The Light company
Houston Lighting & Power South Texas Project Electric Generating Station P. O. Box 289 Wadsworth, Texas 77483

February 22, 1995
ST-HL-AE-5005
File No.: G26
10CFR50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Unit 1
Docket No. STN 50-498
Licensee Event Report 95-002
Excessive Degradation of Boraflex Neutron Poison Found in
the South Texas Project Spent Fuel Pool Storage Racks

Pursuant to 10CFR50.73, Houston Lighting & Power submits the attached Unit 1 Licensee Event Report 95-002 regarding excessive degradation of Boraflex neutron poison found in the South Texas Project Spent Fuel Pool storage racks. This event did not have an adverse effect on the health and safety of the public.

If you should have any questions on this matter, please contact Mr. J. M. Pinzon at (512) 972-8027 or me at (512) 972-8787.

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Vice President,
Nuclear Engineering

JMP/lf

Attachment: LER 95-002 (South Texas, Unit 1)

IE22

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas Unit 1	05000 498	1 OF 20

TITLE (4) Excessive Degradation of Boraflex Neutron Poison Found in the South Texas Project Spent Fuel Pool Storage Racks

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	24	95	95	-- 002 --	00	02	23	95		05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	0		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Jairo Pinzon - Staff Engineer	(512) 972-8027

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On January 25, 1995, Unit 1 was in Mode 3 at 0 % power. At approximately 1500 hours, an evaluation of a preliminary report on spent fuel storage rack Boraflex testing determined that at least one rack cell may be outside the design basis (no more than a 7.75 inch gap in the Boraflex panels on any two sides of a cell). The root cause of the event is use of the Boraflex material in the spent fuel pool environment. The mechanism of Boraflex degradation is not completely characterized, but it is known to be related to gamma flux (and to a small extent, neutron flux) which causes changes in the base polymer material characteristics leading to hardening and embrittlement, and exposure to the spent fuel pool environment (boric acid and forced coolant flow conditions) which may lead to more rapid deterioration. Corrective action includes placing restrictions on the use of the degraded Unit 1 Region 1 storage cells, developing a Long Term Boraflex Management Plan to address this issue, and developing a dose to degradation correlation to aid in establishing restrictions on future cell usage in Unit 1 and Unit 2.

EVENT DESCRIPTION

On January 25, 1995, Unit 1 was in Mode 3 at 0 % power. At approximately 1600 hours, an evaluation of a preliminary report on spent fuel pool storage rack Boraflex testing determined that at least one rack cell may be outside the design basis (no more than a 7.75 inch gap in the Boraflex panels on any two sides of a cell).

The South Texas Project spent fuel pool fuel storage racks consist of two regions with the fuel racks in Region 1 designed to store fuel assemblies with higher reactivity than are allowed in Region 2. The cells in both regions were designed with Boraflex neutron poison panels to ensure that adequate negative reactivity would be maintained when the pool was assumed to be flooded with unborated water. The Boraflex panels are about 7.5 inches wide and extend the height of the storage cell. Region 1 panels are removable and Region 2 panels cells are fixed in place. The general practice at the South Texas Project has been to off-load discharged fuel assemblies into the Region 1 spent fuel racks, where they remain until preparations begin for the next refueling outage. This practice has resulted in higher gamma exposure to the Region 1 spent fuel racks than the Region 2 spent fuel racks.

Blackness (neutron absorption) testing had been conducted in August 1994 on selected South Texas Project Unit 1 spent fuel pool storage racks. The tests were performed to determine the condition of the Boraflex neutron poison material and to quantify (i.e., determine size and location of) any gaps identified. The testing was performed by HOLTEC International using a specially-designed logging tool containing a Californium-252 neutron source and four boron trifluoride (BF_3) thermal neutron detectors. A summary of the test results is attached.

