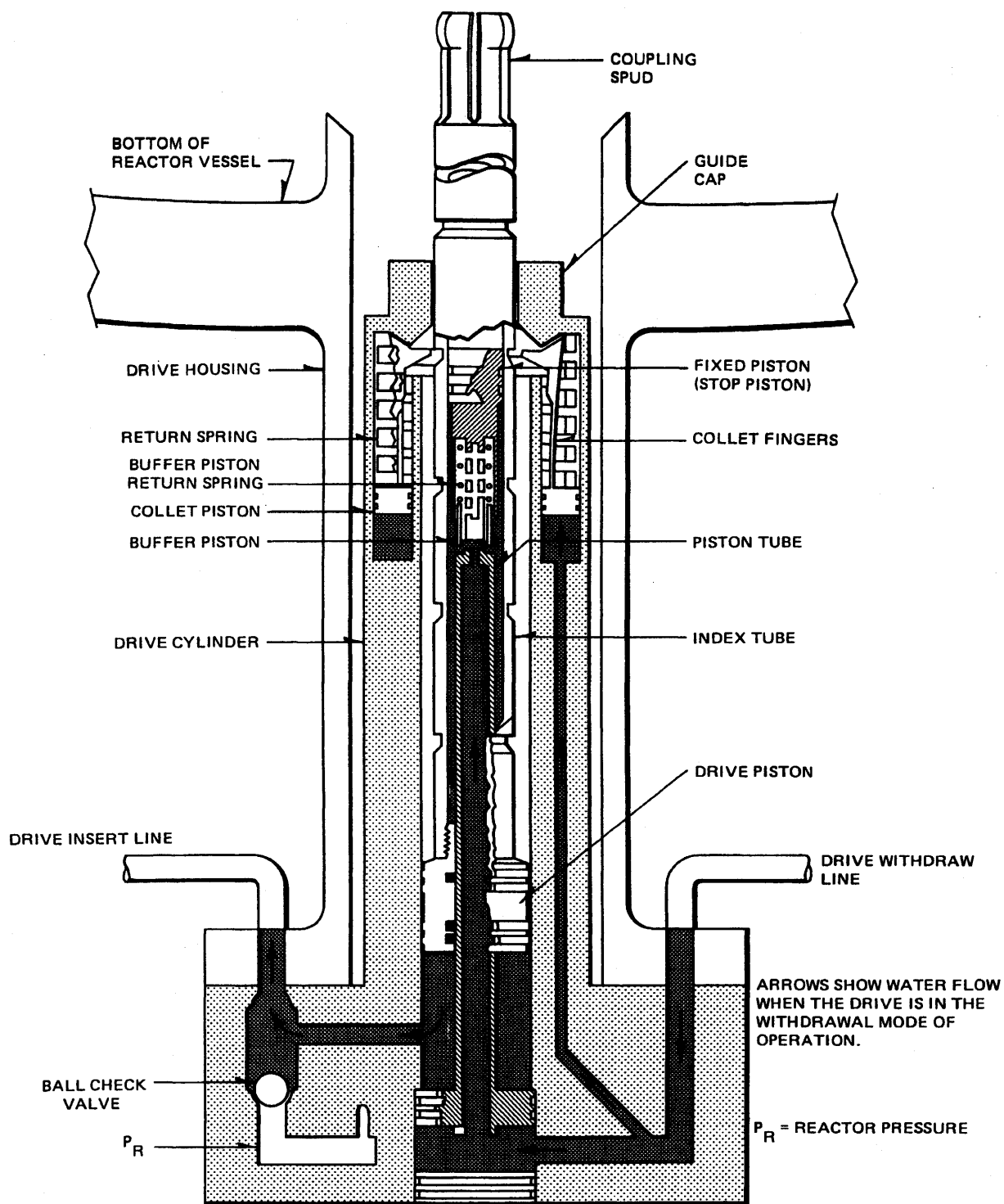
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Control Rod to Control Rod Drive
Coupling

Figure 4.6-1



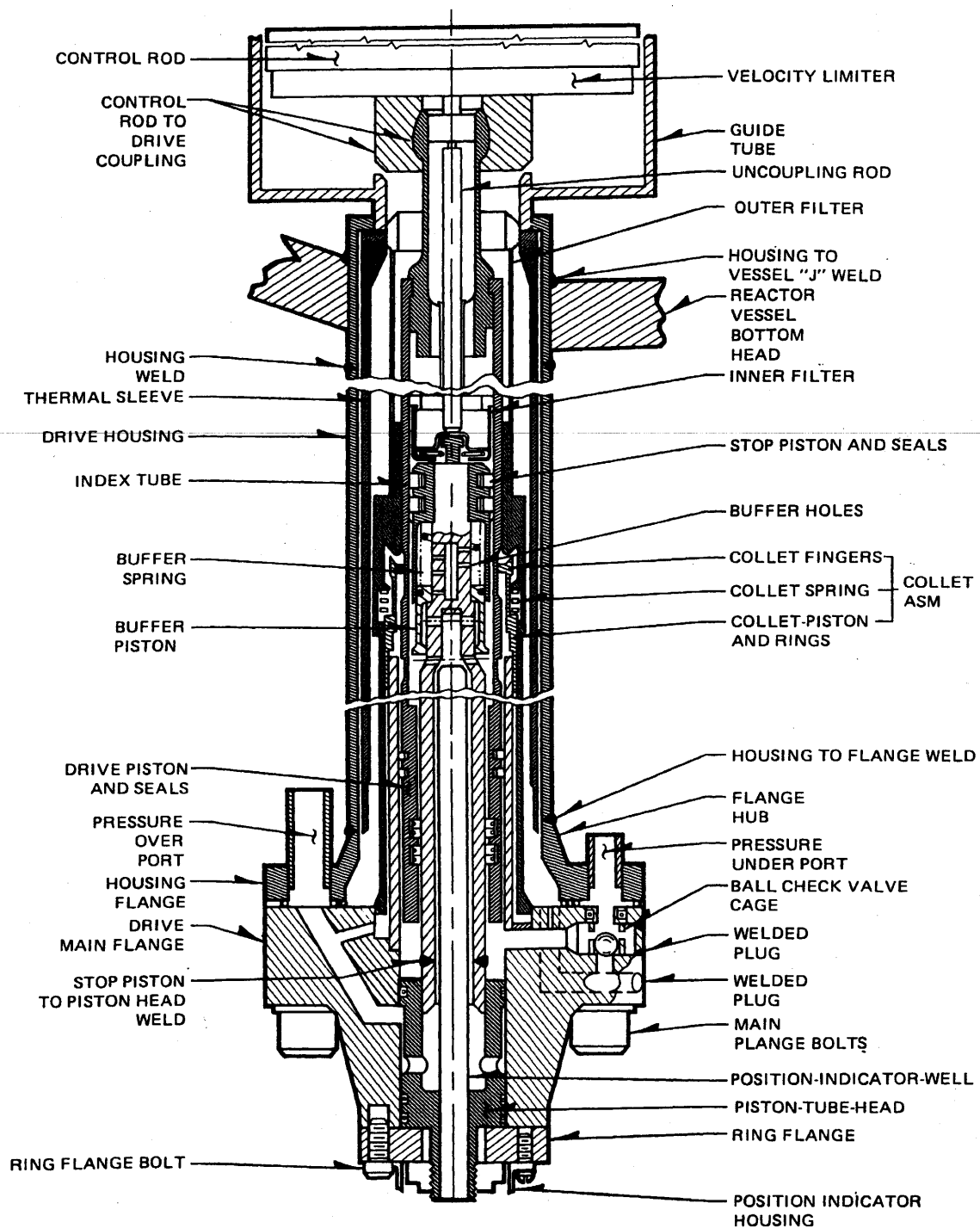
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PERRY NUCLEAR POWER PLANT

