

July 24, 1985

DMB oib

Docket No. 50-289

MEMORANDUM FOR: John F. Stolz, Chief
Operating Reactors Branch #4, DL

FROM: Owen Thompson, Project Manager
Operating Reactors Branch #4, DL

SUBJECT: DOCUMENTS REQUESTED BY UCS REGARDING EQUIPMENT
QUALIFICATION AT TMI-1 PER CLI-84-11

By letter dated May 16, 1985, the Union of Concerned Scientists (UCS) requested that the Commission direct the staff to provide "the underlying data and documentation concerning the SER conclusions" that relate to the staff's certification of equipment qualification for TMI-1 per CLI-84-11. Subsequently, on June 19, 1985, Commissioner Asselstine requested additional information about the available documentation.

The following documents, which are currently in the NRC Document Control System (DCS) with an accession number, have been sent to the Record Services Branch (RECSB) with instructions to make the documents available in the Public Document Room (PDR) and Local PDR.

- o Memorandum from Darrell Eisenhut, Director, Division of Licensing to Richard Vollmer, Director, Division of Engineering, dated August 3, 1984, subject: TMI-1 Restart Proceeding Environmental Qualification Certification
- o Memorandum from Brian W. Sheron, Chief, Reactor Systems Branch, DSI to Vincent Noonan, Chief, Equipment Qualification Branch, DE, dated December 12, 1984, subject: TMI-1 Equipment Subject to a Harsh Radiological Environment

The enclosed informal notes and documents that were used by the staff in preparing the Safety Evaluation are to become available in the PDR and Local PDR by distribution of this memorandum.

- o Notes made by NRC staff during its review of GPUN's submittals, telecons with GPUN and audits of the TMI-1 EQ files
- o Copy of "SB LOCA Radiation Qualification File Index" provided to NRC staff by GPUN during September 6 and 7, 1984 TMI-1 EQ file audit
- o Telecopy, dated February 21, 1985 from GPUN to NRC, providing information on incore thermocouple extension cable

Documents, including test results, analyses, calculations, evaluations, etc. which were relied upon by GPUN to demonstrate equipment qualification are in the licensee's possession and therefore the staff cannot make those documents available.

All documents in the staff's possession that were used in preparing the Safety Evaluation in response to CLI-84-11 will be available in the PDR and Local PDR as soon as this memorandum is processed by RECSB.

"ORIGINAL SIGNED BY:"

Owen Thompson, Project Manager
Operating Reactors Branch #4, DL

Enclosures:
As Stated

cc w/enclosures:
GLainas
RLa Grange
JGoldberg
RLevi
JThoma
PDR
L PDR

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7/ /85

NRC STAFF NOTES

DOCKET No. 50-289

PDR
LOCAL PDR

1/19/85 Conf Call - TMI-1

Hue Hilbert

George Layman

- 1) 1x107 right ~~is~~
Will check on previous question
Not test data on hardware. (press / ten / per,)
first results by end of Feb.
(Schedule exemption coming in.)
- 2) still working on file
* All attach 5 will be cleared up by 1/29

Audit 3) Will update submittal
(not sure beta shields are installed) - resident will verify

- 4) 0 - will update
- 0 - " "
- 0 EQ-TJ-105 (Attach 5) - will update
- 0 - will update
- 0 - " "
- 0 - " "
- 0 Muv-12 - will update
- 0 Muv-2A & B - " check into it
- 0 - will update
- 0 - " "
- 0 - " "
- 0 - " "

5) qualified - will note

6) - Will update

7) - " "

8) - Will update JIS - 84-3

9) - " " " "

10) - 12) ✓

Equip. not installed

- Weck RTD, (7) (Resonant 1340's?)
- PS 479's (2) - ASCO press. switches
- ✓ - MV-23-DPT 1, 2, 3 & 4 - 1153B,
- ✓ - MV-42-DPT - 1153B
- ✓ - DH-1-DPT 1 & 2 - 1153B,
- ✓ - MV-14-LT - 1153B

179 - B,

114 - D,

- ~~Remove lead ext. cable, Sam. Moore cable, EQ-TL-140~~
- EQ-TL-121 ✓, MU-P3A, B+C, GE motor, - O.V. for rad.
 - ✓ EQ-TL-130 ✓, 177 HW & 177 GY, Rosemount RTD,
 - ✓ EQ-TL-139A ✓, ^{GAEBIM EX-15L} Cont. Cable, incase therm. cable
 - ✓ EQ-TL-105 ✓, Limit torque
 - ✓ EQ-TL-103 ✓, " - O.V. for rad.
 - ✓ EQ-TL-140 ✓, Sam. Moore cable (PT-981B)
 - ✓ EQ-TL-121 ✓, MU-P2A, B+C, GE motor
 - ✓ EQ-TL-147 ✓, PS-479, ASCO press. switches
 - ✓ EQ-TL-~~147~~¹⁴⁹ ✓, MU-23-DPT 1, 2, 3+4, Rosemount press. trans.
 - ✓ " ✓, MU-42-DPT, " " "
 - ✓ " ✓, DH-1-DPT 1+2, " " "
 - ✓ " ✓, MU-14-LT, " " "
 - X - EQ-TL-133 ✓, Gen. Semi. (Transist) Diodes,

TMI-1

? 1) - Incore thermocouples (8/23/84) - JFO (inadequate)
- extension cable (11/8) -

test &/or evaluate w/ JFO

- JFO (84-6) (12/11) | p. 21, 12/11, ML

? 2) Make-up Main Lube Oil Pump Motors, MU-P 3A/B/C
(8/23/84) - replace w/ JFO

* 12/11 - p. 3 - Motor List - TEN Items. 44

? 12/11 - p. 1, attachment 2, Cat. IV - qualified

? 3) Rosemount RTDs, Model nos. 177HW & 177GY
(8/23/84) (Beta shield, & prior to restart

12/11 - ML - p. 10 - Items 90 (HW), p. 16¹⁷ - Item 91 (HW)

• " - p. 18 - Item (none) (GY) & (HW)

? 4) Limit ^{p. 6}orgues DHV-4B; 7A/B; NSV-4^{p. 6}, 15, 35;
CAV1^{p. 6}, 3, 13; HJV-12^{p. 6}, 2A/B, 25; WDG-V3;
WDLV^{p. 6}-303; ICV^{p. 6}-V2 (8/23/84) - replace splices &
ding brakes, documentation DHV-4 A+B only - or replace
w/ JFO

? 5) Samuel Moore instrumentation cable (PT-9817) (8/23/84)

- replace w/ JFO or documentation

* 12/11 - p. 20 - ML

- ✓ 6) Aux. lube oil pumps MUP-2' (11/9/84) - same status ~~as~~ MUP-3' (8/27/84) ~~sent~~
 - qualifying - per R. Harkin, (12/11/84?)
 * 12/11 - p. 5 - ML
- ✓ 7) Aux. lube oil pump press. switches PS 479' (11/9)
 - replaced or JIO
 - Replacing this month (Jan.) per phone call with R. Harkin, (12/11/84?)
 * 12/11 - p. 5 - ML
- ✓ 8) LPI flow indication transmitters MU-23-DPT 1, 2, 3, 4 (11/9) - replaced or JIO
 - JIO 84-3 (12/11/84)
 * 12/11 - p. 5, - ML
- ✓ 9) RCP rec. inj. flow transmitter MU-42-DPT (11/9)
 - replace or JIO
 - JIO 84-3 (12/11)
 * 12/11 - p. 5 - ML
- ✓ 10) LPI flow indication transmitter DH-1-DPT 1+2 (11/9)
 - replace or JIO
 - JIO 84-1 (12/11)
 * 12/11 - p. 6, - ML
- ✓ 11) make-up level tank indication transmitter MU-14-LT (11/9) - replace or JIO
 - JIO 84-4 (12/11)
 * 12/11 - p. 5 - ML