The testing involved 45 cells in Regions 1 and 2 of the Unit 1 spent fuel storage racks. In all eight cells tested in Region 2, no detectable gaps or other degradation of the Boraflex panels were found. In Region 1, 20 of 37 cells tested showed some evidence of gaps and/or more significant Boraflex panel degradation. Boraflex degradation exceeded the South Texas Project design limit for gap size (3.75 inch gaps in all four panels of a cell, 7.75 inch gaps in any two panels of a cell) in six Region 1 cells, and Boraflex panel end shrinkage in all four panels of one additional Region 1 cell may exceed the design limit.

In the South Texas Project Boraflex Surveillance Plan, eight cells had been designated to receive an accelerated dose, in order to develop an early assessment of long-term Boraflex degradation. Selected high-burnup fuel assemblies were loaded into these cells early at each refueling and left there until the next refueling. Five of these eight cells exhibited large areas of degradation, postulated to be 'washout' accelerated dissolution of the Boraflex material caused by pool water cooling flow through the poison enclosures. All eight designated cells showed faults on at least one side. More than two-thirds of the panels in these cells showed faults, ranging from relatively small gaps (< one inch) to large gaps (> four inches) and significant end shrinkage. In addition, large areas (three to 4.5 feet) of some panels indicated partial or significant loss of poison material.

EVENT DESCRIPTION: (Continued)

Above design basis degradation (washout) was found in one Region 1 cell which had been designated to have a long-term exposure in the surveillance plan (i.e., a single discharged assembly remained in the cell rather than being transferred to Region 2). In addition, significant washout was found in one other cell of Region 1. This cell had been designated to have a long-term exposure in the surveillance plan; i.e., a single discharged assembly remained in the cell rather than being transferred to Region 2. The degradation in this cell was similar to other washout observed, but did not exceed the design basis gap distribution.

A Justification for Continued Operation was prepared August 16, 1994, as a precaution in response to the first indications of degradation of the Boraflex neutron poison. It was determined that the required subcriticality can be assured, without Boraflex, provided that soluble boron concentration in the spent fuel pool is kept above 2500 ppm. Steps were taken to establish and maintain the boron concentration in the spent fuel pool. Additional operational and surveillance requirements were established to control dilution and ensure that an adequate margin of safety will be maintained.

CAUSE OF THE EVENT

The root cause of the event is use of the Boraflex material in the spent fuel pool environment. The mechanism of Boraflex degradation is not completely characterized, but it is known to be related to the following factors:

1) Gamma flux (and to a small extent, neutron flux) causes changes in the base polymer material characteristics, leading to hardening and embrittlement.

2) Exposure to spent fuel pool environment (boric acid and forced coolant flow conditions) may lead to more rapid deterioration.

ANALYSIS OF THE EVENT:

This excessive degradation of Boraflex neutron poison found in the South Texas Project Spent Fuel Pool storage racks is being reported as a condition that was discovered to be outside the design basis of the plant and is reportable pursuant to 10CFR50.73(a)(2)(ii).

The South Texas Project spent fuel pool racks use high density storage racks fabricated by U.S. Tool and Die Co. The racks are of two regions, with the fuel racks in Region 1 (288 cells) designed to store fuel assemblies with higher reactivity than are allowed in Region 2 (1417 installed cells). The cells in both regions were designed with Boraflex neutron poison panels to ensure that adequate negative reactivity would be maintained when the pool was assumed to be flooded with unborated water. The Boraflex panels are approximately 7.5 inches wide and extend the height of the storage cell. Region 1 panels are removable, and Region 2 panels cells are fixed in place.

ANALYSIS OF THE EVENT: (Continued)

Because pool water analysis had for several years indicated a slight, but increasing, level of reactive silica (now approximately 20-25 ppm), it was assumed that gradual deterioration of Boraflex was underway due to exposure to gamma radiation. In light of industry experience, the probable degradation was judged to be typical because of the levels of South Texas Project measured silica were less than or comparable to other plants known to have Boraflex deterioration and typical "gapping" caused by tearing of the shrinking material.