Control Rod Drive Unit

Figure 4.6-2



(Rev. 12 1/03)

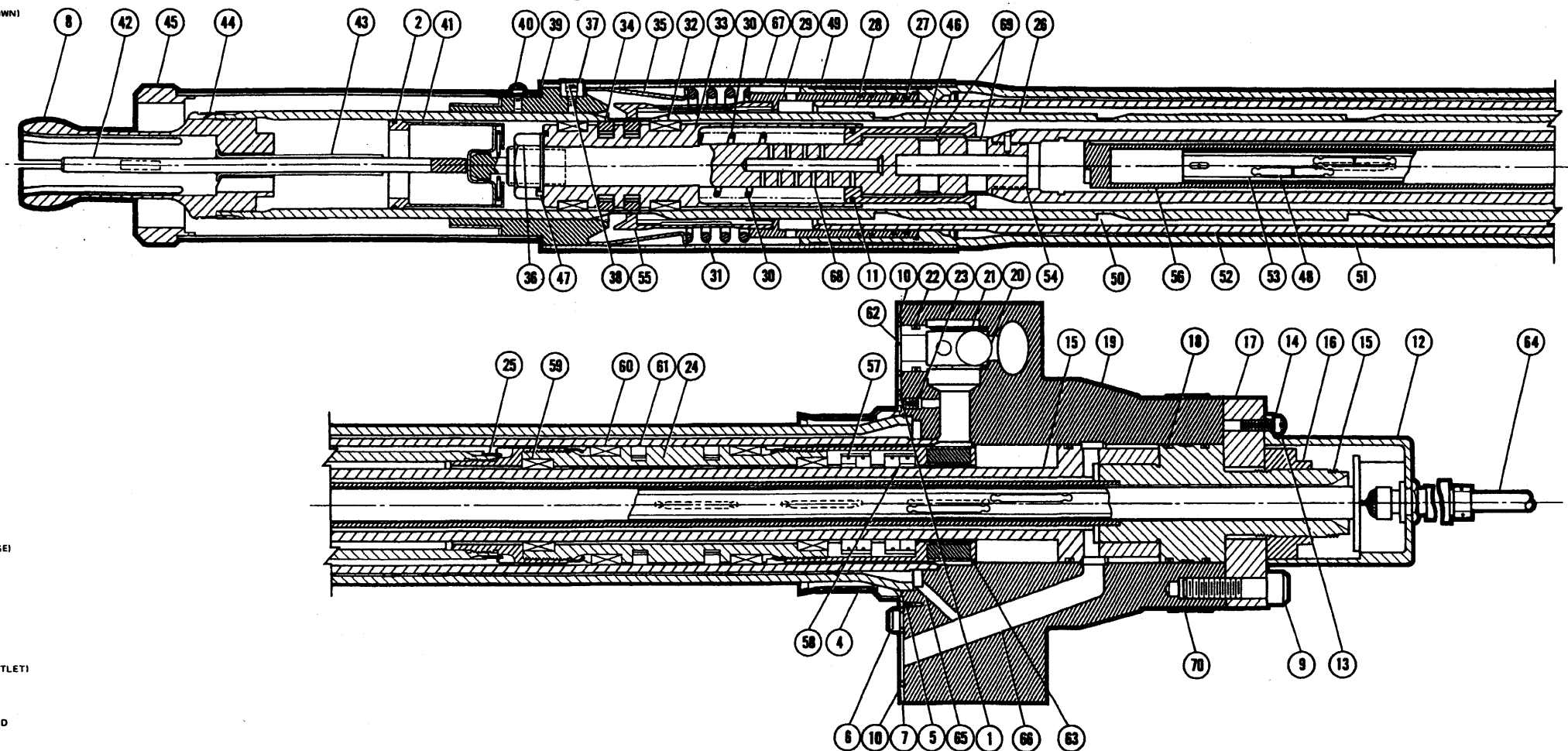


PERRY NUCLEAR POWER PLANT

Control Rod Drive Schematic

Figure 4.6-3

- 1 O-RING (FLANGE FACE)
- 2 SEAL RING (INNER FILTER)
- 3 SCREW, FLAT HEAD (O-RING SPACER MOUNTING NOT SHOWN)
- 4 STRAINER
- 5 SCREW, FLAT HEAD (STRAINER)
- 6 DOWEL PIN (DRIVE ALIGNMENT)
- 7 O-RING SPACER
- 8 SPUD (COUPLING)
- 9 CAP SCREW (RING FLANGE)
- 10 "O" RING (INSERT AND WITHDRAW PORTS)
- 11 SEAL RING (BUFFER PISTON)
- 12 POSITION INDICATOR PROBE
- 13 SCREW (POSITION PROBE)
- 14 WASHER (FOR P13)
- 15 PISTON TUBE
- 16 NUT (PISTON TUBE RETAINER)
- 17 RING FLANGE
- 18 O-RING (PISTON TUBE HEAD)
- 19 CYLINDER, TUBE AND FLANGE
- 20 BALL (CHECK VALVE)
- 21 BALL RETAINER
- 22 O-RING (BALL RETAINER)
- 23 SET SCREW PLUG (COOLING ORIFICE)
- 24 DRIVE PISTON
- 25 BAND
- 26 INDEX TUBE
- 27 SEAL RING (COLLET PISTON INTERNAL)
- 28 SEAL RING (COLLET PISTON EXTERNAL)
- 29 COLLET AND PISTON
- 30 BUFFER SPRING
- 31 COLLET SPRING
- 32 SPLIT BUSHING (STOP PISTON)
- 33 STOP PISTON
- 34 SEAL RING (STOP PISTON)
- 35 BARREL
- 36 NUT (STOP PISTON RETAINER)
- 37 PLUG (GUIDE CAP MOUNTING)
- 38 SCREW, FILLISTER HEAD (GUIDE CAP)
- 39 GUIDE CAP
- 40 DRILLED FILLER SCREW (OUTER FILTER)