? 12) Transzorb diode, (11/9) - test (or JI0)
- JI0 87-9 (12/11)
* 12/11 - p. 20 - ML

1/29-30/45 audit

Get. ✓ 130 ✓
✓ 139 A ✓
✓ 105 ✓
✓ 103 (sew, only) ✓
✓ 147 ✓
✓ 149 ✓

50.79

✓ 103 ✓
✓ 117 ✓
✓ 112 ✓
✓ 123 ✓
✓ 140 ✓
✓ 136 → ✓ similarity (weird RTD,)
✓ 131 ✓
✓ 121 ✓
✓ 118 ✓
✓ 115 X
✓ 138 ✓

9/6-7/84 audit

✓ 103A ✓	✓ 132A ✓
✓ 114A ✓	✓ 133A ✓
✓ 118A ✓	✓ 135A ✓
118A	✓ 138A ✓
	✓ 140A

1/29-30 TME-1 EQ Audit

THE EQUATION $z^2 + 1 = 0$ HAS TWO SOLUTIONS

[illegible]

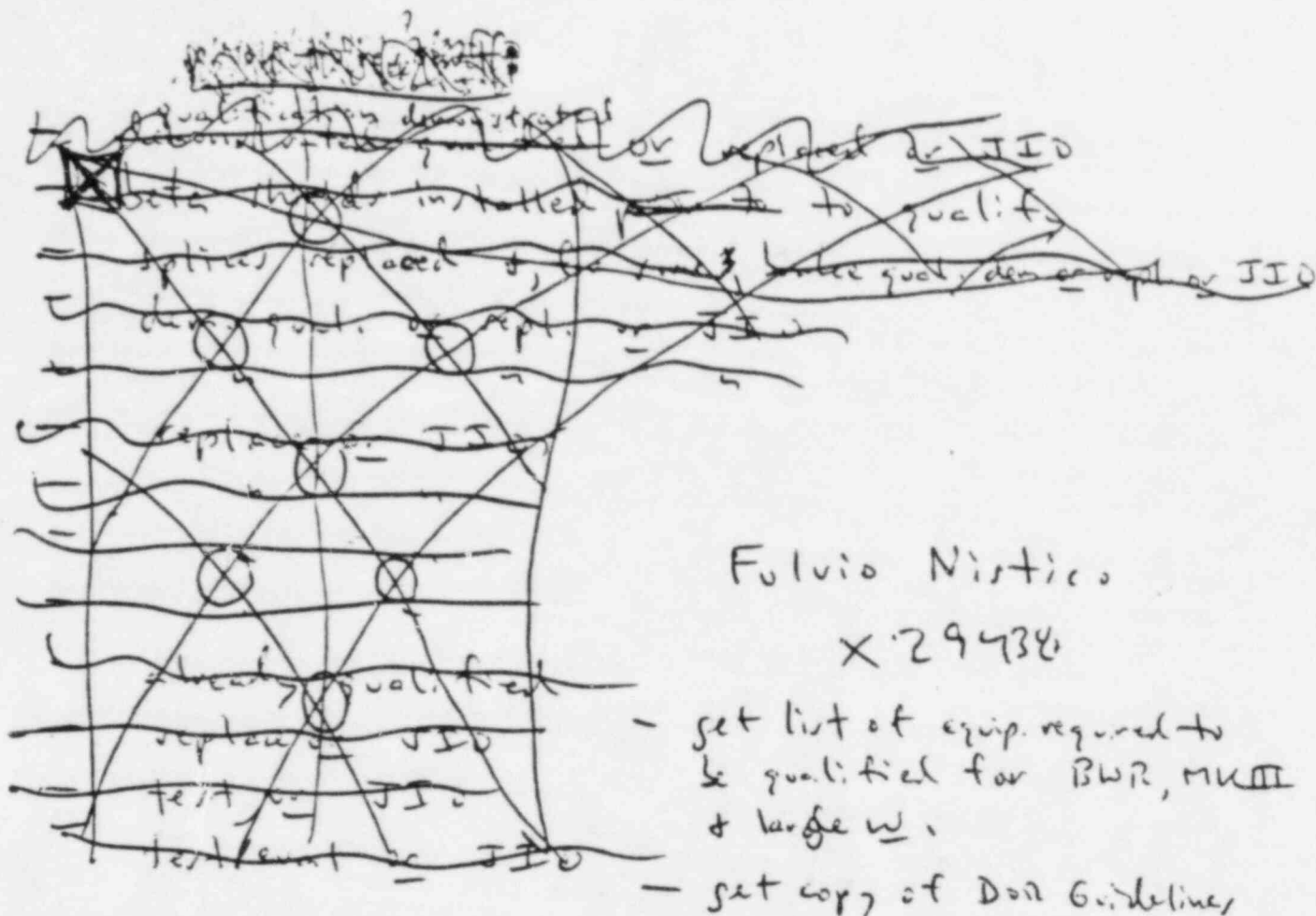
Food: 2000 = 2000:

1, 2, 3, 4, 5, 6, 7, 8, 9, 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, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 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, 84

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→ Postcard from G. C. ...
intending file and complete
Vol. 6 Feb. 11, 1935.