A Justification for Continued Operation was prepared August 16, 1994, as a precaution in response to the first indications of greater than typical degradation of the Boraflex neutron poison panels between storage cells in the spent fuel pool racks. Pending completion of test results evaluation by the offsite consultant/contractor, there was concern that the South Texas Project Technical Specification 5.6.1.1.a (which requires that the spent fuel pool racks remain subcritical k_{eff} less than or equal to 0.95, when flooded with unborated water) might not be satisfied. The Justification for Continued Operation cites engineering analyses to show the racks meet Technical Specification 5.6.1.1.a with no Boraflex, as long as soluble boron concentration is maintained > 2500 ppm. A criticality analysis shows that 1300 ppm is sufficient for criticality control of the most reactive fuel allowable for the South Texas Project. An additional 700 ppm is added to provide margin for accident conditions (such as mispositioned or dropped assemblies); an additional 500 ppm is added for margin to safety.

The Justification for Continued Operation also specifies short-term compensatory measures: confirmation of frequency of surveillances of spent fuel pool boron concentration, caution tags to control dilution pathways to the spent fuel pool, caution to maintain boron concentration if circumstances force the use of firewater around the spent fuel pool, and a caution to pre-borate (minimum 2500 ppm) new mixed-bed demineralizers in the spent fuel pool cooling & cleanup system.

The Justification for Continued Operation and related analyses apply to both of the South Texas Project units. Additionally, the locations of fuel assemblies in the Unit 2 spent fuel pool racks were evaluated. It was determined that the assemblies located in the designated accelerated exposure cells of Unit 2 racks were either low reactivity assemblies with significant burnup or assemblies with moderately higher reactivity but with rod cluster control assemblies stored in them. Thus, the Unit 2 subcriticality requirements are satisfied for the designated accelerated exposure cells, even if all Boraflex were degraded and the soluble boron were lost.

CORRECTIVE ACTIONS:

1. Restrictions will be placed on the use of the degraded Unit 1 Region 1 storage cells to assure compliance with design basis.

2. A Long Term Boraflex Management Plan is being developed to address this issue.

3. A dose-to-degradation correlation will be developed to aid in establishing restrictions on future cell usage in Units 1 and 2. Restrictions will be established, as necessary, to ensure compliance with the design basis.

ADDITIONAL INFORMATION:

There have been no similar events reported by the South Texas Project. However, the degradation of Boraflex has been previously reported by other nuclear plants; the most closely related incident of Boraflex degradation would be that reported by Palisades (Palisades Licensee Event Report 93-007). This referenced report noted up to 90 percent disintegration or complete deterioration of Boraflex material in surveillance coupon holders.

Nuclear Regulatory Commission has issued Information Notice 93-70, "Degradation of Boraflex Neutron Absorber Coupons" on this issue.

ATTACHMENT 1

SOUTH TEXAS PROJECT BLACKNESS TEST RESULTS SUMMARY

This section summarizes the results of the blackness testing performed in August, 1994, and its implications as far as rack criticality. A summary of the condition of the panels tested is presented in Table 2.

BASIS FOR CRITICALITY CONCLUSIONS

The criticality analysis of record (performed by Westinghouse) for the Region 1 and 2 racks serves as the basis of conclusions reached on criticality concerns. The assumptions of this analysis are summarized below:

Table 1

Boraflex Damage	Region 1	Region 2
Gaps on 4 of 4 sides (in)	3.75	3.00
Gaps on 2 of 4 sides (in)	7.75	6.25
End shrinkage, 4 of 4 sides (in)	8.75	7.50
Max Close-packed enrich.	4.0 w/o	1.7 w/o

Note that in the criticality analysis, the gaps are assumed to occur in a similar fashion around every cell in the rack. This is a quite conservative assumption.

Evidence of End-Shrinkage

The ends of panels not at 179" are usually within the ±3" elevation measurement uncertainty of the blackness test equipment. The largest shrinkage indicated is on the north panel of cell 1P83. The top of this panel is reported at 168" ±3". Since only one panel is affected, however, the criticality analysis results are not exceeded. Cells 1K84, 1L85, and 1F80, exhibit the same type of indications on one or two panels out of four.