- 41 INNER FILTER
- 42 ROD (UNCOUPLING)
- 43 TUBE
- 44 BAND (SPUD)
- 45 FILTER (OUTER)
- 46 BUFFER PISTON
- 47 WASHER, LOCK
- 48 POSITION INDICATOR SWITCHES
- 49 COLLET HOUSING (PART OF OUTER TUBE)
- 50 INDEX TUBE NOTCH
- 51 OUTER TUBE (PART OF CYLINDER TUBE AND FLANGE)
- 52 INNER CYLINDER (PART OF CYLINDER TUBE AND FLANGE)
- 53 LOCATION OF THERMAL COUPLE (NOT SHOWN - PART OF POSITION INDICATOR PROBE)
- 54 BUFFER SHAFT
- 55 COLLET FINGER (PART OF COLLET AND PISTON)
- 56 INDICATOR TUBE (PART OF PISTON TUBE)
- 57 INNER SEALS (DRIVE PISTON - DRIVE UP SEALS)
- 58 INNER SEALS (DRIVE PISTON - DRIVE DOWN SEALS)
- 59 INTERNAL BUSHING (DRIVE PISTON)
- 60 EXTERNAL BUSHING (DRIVE PISTON)
- 61 OUTER SEALS (DRIVE PISTON)
- 62 INSERT PORT (INSERT AND SCRAM INLET/WITHDRAW OUTLET)
- 63 RING MAGNET (PART OF DRIVE PISTON)
- 64 CABLE (POSITION INDICATOR)
- 65 PORT TO COLLET PISTON (WITHDRAW PRESSURE TO COLLET PISTON)
- 66 WITHDRAW PORT (WITHDRAW INLET/INSERT OUTLET AND SCRAM DISCHARGE)
- 67 WATER PORTS IN COLLET HOUSING
- 68 BUFFER ORIFICES IN BUFFER SHAFT
- 69 FLOW PORTS IN BUFFER SHAFT
- 70 NAMEPLATE



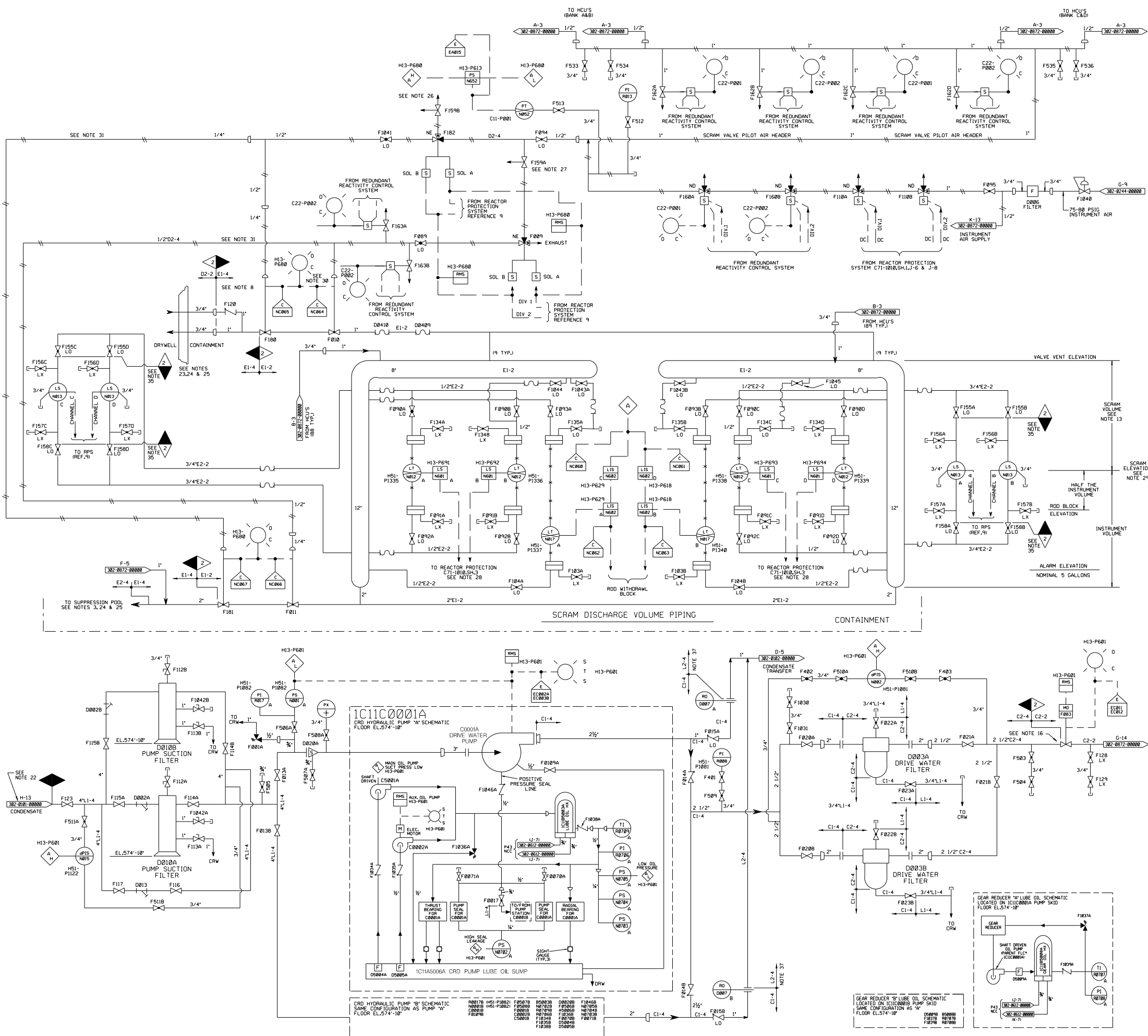
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Control Rod Drive Unit (Cutaway)