2. Egypt - 1950 - 1955 - 1960 - 1965 - 1970 - 1975 - 1980 - 1985 - 1990 - 1995 - 2000 - 2005 - 2010 - 2015 - 2020 - 2025 - 2030 - 2035 - 2040 - 2045 - 2050 - 2055 - 2060 - 2065 - 2070 - 2075 - 2080 - 2085 - 2090 - 2095 - 2100 - 2105 - 2110 - 2115 - 2120 - 2125 - 2130 - 2135 - 2140 - 2145 - 2150 - 2155 - 2160 - 2165 - 2170 - 2175 - 2180 - 2185 - 2190 - 2195 - 2200 - 2205 - 2210 - 2215 - 2220 - 2225 - 2230 - 2235 - 2240 - 2245 - 2250 - 2255 - 2260 - 2265 - 2270 - 2275 - 2280 - 2285 - 2290 - 2295 - 2300 - 2305 - 2310 - 2315 - 2320 - 2325 - 2330 - 2335 - 2340 - 2345 - 2350 - 2355 - 2360 - 2365 - 2370 - 2375 - 2380 - 2385 - 2390 - 2395 - 2400 - 2405 - 2410 - 2415 - 2420 - 2425 - 2430 - 2435 - 2440 - 2445 - 2450 - 2455 - 2460 - 2465 - 2470 - 2475 - 2480 - 2485 - 2490 - 2495 - 2500 - 2505 - 2510 - 2515 - 2520 - 2525 - 2530 - 2535 - 2540 - 2545 - 2550 - 2555 - 2560 - 2565 - 2570 - 2575 - 2580 - 2585 - 2590 - 2595 - 2600 - 2605 - 2610 - 2615 - 2620 - 2625 - 2630 - 2635 - 2640 - 2645 - 2650 - 2655 - 2660 - 2665 - 2670 - 2675 - 2680 - 2685 - 2690 - 2695 - 2700 - 2705 - 2710 - 2715 - 2720 - 2725 - 2730 - 2735 - 2740 - 2745 - 2750 - 2755 - 2760 - 2765 - 2770 - 2775 - 2780 - 2785 - 2790 - 2795 - 2800 - 2805 - 2810 - 2815 - 2820 - 2825 - 2830 - 2835 - 2840 - 2845 - 2850 - 2855 - 2860 - 2865 - 2870 - 2875 - 2880 - 2885 - 2890 - 2895 - 2900 - 2905 - 2910 - 2915 - 2920 - 2925 - 2930 - 2935 - 2940 - 2945 - 2950 - 2955 - 2960 - 2965 - 2970 - 2975 - 2980 - 2985 - 2990 - 2995 - 3000 - 3005 - 3010 - 3015 - 3020 - 3025 - 3030 - 3035 - 3040 - 3045 - 3050 - 3055 - 3060 - 3065 - 3070 - 3075 - 3080 - 3085 - 3090 - 3095 - 3100 - 3105 - 3110 - 3115 - 3120 - 3125 - 3130 - 3135 - 3140 - 3145 - 3150 - 3155 - 3160 - 3165 - 3170 - 3175 - 3180 - 3185 - 3190 - 3195 - 3200 - 3205 - 3210 - 3215 - 3220 - 3225 - 3230 - 3235 - 3240 - 3245 - 3250 - 3255 - 3260 - 3265 - 3270 - 3275 - 3280 - 3285 - 3290 - 3295 - 3300 - 3305 - 3310 - 3315 - 3320 - 3325 - 3330 - 3335 - 3340 - 3345 - 3350 - 3355 - 3360 - 3365 - 3370 - 3375 - 3380 - 3385 - 3390 - 3395 - 3400 - 3405 - 3410 - 3415 - 3420 - 3425 - 3430 - 3435 - 3440 - 3445 - 3450 - 3455 - 3460 - 3465 - 3470 - 3475 - 3480 - 3485 - 3490 - 3495 - 3500 - 3505 - 3510 - 3515 - 3520 - 3525 - 3530 - 3535 - 3540 - 3545 - 3550 - 3555 - 3560 - 3565 - 3570 - 3575 - 3580 - 3585 - 3590 - 3595 - 3600 - 3605 - 3610 - 3615 - 3620 - 3625 - 3630 - 3635 - 3640 - 3645 - 3650 - 3655 - 3660 - 3665 - 3670 - 3675 - 3680 - 3685 - 3690 - 3695 - 3700 - 3705 - 3710 - 3715 - 3720 - 3725 - 3730 - 3735 - 3740 - 3745 - 3750 - 3755 - 3760 - 3765 - 3770 - 3775 - 3780 - 3785 - 3790 - 3795 - 3800 - 3805 - 3810 - 3815 - 3820 - 3825 - 3830 - 3835 - 3840 - 3845 - 3850 - 3855 - 3860 - 3865 - 3870 - 3875 - 3880 - 3885 - 3890 - 3895 - 3900 - 3905 - 3910 - 3915 - 3920 - 3925 - 3930 - 3935 - 3940 - 3945 - 3950 - 3955 - 3960 - 3965 - 3970 - 3975 - 3980 - 3985 - 3990 - 3995 - 4000 - 4005 - 4010 - 4015 - 4020 - 4025 - 4030 - 4035 - 4040 - 4045 - 4050 - 4055 - 4060 - 4065 - 4070 - 4075 - 4080 - 4085 - 4090 - 4095 - 4100 - 4105 - 4110 - 4115 - 4120 - 4125 - 4130 - 4135 - 4140 - 4145 - 4150 - 4155 - 4160 - 4165 - 4170 - 4175 - 4180 - 4185 - 4190 - 4195 - 4200 - 4205 - 4210 - 4215 - 4220 - 4225 - 4230 - 4235 - 4240 - 4245 - 4250 - 4255 - 4260 - 4265 - 4270 - 4275 - 4280 - 4285 - 4290 - 4295 - 4300 - 4305 - 4310 - 4315 - 4320 - 4325 - 4330 - 4335 - 4340 - 4345 - 4350 - 4355 - 4360 - 4365 - 4370 - 4375 - 4380 - 4385 - 4390 - 4395 - 4400 - 4405 - 4410 - 4415 - 4420 - 4425 - 4430 - 4435 - 4440 - 4445 - 4450 - 4455 - 4460 - 4465 - 4470 - 4475 - 4480 - 4485 - 4490 - 4495 - 4500 - 4505 - 4510 - 4515 - 4520 - 4525 - 4530 - 4535 - 4540 - 4545 - 4550 - 4555 - 4560 - 4565 - 4570 - 4575 - 4580 - 4585 - 4590 - 4595 - 4600 - 4605 - 4610 - 4615 - 4620 - 4625 - 4630 - 4635 - 4640 - 4645 - 4650 - 4655 - 4660 - 4665 - 4670 - 4675 - 4680 - 4685 - 4690 - 4695 - 4700 - 4705 - 4710 - 4715 - 4720 - 4725 - 4730 - 4735 - 4740 - 4745 - 4750 - 4755 - 4760 - 4765 - 4770 - 4775 - 4780 - 4785 - 4790 - 4795 - 4800 - 4805 - 4810 - 4815 - 4820 - 4825 - 4830 - 4835 - 4840 - 4845 - 4850 - 4855 - 4860 - 4865 - 4870 - 4875 - 4880 - 4885 - 4890 - 4895 - 4900 - 4905 - 4910 - 4915 - 4920 - 4925 - 4930 - 4935 - 4940 - 4945 - 4950 - 4955 - 4960 - 4965 - 4970 - 4975 - 4980 - 4985 - 4990 - 4995 - 5000 - 5005 - 5010 - 5015 - 5020 - 5025 - 5030 - 5035 - 5040 - 5045 - 5050 - 5055 - 5060 - 5065 - 5070 - 5075 - 5080 - 5085 - 5090 - 5095 - 5100 - 5105 - 5110 - 5115 - 5120 - 5125 - 5130 - 5135 - 5140 - 5145 - 5150 - 5155 - 5160 - 5165 - 5170 - 5175 - 5180 - 5185 - 5190 - 5195 - 5200 - 5205 - 5210 - 5215 - 5220 - 5225 - 5230 - 5235 - 5240 - 5245 - 5250 - 5255 - 5260 - 5265 - 5270 - 5275 - 5280 - 5285 - 5290 - 5295 - 5300 - 5305 - 5310 - 5315 - 5320 - 5325 - 5330 - 5335 - 5340 - 5345 - 5350 - 535



Prior to restart:

- 1111 - qualification demonstrated or replace or JIO ✓
- 1111 - replace or JIO ✓
- replace ✓
- install beta shielding ✓
- test or JIO
- test/eval or JIO
- ~~already qualified~~

TNI-1 JCO

HPI aux. lube MUP-2 - qualifying
oil pump

press. switch 479 replacing the switch

12/1/84

file 121

(84-3 JCO)

MU 27 DPT 12, 3 & 4

MU-42-DPT

DH-1-DPT 1 & 2

(84-1)

MU-14-LT

(84-4)

Transducer divider

(84-8)

Thermocouple cable

(84-6)

Comments:

JIO

1) 8/23/84 Submittal states 46 of 52 operational.
12/11 " , JIO 84-6, states 50 have
electrical continuity. (All other thermocouples known
to be damaged inside RPV as a result of core
damage.) If damage of other 2 ~~is~~ inside
RPV, then operating experience can be used for
radiation qualification. (How about press/ temp./
chem. / prag ?)

