C&D TECHNOLOGIES
Power Solutions

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11 November 1999

US Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Document Control Desk

C&D Technologies, Inc.; Nebraska Public Power; Final Report to C&D Public Safety Committee and NRC

NUPIC Audit of C&D Technologies, Inc.; Attica IN Facility

Dear Sirs;

On November 2-4, 1999 a NUPIC team of auditors led by Florida Power Corporation audited our Attica, IN facility. During the course of the audit they reviewed the latest 10CFR21 reportable occurrence. The NUPIC audit team expressed some confusion over a paragraph in the Executive Summary of the report which state '*In January 1997, C&D adopted requirements of 10CFR50 Appendix B as part of the Quality Manual. After these changes cells were manufactured as Safety Related, as opposed to dedicating them for Safety Related at the end of the process. At that time changes were made to the Quality Plan for Nuclear Safety Related products. Requirements for 'pot sample' alloy testing immediately prior, during and immediately after a run of Safety Related grids was one of the requirements that was added.*'

After the changes in 1997 an analysis of the pot alloy for calcium content (a 'bloom test') was run three times a shift to determine calcium content and make adjustments if necessary. This effectively gave us a reading at the beginning of the run, during the run and after the run so that we could bracket the results on grids cast for class 1E orders. During the audit, we discovered that in some cases where the casting run was limited to less than 2 hours, there was a test run at the beginning of the run but not 'during the run' or 'immediately after a run' because of the limited time spent casting. There was an analysis at the next scheduled test, which would have been 3 hours at the maximum.

In our opinion, this would not have affected the grids cast because of the short duration and the time it takes for the pot alloy content to significantly change. We will review the records of casting and assure that the subsequent bloom test did not show a significant change in the pot alloy content during the intervening period.

Pending investigation of the bloom test records for class 1E castings, from 1997 to September 1999, we do not feel that this will alter our conclusion on the original report.

On present production we are testing cast grids, sampled in accordance with ANSI/ASQC Z1.9-1993, for calcium content using an Optical Emission Spectrometer and accepting or rejecting on a lot basis for each casting run. The final parameters for the sampling criteria are being developed now and will be added to the Quality Test Plan as soon as they are finalized.

IE19

Sincerely,

Terry Kinden
Director Quality Assurance

Cc: Dr. Holden
Dr. Misra
P. Kambouroglou
B. Radecki
D. Brown
M. Guthrie
A. Williamson
G. Walker
file: QA7938

Attachments:
Nebraska Public Power; Final Report to C&D Product Safety Committee and NRC

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Nebraska Public Power

Final Report to C&D Product Safety Committee & NRC
Nebraska Public Power District
Cooper Nuclear Station
Customer PO # 95-60
C&D Invoice # 174184-01
(356) LCR-25

Submitted by: T. Kinden

10/4/99

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Executive Summary

On July 15th, Glenn Winans was contacted by NPPD (Nebraska Public Power District) and told that they had one cell that had fallen below their tech specs for voltage and ask to provide an emergency visit from a representative from C&D to review the batteries. Glenn visited the plant on July 16th along with the DC System Engineer and performed a walkdown inspection of every battery cell for both 125/250 Divisions I & II. This also included the 4 spare battery cells and the one cell removed from the 125A battery. Observations from Glenn's inspection are included within his trip report. Observations included positive plate growth, positive plate flaking and misaligned separators. One cell was returned on RMA # 74690 (TS# 99-74690) to the Battery Test Lab for analysis. Two additional cells were returned under RMA 11253 (TS# 99-75200) and nineteen cells are being returned under RMA 11256 (TS# 99-75201).

To date, 24 cells have passed through the Battery Test Lab and have completed capacity testing and analysis. The third cell, Work Order 65868 Cell #87 SN 37, failed at 56.5% of capacity. Teardown of the cell revealed a growth and a short due to plate processing which caused the cell to fail. Higher than expected growth was found in some of the positive plates. Three other cells (Work Order 65868 Cell #40 SN 30 and Work Order 65868 Cell #37 SN 33 and Work Order 65868 Cell86 SN38) have tested below full capacity at 94.0%, 94.5% and 90.1% respectively. All other cells have tested to greater than 100% capacity.