Figure 4.6-4



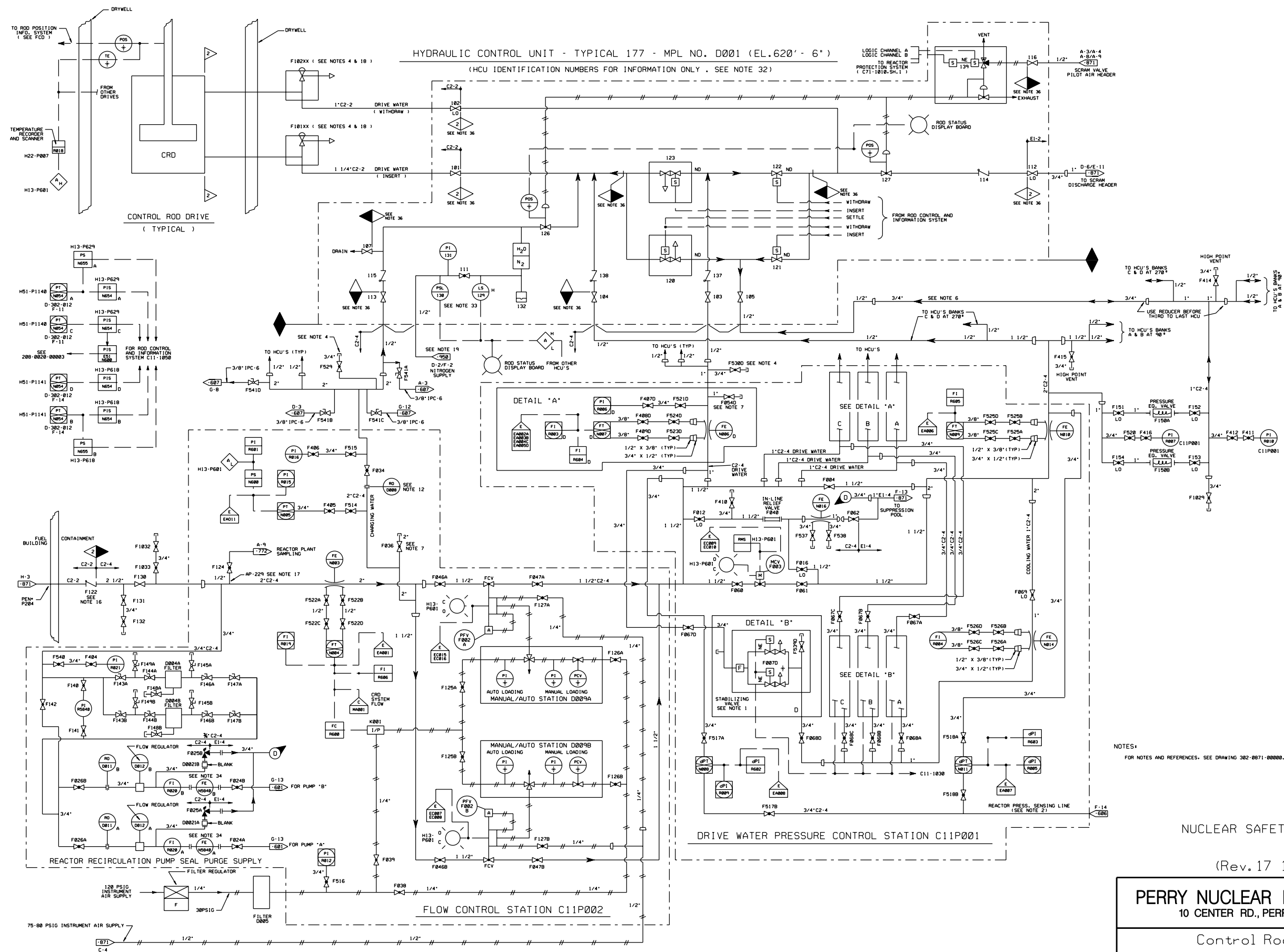
- NOTES:
1. ONE STABILIZING VALVE OF STABILIZING VALVE ASSEMBLY (F007) CLOSES ON WITHDRAWAL SIGNAL PER ONE DRIVE OPERATION. TWO STABILIZING VALVES OF STABILIZING VALVE ASSEMBLY (F007) CLOSE ON INSERT SIGNAL PER ONE DRIVE OPERATION. FOR CANGED ROD DRIVE OPERATION, AN APPROPRIATE NUMBER OF STABILIZING VALVES SHALL BE OPERATED.
 2. PROVISION FOR CONTAINMENT ISOLATION TO BE IN ACCORDANCE WITH CURRENT LICENSING REQUIREMENTS.
 3. SCRAM DISCHARGE DRAIN MUST BE SUBMERGED DUE TO POTENTIAL RELEASE OF STEAM LEAK-OUT ON DISCHARGE SIDE AT ALL SYSTEM HIGH POINTS. F101 IS THE VENT VALVE FOR THE INSERT LINE AND F102 IS THE VENT VALVE FOR THE WITHDRAWAL LINE. THE FIRST 'X' FOLLOWING THE F101/F102 CORRESPONDS TO THE NUMBER OF TIMES THE ALPHABET WAS USED TO ENCOMPASS ALL 177 HCU'S. THE SECOND 'X' REPRESENTS THE RESPECTIVE ALPHABET LETTER.
 4. EXHAUST FLOW FROM MOVING DRIVES IS DISPENSED VIA THE HCU'S OF ALL OTHER NON-MOVING DRIVES TO REACTOR VESSEL. FLUSHING, NO PERMANENT PIPING CONNECTION TO BE MADE TO THIS VALVE.
 5. VACUUM BREAKER VALVE (F120) AND VENT VALVES (F101 & F102) TO BE ON HIGH POINT OF VENT LINE. VACUUM BREAKER VALVE SHALL OPEN ON A DIFFERENTIAL PRESSURE SETTING NO GREATER THAN 10.0 PSI. THE LOCATION OF THE VACUUM BREAKER SHOULD CONSIDER THE POTENTIAL RELEASE OF RADIOACTIVE NON-CONDENSIBLES, WATER AND STEAM THAT COULD OCCUR IF THE VACUUM BREAKER VALVE WERE TO FAIL IN AN OPEN POSITION WHEN THE VENT SYSTEM PIPING IS PRESSURIZED.
 6. EXCEPT AT POINTS OF CONNECTION WITH NEP SUPPLIED EQUIPMENT OR PIPING, THE PIPING DESIGNER SHALL SIZE PIPES IN CONFORMANCE WITH THE SYSTEM SPECIFICATION AND PROCESS DIAGRAM.
 7. FOR LOCATION AND IDENTIFICATION OF INSTRUMENTS, SEE INSTRUMENT DATA SHEET LISTED IN MPL FOR EACH INSTRUMENT.
 8. SCRAM NITROGEN AND AIR LINES SHALL BE OF A NON-CORRODING MATERIAL.
 9. MULTIPLE ORIFICES CONNECTED IN SERIES AS SHOWN IN PURCHASE PART DRAWING OF ORIFICE D008. THE PRESSURE DROP ACROSS EACH ORIFICE IS 250 PSI AT PUMP RUN-OUT CONDITION. SEE MPL FOR THE QUANTITIES OF ORIFICES. VALVE F004 SUPPLEMENTS THE ORIFICES D008 FOR THE REQUIRED PRESSURE DROP.
 10. THE SCRAM DISCHARGE VOLUME ARRANGEMENT SHOWN IS FOR REFERENCE ONLY. FOR REQUIREMENT, SEE CRD DESIGN SPEC. REFERENCE 10.
 11. DELETED.
 12. FLUSHING CONNECTIONS SHALL BE PROVIDED IN ACCORDANCE WITH REFERENCE 7. TEMPORARY STRAINER SCREENS SHALL BE PROVIDED ON THE SUCTION SIDE OF ALL PUMPS IN ACCORDANCE WITH REFERENCE 7.
 13. ISOLATION VALVES SHALL BE LOCATED AS CLOSE AS PRACTICABLE TO THE CONTAINMENT PERFORATION.
 14. CONTINUOUS FLOW TO THE REACTOR SAMPLE STATION SHOULD BE LITER/MINUTE. MAXIMUM SHALL BE 2 LITER/MINUTE.
 15. INVENT PORT TO CONFORM WITH SAE INTERNAL STRAIGHT THREAD BOSS DIMENSIONS FOR 50 TUBE STRAIGHT THREAD FITTING (3/4-16UNF-2B) AND DEPTH OF 50 MINIMUM EFFECTIVE THREAD TO BE COMPATIBLE WITH THE INSTRUMENT USE FOR TESTING.
 16. PORTABLE NITROGEN CHARGING SYSTEM SHALL BE PROVIDED TO MEET THE REQUIREMENTS OF THE HCU'S. REFERENCE IS FOR SPECIFIC ACCUMULATOR CHARGING REQUIREMENTS. IT SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH GOOD INDUSTRY PRACTICE AND SHALL HAVE THE APPROPRIATE SAFETY DEVICES, GAGES, AND VALVES. A PRESSURE RELIEF VALVE SHALL BE INSTALLED DOWNSTREAM OF THE CHARGING STATION PRESSURE REGULATOR WHICH SHALL PREVENT PRESSURIZATION ABOVE SYSTEM REQUIREMENTS.
 17. DELETED.
 18. SOURCE OF CRD SYSTEM WATER SHALL BE NORMALLY FROM CONDENSATE TREATMENT SYSTEM. CONDENSATE STORAGE TANK IS THE ALTERNATE SOURCE IF CONDENSATE TREATMENT SYSTEM IS NOT IN OPERATION. FOR DETAILED DESIGN REQUIREMENT FOR SOURCE AND QUALITY OF WATER, SEE REFERENCE 10.
