United States Senate

WASHINGTON, D.C. 20510

August 18, 1982

Mr. Carlton Kammerer, Director
Office of Congressional Affairs
Nuclear Regulatory Commission
1717 H Street, N.W.
Washington, D.C. 20555

Dear Mr. Kammerer:

Because of the desire of this office to be responsive to all inquiries and communications, your consideration of the attached is requested. Your findings and views, in duplicate form, will be greatly appreciated.

Please reference our file number, 2230500013, and return the attached copy of my constituent's letter with your response.

Thank you for your assistance in this regard.

Sincerely,

Charles H. Percy
United States Senator

CHP/cd

Enclosure

REPLY TO: Office of United States
Senator Charles H. Percy
4321 Dirksen Senate Office Bldg.
Washington, DC 20510

OUR FILE: 2230500013

8/26...To ~~OCA~~ DPO for Direct Reply...Suspense: Sept. 2...ORIGINAL to Docket...82-0884.

8-9-82

Dear Senator Percy:

Enclosed please find a copy of a letter that I recently sent to U.S. representative Thomas Corcoran which I believe is self explanatory.

Mr. Corcoran seems to lack interest in our local well being. How do you feel about the LaSalle station problem? And what are you willing to do to help?

Sincerely,

Chas. A. Sanders Jr.

Charles A. Sanders Jr.
P.O. Box 392
Ottawa, Illinois
61350

Rep. Thomas Corcoran
1107 Longworth Bldg
Washington D.C.
20510

August 3, 1982

Dear Mr. Corcoran:

On June 1, 1982 I met with you and asked you to intercede on behalf of the local citizens to create a public hearing on allegations of construction improprieties at LaSalle Station Nuclear Power plant and also to allow public access to the investigation of same by the Nuclear Regulatory Commission. You declined and stated you would reserve judgement until the NRC findings were complete.

After reading the entire final report by the NRC my initial feelings have only been reinforced. The nearly 100 pages of the formal investigation with supporting documents obviously points to the fact that the NRC made little more than a thorough review of Commonwealth Edisons documentation. Any actual investigation involving physical, chemical or other retesting was miniscule in scope and sampling techniques specifically ignored problem areas.

Continued reference was made to structural integrity while other issues were ignored.

Questions such as discontinuity of concrete in areas of the pedestal other *than* those actually encountered: permiability of the containment structure due to disruption of the temperature steel: cloride ion attack of the reinforcing steel other than the screenhouse were never even approached.

The final blow has been the exposure of fraudulent documentation by an "HVAC" subcontractor after the NRC closed the investigation yet had prior knowledge of problems with this subcontractor. All of this comes on the heels of Commonwealth Edison being allowed to achieve criticality in April which barred access to portions of the plant needed for an objective investigation.

Valauable time has been lost because of the lack of initiative by public officials. We insist that you take action immediately to protect the lives of those that could be affected by a major failure of thhis plant.

Immediate cessation of power with appropriate decontamination and dismantling should be undertaken to allow for the thoroughest of examinations. We suggext that public access be provided through the use of the "Government Accountability Project" as an intermediary.

Sincerely,

Charles A Sanders Jr.

Charles A Sanders Jr.
Illinois River Valley Alliance
Ottawa Illinois 61350

P.O. Box 392

IE HQ FILE COPY

JUL 19 1982

Docket No. 50-373
Docket No. 50-374

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the special safety inspection conducted by Mr. I. N. Jackiw, and others of the Region III and NRR staffs during May through July 1982, of activities at LaSalle County Nuclear Power Station, Unit 1, authorized by NRC Operating License No. NPF-11.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, interviews with personnel, and special tests.

This special inspection was conducted in response to several allegations regarding the adequacy of construction at the LaSalle Station. The enclosed report is limited to the identification and resolution of technical issues. Further inspection and/or investigation activities will be conducted to determine compliance with regulatory requirements and the extent of possible records falsification. Appropriate enforcement action will be initiated separate from this report.

Subsequent to preparation of the attached report, plans were made to hold a meeting with organizations who had provided the Region III staff with specific allegations that had been referred to them. During a telephone conversation with a representative of the Government Accountability Project on July 15, 1982, the Regional Administrator was advised that the staff had been provided with information regarding the Heating, Ventilation and Air Conditioning (HVAC) Company's work at LaSalle. Such information had not been pursued during the special inspection.

IE01

It was subsequently learned that on May 3, 1982, an individual came to the Region III office with allegations regarding operations of the HVAC Contractor. His allegations were considered by the staff to be general in nature and primarily directed at the company's activities at the Midland site. Subsequently, he provided specific records to the Region III staff. These were reviewed, and identified for followup at a later date.