Cells have shown higher than expected grid growth for 4-year-old cells. Analysis of the grid alloy has shown high calcium (Ca) content in relation to the grid alloy specification. The high calcium content can account for the grid growth and for sedimentation that caused the short in cell #87. The amount of grid growth is correlated to the Ca content within the grid.

At the time the cells for this order were manufactured in Attica in August 1995, we manufactured the plate grids as commercial grade and later dedicated the entire cell assembly during final acceptance testing. Quality Control Check points and Quality Record keeping requirements were less stringent than they are today.

In January 1997, C&D adopted requirements of 10CFR50 Appendix B as part of the Quality Manual. After these changes cells were manufactured as Safety Related, as opposed to dedicating them for Safety Related at the end of the process. At that time changes were made to the Quality Plan for Nuclear Safety Related products. Requirements for 'pot sample' alloy testing immediately prior, during and immediately after a run of Safety Related grids was one of the requirements that was added.

Records of the 'Bloom Test' used to control the alloy during casting can not be located, so there has been no independent picture of the plant process during the manufacturing period. Based upon analysis of the grids from returned cells, control of the alloy was not sufficient at the time of manufacture.

All cells identified in the Field Service report with growth, and all cells that have been returned to the BTL for analysis have come from 5 work orders (65865, 65866, 65867, 65868 and 65869). All cells from these work orders have been identified as either being shipped to NPPD as part of the order, or having been scrapped in house. Through Field Service and Applications Engineering, there have not been any reports from any other customer of unusual growth in safety or non-safety related cells. The extent of the nonconformance appears to be limited to the order shipped to NPPD.

Growth within the grids is correlated to the percent calcium found within the alloy. With the exception of cell #87 which failed capacity, the positive plate active material does not show loss of contact with the grid and there has been less than expected peroxidation of the grid metal based on past experience with .03% Ca. The good contact between the grid and the active material accounts for the 100% and greater capacity performance. There has been little loss of grid metal through peroxidation so that structural strength remains, and seismic qualification should not be a problem.

Based on test results to date, the battery should continue to function for the next 36 months. However, not all the plates that should have been cast with high Ca content can be accounted for within the cells identified to date by NPPD and returned on RMA. This indicates a high probability that there are additional cells with Ca content high enough to promote rapid growth that have not been identified by NPPD. Although capacity test results indicate good performance that will probably continue until the cells can be replaced, it is recommended that NPPD adopt at least a monthly surveillance to look for growth, sedimentation build up, or downward voltage trends within a cell.

All cells have been accounted for within the work order that have exhibited high growth. However not all plates can be absolutely accounted for because there appears to be an intermixing of several populations of grids within the work orders. Because we cannot strictly account for all grids, this has been reported as a 10CFR21 reportable event to the NRC.

We have no evidence that these plates have affected any other utility besides NPPD.

It is recommended that all cells in the 4 strings, that have not already been replaced as part of the current RMA's be replaced during the next three years, which will cover the next two outages on an 18 month schedule.

Capacity Testing

All cells were tested at the 8-hour rate to 1.75 volts cutoff. Cells were discharged as received from NPPD and were on open circuit during transit from NPPD. Temperature correction was per C&D procedures and time of discharge was corrected while discharge rate was held constant.