 19. THE SCRAM DISCHARGE VOLUME VENT LINE SHALL BE ROUTED VIA A DEDICATED LINE TO A NON-SUBMERGED DISCHARGE. THE VENT SYSTEM PIPING SHOULD NOT CONTAIN SIGNIFICANT FLOW RESTRICTIONS WHICH COULD INHIBIT VENTING OF THE SCRAM DISCHARGE VOLUME TO THE EXTENT OF LIMITING THE REACTOR DISCHARGE VOLUME DRAIN RATE. THE DESIGN OF THE NON-SUBMERGED VENT DISCHARGE MUST CONSIDER THE POTENTIAL FOR THE RELEASE OF RADIOACTIVITY DUE TO THE DISCHARGE OF NON-CONDENSIBLES, WATER AND STEAM WHICH MAY OCCUR DURING THE PERIOD AFTER SCRAM PRIOR TO VENT VALVE CLOSURE AND UPON SCRAM RESET WHEN THE VENT VALVES ARE REOPENED WITH THE SCRAM DISCHARGE VOLUME PRESSURIZED.
 20. TO PREVENT LOOP SEALS FROM OCCURRING IN RELATIVELY SMALL DIAMETER LINES OF THE SCRAM DISCHARGE VOLUME VENT AND DRAIN SYSTEM, A CONTINUOUS DOWNWARD PITCH AWAY FROM THE SCRAM DISCHARGE VOLUME VENT AND DRAIN VALVES MUST BE MAINTAINED. THERMAL EXPANSION EFFECTS SHOULD BE ADDRESSED IN THE DESIGN OF THE VENT AND DRAIN SYSTEMS.
 21. THE DESIGN OF THE SCRAM DISCHARGE VOLUME, ASSOCIATED VENT, AND DRAIN SYSTEM PIPING AND COMPONENTS MUST CONSIDER THE POTENTIAL PRESSURE, TEMPERATURE, AND TRANIENT LOADING WHICH MAY RESULT FROM (a) THE DISCHARGE TO THE SCRAM DISCHARGE VOLUME AND DOWN THE VENT AND DRAIN LINE DURING A FULL SCRAM PRIOR TO VENT AND DRAIN VALVE CLOSURE, (b) THE PRESSURIZATION OF THE SCRAM DISCHARGE VOLUME TO REACTOR VESSEL PRESSURE FOLLOWING VENT AND DRAIN VALVE CLOSURE, AND (c) DEPRESSURIZATION OF THE SCRAM DISCHARGE VOLUME VENT AND DRAIN VALVES.
 22. THE F101 VALVE SHALL BE ADJUSTED SO THAT THE F101 VALVE AND THE F101 VALVE FULLY CLOSE AT LEAST FIVE (5) SECONDS AFTER THE F101 AND F101 VALVES, RESPECTIVELY, DURING A FULL CORE SCRAM.
 23. THE F101 VALVE SHALL BE ADJUSTED SO THAT THE F101 AND F101 VALVES START TO OPEN AT LEAST FIVE (5) SECONDS AFTER THE F101 AND F101 VALVES, RESPECTIVELY, UPON THE RESET OF A FULL CORE SCRAM.
 24. INSTRUMENT LOW POINT PIPING TAP LOCATION SHOULD BE 12 INCHES ABOVE THE SCRAM DISCHARGE INSTRUMENT VOLUME REFERENCE DATUM ELEVATION.
 25. THE ELEVATION WITHIN THE SCRAM DISCHARGE INSTRUMENT VOLUME CORRESPONDING TO THE SCRAM INITIATION SET POINT SHALL BE 3.8 1/2 INCHES BELOW THE LOWEST ELEVATION OF THE HORIZONTAL SCRAM DISCHARGE VOLUME ELEVATION.
 26. SCRAM DISCHARGE VOLUME VENT AND DRAIN VALVE CONTROL ROOM INDICATORS SHALL INDICATE OPEN WHEN BOTH VALVES ARE OPEN AND SHALL INDICATE CLOSED WHEN EITHER VALVE IS CLOSED.
 27. THE PNEUMATIC PIPING FROM NEEDLE VALVE F101 AND SOLENOID VALVE F101 TO THE VENT AND DRAIN VALVES F101, F101, F101, F101 SHALL BE ROUTED AND SUPPORTED TO MINIMIZE THE POSSIBILITY OF PIPE CRIMP AND ALSO IT SHOULD BE ADEQUATE PIPE THICKNESS AND MATERIAL TO MINIMIZE THE CONSEQUENCES OF PIPE CRIMP.
 28. HCU MPL NUMBERS CORRESPOND TO CORE GRID CONTROL ROD NUMBERING DESIGNATION.
 29. S, S, 129 MPL NUMBERS CORRESPOND TO N, HCU NUMBER A, PS 130 MPL NUMBERS CORRESPOND TO N, HCU NUMBER B, F113 MPL NUMBERS CORRESPOND TO A, HCU NUMBER.
 30. FLOW ELEMENTS (IC1000000) ARE INSTALLED TO MONITOR RECIRCULATION SEAL PURGE FLOW STABILITY. THESE ELEMENTS MAY BE CONNECTED TO TEMPORARY MATE FOR DATA COLLECTION.
 31. INSTRUMENTATION CONNECTED TO VALVES IC1000000/B/C/D AND IC1000000/B/C/D IS INSTALLED AS SAFETY RELATED. NON-SAFETY VENT AND DRAIN VALVES IC1000000/B/C/D AND IC1000000/B/C/D WERE PROCURED TO ASME SECTION III, CLASS 2 REQUIREMENTS.
 32. THE MANUFACTURE, PROCUREMENT, FABRICATION AND INSTALLATION OF PIPING AND COMPONENTS SHOWN AS (P-15) SAFETY RELATED. MATERIALS ARE ASME SECTION II PER DE DESIGN SPECIFICATION 2244168 REV.2.
 33. FOLLOWING PROPER ADJUSTMENT THE VALVE (F159A/B) SHALL BE LOCKED INTO POSITION TO MAINTAIN ADMINISTRATIVE CONTROL.
 34. THE 12-4 PIPING BETWEEN THE RESTRICTING ORIFICE IC1000000/B AND VALVE F1000000 IS SCHEDULE 80 SEAMLESS PIPE.