Separately, another individual had been contacted by the staff who also claimed to have allegations regarding the HVAC Contractor's activities at LaSalle. (This individual's name had been provided to the staff during a June 2, 1982 meeting in the Region III office.) However, the only written information received by Region III from this individual pertained to problems at the Midland site, and no information was received by telephone or in writing specific to LaSalle. Consequently, the special inspection, as documented in the attached report, did not include any review of the HVAC Contractor's activities.

Following a review on July 16, 1982, of the information received earlier, it is our conclusion that no reason exists to preclude the LaSalle Unit 1 from going beyond zero power. We plan to pursue the details further, and will report our findings in a subsequent report. If our further inspection identifies problems of safety significance, appropriate regulatory action will be taken.

In conclusion, it is the staff's view that LaSalle Unit 1 can be operated above zero power. This recommendation is being made to the Office of Nuclear Reactor Regulation. It should be clear, however, that no action on your part is authorized until NRR has appropriately amended your operating license.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/s/ James G. Keppler

James G. Keppler
Regional Administrator

Enclosure: Inspection Reports
No. 50-373/82-35(DETP) and
No. 50-374/82-06(DETP)

cc w/encl:
Louis O. DelGeorge, Director
of Nuclear Licensing
D. L. Shamblin, Site
Construction Superintendent
T. E. Quaka, Quality
Assurance Supervisor
R. H. Holyoak, Station
Superintendent
B. B. Stephenson, Project Manager
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
Karen Borgstadt, Office of
Assistant Attorney General
Judith S. Goodie, Assistant
Attorney General
Bridget Little Rorem, Illinois
Friends of the Earth
T. Devine, Government Accountability
Project

RIII	RIII	RIII	RIII
Nobelius/jp	Davis	Keppler	Spessard
7/16/82	7/18/82	7/19/82	for ALS

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

IE HQ FILE COPY

Report No. 50-373/82-35(DETP); 50-374/82-06(DETP)

Docket No. 50-373; 50-374 License No. NPF-11; CPPR-100

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: LaSalle Nuclear Power Station, Units 1 and 2

Special Inspection At: LaSalle Site, Marseilles, Illinois
Sargent and Lundy, Chicago, Illinois

Inspection Conducted: May 25 - July 11, 1982

Inspectors who conducted the inspection activities are identified at the beginning of each appropriate Section of the report details.

Approved By: I. N. Jackiw, Chief
Test Program Section

C. E. Norelius for I.N.J.

Inspection Summary

Inspection on May 25 - July 11, 1982 (Report No. 50-373/82-35(DETP); 50-373/82-06(DETP))
Areas Inspected: Special inspection to follow up on allegations/concerns regarding construction deficiencies at the LaSalle County Site. The inspection involved a total of 1,580 inspector-hours on site by several NRC inspectors.
Results: Thirty-six separate allegations of varying significance were identified. Of these, twenty required prompt consideration regarding the operation of Unit 1; others will be considered later; some require no further NRC action. This report describes allegations, findings and the resolution of the technical issues. Any enforcement action which may result from further inspection/investigation activity will be handled separately.

SUMMARY AND CONCLUSION

As a result of allegations received in Region III by telephone, a request to institute a Show Cause Order from the Attorney General, State of Illinois, on March 24, 1982, a further 10 CFR 2.206 request received from Illinois Friends of the Earth on April 28, 1982, and an amended petition from the Attorney General, State of Illinois, on May 3, 1982, a special inspection was conducted into alleged inadequacies in construction of the LaSalle nuclear facility. As part of this inspection, individuals who filed affidavits with the above referenced petitions and others whom they identified as having pertinent information were contacted. Additional concerns identified during those interviews were also addressed during this inspection.

From the affidavits and statements of those interviewed, thirty-six separate alleged problems were identified. Site tours were conducted with several individuals to identify specific areas of concern. The allegations were categorized by the NRC staff as matters requiring prompt resolution prior to the operation of the Unit 1 facility (Category 1), those matters which require followup on a longer time frame, but have no direct impact on the operation of Unit 1 (Category 2), and those matters which do not require further NRC involvement (Category 3).

Twenty of these allegations were considered to be Category 1 items. Some of the allegations were not substantiated. For several others, the facts stated by concerned individuals were correct; however, these were found to be acceptable when the entire system of controls was examined. One allegation relating to improper site security resulted in finding violations of the licensee's security requirements. These matters were brought to the licensee's attention and promptly corrected. One allegation of falsification of certain calibration records by a site contractor was substantiated. Technical problems resulting from this finding were identified, engineering assessments were made, and a corrective action program was defined and undertaken by the licensee.

