

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of Commonwealth) Docket Nos. 50-237
Edison Company (Dresden Station,) 50-249
Units 2 and 3) (Spent Fuel Pool Modification)

SUPPLEMENTAL TESTIMONY OF

RONALD M. RAGAN

- A. Dimensional Checks of Storage Locations
- B. Design of Fuel Grapple
- C. Action Should A Fuel Assembly Become Stuck
- D. Mandrel Testing of Unfilled Storage Locations

S.S.

COUNTY OF GRUNDY

AFFADAVIT OF RON RAGAN

I, Ron Ragan, being first duly sworn, state that the attached testimony is true and correct to the best of my knowledge and belief.

Ronald M. Ragan

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A. Dimensional Checks of Storage Locations

1) Measurements were made by Commonwealth Edison personnel on the four high density spent fuel racks currently being stored at Dresden Station. Measurements were made of the internal dimensions of each storage location, at the top of the racks between the lead-in clips. This data is attached as Appendix I. The measurements were taken with a vernier caliper and, despite the numbers indicated in Appendix I, due to the difficulty of making the measurement the accuracy is about $\pm .01$ ". Only one storage location (#32 in rack 1000 498 1/4) has a measured dimension less than 5.74".

The internal dimensions of the storage locations at points below the lead-in clips were not measured.

B. Design of Fuel Grapple

2) When fuel assemblies are lowered into their storage locations, they are lowered only by the force of their own weight and that of the grapple. When submerged, an assembly weighs approximately 600 pounds (out of water, it would weigh 680 pounds). This weight is supported by a cable inside of a freely telescoping grapple body - there is no way to try to force a partially-inserted assembly down. With the cable slack an electrical interlock limits the additional weight of the grapple

resting on top of the fuel assembly to about 50 pounds. If this interlock were to fail, the added weight of the telescoping cans on the fuel assembly would be approximately 500 lbs. It is very unlikely that this interlock would fail.

3) The maximum lift that the grapple can exert is 1100 pounds. The lift is limited by an electrical interlock for which there is no disconnect or over-ride switch. It cannot be bypassed by the fuel handler. Should it be desired to bypass the interlock under some special circumstances, the station management would have to request that the Electrical Maintenance Department modify the control circuitry in the grapple.

4) The controls on the grapple include indicating lights for:

a) Slack Cable - This tells the fuel handler when the assembly has been fully lowered into its storage location. It would also illuminate if an assembly were to become stuck when only partially lowered.

b) Hoist Loaded - This tells the fuel handler that weight is being exerted on the grapple.

c) 1100 lb. Trip Setting - This light would illuminate upon tripping of the interlock.

5) The procedure for operating the fuel grapple is attached as Appendix 2.

C. Action Should A Fuel Assembly Become Stuck

6) There are three types of situations where a fuel assembly could be stuck;

a) after being partially lowered into a fuel storage rack,

b) after having been stored in a fuel storage rack where the rack has been subsequently deformed and the assembly has become jammed either still fully inserted, or

c) after being partially withdrawn.

7) In the first situation, the Cable Slack light would come on when the downward movement of the assembly was arrested. The fuel handler would visually determine if the assembly had or had not been fully inserted. Upon observing that the assembly had only been partially inserted, he would wait for the assistance of the licensed fuel handling foreman who is on the refueling floor when any fuel moving is taking place. The fuel handling foreman would notify station management, at which time the best course of action would be determined.

8) In the second and third situations, the grapple lift interlock would trip at 1100 pounds as the fuel

handler was attempting to raise the assembly, and the indicating light would come on. Again, he would wait for the assistance of the licensed fuel handling foreman, who would notify station management and receive any technical support needed.

9) Applicable Dresden Fuel Handling Procedures are being revised to include limitations to implement the actions discussed in paragraphs 7 and 8.

10) In my opinion, the design of the fuel grapple and the Dresden Fuel Handling Procedures, (when revised to implement the action discussed in paragraphs 7 and 8), will be sufficient to insure safe fuel handling operations under normal circumstances and in the event that a fuel assembly should become stuck in a fuel storage rack.