Cell #	Work Order	Serial Number	Percent Capacity
7	65868	11	104.1
82	65865	7	108.6
87	65868	37	56.5
51	65867	2	102.0
15	65868	25	>107.6
8	65865	12	>107.6
47	65866	31	107.6
6	65865	8	108.6
11	65868	31	102.7
5	65865	9	104.4
Spare	44249	23	102.2
40	65868	30	94.0
37	65868	33	94.5
17	65866	32	104.5
18	65866	30	104.0
14	65866	33	104.4
87	65865	14	104.5
85	65865	13	107.5
120	65867	5	>112.0
3	65865	15	106.0
48	65868	57	108.4
88	65867	4	111.4
86	65868	38	90.1
47	65868	60	108.7

Alloy Analysis

Tests 1-4 were tested against the Ca/Sn/Al standard and are suspected to have tested slightly high for Ca and are not included within the table. The highest tested Ca level at .172 is among this group. The remaining tests were tested against the .03 Ca standard. Lugs from test samples were given to NPPD and were not available for retest. The test samples from the remaining RMA's will be tested against both the Ca/Sn/Al standard and the .03Ca standard to quantify the difference in results and if the difference is relevant they'll be added to these results.

Tests 6, 7 and 13 were re-tested and are not included. The retest results are within tests 7, 17 and 18 respectively.

Elimination of certain data points per the paragraphs above was done for clarity of information. Inclusion of the missing data points does not alter the overall picture of high Ca content within the positive grids as the failure mechanism.

The plates identified as 'bad' showed visible growth while those identified as 'good' did not show growth. All of the plates identified as 'bad' and showing visible growth have high Ca levels. All of the levels on the 'bad' plates are greater than .110% with the exception of test #33, which was .081%.

Two plates, #17 and #20 that were identified as 'good' had Ca levels of .081 and .076 respectively. Although these have not shown growth yet, it is expected that they will grow in time.

In general, the high Ca plates also have higher Sn content associated with them. The Sn content does not correlate well with the Ca content ($r^2 = 0.136$) other than the fact that the Sn is generally present along with the Ca. Ca/Sn ratios are well below those found in alloy. I do not believe that the incorrect alloy was placed in the pot. The Sn content may be accounted for from residual Sn content left from when the pot was dipped out and the alloy changed over.

sample	Spec	5	7	8	10	11	12	14
condition		good	bad	neg	bad	good	bad	bad
retest		test	test	test	test	test	test	test
site					site 8	site 51	site 51	site 47
cell #		cell 87	cell 87	cell 87		cell 2	cell 2	
comment 1	M-5							
comment 2	RL-72							
Ca	.025 -.035	0.0330	0.1200	0.0990	0.1140	0.0350	0.1150	0.1120
Sr	.0020 max	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
Mg	.0020 max	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
Cu	.0020 max	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0003
Bi	.0150 max	0.0001	0.0002	0.0006	0.0005	0.0005	0.0005	0.0005
Ag	.0025 max	0.0003	0.0006	0.0007	0.0011	0.0006	0.0010	0.0001
Fe	.0020 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ba	.0020 max	0.0004	0.0004	0.0006	0.0002	0.0001	0.0002	0.0001
Sb	.0005 max	0.0002	0.0003	0.0004	0.0005	0.0003	0.0003	0.0003
As	.0005 max	0.0001	0.0002	0.0004	0.0004	0.0001	0.0000	0.0005
Sn	.0050 max	0.0000	0.0000	0.0000	0.0045	0.0000	0.0044	0.0041
Zn	.0002 max	0.0000	0.0006	0.0008	0.0000	0.0000	0.0000	0.0000
Cd	.0005 max	0.0000	0.0000	0.0000	0.0002	0.0002	0.0002	0.0002
Ni	Not listed	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003