2) 8/23/84 - demonstrated qualified, replaced as JIO.
12/11 - Attach 2, p. 1 of Cat ~~IV~~ ^{IV} qual. established by
file ~~EW-TI-130~~ ^{EW-TI-130}. However, Attach. 5,
~~p. 3, identifies EW-TI-130 as Press. released~~
~~assembly! Is it now qualified? say, open.~~

3) 12/11 - Attach. 2, p. 2 of Cat ~~IV~~ ^{IV}, say,
^{TEN 90+91}
qual. est. by EW-TI-130. 8/23/84 - Beta
shield, will be installed. Attach. 4, Note 2 on
p. 2 of Add./Repl. - identical to other
qualified items on ML. However, p. 2 of
Attach 5 say, qualified subject to.....

* 8/27/84 submitted identifies all the following
Limiting as requiring validation qual. - all need
replacement splines - DHV-4A/B also need brake qual.,
or replaced or JFC

(2)

4) (0) DHV-4A+B: Item 20^(AB). Attach 2, p. 1, Cat II.C. -
states qual. life established. ~~not~~ Attach 5, p. 1,
EQ-T1-105 - open & red not mentioned - or splines - or
Dings brakes)²

(0) DH-V7A+B: Item 24^(AB). ~~Attach 2, p. 1, Cat. II.C. -~~
~~11~~ (except no brakes)

(0) NS-V4, 15~~15~~: Item 23. TCR identifier is
out of scope - cold shutdown. 12/11 submitted does
not address² (except Master List.)²

(0) NJ-V25: Item 5^(RB). Attach. 2, p. 1, Cat II.C. -
qual. life ext. Attach 5, p. 1, EQ-T1-107
- open - red & splines not mentioned.

(0) CA-V1+B: Item 7^(RB) Attach. 2, p. 1, Cat.
IB, II A & II B - open till March. Attach. 5,
p. 1, EQ-T1-103 - open. red & splines not
mentioned.

(0) CA-V17: 114^(RB) 11

(0) NOV-12: Item 24. Attach 2, p. 1, Cat II.C. -
out of scope (A1., Attach 4.)

○ MU-V2A+B: Item 119. (RB) Attach. 2, p. 2, Col IB, #A & II.B - Can't tell what proposed resolution is! Attach 5, p. 1, EQ-T1-103 - open - red & splines not mentioned.

○ MU-V25: Item 120. (RB) - same comments as CAW1+B above.

○ WDG-V3: Item 1. (RB) - ~~same comments as~~
" "

○ WDLV-303: Item 120. (RB)
" "

○ IC-V2: Item 7. (RB)
" "

* (⊕) listed twice - p. 2 of attach. 2)

5) Attach. 4, p. 1 of Add/Rep. - refers to note 5 on p. 2 - note 1 says new equip - Nothing on qual. status!
(H^{refers to} of 5/31/84)

6) MUP-2A, Doc: Item 44. Attach. 2, p. 1, Cat IV - Qual. est by EQ-TL-121, Are they now qualified? Attach 5, p. 2 - open.

7) PS-479, w TEN. Attach 1, p. 4 - open. (EQ-TL-147.) Attach. 4, p. 1, Add/Rep. refer, to note 6 - redund. —

SO { 8) MU-23-DPT-1, 2, 3 & 4. JIO 84-3 - problem on p. 2 of 6.
9) MU-42-DPT " "

JIO 10) DH-1-DPT 1 & 2. JIO 84-1.

JIO 11) MU-14-LT. JIO 84-4.

~~WAT~~ JIO 12) Diodes. JIO 84-08.

JIOs with disappear

May disappear end of Jan.

Victorien 84-9 } left by March
themo 84-6 }

* Only need to send this one to DSI.

- If the activity were to accumulate sooner -
does that affect what we're doing

* - Call Gorton

DHV-4A+B - by 3/21/81 uninsulated
motor leads will be corrected
& Reg. chn installed

CAV-3 - replacement of motor due
to damaged motor lead wires

walked down results checked & instant
limit and/or torque switch & splice-
taped connections were intact correct

- ✓ - MU-23-DPT-1,2,3 & 4 - connected to replace, 3/31/85
- ✓ - MU-42-DPT - " "
- ✓ - DH-1-DPT 1 & 2 - " "
- ✓ - MU-14-LT - " "
- ✓ - WEED RTD, - " "
- ✓ - PJ-479A, D & C - " "
- ⊗ - DITV-4A & B - ~~for~~ unisolated motor
lead, (& Reg. ch -) - connected to 3/31/85
- ⊗ - CAV-7 - replace motor &
splice, - connected, 4/2/85
- ✓ - disk, - connected to replace, 3/31/85



within the scope
~~was reviewed~~ of this evaluation was reviewed:

- ✓ 1 — • Limitorque Motorized Valve Actuators (located inside containment ~~and the auxiliary building~~)
- 2 — ~~• Limitorque Motorized Valve Actuators (located in the auxiliary building)~~
- • G.E. Terminal Blocks
- ✓ 1 — • ASCO Solenoid Valves (qualified to the DoD Guideline)
- ~~• Square D Pressure Switches~~
- ✓ — • Static O-Ring Pressure Switches
- ✓ 1 D/2B — • Rosemount Transmitters (Models ~~1153B and D~~)
- ~~• G.E. Motors~~
- • General Electric Motors
- • Rosemount RTDs
- • Conax Electrical Seals
- ✓ 1 — • Microswitch Limit Switches
- ✓ 1 — • Transorb ~~Diodes~~
- ✓ 1 — • Target Rock Solenoid Valves
- • Weed RTDs
- ✓ 1 — • Ross Solenoid Valves
- ~~• Incore Detectors and~~
- • Continental Wire and Cable Co. Cable (incore thermocouple extension cable)
- ✓ 1 — • Samuel Moore Cable
- • ASCO Pressure Switches
- ~~• RWR~~

A✓

1/29/85
+ 1/30/85

TMI-1 EQ AUDIT FOR CLI-84-11

EQ-T1-130, Rosemount RTDs, Model 177HW-2

✓ O.K. 1) What about 17764? Do not exist - all RTDs are 177HW-2. Will revise submittals.

✓ Is this seismic?