D. Mandrel Testing of Unfilled Storage Locations

11) A periodic mandrel testing of unfilled storage locations was recommended by Dr. J. E. Draley for Dresden's proposed high density spent fuel racks. This is addressed in his reply to Contention 7(B) in his testimony, submitted previously in this hearing (following Tr. 341). This was to guard against the unlikely event that a severe local swelling of a boral plate in a rack, in combination with a coincidental bowing of a fuel channel, would interfere with fuel movement in the rack.

12) In light of:

(1) the high improbability of such a boron plate swelling as indicated by Dr. Draley,

(2) the corrosion surveillance program already committed to,

(3) the studies made by Commonwealth Edison to determine the causes and magnitudes of channel bowing and anticipate future bowing, and

(4) the existence of the grapple interlock and the development of Station procedures which will prevent any excessive forces being applied to channelled fuel assemblies should they become stuck,

Edison feels that such periodic mandrel testing is not necessary.

ATTACHMENT 1

MEASUREMENTS ON HIGH DENSITY SPENT FUEL RACKS
STORED AT DRESDEN STATION

x = 6.017	6.002	5.886	6.066	5.900	6.033	6.053	6.032	6.030	5.995	y = 6.056
99	78	77	77	56	56	55	34	33	12	99
5.908	6.100	6.010	6.020	6.020	6.012	6.046	5.978	6.061	5.996	5.908
98	79	76	57	54	54	35	32	13	10	98
5.992	6.037	5.922	6.054	5.940	6.012	6.070	5.931	6.051	5.927	5.992
6.076	5.942	6.187	6.080	6.187	6.187	6.117	6.187	6.064	6.110	6.076
97	80	75	58	53	53	36	31	14	9	97
6.007	6.008	6.079	5.981	5.945	5.978	5.943	6.015	6.010	6.016	6.007
5.990	6.062	5.833	6.078	5.876	6.060	5.886	6.078	6.078	5.796	5.990
96	81	74	59	52	52	37	30	15	8	96
6.041	6.055	5.924	6.055	5.898	6.059	5.921	6.066	6.016	6.016	6.041
6.057	5.898	6.073	5.833	6.053	5.823	6.080	5.883	6.048	6.048	6.057
95	82	73	60	51	38	29	16	7	7	95
6.073	5.962	6.073	5.910	6.042	5.932	6.061	5.940	6.060	6.060	6.073
5.900	5.861	5.918	6.064	5.877	6.064	5.871	6.037	5.938	5.938	5.900
94	83	72	61	50	39	28	17	6	6	94
6.092	5.928	5.898	6.033	5.895	6.068	5.933	6.075	6.006	6.006	6.092
6.011	6.056	6.047	5.898	6.062	5.906	6.064	5.906	6.045	6.045	6.011
93	84	71	62	49	40	27	18	5	5	93
6.063	6.052	6.068	5.932	6.079	5.919	6.081	5.891	6.082	6.082	6.063
5.925	5.875	5.852	6.050	5.921	6.061	5.872	6.047	5.913	5.913	5.925
92	85	70	63	48	41	26	19	4	4	92
6.058	5.946	5.890	6.071	5.921	6.064	5.914	6.041	5.995	5.995	6.058
5.913	6.062	6.068	6.028	6.040	6.079	6.043	5.989	6.036	6.036	5.913
91	86	69	64	47	42	25	20	3	3	91
6.040	6.090	6.056	5.896	6.081	5.876	6.069	5.936	6.068	6.068	6.040
6.033	5.987	5.911	6.010	5.912	6.041	5.966	6.046	6.005	6.005	6.033
90	87	68	65	46	43	24	21	2	2	90
6.050	5.947	5.911	6.068	5.886	6.063	5.855	6.060	5.913	5.913	6.050
x = 5.966	6.033	6.030	5.907	6.023	5.910	6.020	5.952	6.012	6.012	y = 5.895
89	88	67	66	45	44	23	22	1	1	89