sample	Spec	15	16	17	18	19	20	21
condition		good	bad	good	good		good	good
retest		test	test	test	test	test	test	test
site		site 15	site 15	site 8	site 47		site 11	site 5
cell #		cell 25	cell 25			cell 23	cell 32	cell 9
comment 1	M-5							
comment 2	RL-72							
Ca	.025 -.035	0.0290	0.1110	0.0810	0.0310	0.0330	0.0760	0.0310
Sr	.0020 max	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0000
Mg	.0020 max	0.0000	0.0001	0.0001	0.0000	0.0000	0.0001	0.0000
Cu	.0020 max	0.0000	0.0003	0.0003	0.0000	0.0000	0.0005	0.0000
Bi	.0150 max	0.0005	0.0005	0.0004	0.0004	0.0003	0.0003	0.0003
Ag	.0025 max	0.0007	0.0009	0.0007	0.0005	0.0007	0.0008	0.0005
Fe	.0020 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ba	.0020 max	0.0001	0.0002	0.0001	0.0001	0.0002	0.0001	0.0001
Sb	.0005 max	0.0003	0.0003	0.0001	0.0002	0.0001	0.0002	0.0002
As	.0005 max	0.0002	0.0001	0.0003	0.0001	0.0004	0.0002	0.0002
Sn	.0050 max	0.0000	0.0050	0.0045	0.0000	0.0000	0.0380	0.0000
Zn	.0002 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cd	.0005 max	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002
Ni	Not listed	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

sample	Spec	22	23	24	25	26	27	28
condition		bad	good	bad	good	good	bad	good
retest		test	test	test	test	test	test	test
site		site 5	site 6	site 6	site 11	sn 30	sn 30	sn 32
cell #		cell 9	sn 8	sn 8	cell 31	cell 40	cell 40	cell 17
comment 1	M-5							
comment 2	RL-72							
Ca	.025 -.035	0.1130	0.0310	0.1120	0.0840	0.0350	0.1200	0.0350
Sr	.0020 max	0.0001	0.0000	0.0001	0.0001	0.0000	0.0001	0.0000
Mg	.0020 max	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
Cu	.0020 max	0.0003	0.0000	0.0003	0.0002	0.0000	0.0003	0.0000
Bi	.0150 max	0.0004	0.0003	0.0004	0.0005	0.0003	0.0003	0.0003
Ag	.0025 max	0.0009	0.0005	0.0010	0.0008	0.0006	0.0008	0.0006
Fe	.0020 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ba	.0020 max	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	0.0002
Sb	.0005 max	0.0002	0.0003	0.0002	0.0003	0.0000	0.0000	0.0000
As	.0005 max	0.0004	0.0002	0.0002	0.0001	0.0000	0.0000	0.0000
Sn	.0050 max	0.0045	0.0000	0.0045	0.0021	0.0000	0.0046	0.0000
Zn	.0002 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cd	.0005 max	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Ni	Not listed	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

sample	Spec	29	30	31	32	33	34	35
condition		bad	good	bad	good	bad	good	bad
retest		test	test	test	test	test	test	test
site		sn 32	sn 33	sn 33	sn 30	sn 30	sn 33	sn 33
cell #		cell 17	cell 37	cell 37	cell 18	cell 18	cell 14	cell 14
comment 1	M-5						65866	65866
comment 2	RL-72							
Ca	.025 -.035	0.1260	0.0360	0.1210	0.0400	0.0810	0.0370	0.0370
Sr	.0020 max	0.0001	0.0000	0.0001	0.0000	0.0001	0.0001	0.0001
Mg	.0020 max	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Cu	.0020 max	0.0003	0.0000	0.0003	0.0003	0.0005	0.0000	0.0000
Bi	.0150 max	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003
Ag	.0025 max	0.0008	0.0006	0.0008	0.0005	0.0007	0.0005	0.0005
Fe	.0020 max	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ba	.0020 max	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Sb	.0005 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
As	.0005 max	0.0000	0.0000	0.0000	0.0001	0.0000	0.0002	0.0003
Sn	.0050 max	0.0051	0.0000	0.0054	0.0000	0.0059	0.0000	0.0000
Zn	.0002 max	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cd	.0005 max	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Ni	Not listed	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