- REFERENCES:
1. 302-0606-000000 NUCLEAR BOILER SYSTEM B21
 2. 302-0601-000000 REACTOR RECIRCULATION SYSTEM B33
 3. 302-0101-000000 CONDENSATE SYSTEM N21
 4. 302-0612-000000 NUCLEAR COOLING WATER SYSTEM P43
 5. 302-0900-000000 NITROGEN SUPPLY SYSTEM P86
 6. 302-0772-000000 REACTOR PLANT SCRAM SYSTEM P35
 7. 462-4140 CLEANING OF PIPING AND EQUIPMENT
 8. C11-1820 CONTROL ROD DRIVE HYDRAULIC SYS. PROCESS DIA.
 9. C71-1010 REACTOR PROTECTION SYSTEM IED
 10. C11-4010 CONTROL ROD DRIVE HYDRAULIC SYS. DESIGN SPEC.
 11. 302-0872-000000 CONTROL ROD DRIVE HYDRAULIC SYSTEM DIAGRAM
 12. C11-1030 CONTROL ROD DRIVE HYDRAULIC SYSTEM FCD
 13. 302-0102-000000 CONDENSATE TRANSFER AND STORAGE SYSTEM P11
 14. 462-4240 WATER SAMPLING
 15. C11-0001 HCU OUTLINE DRAWING
 16. 462-1010 GROUP CLASS 8 CONTAINMENT ISOLATION DIAGRAM
 17. C11-1050 ROD CONTROL AND INFO SYSTEM
 18. 302-0671-000000 REACTOR WATER CLEANUP SYSTEM G33

(REV. 20 10/2017)

PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

CONTROL ROD DRIVE HYDRAULIC SYSTEM
FIGURE 4.6-5 (SHEET 1 OF 2)
(DWG. 302-0871-000000)



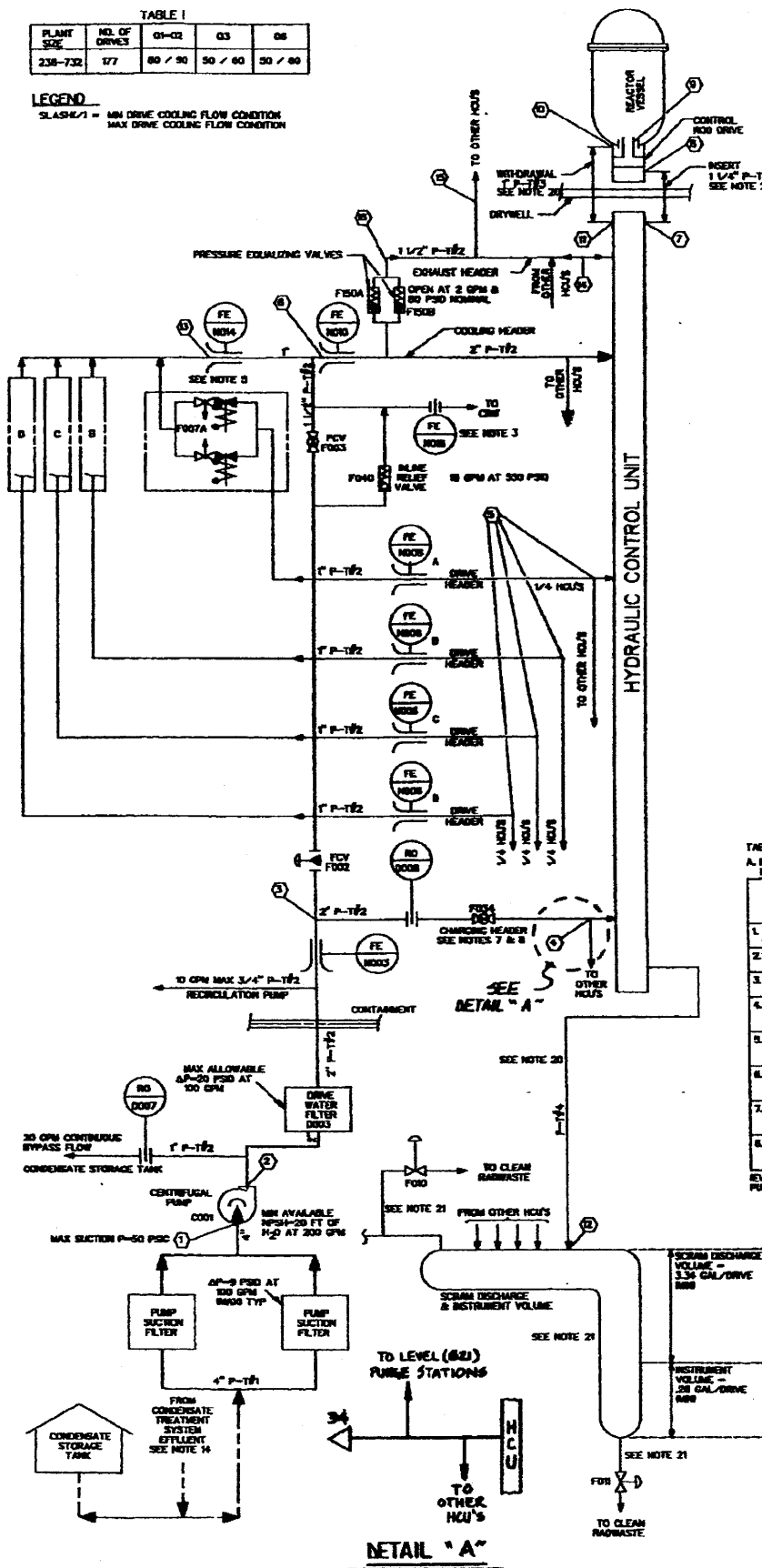
PERRY NUCLEAR POWER PLANT
10 CENTER RD., PERRY, OHIO 44081