Of those matters which were considered important to the operation of Unit 1, all have been pursued to the extent that they were either found not to present a problem to public health and safety, or further licensee action has been defined and completed to provide similar assurance. The staff concludes that with regard to the matters addressed in this report, there are no remaining technical issues to preclude the licensee from operating Unit 1 above zero percent power.

DETAILS

Persons Contacted

Commonwealth Edison Company

C. Reed, Vice President
L. O. DelGeorge, Director of Nuclear Licensing
J. J. Maley, Manager of Projects
T. E. Quaka, Site QA Superintendent
R. T. Rose, Lead Structural Engineer
C. Schroder, Nuclear Licensing
D. L. Shamblin, Staff Assistant Project Manager
W. J. Shewski, Manager of QA
D. J. Skoza, QA Engineer
B. B. Stephenson, Project Manager
G. Marcus, Director of QA

Sargent and Lundy (S&L)

R. J. Mazza, Project Director
H. S. Taylor, Head, Quality Assurance Division
E. R. Kurtz, Supervisor, Project Section, QC Division
M. E. Schuster, Head, Quality Control Division

Walsh Construction Company

M. R. Dougherty, QA Manager

Morrison Construction Company

K. J. Hamilton, Project Manager
T. G. O'Conner, Superintendent
M. Wherry, QC Supervisor

Numerous other licensee and contractor staff members were interviewed during the course of this inspection.

Background Information

In early 1982, the Region III office received allegations regarding construction activities at the LaSalle Nuclear facility. Two of these allegations related to (1) inadequate roof slab thickness for the offgas building, and (2) improper coring and drilling of holes in the walls of safety related structures. The Region III staff concluded that the offgas building was not a safety related structure, and therefore no action was taken. The staff concluded, however, that the allegation regarding concrete coring and drilling activities merited further investigation. An onsite inspection was initiated on March 24, 1982, into the coring and drilling program requirements of the licensee and its principal electrical contractor, the H. P. Foley Company.

Also, on March 24, 1982, the Attorney General for the State of Illinois initiated a request to institute a Show Cause Proceeding under the provisions of 10 CFR 2.206. This petition covered the same two concerns identified above regarding the offgas building and coring and drilling activities. Attached to that request were two affidavits. One was from a laborer who related his activities in drilling holes at the site. The second affidavit was from a consultant who stated that the coring and drilling activities which damaged reinforcing steel could weaken the structure if not properly controlled.

Because the Region III office had made the initial determination not to look into concerns regarding the thickness of the concrete roof slab on the offgas building, it was determined that the NRC's Office of Inspection and Enforcement would independently review this matter. The Office of Inspection and Enforcement completed its review on April 14, 1982. They agreed with the initial Region III assessment that the offgas building was a non-safety related structure. However, they also pursued the question of the roof slab thickness, and found that the roof was built as designed with the proper thickness.

The Director of NRC's Office of Nuclear Reactor Regulation requested a meeting with the licensee and its architect engineer, Sargent and Lundy, on March 31, 1982 to discuss their programs for determining that their coring and drilling activities did not unduly weaken facility structures.

NRR and the Region III staff began a technical assessment of the report provided at the meeting by the licensee and Sargent and Lundy. An inspection at Sargent & Lundy to review engineering judgment and calculations which had been performed with regard to damaged reinforcing steel, was performed on April 8, 1982. As a result of the initial look at the programs of Commonwealth Edison and Sargent & Lundy, a report was issued by Region III (Inspection Report No. 50-373/82-21) on April 27, 1982.

On April 28, 1982, the Illinois Friends of the Earth issued an additional request to institute a proceeding to Show Cause and provided four additional affidavits which contained additional allegations of improper construction practices at the LaSalle facility. The same issues were addressed in an amended petition from the Attorney General, State of Illinois, by letter dated May 3, 1982.

A special inspection was initiated to review the allegations made in the affidavits and by additional individuals whose names were obtained from the affiants, the Illinois Attorney General's office, the Illinois Friends of the Earth and the Government Accountability Project. A meeting was held with these groups on June 2, 1982 to assure that the Region III staff's understanding of their concerns was accurate and complete. Additional names of individuals who had expressed concern about activities at LaSalle were provided during this meeting.

Interviews were conducted with concerned individuals. Based on these interviews and the statements provided, 36 separate issues were defined. The allegations and concerns ranged considerably in detail and safety

significance. Several items were alleged to have occurred as early as 1975.