measurements in inches

← x →

↑ y ↓

X = 6.044 49	5.930 78	6.021 77	5.948 56	6.019 55	5.951 34	6.031 33	5.942 12	X = 6.042 11
Y = 6.064	5.886	6.041	5.905	6.090	5.904	6.083	5.896	Y = 6.031
5.740 98	6.047 79	5.788 76	6.027 57	5.772 54	6.031 35	5.729 32	6.043 13	5.757 10
6.043	6.063	5.889	6.075	5.916	6.004	5.849	6.072	6.075
6.011 47	5.850 80	6.112 75	5.932 58	6.187 53	5.940 36	6.187 31	5.869 14	6.069 9
6.034	6.027	6.002	5.968	5.968	5.962	5.982	6.042	6.803
5.835 46	6.080 81	5.905 74	6.081 59	5.850 52	6.029 37	5.810 30	5.869 15	5.771 8
6.019	6.033	5.992	6.055	5.882	6.080	5.876	6.082	6.074
6.063 95	5.840 82	6.052 73	5.886 60	6.053 51	5.853 38	6.021 29	5.818 16	6.042 7
6.072	5.886	6.035	5.881	6.052	5.889	6.042	5.847	6.065
5.872 44	6.055 83	5.908 72	6.054 61	5.929 50	6.034 39	5.931 28	6.063 17	6.048 6
6.032	6.100	5.840	6.030	5.915	6.095	5.852	6.045	5.903
6.068 93	5.930 84	6.068 71	5.920 62	6.071 49	5.979 40	6.047 27	5.965 18	6.083 5
6.090	5.931	6.073	5.912	6.052	5.871	6.056	5.918	6.018
5.892 42	6.050 85	5.922 70	6.064 63	5.866 48	6.066 41	5.943 26	6.066 19	6.022 4
6.022	6.047	5.816	6.033	5.843	6.069	5.911	6.054	5.937
6.072 41	5.865 86	6.065 69	5.952 64	6.071 47	5.930 42	6.054 25	5.960 20	6.060 3
6.072	5.881	6.054	5.900	6.082	5.906	6.053	5.901	6.043
5.920 40	6.032 87	5.902 68	6.021 65	5.913 46	6.019 43	5.918 24	6.067 21	5.965 2
5.787	6.095	5.911	6.076	5.755	6.083	5.990	6.095	5.927
X = 6.038 89	5.956 88	6.028 67	5.976 66	6.051 45	5.994 44	6.034 23	5.913 22	X = 6.048 1
Y = 6.043	5.880	6.064	5.886	6.095	5.916	6.070	5.859	Y = 6.013