Control Rod Drive
Hydraulic System

Figure 4.6-5 (sheet 2 of 2)
(DWG. D-302-872-00000)

TABLE 1				
PLANT SIZE	NO. OF DRIVES	01-02	03	04
238-732	177	80 / 90	50 / 60	50 / 60

LEGEND
SLASH/ = MIN DRIVE COOLING FLOW CONDITION
MAX DRIVE COOLING FLOW CONDITION



MODE A NORMAL OPERATION-SIZES COOLING WATER HEADERS															
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FLOW, GPM	01	02	03	0	0	06	28/34	28/34	28/34	0	0	0	0	0	0
PRESSURE, PSIG	TDM-1000 PSI MIN			PR+250			>PR	>PR	>PR	PR	PR	0	SEE NOTE 12 & 13	PR	PR
	MAX LINE LOSS 60 PSID														

CONDITIONS:
1. DRIVES LATCHED.
2. MINIMUM COOLING FLOW TO DRIVES.
3. PRESSURE OF REACTOR (PR) AT 1000 PSIG MEASURED IMMEDIATELY ABOVE THE VESSEL CORE PLATE.

MODE B GANGED ROD INSERTION-SIZES THE DRIVE WATER HEADERS															
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FLOW, GPM	01	02	03	0	4	SEE NOTE 4	4	4	13	7	7	0	0	7	2.8
PRESSURE, PSIG	TDM-1000 PSI MIN			PR+1			PR+10	PR+10	PR	PR+15	PR+12	0	-PR+13	-PR+10	-PR+10
	MAX LINE LOSS 60 PSID														

CONDITIONS:
1. 4 DRIVES INSERTING AT 3 INCHES/SECOND.
2. EACH DRIVE HEADER FEEDING FLOW TO 1 DRIVE MAX.
3. PRESSURE OF REACTOR (PR) AT 1000 PSIG.

MODE C SCRAM-SIZES INSERT & WITHDRAW LINE															
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FLOW, GPM	50	50	20	0	0	20	125	125	5	37	37	37	0	0.1	18.8
PRESSURE, PSIG						SEE NOTE 10	104 PSID MIN 100 PSID MAX LINE LOSSES		PR	41 PSID MIN 40 PSID MAX LINE LOSSES		SEE NOTE 10			200
															SEE NOTE 10

CONDITIONS:
1. DRIVES SCRAMMING.
2. FLOW BASED ON ROD VELOCITY OF 100 INCHES PER SECOND.
3. PRESSURE OF REACTOR (PR) AT 1000 PSIG.

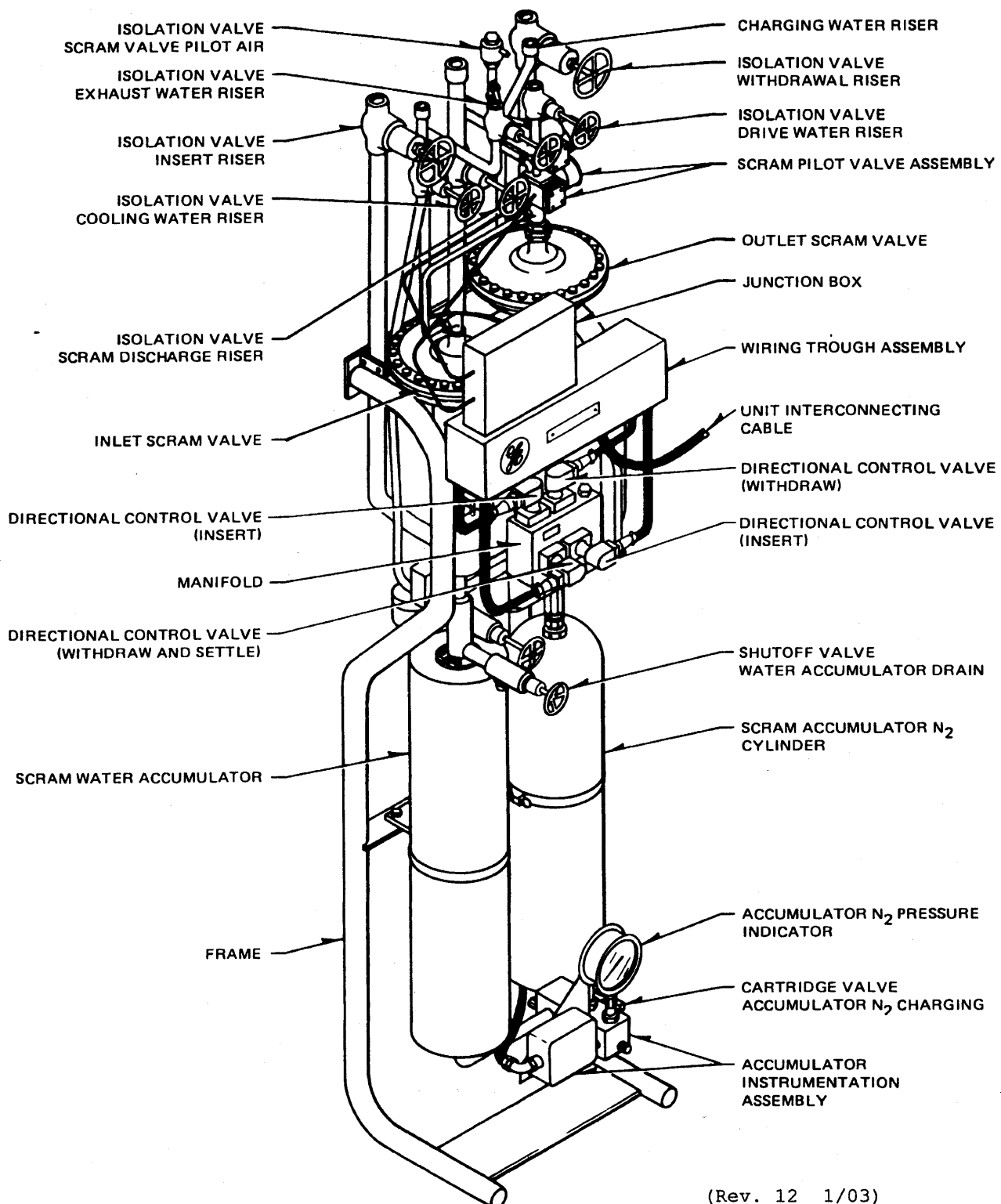
MODE D SCRAM COMPLETED-SIZES THE PUMP SUCTION LINE															
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FLOW, GPM	200 MAX	200 MAX	170	150 MAX	0	20	SEE NOTES 7 & 8			SEE NOTE 10			0	0.1	18.8
PRESSURE, PSIG	TDM-1475 MIN			SEE NOTE 10			PR			65 MAX	65 MAX	65 MAX	SEE NOTE 10		
NOTES: 1. MINIMUM LINE LOSS 60 PSIG															