sample	Spec	36	37	38	39
condition		good	bad	good	good
retest		test	test	test	test
site		sn 14	sn 14	sn 13	sn 13
cell #		cell 85	cell 85	cell 87	cell 87
comment 1	M-5	65865	65868	65865	65865
comment 2	RL-72			samp 1H	samp 2
Ca	.025 -.035	0.0280	0.0940	0.0200	0.0200
Sr	.0020 max	0.0001	0.0001	0.0001	0.0001
Mg	.0020 max	0.0001	0.0001	0.0001	0.0001
Cu	.0020 max	0.0000	0.0004	0.0000	0.0000
Bi	.0150 max	0.0002	0.0003	0.0002	0.0003
Ag	.0025 max	0.0005	0.0007	0.0006	0.0006
Fe	.0020 max	0.0000	0.0000	0.0000	0.0000
Ba	.0020 max	0.0002	0.0002	0.0002	0.0002
Sb	.0005 max	0.0000	0.0000	0.0000	0.0000
As	.0005 max	0.0005	0.0004	0.0003	0.0005
Sn	.0050 max	0.0001	0.0067	0.0000	0.0000
Zn	.0002 max	0.0000	0.0002	0.0000	0.0000
Cd	.0005 max	0.0002	0.0002	0.0002	0.0002
Ni	Not listed	0.0003	0.0003	0.0003	0.0003

Quality Control

The PbCa pots are to be monitored and controlled by use of the bloom test taken by the pot tender every two hours. The results from the bloom test are to be logged and the log is identified as a quality record.

This was either not done, or not done properly, to control the alloy content during the manufacture of the grids from the returned cells.

The bloom test records for production during this period cannot be located. Without the bloom test records it's unlikely that we will be able to ascertain exactly what happened in the plant during the manufacture of the grids, except to determine that excess calcium was introduced to the pot and to the grids.

Alloy control was inadequate during the manufacturing process and record keeping has been inadequate to maintain the records since the time of manufacture.

The bloom test is used as a quick test on the manufacturing floor that can be used to control the pot with a quick turn around of results. However the test can be misread without considerable experience in reading the results and needs to be verified on a periodic basis by use of either ICP (Intercoupled Plasma Spectrometer) or OES (Optical Emission Spectrometry).

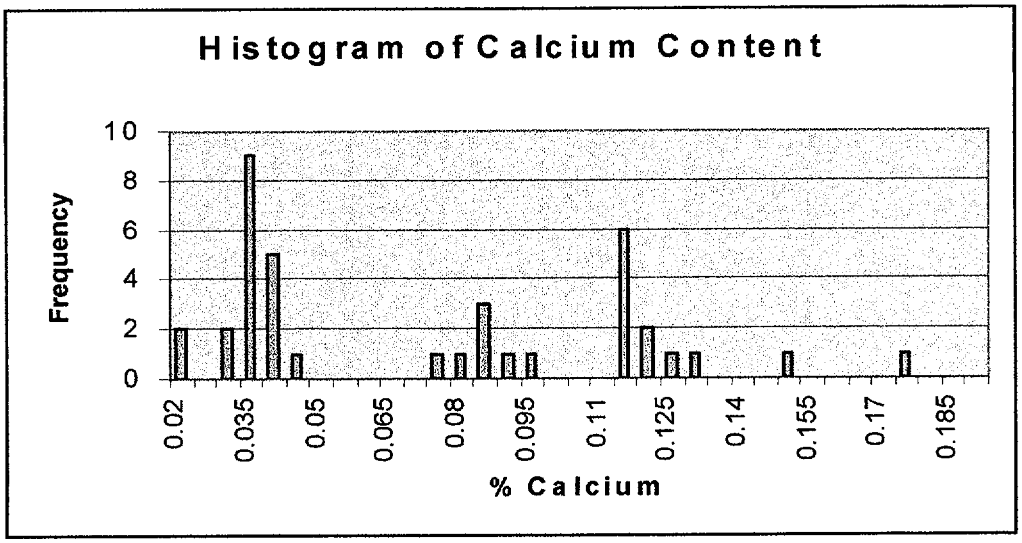
In 1997, the quality plan for Nuclear Safety Related cells was changed so that in addition to the bloom tests, pot samples were taken prior to the beginning of a casting, during and again at the end of casting, to bracket the casting run. The pot samples are submitted to the MTL for analysis on the OES.