Cell 1C84 has indications of end shrinkage in all four panels. The tops of these panels are indicated at 173" ±3". Depending on the actual panel end elevations, the end shrinkage in this cell could also be outside the design limit.

Several panels had top elevations which exceeded 179". However, most of these were within 182" and are more probably an indication of measurement errors.

ATTACHMENT 1

SOUTH TEXAS PROJECT BLACKNESS TEST RESULTS SUMMARY

Panel Gaps and "Washouts"

Thirty seven (37) cells in Region 1 and eight (8) cells in Region 2 racks were tested. Of these 45 cells, 20 cells in Region 1 and no cells in Region 2 exhibited any evidence of degradation. Therefore, the following discussion only refers to the Region 1 racks. As an initial discriminator, only panels exhibiting gaps or washouts in excess of 3.75" are considered. This results in the list of panels presented in Table 3.

This list is then refined to produce Table 4. Most of the gaps which are approximately 3" to 5" can be eliminated from consideration since gaps do not appear on all four sides at the same elevation. While the gaps are larger than the 3.75" for Region 1, the k_{eff} of the cell would not be expected to exceed 0.95 since gaps do not appear on all four panels. Other areas of washout, which retain more than 60% absorption are probably not of concern. Per the current criticality analysis of record, the boron loading could decrease by 62% before k_{eff} exceeds 0.95.

Table 4 lists the panels exhibiting "excessive gaps and/or washouts". Of these, several merit discussion:

Panel 1B81S (cell 1B81, south panel)

The 17" gap at 104" is opposite a 52" gap at 104" on panel 1B82N. These large gaps most likely would cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel.

Panel 1B82N

The 14" gap at 35" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

The 52" gap at 104" is discussed on panel 1B81S. The two gaps over 7.75" in one cell was the cause for the original reporting of excessive Boraflex degradation.

Panel 1B82W

The 4" gap at 38" is coincident with similar gaps on 2 other panels. This is approaching the 4 panels with a gap scenario in the criticality analysis.

The 34" gap at 126" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

ATTACHMENT 1

SOUTH TEXAS PROJECT BLACKNESS TEST RESULTS SUMMARY

Panel 1C82N

The 18" gap at 28" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

Panel 1C82E

The 43" washout at 97" and the 10" washout at 174" would allow checkerboard loading in these cells, but probably not the loading of fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

Panel 1C82S

The damage at 21" results in degradation on 3 of 4 sides of the cell. However, the amount of degradation is difficult to quantify.

The 36" washout at 85" would allow checkerboard loading in these cells, but probably not the loading of fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

Panel 1C83N

The 10" gap at 27" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion. The opposing panel (1C82S) has some degradation in this area. However, the amount is difficult to quantify.

Panel 1C83E

There is a region from 62" to 118" elevation which has been degraded to only 30-70% of the original absorption capabilities. This amount of degradation could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

Panel 1B83N

The 14" gap at 99" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

ATTACHMENT 1

SOUTH TEXAS PROJECT BLACKNESS TEST RESULTS SUMMARY

Panel 1C91E

The 33" gap at 149" far exceeds the 3.75" size. This large gap could cause k_{eff} to exceed 0.95 when the cells are loaded with fresh, 4.0 w/o fuel. Specific analysis would be needed to confirm this conclusion.

While the defects in the panels listed above are cited as possible locations which could cause k_{eff} to exceed 0.95 when those cells are loaded with fresh, 4.0 w/o fuel, this is a conservative determination. Specific analysis would be required to confirm these suspicions. To determine if "k_{eff}< 0.95 with unborated water" were ever actually exceeded in STP operating history, specific analyses would be needed, using the fuel assemblies actually placed in the suspect cells.