✓ 2) File identifier open item - GPUN will verify that any limitation, and anomalies in report 58-0332-00 (Ref. 2) were adequately addressed by Babcock & Wilcox - Closed out w/ telecon

✓ 3) Beta shields? - Checking - (probably was only applicable to 17764) - no longer installing - not necessary, per 1/29 D&W telecon

✓ 4) SCWS: req'd $2.2 \times 10^8 \text{ n}$
qual $3.8 \times 10^8 \text{ R}$

✓ 5) Ref. 2 - p. 4 of 13? O.K.

✓ 6) Ref 6 from SCWS sheets? - included in Ref. 01

✓ 7) Similarity, Ref. 01, p. 5? O.K.

✓ 8) Ref. 01 - p. 11 - indicates qualified to 3.8×10^8 - O.K., but why is there a need for β shield? - Checking on it.
- no need to install per D&W telecon & documentation cited

✓

(radiation qual. file)

EQ-T1-139A, Continental Wire & Cable

(increase thermocouple extension cable)

Model GAI B/M EX-15L

- ✓ 1) Notes on pages 10-16 indicate cable not qualified. (For other than rad.!))
- ✓ 2) Rad. req. $2.16 \times 10^6 \text{ R}$ } screw-p. 15
qualified ~~1.02 x 10⁶ R~~ }
(blank) R should be 1.02×10^6 will be added
- ✓ 3) p. 16 (Component materials evaluation sheet)
wire insul. - qual. to 1.1×10^6 }
parawrapping - " - 1×10^6 } relying on
jacket - " - 1.1×10^6 } experience
- ✓ 4) Ref. 13 - conclusion indicates cable not yet qualified. - other than rad.
- ✓ 5) Ref. 5 - concludes cable acceptable to $1 \times 10^6 \text{ R}$
- Cites other references - where are they?
They have refs.

* - O.K., but need stronger argument for 10 hrs & why failures in TMI-2 not rad. related - will address in forthcoming letter

- File will be cleaned up & supplemented for 50.49

✓
* Ref 13 misidentified

EQ-TL-107 - Limitorque (inside TMT)

SLBW1 -

✓ NS-V-35 - operator power feed connection is
a Raychem splice

CAV-123 -

○ CA-V-13 - { same as above plus -
unqualified components being
replaced - see Ref 13 (Max has
copy) + (21 (splitters))? checking

MU-V-2A+B - same as NS-V-35

MU-V-25 - " " "

○ WDG-V-3 - same as CAV-13

WDL-V-303 - same as NS-V-35

IC-V-2 - " " "

th ✓
EQ-TL-147, ASCO Model No SA21AR/TE20A32 R
(Aox. bldg.) press. switches

- ✓ 1) p. 2 - open item requiring action - confirm
traceable/auditable documentation of installation
- O.M. - replacement switches to be installed.
File addresses PS-479A, B & C

All SCREW reqd. $4.26 \times 10^5 R$
qual. $1.7 \times 10^7 R$

File locker O.M.

Exit Meeting

- increase thermocouples - justify is ~~done~~, have, why ~~one~~ ~~for~~ thermocouples not needed beyond that time, why failures are not validation related
- Weed RTDs - clarify relationship to increase therm. system & address similarity
- Gen. Semi. diodes - complete review
- * punch list on Limiting & other components must be completed & Region will verify (Max has copy of it.)

2nd audit results

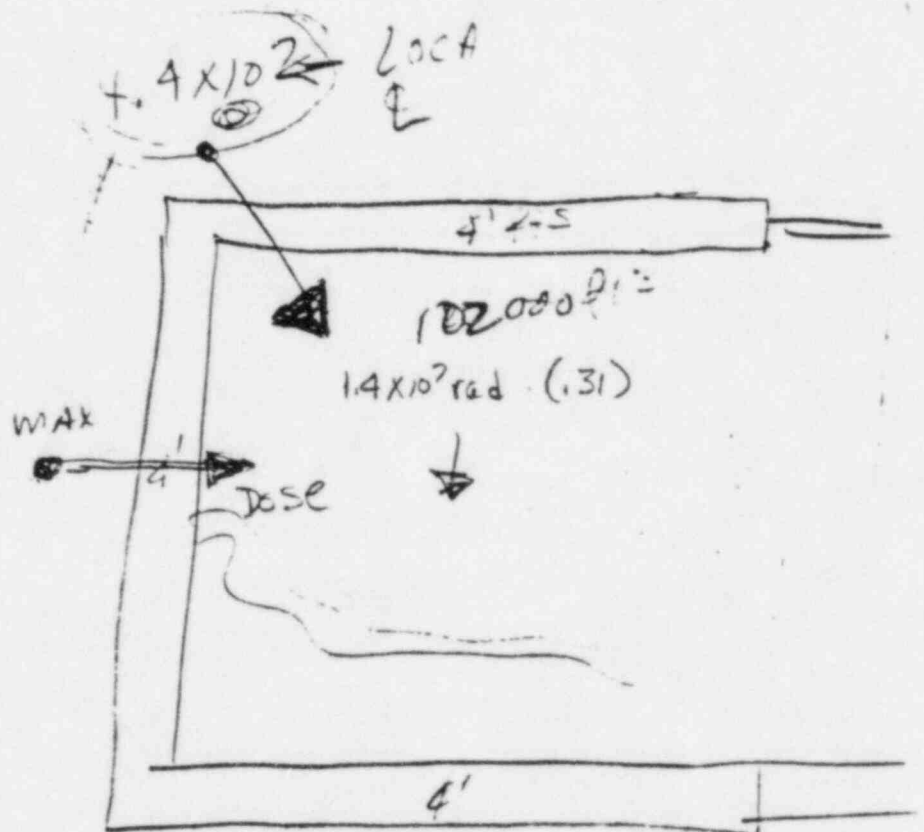
- increase thermocouple extension cable: additional evaluation needed to establish qualified
- Weed RTDs: ~~similarity~~ needed strengthening, & relationship to increase thermocouple, then needed clarification

#

- Transistor diodes: review by invoice needed to be completed & qual. documented
- Limiting (others): punch list must be completed as it relates to this review effort

- ✓ CA-V-13 ^{DO} DUREZ - torque switch needed to be replaced with Melamine torque switch
- ✓ DA-V-102 ^{DO} DUREZ torque & limit switches needed to be replaced w/ Melamine.
- ✓ RC-V-314 ^{DO} Splice-taped connection needed to be replaced w/ qualified terminal block or Raychem heat shrink tubing
- ✓ IC-V-2 ^{DO} DUREZ limit switch