NPPD has requested that we take a sample of grids during the casting run. The sample would be based on a sampling plan drawn from ANSI Z-1.9; Sampling by Variables. The samples will then be analyzed on the OES to verify the alloy content. We will adopt this as part of the quality plan in place of the bracketed samples taken now.

In 1997 we also made the change that copies of the bloom test record are maintained as part of the nuclear documentation package. This is in addition to the normal plant quality records. This should improve record keeping on any orders after 1997.

Alloy Control

Analysis of how the Ca content got so high needs to address both the high Ca content and the Sn content found within the alloy analysis.



The distribution of the alloy content indicates that there were at least two and possibly three populations of grids mixed within the cells and an intermixing of grids. The lower population is in the .025 - .045% range and still would have been slightly high for Ca. The upper population is from .115 - .175% and represents the high growth plates. There is an intermediate population centered at approx. .09% calcium where there have been mixed results on grid growth.

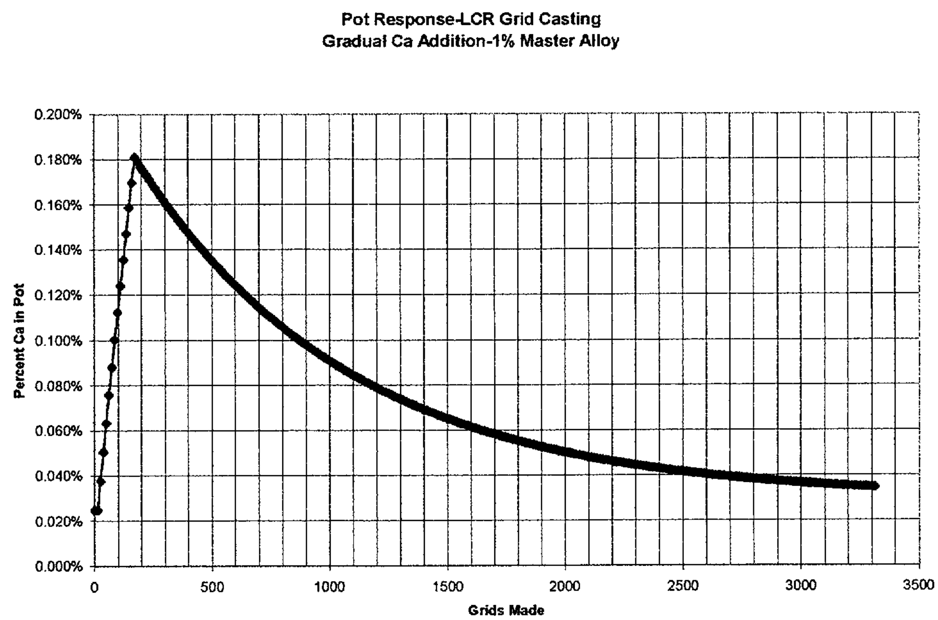
It is common practice at Attica, because of the need to hand feed grids at the pasting operation, to feed from two stacks of grids on either side of the pasting machine and to intermix grids, first one taken from the right skid, and then one from the left. This practice could easily intermix grids within a set of cells and give the distribution seen.

Because of the Sn content within the grid analysis there has been speculation that a Ca/Al/Sn negative alloy might have been used to cast the positive grids. The negative grid alloy at the time the grids were manufactured was M-56, List 605, RL-186 alloy with a Ca content of .058 - .068% and a Sn content of .55 - .61%. The highest Sn content within the analyzed grids is .0067% and only about 1% of the negative alloy content. Al was not sampled for during the grid analysis. It does not follow that the negative alloy could have been used.

A more likely scenario is that the correct alloy (M-5, List 3, RL-72) was used but that the bloom test was either misread or miscalculated and that excessive 1% Ca master alloy was added to the pot in an attempt to bring the Ca content of the pot up.