Table 2: Summary of Gap Data

					% Boron		
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
1G81	W	53.0	1.1	0%	53.5	52.4	53.0
1E81	E	177.0	4		179.0	175.0	177.0
1C81	E	149.0	2.1		150.0	147.9	149.0
		7.8	3		9.3	6.3	7.8
	S	30.0	1.3		30.6	29.3	30.0
		33.0	2.7		34.3	31.6	33.0
		72.0	1.8		72.9	71.1	72.0
		84.9	24	83%	96.9	72.9	84.9
		8.3	4		10.3	6.3	8.3
1B81	N	178.5	1		179.0	178.0	178.5
	E	178.5	1		179.0	178.0	178.5
	S	31.6	6	80%	34.6	28.6	31.6
		35.0	1.3		35.6	34.3	35.0
		38.6	6	80%	41.6	35.6	38.6
		60.0	1.3		60.6	59.3	60.0
		71.0	1.2		71.6	70.4	71.0
		104.0	17		112.5	95.5	104.0
	W	177.5	3		179.0	176.0	177.5
1B82	N	27.0	2	75%	28.0	26.0	27.0
		35.0	14		42.0	28.0	35.0
		52.0	1		52.5	51.5	52.0
		104.0	52		130.0	78.0	104.0

Table 2: Summary of Gap Data

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
	E	87.0	1.2		87.6	86.4	87.0
	S	59.0	0.5		59.2	58.7	59.0
		72.0	1.4		72.7	71.3	72.0
		77.0	8.6	50%	81.3	72.7	77.0
		83.0	3.4		84.7	81.3	83.0
		93.7	18	80%	102.7	84.7	93.7
	W	24.0	24	90%	36.0	12.0	24.0
		38.0	4		40.0	36.0	38.0
		61.0	2.5		62.2	59.7	61.0
		68.0	1		68.5	67.5	68.0
		76.0	1		76.5	75.5	76.0
		84.0	0.7		84.3	83.6	84.0
		126.0	34	10%	143.0	109.0	126.0
1C82	N	28.0	18		37.0	19.0	28.0
		41.0	1.8		41.9	40.1	41.0
	E	22.0	1.3		22.6	21.3	22.0
		97.0	43	65%	118.5	75.5	97.0
		174.0	10	65%	179.0	169.0	174.0
	S	21.0	1		21.5	20.5	21.0
		30.0	2.1		31.0	28.9	30.0
		40.0	1		40.5	39.5	40.0
		58.0	1		58.5	57.5	58.0

Table 2: Summary of Gap Data

		% Boron					
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		85.0	36	50%	103.0	67.0	85.0
1S82	W	78.0	0.6		78.3	77.7	78.0
1P83	N	173.5	11		179.0	168.0	173.5
	E	145.0	1.4		145.7	144.3	145.0
1J83	E	96.0	1.6		96.8	95.2	96.0
1G83	N	14.0	2.7		15.3	12.6	14.0
	S	178.0	2		179.0	177.0	178.0
1C83	N	13.0	1.2		13.6	12.4	13.0
		14.6	2		15.6	13.6	14.6
		27.0	10	95%	32.0	22.0	27.0
	E	24.0	1.1		24.5	23.4	24.0
		25.5	2	90%	26.5	24.5	25.5
		29.0	1.6		29.8	28.2	29.0
		68.0	12	30%	74.0	62.0	68.0
		75.5	3	0%	77.0	74.0	75.5
		83.0	12	40%	89.0	77.0	83.0
		90.5	3	0%	92.0	89.0	90.5
		98.0	12	50%	104.0	92.0	98.0
		105.5	3	0%	107.0	104.0	105.5
		112.5	11	70%	118.0	107.0	112.5
	S	24.0	0.9		24.4	23.5	24.0
		93.0	1.5		93.7	92.2	93.0