The Region III staff decided to categorize these issues such that resolution of the safety significant issues affecting Unit 1 operation would receive top priority.

Category 1 matters are those needing prompt resolution prior to power operation; Category 2 matters were judged to require followup, but on a longer time frame; and Category 3 matters require no further action by the NRC staff. Category 2 matters included allegations relating to Unit 2, personnel matters, and activities that did not have an immediate safety impact. Category 3 matters included allegations which were too general to pursue, involved non-safety related systems or are subject to other regulatory jurisdictions. The summary of the items and category of each are set forth in Attachment A to this report.

Allegations/Concerns

The remainder of this report shows the Category 1 allegations and the NRC findings for each. (The details are separated by Sections based on the individual inspectors who reviewed the concerns. A single Section may address more than one allegation.

SECTION I

Prepared by: F. C. Hawkins C E Norelius for FCH

J. H. Neisler C E Norelius for JHN

S. P. Chan C E Norelius for S.P.C

J. R. Kniceley J R Kniceley

1. Drilling/Coring in Concrete

Generally, concerns were expressed regarding indiscriminate concrete coring and drilling, and inadequate implementation of the site contractors' drilling and coring quality control programs at the LaSalle site.

The specifics regarding these subjects were received by the NRC over the period March 24-May 26, 1982. The results of our initial investigation into the concerns are documented in Inspection Report No. 82-21. Subsequent to the issuance of Inspection Report No. 82-21, the Illinois Attorney General's Office provided the NRC additional affidavits regarding alleged improper concrete drilling and coring activities. In order to fully address the new concerns, the scope of the previous inspection effort was expanded to include all site contractors who performed drilling or coring work at LaSalle.

The purpose of this inspection was to determine the adequacy of the site contractor's programs to control and document concrete drilling and coring activities. This inspection included detailed review of drilling/coring procedures, personnel interviews, observation of in-process work, and review of quality records pertaining to work performed by Walsh Construction Company, Reactor Controls, Inc., Commonwealth Electric Company, Mid-City Architectural Iron Company, H.P. Foley Company, Commercial Concrete Drilling and Sawing Company, Morrison Construction Company, and the Zack Company.

Previously, the acceptability of the Sargent and Lundy program to assimilate and properly assess the field supplied drilling data and to properly control and assess the structural effects of concrete drilling and coring was determined by NRR and Region III on April 8, 1982. The summary evaluation prepared by the Structural Engineering Branch, NRR, is included as Attachment B to this report. The results of the field inspection are documented in Inspection Report No. 82-21 shown as Attachment C to this report.

All available correspondence and documentation regarding the issue was reviewed. This included the following:

- Petition by the People of the State of Illinois by Tyrone C. Fahner, Attorney General, State of Illinois, pursuant to 10 CFR 2.206, dated March 24, 1982.

- Transcript, U.S. Nuclear Regulatory Commission, Docket Nos. 50-373 and 50-374, Room P-422, 7920 Norfolk Avenue, Bethesda, Maryland, March 31, 1982.

- Commonwealth Edison Company submittal of March 31, 1982, entitled "Response to Petition Made by the Office of the Attorney General, State of Illinois, In the Matter of Reinforcing Steel Damaged During the Installation of Cored Holes and Concrete Expansion Anchors."

- Filing by the Illinois Attorney General Office, entitled "Comments of the People of Illinois on Commonwealth Edison Company's Presentation of March 31, 1982", dated April 13, 1982.

- Filing by the Illinois Attorney General's Office, entitled "Amendment to Request for Show Cause Proceding", dated May 3 1982.

- Commonwealth Edison Company submittal of May 7, 1982, entitled "Final Report in Response to Petition Made by the Office of the Attorney General, State of Illinois, in the Matter of Reinforcing Steel Damaged During the Installation of Cored and Drilled Holes and the Matter of the Off-Gas Building Roof for LaSalle County, Units 1 & 2."

- Commonwealth Edison Company submittal of May 18, 1982, entitled "Report in Response to Amended Petition dated May 3, 1982 Made by the Office of the Attorney General, State of Illinois, in the Matter of Reinforcing Steel Damaged During the Installation of Cored and Drilled Holes for LaSalle County, Units 1 & 2."

- Letter from the Illinois Attorney General's Office to Mr. H. Denton, Director of Nuclear Reactor Regulation, dated May 26, 1982.