In addition to how the Ca content got up so high, we must also address why alarms did not go off when subsequent bloom tests were taken, and should have shown high Ca levels. There is no good explanation for how this could have happened if procedures were followed and the calculations were correct. Review of the bloom test has shown weaknesses within the practice in the plant that must be addressed. This includes insufficient review by QA and supervision to verify the procedures and calculations and the failure of the plant to used weighed amounts of master alloy to adjust the pots. Pot tenders are reported to adjust the pots 'by experience' and to melt off portions of a 60# pig to make adjustments.

Without the missing records, there is no way to know for certain what specific mistake was made in adjusting the pot and why the high levels of Ca were not picked up on subsequent 2 hourly tests. Regardless of how this happened, we know from the grid analysis that the Ca content was high. Present procedures would catch this and be part of the nuclear documentation package for records.



The graph above models the rise of Ca level within a 4500 lb pot of lead when 1% Ca master alloy is added to the pot and then the subsequent dilution of the Ca level when .03Ca alloy is again added to the pot. The model makes the assumptions that master alloy is added to the pot when the lower specification limit of .025% Ca is reached, and adds sufficient master alloy to reach .180% Ca (slightly higher than the highest levels seen in analysis of the grids). The pot is then diluted as the alloy in the pot is utilized in casting grids, and new .03% Ca alloy is added to maintain the pot level.

The model shows that the Ca level would rise rapidly and then dilute rapidly in the beginning, leveling off as the alloy in the pot approached the Ca content in the .03% Ca alloy being added. Because the model goes to .18% which is higher than the highest reading seen to date (.17% Ca) this should be a conservative model. All grids that have shown growth to date have been greater than .10% Ca. The model shows that we would have cast about 800 grids at this level or higher. Approx. 3500 grids would have been cast in total.

Conclusions

1. High Ca content within positive grids has lead to accelerated growth. In plates at the NPPD Cooper facility Ca content above 0.1% is showing visible growth even though in most cases, there has not been a loss of contact between the grid and the active material leading to capacity failures or shorts because of sedimentation.

2. Modeling of the rise of Ca content within the pot and subsequent dilution predicts that there should be approx. 800 grids that were cast with greater than 0.10% Ca content at which point there is visible growth. 800 Grids would make 67 cells, if all of the plates were high Ca. There is evidence from the distribution of Ca content that at least two and possibly three populations of grids are present within the returned cells and that the plates were intermixed within a cell. This raises the possible number to two or three times the 67 possible cells that may have plates containing higher than 0.10% Ca. Only 22 cells have been returned on RMA so far, leading to the strong probability that there are more cells within NPPD that contain high Ca and are likely to exhibit growth.

3. Based upon the probability that there are additional cells that have not been isolated within NPPD, we need to recommend an increase in surveillance from quarterly to monthly to look for growth, sedimentation build up, or a trend in voltage loss on a cell.

4. Cells with very high calcium content have been identified and removed under the present Return Material Authorization (RMA). Remaining cells should be replaced over the next 36 months.

5. All cells reported for high growth, have been within 5 work orders and all cells within these work orders are accounted for within the NPPD order or plant scrap. There is no evidence that any other utility is affected. Other utilities that were shipped cells containing these plate types between June 1995 and February 1997 have been notified. A list of notifications is contained in attachment 1.

6. The quality plan for Safety Related cells needs to be revised to include a sampling of grids based upon ANSI Z-1.9 Sampling Procedures for Variables in addition to the bloom test. The bloom test can be used for immediate pot control with quick feed back to the operator, while the sampling of grids and analysis by OES will be used for final QC release of grid lots for Safety Related orders.

7. The bloom test is described in Material Test Procedure LT-6 and appears to be adequate.

Appendix 1

List of Utilities, which received cells with LCR, LCU or LCUN plates between July 1995 and February 1997.