Calculation layout



POCKET No. 50-289

DESIGNATED ORIGINAL

PDR

LOCAL PDR

SB LOCA RADIATION QUALIFICATION FILE INDEX

SPECIFIED RADIATION LEVEL	TESTED OR MATERIALS ANALYSIS RADIATION LEVEL		
2E7	2EB	EQ-T1-101	✓ BIW Cable
1.6E6	2E6	EQ-T1-102	✓ States Terminal Block
2E7	2.04EB	EQ-TM-103A	✓ - Limitorque VMO (Rx Bldg)
1.6E6	2E7	EQ-TM-105A(1)	✓ Limitorque VMO (Aux Bldg)
2E7	2E7	EQ-TM-105A(2)	✓ Dings Brakes (Rx Bldg)
8.2E5	8.2E5	EQ-TM-105A(3)	✓ Dings Brakes (Aux Bldg)
2E7	2EB	EQ-T1-108	✓ Anaconda Cable
2E7	2.05EB	EQ-T1-109	✓ Continental Cable
2E7	2EB	EQ-T1-111	✓ Kerite Cable
1.6E6	8E6	EQ-TM-112A	✓ GE Terminal Block
5.5E5	2E7	EQ-TM-113A	✓ ASCO Solenoid Valve (NUREG-0588)
3.2E5	1E6	EQ-TM-114A	✓ ASCO Solenoid Valve (DOR Guidelines)
5.5E5	3.55E5	EQ-TM-116A	○ ✓ Static-O-Ring Press. Sw. (DOR Guidelines)
4.2E5	3.3E7	EQ-TM-117A	✓ Static-O-Ring Press. Sw. (NUREG-0588)
2E7	5E7	EQ-TM-118A	✓ - Rosemount Transmitter (1153D)
6E6	5E6	EQ-TM-119A	✓ Westinghouse Motors
5.5E5	1E7	EQ-TM-122A(1)	✓ Foxboro Transmitter (Aux Bldg)
2.8E6	1E7	EQ-TM-122A(2)	✓ Foxboro Transmitter (Rx Bldg)
2E7	1EB	EQ-TM-123A	✓ GE Fan Motor
6.2E6	2E6	EQ-TM-127A	✓ NAMCO Limit Switch
2E7	4E7	EQ-TM-128A	✓ Bailey Transmitter
1.05E6	5E6	EQ-TM-129A	✓ Rosemount Transmitter (1152)
2E7	2E7	EQ-TM-130A	○ ✓ Rosemount RTD
2E7	1.58EB	EQ-TM-131A(1)	✓ Conax Electrical Seal (PL Series)
2E7	2.2EB	EQ-TM-131A(2)	✓ Conax Electrical Seal (75900 Series)
7.8E5	1E6	EQ-TM-132A	✓ Microswitch Limit Switch
6.2E6	2E7	EQ-TM-133A	✓ - Transzorb (Diode)
2E7	2EB	EQ-T1-134	✓ Raychem Heat Shrink Tubing
5.5E5	1EB	EQ-TM-135A	✓ Target Rock Solenoid Valve
2E7	3.03EB	EQ-TM-136A	✓ Weed RTD
2E7	1EB	EQ-TM-137A	✓ GE Penetrations
7.8E5	6.78E5	EQ-TM-138A	○ ✓ - Ross Solenoid Valves
2E5	2EB	EQ-TM-140A	✓ Samuel Morse Cable

78A

* SEE NOTE 7 OF FILE

+ 139A
142
140
15

DESIGNATED ORIGINAL

1

Docket No. 50-289

PDR
LOCAL PDR

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TIME SENT _____

2/21/85

To: R LaGrange NRC-EQ Branch

From: Roy Harding GPOW-Licensing

As discussed in our phonecon today, attached are the follow documents:

- 1) SCEW for incure T/C cable (note-op, time and rad. qual.)
- 2) Calc. 1101-625-5350-007 which shows an integrated radiation dose of $4.79 \times 10^6 R$ based on a 30 day operating time
- 3) Calc. 1101-625-5350-007 Rev 1 which shows an integrated radiation dose of $2.16 \times 10^6 R$ based on a 10 hr operating time
- 4) Memo from J A Flanagan to S Milioti which indicates a total dose of $1 \times 10^7 R$ base on empirical data.

The date of the continuity checks was not contained in GENO RPT INF 031 Vol 2. We have contacted Mr Menninger the autor concerning the date. He told us that the continuity checks we performed in July 1982.

Roy

Facility: TMI
Unit: 1
Docket: 50-289

SYSTEM COMPONENT EVALUATION WORK SHEET

NUREG 0588 ITEM II.F.2

QUALIFIED TO DOR GUIDELINES

SCEW-TI-625-003 Sheet 1 of 2

Prepared Prof. P. Bracken
Checked by J. R. P. P. P.
Approved J. R. P. P. P.
Revision 6 Date 1/22/85

Equipment Description	Environment		Documentation Ref.		Qualification Method	Outstanding Items
	Parameter	Specification	Qualification	Specification	Qualification	
Incore System: Monitoring Plant ID No. AR-149A thru 199A Component: Cable Manufacturer: Continental Wire Model Number: GAI B/M EX-15L Function: Elec. Connector Accuracy: Spec: N/A Devon: N/A Service: Incore Thermocouples Location: Containment E1, 248' x 160' Flood Level Elev: 286.66 ft Above Flood Level: Yes	Operating Time	10 hours		1		Test & Analysis
	Temperature (°F)	See Accident Profile #1		2 Figure 6.B-13		Test & Analysis
	Pressure (PSIA)	See Accident Profile #2		2 Figure 6.B-14		Test & Analysis
	Relative Humidity (%)	100		2		Test & Analysis
	Chemical Spray (pH)	8.5-11		3 Page 4		Test & Analysis None
	Radiation (RAD)	2.16X10 ⁸		4	5	Test & Analysis
	Aging (°F/Years)	130/40		3 Page 2a	Note A	Test & Analysis
	Submergence	N/A		3 Page 2a	N/A	N/A

SEE EO FILE NO. EO T/ 139

Notes:

Documentation References:

- EQ-TI-139-18
- TMI-1 FSAR
- GPUN TDR 282 Rev. 4 Area 32
- GPUN C-1101-625-5350-007
- EQ-TI-139A-12

0680M/pg 15

(W)

COMPONENT MATERIALS EVALUATION SHEET

INCORE MONITORING

Plant I.D. No.: AR-149A thru 199A

Component: Cable

Manufacturer: CONTINENTAL WIRE AND CABLE CO.

Model No.: GAI B/M EK 15L

PARTS LIST	MATERIALS LIST	THERMAL AGING		RADIATION	
		QUALIFIED LIFE	REFERENCE	QUALIFICATION	REFERENCE
Wire Insulation	Teflon (FEP)	130°F/2.47x10 ⁴ yr	GPUN 1101-5340-75 Rev 1	1.1x10 ⁶ R	GPUN C-1101-625-5350-004
Pair Wrapping	Aluminum/Mylar	130°F/3.95x10 ⁴ yr	GPUN C-1101-600-5350-002 Rev 1	1x10 ⁶ R	EPR1 RP 1707-3
Jacket	Teflon (FEP)	130°F/2.47x10 ⁴ yr	GPUN 1101-5350-75 Rev 1	1.1x10 ⁶ R	GPUN C-1101-625-5350-004

(F)

SUBJECT **Radiation Normal Service plus Accident LOCA**
Conditions for the Incore Detection Cable Assembly

1.0 Purpose

Determine service the Incore detector to penetration cable assembly normal 40 year life plus accident radiation exposure requirements.

2.0 Conclusion

The incore detector to penetration cable assembly will be exposed to a total integrated radiation dose of 4.79×10^6 RADS.