Table 2: Summary of Gap Data

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		95.2	3	70%	96.7	93.7	95.2
1B83	N	34.0	1.7		34.8	33.1	34.0
		36.8	4	70%	38.8	34.8	36.8
		66.3	2	70%	67.3	65.3	66.3
		68.0	1.3		68.6	67.3	68.0
		70.1	3	70%	71.6	68.6	70.1
		85.0	0.5		85.2	84.7	85.0
		90.0	0.5		90.2	89.7	90.0
		99.0	14		106.0	92.0	99.0
	E	74.0	1.1		74.5	73.4	74.0
		76.0	3	80%	77.5	74.5	76.0
	S	75.0	1.5		75.7	74.2	75.0
1B84	N	81.0	2.4		82.2	79.8	81.0
	E	77.0	0.8		77.4	76.6	77.0
	S	87.0	1.8		87.9	86.1	87.0
1C84	N	70.0	1.1		70.5	69.4	70.0
		176.0	6		179.0	173.0	176.0
	E	176.0	6		179.0	173.0	176.0
	S	176.0	6		179.0	173.0	176.0
		6.6	0.6875		7.0	6.3	6.6
	W	176.0	6		179.0	173.0	176.0
1K84	E	175.5	7		179.0	172.0	175.5

Table 2: Summary of Gap Data

					% Boron		
Cell	Side	Elevation	Length	Rema ing	Top	Bottom	Center
1L85	E	176.0	6		179.0	173.0	176.0
1G85	W	78.0	0.7		78.3	77.6	78.0
1F80	E	122.0	0.7		122.3	121.6	122.0
		176.0	6		179.0	173.0	176.0
	S	154.0	0.8		154.4	153.6	154.0
		175.5	7		179.0	172.0	175.5
		7.1	1.68		8.0	6.3	7.1
1F81	S	7.8	3		9.3	6.3	7.8
1F83	S	175.0	3.2		176.6	173.4	175.0
1F87	S	69.0	1.2		69.6	68.4	69.0
1U89	N	46.0	1.1		46.5	45.4	46.0
		104.0	0.4		104.2	103.8	104.0
		164.0	2.5		165.2	162.7	164.0
	E	112.0	1		112.5	111.5	112.0
1M88	E	15.0	3.1		16.5	13.4	15.0
		17.0	2		18.0	16.0	17.0
		20.0	0.5		20.2	19.7	20.0
		82.5	3	75%	84.0	81.0	82.5
		84.5	1	0%	85.0	84.0	84.5
		86.5	3	75%	88.0	85.0	86.5
		88.5	1	0%	89.0	88.0	88.5
		90.5	3	75%	92.0	89.0	90.5

Table 2: Summary of Gap Data

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		93.0	2	0%	94.0	92.0	93.0
		94.5	1	75%	95.0	94.0	94.5
1C91	E	77.0	0.6		77.3	76.7	77.0
		138.5	19	75%	148.0	129.0	138.5
		149.0	2	50%	150.0	148.0	149.0
		156.0	12	75%	162.0	150.0	156.0
	W	113.0	0.5		113.2	112.7	113.0

Table 3: Panels Exhibiting Gaps or Washouts in Excess of 3.75"

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
1B81	S	31.6	6	80%	34.6	28.6	31.6
		35.0	1.3		35.6	34.3	35.0
		38.6	6	80%	41.6	35.6	38.6
		104.0	17		112.5	95.5	104.0
1B82	N	27.0	2	75%	28.0	26.0	27.0
		35.0	14		42.0	28.0	35.0
		104.0	52		130.0	78.0	104.0
	S	72.0	1.4		72.7	71.3	72.0
		77.0	8.6	50%	81.3	72.7	77.0
		83.0	3.4		84.7	81.3	83.0
		93.7	18	80%	102.7	84.7	93.7
	W	24.0	24	90%	36.0	12.0	24.0
		38.0	4		40.0	36.0	38.0
		126.0	34	10%	143.0	109.0	126.0
1C82	N	28.0	18		37.0	19.0	28.0
	E						
		22.0	1.3		22.6	21.3	22.0
		97.0	43	65	118.5	75.5	97.00
		174.0	10	65%	179.0	169.0	174.0
	S	21.0	1		21.5	20.5	21.0
		30.0	2.1		31.0	28.9	30.0

Table 3: Panels Exhibiting Gaps or Washouts in Excess of 3.75"