The March 24, April 13, May 3, and May 26, 1982 transmittals from the Illinois Attorney General's Office were reviewed to identify specific items of concern dealing with concrete drilling and coring activities. Paragraphs 1. through 4. of this section identify those items, as understood by the NRC, and the results of our investigation into each. Paragraph 5. reports the results of interviews conducted with personnel knowledgeable of drilling and coring activities at LaSalle. Paragraph 6. documents the results of a review of procedures for LaSalle contractors engaged in drilling or coring activities. Paragraph 7. reports on field inspection of in-process coring activities and the inspection of cores which were retained from previous coring work.

1. <u>March 24, 1982 Filing by the Attorney General of the State of Illinois</u>

   This transmittal contained an affidavit from Mr. E. Garrison, which the Attorney General believes alleged certain shortcomings with Commercial Concrete Sawing and Drilling Company's (an

H.P. Foley Company subcontractor) concrete drilling and coring program. During their tenure at LaSalle, Commercial Concrete Drilling and Sawing Company used the Foley procedures and Sargent & Lundy Specification LS-CEA to accomplish all drilling and coring work.

The concerns which the Attorney General raised from the affidavit were of both a specific and general nature. These concerns were evaluated and the results documented in Inspection Report No. 82-21. Report 82-21 described the H.P. Foley Company drilling and coring program with respect to engineering design control, field activity control, quality inspection, and documentation of reinforcing steel damage, and addressed the Attorney General's concerns from a programatic standpoint.

The two specific incidents which Mr. Garrison referred to in his affidavit were reviewed during this inspection. Following each statement are the results of our inspection of these specific incidents.

a. Statement: "On one occasion, I drilled a 6" diameter hole through rebar in the reactor building of Unit 1, at an elevation below 710'. It was at a place where the steel tied together, and removed about 25-40 pounds of steel."

   Finding: H. P. Foley daily reports of core drilling and concrete expansion anchor installation were reviewed. One instance was identified in which Mr. Garrison cored a two foot deep, six inch diameter hole on June 22, 1979.

   The hole was located in the Unit 1 reactor building at elevation 688.6', five feet west of G-line and eight feet south of 14 line. Sargent & Lundy structural drawing S-251, Revision W, dated February 6, 1979, clearly specified the location of the core hole prior to the work being performed. This approval was based on conservative engineering analysis of reinforcing steel likely to be cut during the coring operation. NRC review of this engineering function is documented in Attachment B.

   Calculations were performed by Sargent & Lundy to estimate the amount of reinforcing steel actually cut by the coring operation. The calculations were based on Mr. Garrison's sketch of damaged reinforcing steel which he provided as part of the H.P. Foley daily report. They estimate that approximately 5-6 pounds of steel was cut and removed. The NRC inspector considers the Sargent & Lundy estimate to be valid.

   In this instance, the cutting of reinforcing steel does not constitute a nonconforming condition. This is because

Sargent & Lundy gave prior approval, based on an engineering assessment, to core drill the hole. (See reference made to "Office routed cores" in Inspection Report No. 82-21)

In conclusion, the NRC has verified that the activities surrounding and documentation regarding this core were conducted in accordance with CECo quality program requirements, and H.P. Foley procedures.

b. Statement: "On a second occasion, I drilled a 7" diameter hole in the reactor building of Unit 1 at elevation 735. I hit the 2" rebar, and as I continued to drill the rebar was splitting. That hole was drilled to a depth of 6 to 7 feet, where we hit a beam in the floor of a room where steam pipes were located. This hole was later grouted in, because it was improperly located."

Finding: H.P. Foley daily reports of core drilling and concrete expansion anchor installation were reviewed. One instance was identified in which Mr. Garrison cored a four foot-eight inch deep, seven inch diameter hole on April 28, 1979. The hole was located in the Unit 1 reactor building at elevation 753', two feet-three inches east of H line and 12.8 line. The hole had been abandoned and subsequently grouted back. Review of structural drawings did not reveal the presence of any structural steel in the vicinity of this cored hole.

On May 17, 1982, Mr. Garrison was interviewed by two Region III inspectors. During the interview with Mr. Garrison, he provided no additional details. He declined taking any plant tour to describe or point out the holes he referred to and, asked not to be contacted further.

On June 9, 1982, a tour of the plant was conducted with another former employee to identify locations of specific alleged construction problems. During the tour, this specific hole was identified by the individual as being the one referred to in Mr. Garrison's statement.

The location of the core hole was approved by Sargent and Lundy prior to the work being performed as evidenced by Sargent and Lundy structural drawing S-211, Revision U, dated July 19, 1978. This approval was based on conservative engineering analysis of reinforcing steel likely to be cut or damaged during the coring operation. NRC review of this engineering function is documented in Attachment B.