Utility	Plant	Battery	C&D Order No.	Date Shipped	Notification Address
CP&L	Shearon Harris	(60) LCR-19 (120) LCR-19 (122) LCR-33	0226454-01 0165742-01 0185773-01	01/17/97 7/18/95 2/29/95	Carolina Power & Light Co Department Manager Harris Nuclear Project State Road 1134 (P.O. Box 165) New Hill, NC 27562
Consumers Power	Palisades	(122) LCR-25	0168608-02	07/18/95	Consumers Power Co. Procurement Engineering Supervisor Palisades Generating Plant 27780 Blue Star Memorial Hwy Covert, MI 49043
Entergy Operations Inc.	Arkansas Nuclear One	(6) LCR-21	0230058-01	01/10/97	Entergy Operations, Inc. Arkansas Nuclear One 1448 State Road 333 Russellville, AR 72801 Attn: Manager, Industry Events Review
Entergy Operations, Inc.	Grand Gulf	(1) LCR-33 (60) LCR-33 (4) LCR-31 (1) LCR-33	0200024-01 0205675-01 0212414-01 0212413-01	05/8/96 08/16/96 10/2/96 08/16/96	Entergy Operations, Inc. Manager, Quality Services Box 756 Port Gibson, MS 39150

Utility	Plant	Battery	C&D Order No.	Date Shipped	Notification Address
Florida Power Corp.	Crystal River	(1) LCR-25	0191060-01	2/15/96	Florida Power Corp. Attn: Purchasing /Contracting SA2F Crystal River Energy Complex 15760 W. Powerline St. Crystal River, FL 34428-6708
Georgia Power	Vogtle	(2) LCR-31	0177434-01	11/16/95	Southern Nuclear Operating Co. Vogtle Project Manager Nuclear Engineering and Licensing PO Box 1295 Birmingham, AL 35201
Nebraska Public Power District	Cooper	(356) LCR-25	0174184-01	09/18/95	Nebraska Public Power District Cooper Nuclear Station PO Box 98 Brownville, NE 68321 Attn: OER Program Administrator Attn: IRC Supervisor Attn: Vendor Manual Specialist
Niagara Mohawk Power Corp.	9 Mile Point	(122) LCR-33	0195703-01	1/14/97	Niagara Mohawk Power Corp. Attn: Procurement Engineering, P Bldg. Nine Mile Point Unit 2 PO Box 63 Lycoming, NY 13093
PG&E	Diablo Canyon	(126) LCR-25 (60) LCUN-33 (60) LCUN-33	0155703-01 0161621-01 0188000-01	8/21/95 8/18/95 3/29/96	Pacific Gas & Electric Co. Manager, Quality Assruance Diablo Canyon Power Plant PO Box 56 Avila Beach, CA 93424
PP&L	Susquehanna	(5) LCR-25 (6) LCR-25 (1) LCR-25	0200031-01 0171742-01 0192714-01	6/10/96 8/29/95 2/22/96	Pennsylvania Power & Light Co. Supervising Engineer – NQA Two North Ninth St. Allentown, PA 18101

Utility	Plant	Battery	C&D Order No.	Date Shipped	Notification Address
PECO Energy	Limerick	(88) LCR-21 (14) LCR-21 (31) LCR-21 (15) LCR-21	0212084-01 0189004-02 0197760-01 0227827-01	10/25/96 4/19/96 11/19/96 12/16/96	PECO Energy Co. Attn: Procurement Engineering Limerick Generating Station PO Box 2300 Pottstown, PA 19464-0920
PSE&G	Salem	(2) LCR-33	0167410-01	7/11/95	Public Service Electric & Gas Co. Procurement Assessment Manager PO Box 236, Mail Code W04 Hancocks Bridge, NJ 08038
Taiwan Power	Chin Shan	(120) LCR-33 (50) LCR-29 (40) LCR-15	0191852-01 0223837-01 0223217-01	4/19/96 1/6/97 12/31/96	Taiwan Power Co. Director, Supply Department 242 Roosevelt Rd., Section 3 Taipei 100 Republic of China