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		40.0	1		40.5	39.5	40.0
		58.0	1		58.5	57.5	58.0
		85.0	36	50%	103.0	67.0	85.0
1C83	N	13.0	1.2		13.6	12.4	13.0
		14.6	2		15.6	13.6	14.6
		27.0	10	95%	32.0	22.0	27.0
	E	24.0	1.1		24.5	23.4	24.0
		25.5	2	90%	26.5	24.5	25.5
		29.0	1.6		29.8	28.2	29.0
		68.0	12	30%	74.0	62.0	68.0
		75.5	3	0%	77.0	74.0	75.5
		83.0	12	40%	89.0	77.0	83.00
		90.5	3	0%	92.0	89.0	90.5
		98.0	12	50%	104.0	92.0	98.0
		105.5	3	0%	107.0	104.0	105.5
		112.5	11	70%	118.0	107.0	112.5
	S	93.0	1.5		93.7	92.2	93.0
		95.2	3	70%	96.7	93.7	95.2
1B83	N	34.0	1.7		34.8	33.1	34.0
		36.8	4	70%	38.8	34.8	36.8
		66.3	2	70%	67.3	65.3	66.3
		68.0	1.3		68.6	67.3	68.0

Table 3: Panels Exhibiting Gaps or Washouts in Excess of 3.75"

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		70.1	3	70%	71.6	68.6	70.1
		99.0	14		106.0	92.0	99.0
	E	74.0	1.1		74.5	73.4	74.0
		76.0	3	80%	77.5	74.5	76.0
1M88	E	15.0	3.1		16.5	13.4	15.0
		17.0	2		18.0	16.0	17.0
		20.0	0.5		20.2	19.7	20.0
		82.5	3	75%	84.0	81.0	82.5
		84.5	1	0%	85.0	84.0	84.5
		86.5	3	75%	88.0	85.0	86.5
		88.5	1	0%	89.0	88.0	88.5
		90.5	3	75%	92.0	89.0	90.5
		93.0	2	0%	94.0	92.0	93.0
		94.5	1	75%	95.0	94.0	94.5
1C91	E	138.5	19	75%	148.0	129.0	138.5
		149.0	2	50%	150.0	148.0	149.0
		156.0	12	75%	162.0	150.0	156.0

Table 4: Panels Exhibiting Excessive Gaps or Washouts

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
1B81	S	35.0	1.3		35.6	34.3	35.0
		104.0	17		112.5	95.5	104.0
1B82	N	35.0	14		42.0	28.0	35.0
		104.0	52		130.00	78.0	104.0
	W	38.0	4		40.0	36.0	38.0
		126.0	34	10%	143.0	109.0	126.0
1C82	N	28.0	18		37.0	19.0	28.0
	E	22.0	1.3		22.6	21.3	22.0
		97.0	43	65%	118.5	75.5	97.0
		174.0	10	65%	179.0	169.0	174.0
	S	21.0	1		21.5	20.5	21.0
		30.0	2.1		31.0	28.9	30.0
		40.0	1		40.5	39.5	40.0
		58.0	1		58.5	57.5	58.0
		85.0	36	50%	103.0	67.0	85.0
1C83	N	27.0	10	5%	32.0	22.0	27.0
	E	68.0	12	30%	74.0	62.0	68.0
		75.5	3	0%	77.0	74.0	75.5
		83.0	12	40%	89.0	77.0	83.0
		90.5	3	0%	92.0	89.0	90.5
		98.0	12	50%	104.0	92.0	98.0
		105.5	3	0%	107.0	104.0	105.5

Table 4: Panels Exhibiting Excessive Gaps or Washouts

				% Boron			
Cell	Side	Elevation	Length	Remaining	Top	Bottom	Center
		112.5	11	70%	118.0	107.0	112.5
1B83	N	99.0	14		106.0	92.0	99.0
1C91	E	138.5	19	75%	148.0	129.0	138.5
		149.0	2	50%	150.0	148.0	149.0
		156.0	12	75%	162.0	150.0	156.0