With specific regard to the cored holes, neither of these instances constitutes a nonconforming condition since approval based on an engineering assessment was given by Sargent & Lundy. (See reference made to "Office routed cores" in Inspection Report No. 82-21).

In conclusion, the actions of CECo and H.P. Foley Co. regarding the drilling of this core were in accordance with quality program requirements and applicable procedures.

2. April 13, 1982 Filing by the Attorney General of the State of Illinois

The purpose of this correspondence from the Attorney General was to comment on the Commonwealth Edison presentation in Washington, D. C. on March 31, 1982, concerning drilling and coring activities at LaSalle. The following documents the results of our investigation into each concern expressed by Judith S. Goodie of the Illinois Attorney General's Office.

a. Section I, "Cored Holes For Pipe And Conduit Passage"

(1) Statement: "There are no specific analytical criteria for the locating of passageway [sic] holes."

Finding: Cored holes are located according to construction requirements. Prior to the performance of any coring work, Sargent & Lundy engineers assess the effects of the maximum number of reinforcing steel bars which could be cut. This is a conservative assessment, based on the diameter of the core and the spacing of the reinforcing steel in the area to be cored. The assessment is conservative because the maximum number of bars which are assumed to be cut is always equal to or exceeds the number which is actually cut or damaged. The CECo report of May 7, 1982 discusses the mechanism for locating cored holes on pages 7 through 15, and on page 3 of CECo's response, dated March 31, 1982, to the Attorney General's Petition. The NRC inspection on April 8, 1982 independently confirmed that the reported Sargent & Lundy mechanism for routing cored holes is being followed and that it constitutes an acceptable method to accomplish the work (See Attachment B).

(2) Statement: "No written analytical assessment or structural calculations were made of rebar damage in the drilling of holes either before or after the holes were drilled."

Finding: The CECo report of May 7, 1980, pages 29 through 34, discusses this concern. Drawings on which the specifics of any damaged or cut reinforcing steel were designated, were continuously maintained and updated by Sargent & Lundy as information of damaged steel was received from the field contractors. With this information, the Sargent & Lundy engineers made an engineering judgment to assess the acceptability of the proposed coring work or completed drilling work. This engineering judgment "consisted of a review of the

location of the damaged reinforcing steel in relation to the design stress levels in the reinforcing steel and the existing design margins in the concrete elements." (May 7, 1982 CECo report, page 30.)

It was the opinion of the NRC inspection team during the Sargent & Lundy inspection of April 8, 1982, that the use of engineering judgment for this type of evaluation was appropriate and constituted standard industry technique. This conclusion was based on discussions with the responsible Sargent & Lundy engineers and review of the engineering calculations which were performed to substantiate the validity of the engineering assessments in nine selected concrete elements. These structural calculations were performed by Sargent & Lundy in response to the petition by the Illinois Attorney General. Attachment B to this report documents NRC engineering acceptance of the selection basis for the nine areas.

Because of a concern raised at the presentation in Bethesda, Maryland on March 31, 1982, regarding the selection of the nine representative areas, Sargent & Lundy performed structural calculations on all structural elements in Unit 1 areas and in those Unit 2 areas required for Unit 1 operation. The results of this program identified no areas in which the design margins have been reduced below 1.0. This substantiates the validity of the engineering judgments used throughout the LaSalle project.

(3) Statement: "No reporting requirement has been identified for rebar damage in the drilling of passageway holes at any time from 1976 to the present. It is not clear from the information provided on March 31, 1982 whether such reports were in fact made on a regular basis."

Finding: As discussed in Paragraph 2.a.(1) of this section and in Section 2 of Inspection Report No. 82-21, cored holes are of two types, office routed and field routed. In both instances, the core location is approved by Sargent & Lundy prior to the work being performed and recorded on either the mechanical or structural design drawings.

The site contractors are not required to report reinforcing steel which has been cut or damaged during the coring operation. This is because a conservative structural engineering assessment was performed prior to performance of the coring work. The CECo report of May 7, 1982 discusses this system on pages 7 through 15.

(4) Statement: "It is unclear, therefore, how specific instances of rebar damage in passageway holes could have been reported on the Rebar Hit Schedule (RHS) drawings submitted on March 31, 1982 as Exhibit 3A. Nor is there any information as to how many steel bars were discounted for each passageway hole."