← X →

↑ Y ↓

X = 6.044 49	6.036 78	6.095 77	6.036 56	6.021 55	6.001 34	6.018 33	5.990 12	X = 6.046 11
Y = 6.051	5.874	6.048	5.939	6.069	5.881	6.017	5.854	Y = 6.048
5.990 98	6.061 79	5.859 76	6.017 57	5.950 54	6.026 35	5.991 32	6.035 13	5.974 10
5.977	6.021	5.864	6.050	5.934	6.050	5.904	6.030	6.004
6.048 47	5.996 80	6.087 75	6.028 58	6.089 53	6.013 36	6.087 31	5.969 14	6.014 9
6.025	6.054	5.967	5.982	5.985	6.014	6.000	5.964	6.016
5.994 46	6.055 81	5.976 74	6.037 59	5.918 52	6.034 37	5.983 30	6.028 15	6.017 8
6.065	6.058	5.920	6.040	5.971	6.024	5.940	6.036	6.059
6.011 45	5.944 82	6.042 73	5.988 60	6.047 51	5.993 38	6.055 29	5.993 16	6.018 7
6.054	5.991	6.029	5.924	6.059	5.974	6.029	5.988	6.023
5.922 44	6.052 83	5.962 72	6.019 61	5.994 50	6.059 39	5.994 28	6.030 17	5.944 6
5.956	6.067	5.994	6.040	5.979	6.007	5.999	6.004	5.931
6.020 43	5.971 84	6.049 71	6.062 62	5.986 49	5.986 40	6.030 27	5.982 18	6.010 5
6.063	5.922	6.045	6.034	6.036	5.920	6.044	5.921	6.069
5.906 42	6.060 85	5.939 70	6.035 63	5.923 48	6.035 41	5.924 26	6.038 19	5.900 4
5.951	6.022	5.936	6.059	5.971	6.079	5.861	6.032	6.078
6.003 41	5.980 86	6.060 69	5.911 64	6.055 47	5.933 42	6.038 25	5.996 20	6.030 3
6.029	5.905	6.018	5.936	6.008	5.903	6.041	5.904	6.046
5.984 40	6.039 87	5.913 68	6.049 65	5.920 46	6.030 43	5.831 24	6.051 21	5.994 2
5.950	6.050	5.937	6.067	5.902	6.051	5.929	6.005	5.950
X = 6.027 89	5.969 88	6.049 67	6.012 66	6.039 45	5.954 44	6.040 23	6.002 22	X = 6.032 1
Y = 6.056	5.981	6.014	5.989	6.006	5.931	6.039	6.034	Y = 6.004

↑ Y ↓

← X →

x = G.046 49	S.978 78	G.042 77	S.900 56	G.018 55	S.849 34	G.044 33	S.991 12	x = G.068 11
Y = G.008	G.010	G.006	G.069	G.030	G.013	G.019	S.998	Y = G.010
G.000 98	G.056 79	S.993 76	G.037 57	S.841 54	G.035 35	S.985 32	G.049 13	S.991 10
S.780 98	G.040	S.997	G.014	S.933	G.096	S.908	G.044	S.905
S.996 47	S.986 80	S.971 75	G.090 58	S.958 53	G.069 36	S.958 31	G.007 14	G.017 9
G.087	S.978	G.090	S.836	G.087	G.069	G.087	S.813	G.038
G.076 46	G.006 81	S.892 74	G.055 59	S.981 52	G.016 37	S.853 30	G.017 15	G.000 8
S.952 46	G.055	S.999	G.010	S.813	G.014	S.971	G.060	S.983
G.048 95	S.989 82	G.022 73	S.837 60	G.040 51	S.927 38	G.039 29	S.89 16	G.055 7
G.058	S.914	G.099	G.089	G.023	S.929	G.044	S.966	G.032
S.920 44	G.047 83	S.904 72	G.055 61	S.974 50	G.045 39	S.984 28	G.055 17	G.003 6
S.970	G.037	S.907	G.001	S.995	G.055	S.966	G.051	S.837
G.040 93	S.839 84	G.056 71	S.856 62	G.054 49	S.836 40	G.042 27	S.980 18	G.055 5
G.032	S.968	G.005	S.934	G.036	S.921	G.050	S.992	G.040
G.090 92	G.035 85	S.847 70	G.057 63	S.985 48	G.040 41	S.902 26	G.002 19	G.034 4
S.935	G.043	S.930	G.039	S.956	G.020	S.931	G.062	S.934
G.054 91	S.917 86	G.032 69	S.981 64	G.027 47	S.990 42	G.045 25	S.927 20	G.059 3
G.020	G.069	G.046	G.064	G.030	G.074	G.052	G.056	G.099
G.099 90	G.040 87	S.967 68	G.037 65	S.838 46	G.072 43	S.966 24	G.087 21	G.009 2
S.989	G.007	S.926	G.009	S.926	G.050	S.990	G.034	S.939
x = G.087 89	S.931 88	G.008 67	S.978 66	G.078 45	S.825 44	G.016 23	S.984 22	x = G.074 1
Y = G.038	G.055	G.035	S.904	G.029	G.069	G.041	G.037	Y = G.064

← X →

↑ Y ↓