3.0 References

- 3.1 GPUN Calculation C-1101-625-5350-004
- 3.2 NUREG-0020 Vol. 3 No. 7 July 1981
- 3.3 TMI-1 FSAR page 1.1-1 dated 7/82
- 3.4 TMI-1 FSAR Table 6.6-5
- 3.5 GPUN General Arrangement Dwg. IE-153-02-004/007
- 3.6 Radiological Health Handbook 1970
- 3.7 DOR Guidelines Appendix B
- 3.8 GAI Radiation maps E-001-052 dated 8/23/71

4.0 Calculation/Analysis

The incore detector cable assembly is required to function for:

4.1 Normal Service

40 year @ 50 MR/hr Normal Operation (Refer, 3.8)
 $350400 \text{ Hours} \times 50 \text{ MR/hours} = 1.752 \times 10^7 \text{ MR}$
or 1.752×10^4 Rads in 40 year service

4.2 Beta Accident LOCA Dose (Refer 3.1)

GPUN calculation concluded that the jacket and shield reduced the dose from Beta radiation that reaches the wire insulation by a factor of 10.

4.3 Gamma Accident LOCA Dose (Refer 3.7)

DOR Figures 1 through 4 provide factors to be applied to the conservative dose to correct the following plant specific parameters:
(1) reactor power level; (2) containment volume; (3) shielding; and
(4) compartment volume.

SUBJECT: Radiation Normal Service plus Accident LOCA
Conditions for the Incore Detection Cable Assembly

CALC. NO. 1101-625-3350-007

SHEET NO. 2 OF 3

DATE 10/25/84

COMP. BY/DATE Paul F. Bondy 11/14/84

CHK'D BY/DATE M. W. B. 11/14/84

The radiation service condition for the incore cable assembly application specific parameters are:

- Reactor power level - 2,535 MWth (Refer 3.3)
- Containment volume - $2.126 \times 10^6 \text{ ft}^3$ (Refer 3.4)
- *Compartment volume - $102,203 \text{ ft}^3$ (Refer 3.5)
- +Thickness of D-Ring shield wall (concrete) - 48" (Refer 3.5)
- +Thickness of Steel Door - 1 ft (Refer 3.5)
- Time equipment is required to remain functional - 30 Days

*The compartment volume was assumed to be the line of sight area above and below the incore detector seal plate. From GPUN General Arrangement Drawings this volume was calculated to be $40 \text{ ft} \times 21 \text{ ft} \times 10^3 \text{ ft} = 88,200 \text{ ft}^3$ above and $19 \text{ ft} \times 11 \text{ ft} \times 67 \text{ ft} = 14,003 \text{ ft}^3$ below the incore seal plate. Total = $102,203 \text{ ft}^3$ (Refer 3.5)
+The Density of Concrete 2.25 gm/cm^2 and steel 7.86 gm/cm^2 are assumed to provide equivalent shields (Refer 3.6)

The problem is to make a reasonable estimate of the dose that the equipment could be expected to receive in order to evaluate the adequacy of the radiation service condition specification.

Step 1

Enter the nomogram in Figure 1 at 2,535 MWth reactor power level and $2.126 \times 10^6 \text{ ft}^3$ containment volume and read a 30-day integrated dose of $1.4 \times 10^7 \text{ RADS}$.

Step 2

Enter Figure 2 at a dose of $1.4 \times 10^7 \text{ RADS}$ and 48" of concrete shielding for the compartment the equipment is located in and read $1 \times 10^3 \text{ RADS}$. This is the dose the equipment receives from sources outside the compartment. To this must be added the dose from sources inside the compartment (Step 3).

Step 3

Enter Figure 3 at $102,203 \text{ ft}^3$ and read a correction factor of 0.31. The dose due to sources inside the compartment (line of sight volume) would then be $0.31 (1.4 \times 10^7) = 4.34 \times 10^6 \text{ RADS}$. The sum of the doses from steps 2 and 3 equals:

$$1 \times 10^3 \text{ RADS} + 0.31 (1.4 \times 10^7) \text{ RADS} = 4.34 \times 10^6$$

SUBJECT: Radiation Normal Service plus Accident LOCA
Conditions for the Incore Detection Cable Assembly

CALC. NOC-1101-625-5150-007 ⑦
SHEET NO. 3 OF 3
DATE 10/25/84
COMP. BY/DATE Paul T. L. [signature] 10/25/84
CHK'D BY/DATE [signature] 10/25/84

4.4 Beta + Gamma Accident Dose

4.34×10^6 RADS Gamma 30 LOCA Integrated Exposure
0.10 (4.34×10^6) RADS Beta 30 LOCA Integrated Exposure
 $4.34 \times 10^6 + 4.34 \times 10^5 = 4.774 \times 10^6$ RADS Total Accident
Integrated Exposure

4.5 Summary

The incore detector to penetration cable assembly will be exposed to:
 1.752×10^6 RADS during Normal Service—
 4.774×10^6 RADS LOCA Accident—
Total 4.79×10^6 RADS

SUBJECT: Radiation Normal Service plus Accident LOCA
Conditions for the Incore Detection Cable Assembly

1.0 Purpose

Determine service the Incore detector to penetration cable assembly normal 40 year life plus accident radiation exposure requirements.

2.0 Conclusion

The incore detector to penetration cable assembly will be exposed to a total integrated radiation dose of 4.79×10^6 RADS.
2.16

3.0 References

- 3.1 GPUN Calculation C-1101-625-5350-004
- 3.2 NUREG-0020 Vol. 5 No. 7 July 1981
- 3.3 TMI-1 FSAR page 1.1-1 dated 7/82
- 3.4 TMI-1 FSAR Table 6.6-5
- 3.5 GPUN General Arrangement Dwg. IE-153-02-004/007
- 3.6 Radiological Health Handbook 1970
- 3.7 DOR Guidelines Appendix B
- 3.8 GAI Radiation maps E-001-052 dated 8/23/71

4.0 Calculation/Analysis

The incore detector cable assembly is required to function for:

4.1 Normal Service

40 year @ 50 MR/hr Normal Operation (Refer 3.8)
 $350400 \text{ Hours} \times 50 \text{ MR/hours} = 1.752 \times 10^7 \text{ MR}$
or $1.752 \times 10^4 \text{ Rads in 40 year service}$

4.2 Beta Accident LOCA Dose (Refer 3.1)

GPUN calculation concluded that the jacket and shield reduced the dose from Beta radiation that reaches the wire insulation by a factor of 10.

4.3 Gamma Accident LOCA Dose (Refer 3.7)

DOR Figures 1 through 4 provide factors to be applied to the conservative dose to correct the following plant specific parameters:
(1) reactor power level; (2) containment volume; (3) shielding; and
(4) compartment volume.

SUBJECT: Radiation Normal Service plus Accident LOCA
Conditions for the Incore Detection Cable Assembly

The radiation service condition for the incore cable assembly application specific parameters are:

- Reactor power level - 2,535 MWth (Refer 3.3)
- Containment volume - $2.126 \times 10^6 \text{ ft}^3$ (Refer 3.4)
- *Compartment volume - $102,203 \text{ ft}^3$ (Refer 3.5)
- +Thickness of D-Ring shield wall (concrete) - 48" (Refer 3.5)
- +Thickness of Steel Door - 1 ft (Refer 3.5)
- Time equipment is required to remain functional - 30 Days

*The compartment volume was assumed to be the line of sight area above and below the incore detector seal plate. From GPUN General Arrangement Drawings this volume was calculated to be
 $40 \text{ ft} \times 21 \text{ ft} \times 10^5 \text{ ft} = 88,200 \text{ ft}^3$ above and
 $19 \text{ ft} \times 11 \text{ ft} \times 67 \text{ ft} = 14,003 \text{ ft}^3$ below the incore seal plate. Total = $102,203 \text{ ft}^3$ (Refer 3.5)
 +The Density of Concrete 2.25 gm/cm^3 and steel 7.86 gm/cm^3 are assumed to provide equivalent shields (Refer 3.6)

The problem is to make a reasonable estimate of the dose that the equipment could be expected to receive in order to evaluate the adequacy of the radiation service condition specification.