Finding: The CECo and Sargent & Lundy program does not require that specific instances of reinforcing steel damage, due to coring operations, be recorded on Rebar Hit Schedule drawings. Just as cored holes are incorporated into the structural and mechanical design drawings, drilled holes for concrete expansion anchor installation are incorporated into Rebar Hit Schedule drawings. To reiterate, reinforcing steel which is damaged or cut during coring operations is not recorded on Rebar Hit Schedule drawings, but on the structural and mechanical design drawings.

The conservative estimate of the number of reinforcing steel bars which have potential to be cut during coring operations is based on the diameter of the core and the spacing of the reinforcing steel in the area to be cored. The number of bars to be "discounted" in any one area is a function of these two variables. Each new core area presents a new set of variables which must be individually assessed for each core. While each core hole is similar with respect to the variables involved, each is unique with respect to the number of reinforcing steel bars which will be cut or damaged. In order to perform the required engineering assessment for each cored hole which is noted on the structural and mechanical design drawings, the Sargent & Lundy engineer must have performed an estimate of the number of bars likely to be cut or damaged.

The CECo report of May 7, 1982, Table 2.4-1 and 2.5-1, documents the conservatively estimated total number of damaged bars in all Unit 1 safety related areas and in those Unit 2 safety related areas required for Unit 1 operation.

(5) Statement: "Two examples have been provided of instructional notes on individual design drawings where engineering judgment had determined that reinforcing steel should not be cut. In each case, the use of a metal detector was required. However, neither note expressly prohibited the cutting of rebar. Furthermore, there is no evidence of field verification of compliance with the instructional notes."

Finding: The two examples cited refer to areas where the Sargent & Lundy engineering assessment had "determined that [the use of metal detectors] was required to minimize the cutting or damaging [of] reinforcing steel during the installation of cored holes..." (CECo Report of May 7, 1982, page 11). It was not the intent of the referenced drawing notes to explicitly prohibit the cutting or damaging of reinforcing steel, but to minimize it to the extent possible.

Therefore, field verification of the requirement to use the metal detector was not mandatory because of the inherent conservatism in the original approval of each core. The use of metal detectors further increased the conservatism in the approval of each core.

(6) Statement: "Such notes were added to the drawings only after the engineers became concerned that a particular element could not tolerate many more damaged rebars. Implicit in this procedure is the assumption that previous passageway coring had in fact caused some significant amount of rebar damage. This is entirely consistent with the statement in the Garrison affidavit that we 'seldom failed to contact rebar' in drilling the larger diameter holes."

Finding: The intent of the referenced notes was to minimize the cutting or damaging of reinforcing steel during the installation of cored holes, not to explicitly prohibit the cutting or damaging of reinforcing steel. Any reinforcing steel that was damaged was documented and analyzed.

(7) Statement: "The two specific instances of severe rebar damage cited in the Garrison affidavit are acknowledged by Edison to have occurred. No explanation has been offered for the nonconformances, nor has any estimate been provided of the frequency of such occurrences."

Finding: The specific background and resolution of the two instances referred to can be found in Section 1 of this report. To reiterate, the core holes referred to by Mr. Garrison do not constitute a nonconforming condition. A conservative estimate of the number of cored holes in Unit 1 safety related areas and in those Unit 2 safety related areas required for Unit 1 operation can be found in the CECo report of May 7, 1982, Tables 2.4-1 and 2.5-1.

b. Section II, "Drilled Holes For Expansion Anchor Bolts"

(1) Statement: "From December 1976 until July 1979 the cutting of rebar was allowed in non-critical areas of safety related structures without restriction. Revisions 0, 1, 2. It is not known whether the impact of seismic events or loss of coolant accidents was factored into the definition of non-critical areas. Nor are there Quality Assurance specifications for the identification of critical and non-critical areas in the field."

Finding: A non-critical area is defined as an area in which the use of a metal detector was not required and reinforcing steel was permitted to be cut. Further, the areas were defined as those in which the reinforcing steel was not required for the structural integrity of the concrete element under the design loads. This included all normal operating, accident, and severe and extreme environmental conditions, including Loss of Coolant Accident and Safe Shutdown Earthquake. Therefore, cutting or damaging reinforcing steel in one of these defined areas was of no consequence from an engineering design standpoint.

As discussed, even though damage to reinforcing steel due to drilling in non-critical areas was not procedurally required to be reported for the period December 1976 to July 1979, verification has been made that the site contractors did, in fact, report reinforcing steel damage, regardless of the area in which it had occurred. This information was then incorporated into the Rebar Hit Schedule drawings. Therefore, the Rebar Hit Schedule drawings represent the total record of reinforcing steel damaged or cut at LaSalle due to drilling.