CONDITIONS:
1. SCRAMMING OF DRIVES COMPLETED.
2. MINIMUM CRD SUPPLY PUMP FLOW.
3. PRESSURE OF REACTOR (PR) AT 1000 PSIG.

MODE E GANGED ROD WITHDRAWAL-SIZES EXHAUST HEADERS															
LOCATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FLOW, GPM	01	02	03	0	2	SEE NOTE 6	2.3	2.3	2.7	2.0	2.0	0	0	2.3	0.2
PRESSURE, PSIG	TDM-1000 PSI MIN			PR+10			PR+10	PR+10	PR+230	0	0	PR+15	PR+15	PR+15	PR+15
	MAX LINE LOSS 60 PSID														

CONDITIONS:
1. 4 DRIVES WITHDRAWING AT 3 INCHES/SECOND.
2. EACH DRIVE HEADER FEEDING FLOW TO 1 DRIVE MAX.
3. PRESSURE OF REACTOR (PR) AT 1000 PSIG.

TABLE 2 THERMAL CYCLES FOR SAFETY RELATED PIPES AND PIPE SUPPORTS
A. PIPE SECTION-WITHDRAWAL LINES (01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 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414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 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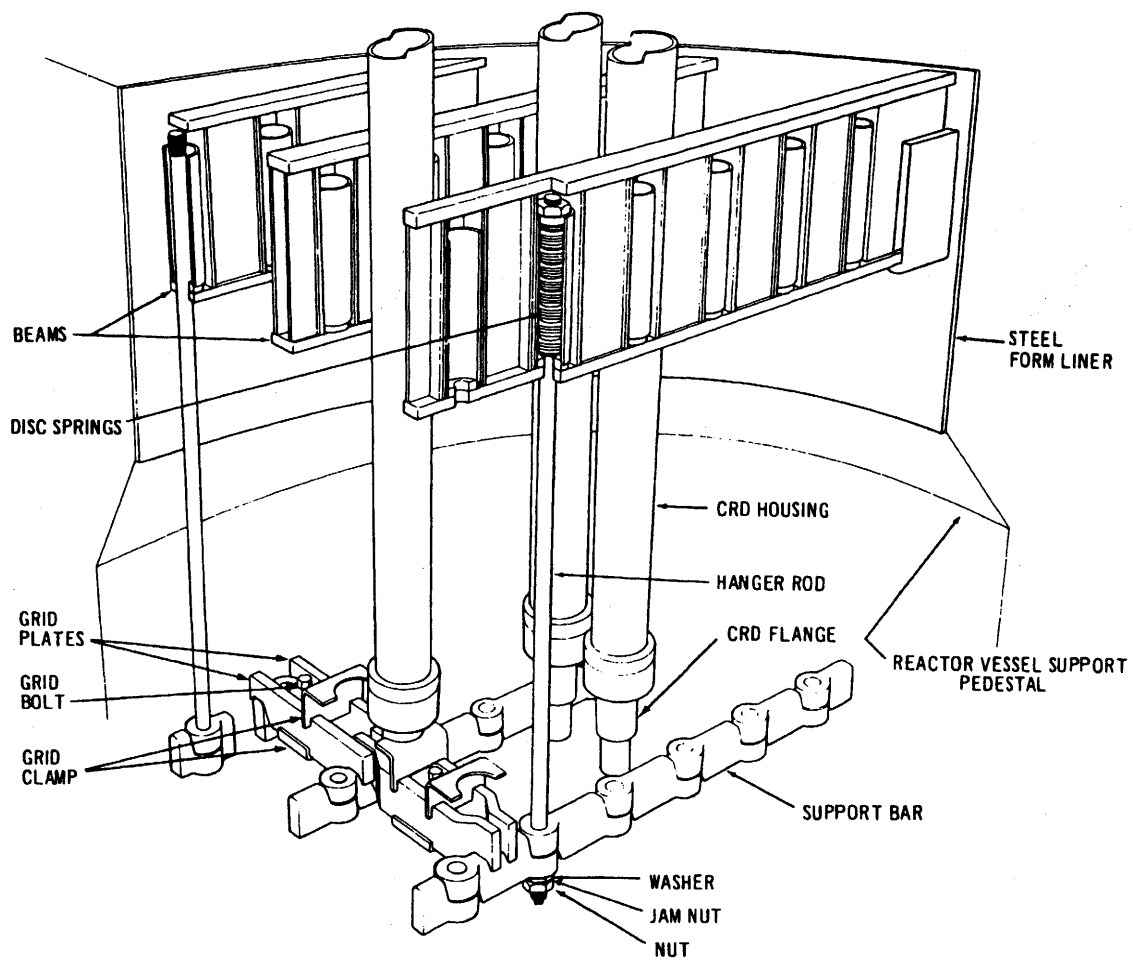
(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Control Rod Drive Hydraulic Control
Unit

Figure 4.6-8



(Rev. 12 1/03)



PERRY NUCLEAR POWER PLANT

Control Rod Drive Housing Support

Figure 4.6-9