Step 1

Enter the nomogram in Figure 1 at 2,535 MWth reactor power level and $2.126 \times 10^6 \text{ ft}^3$ containment volume and read a 30-day integrated dose of $1.4 \times 10^7 \text{ RADS}$.

Step 2

Enter Figure 2 at a dose of $1.4 \times 10^7 \text{ RADS}$ and 48" of concrete shielding for the compartment the equipment is located in and read $1 \times 10^3 \text{ RADS}$. This is the dose the equipment receives from sources outside the compartment. To this must be added the dose from sources inside the compartment (Step 3).

Step 3

Enter Figure 3 at $102,203 \text{ ft}^3$ and read a correction factor of 0.31. The dose due to sources inside the compartment (line of sight volume) would then be $0.31 (1.4 \times 10^7) = 4.34 \times 10^6 \text{ RADS}$. The sums of the doses from steps 2 and 3 equals:

$$1 \times 10^3 \text{ RADS} + 0.31 (1.4 \times 10^7) \text{ RADS} = 4.34 \times 10^6$$

CALC. NO. 1101-625-5350-007 Rm. 1
 SHEET NO. 3 OF 3
 DATE 1/18/85
 COMP. BY/DATE P.F. Borden
 CHK'D. BY/DATE [Signature]

SUBJECT Radiation Normal Service plus Accident LOCA
 Conditions for the Incore Detection Cable Assembly

Step 4

Enter Figure 4 at 10 hour and read a correction factor of 0.45. Apply this factor to the sum of the doses determined from steps 2 and 3 to correct the 30 day total dose to the equipment inside the compartment to 10 hour.

$$0.45 (4.34 \times 10^6) = 1.95 \times 10^6$$

4.4 Beta + Gamma Accident Dose

1.95 x 10⁶ RADS Gamma 10 Hour Integrated Exposure
 0.10 (1.95 x 10⁶) RADS Beta 10 Hour Integrated Exposure
 1.95 x 10⁶ + 1.95 x 10⁵ = 2.145 x 10⁶ RADS Total Accident Integrated Exposure

4.5 Summary

The incore detector to penetration cable assembly will be exposed to:
 1.752 x 10⁴ RADS during Normal Service
 2.145 x 10⁶ RADS LOCA Accident
 Total 2.16 x 10⁶ RADS

20 hrs. => - 0.55 => - 2.66 x 10⁶ R
 30 hrs. => - 0.60 => - 2.88 x 10⁶ R

DEC 3 1984

Memorandum

Subject: TMI-2 Radiation Exposure of Incore Thermocouple System External Extension Cable

Date: November 27, 1984

 From: Radiological Engineering Support
 Operations Manager TMI-2
 J.A. Flanigan

 Location: TMI-2
 9240-84-2592
 RC# 5.0

 To: Manager EQ
 S.J. Milioti

In response to your request of 11-13-84 (Ref:EP&I/84/1913) we are providing the following information.

The most reliable data presently available support a total dose of $1.0E7$ Rads to the teflon cover of the extension cable. This total is comprised of four contributors 1) the dose due to incore table contamination, 2) the dose received by HPR-213, 3) the dose due to Krypton-85, and 4) the dose due to Xenon-133. The individual dose estimates are $1.24E6$ Rads, $0.99E6$ Rads, $1.75E6$ Rads and $6.21E6$ Rads respectively. Details regarding each of these estimates are also included.

The dose estimate based on incore table contamination was obtained through the use of documented surveys by Health Physics Technicians. The surveys were from 10-16-80 Reactor Building Entry #3 through 6-26-84 Entry #394, using thirteen total surveys. Several decontamination attempts have been made on the table, therefore reducing the emphasis placed on smear survey results. All surveys used for dose estimation were β/γ dose rate surveys, usually performed with an RO-2A.

The exposure estimate based on HPR-213 was used to represent post-accident elevated gamma exposure rates. This estimate was taken from GEND-019, Examination Results of the Three Mile Island Radiation Detector HPR-213. HPR-213 is a general area radiation monitor located adjacent to the incore table. The dose received by the detector was based on transistor testing. This dose does not include any exposure from gases or contamination as the inside of the detector was not contaminated. The detector was removed from the Reactor Building on May 28, 1981 Entry #11.

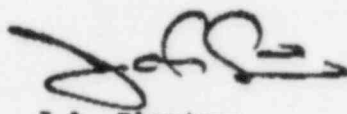
The exposure based on the presence of Krypton-85 gas was estimated using NCRP Report No. 44 to convert activity levels to Rem/hr skin dose. Krypton-85 activity levels in the Reactor Building were taken from GEND-013, TMI-2 Reactor Building Purge Kr-85 Venting, with gas concentrations assumed to be equal throughout the building. Total Kr-85 activity was cross checked with effluent analysis reports for 1980 to validate accuracy. Exposure due to Kr-85 was assumed to be ended at the start of purging June 28, 1980.

(12)

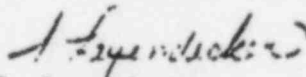
Page 2
November 27, 1984
9240-84-2592
S.J. Milioti

The major contribution to the dose estimate is that from exposure to Xenon-133 gas. This number is also the most likely source of significant error. The estimate of the X-133 contribution was determined by using ICRP-30 to convert activity levels to Rem/hr skin dose. X-133 activity determination was done by plotting a half life curve to zero time from a Reactor Building air sample taken on May 4, 1979. This is in accordance with the logic used in GEND-INF-032 Vol. I, Radionuclide Mass Balance for the TMI-2 Accident: Data Base System and Preliminary Mass Balance Vol. I. There is presently an effort underway to provide further information on X-133 levels which may allow for revision of the number presented here.

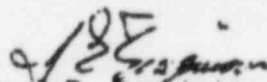
The exposure estimates represented are rough estimates based on currently available information. Any questions concerning their accuracy or the need for refinement may be addressed to S. Layendecker at Extension 8364.



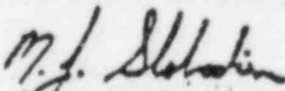
J.A. Flanigan
Radiological Engineering Support
Operations Manager TMI-2



Calculations By: S. Layendecker
Radiological Engineering TMI-2



Checked By: E.E. Tarpinian
Radiological Engineering Support
Effluent Assessment Manager TMI-2



Approved By: M.D. Slobodien, Manager
Radiological Engineering TMI-2

JAF/SL/JET/MJS/wam
attachments
cc: Carirs

J.E. Hildebrand-Radiological Controls Director TMI-2
G.A. Kuehn-Manager, Radiological Controls TMI-1
R.P. Shaw-Radiological Engineering Manager TMI-1