Table 38-2 of Sargent & Lundy Form LS-CEA, Revisions 1, 2 clearly specifies those areas in the field which require the use of a metal detector; hence, critical and non-critical areas are defined. Revision 0 of Form LS-CEA required the use of tungsten carbide tipped drill bits by all site contractors. It has been established that tungsten carbide drill bits are incapable of inflicting detrimental damage to reinforcing steel. (See Attachment D)

(2) Statement: "No reporting requirements existed for rebar cutting in non-critical areas of safety related structures from December 1976 to July 1979. Revisions 0, 1, 2, Table 38-2. It is therefore unclear how all rebar damage at the site could be verified on Exhibit 3A."

Finding: Resolution of this item can be found in Paragraph 2.b.(1) of this section.

(3) Statement: "From July 1979 to the present, one rebar cut for each four-hole plate was permitted in non-critical areas of safety related structures without prior approval. See Article 3.2.9d of Revision 3, 4, 5, 6, 7, 8."

Finding: The NRC finds nothing unacceptable with Sargent & Lundy Form LS-CEA, Revisions 3, 4, 5, 6, 7, and 8, Article 3.2.9d. Based on engineering design considerations, Sargent & Lundy has developed and presented an acceptable specification (LS-CEA) to control drilling activities for the installation of concrete expansion anchors.

It should be noted that, although Form LS-CEA Revisions 3 through 8 and engineering prudence do not require that damage to reinforcing steel due to drilling in the referenced situation be reported, it was the practice of site contractors to report all reinforcing steel damage. Consequently, the Sargent & Lundy Rebar Hit Schedule drawings represent the record of reinforcing steel damaged or cut at LaSalle due to drilling.

(4) Statement: "Reporting forms for rebar damage in drilled holes do not appear in the Specifications until July 1979. Revision 3. No information is given as to specific reporting procedures, even where reporting was required from December 1976 to July 1979. It is known that contractors were not required to distinguish between nicked steel and cut steel until July 1979. Verification that damaged rebar had been reported was not included in the Quality Assurance specifications until July 1979. Revision 3, Article 1.5.2g."

Finding: Our review of site contractors' quality procedures, which were implemented prior to LS-CEA Revision 3, has shown that each contractor was utilizing a form which each had implemented. See Paragraph 6 of this section and Inspection Report 82-21, Section 1. The reporting form, which was included for the first time as a part of Form LS-CEA Revision 3, was developed to provide a standardized form which all site contractors could use to report damaged or cut reinforcing steel due to drilling work.

The fact that the contractors were not required to distinguish between nicked and cut reinforcing steel until July 1979 adds conservatism to the Sargent & Lundy engineering analysis of damaged steel. This

conservatism stems from Sargent & Lundy's assumption, during the engineering analysis, that all steel was cut even if it was only nicked with a tungten carbide drill bit.

(5) Statement: "No provision is made in the reporting form for verifying that a metal detector was actually used, nor was such verification included in the Quality Assurance specifications. Revisions 0-8. Reference to reinforcing placement drawings was permitted, but not required, during the location of holes in critical areas of safety related structures, from 1979-1981. Revisions 3-8, Article 3.2.8. Such reference was not even recommended during 1976-1979. Revisions 0, 1, 2, Article 3.1, Table 38-2."

Finding: The use of a metal detector, as referenced by Form LS-CEA, Revisions 0-8, was specified by Sargent & Lundy in an effort to minimize the cutting or damaging of reinforcing steel. As discussed in Paragraphs 2.a.(5) and 2.a.(6), it was not the intent of the specification to explicitly prohibit the cutting or damaging of reinforcing steel in these instances, but to minimize its occurrence to the extent possible. It should be noted that all reinforcing steel damage, which occurred as a result of drilling, was reported to Sargent & Lundy by the site contractors for subsequent engineering assessment. Consequently, written verification of metal detector use on the reporting forms is not mandatory to assure a complete quality record of drilling activities at LaSalle.

c. Section III, "Cored Holes For Anchor Bolts"

Statement: "The drilling of cored holes for grouted anchor bolts began in July 1980. By this time a procedure had been instituted to notch the concrete elements to expose the reinforcing steel before drilling began. Even so, rebar damage was experienced and reported on RHS drawings. Rebar cuts due to cored anchor bolt holes were 'recently plotted on the drawings known as Exhibit 3A.'"

Finding: Cored holes for the installation of grouted anchor bolts, which partially penetrate concrete elements fall into two categories: (1) Mechanical and electrical equipment foundation anchor bolts; (2) Mechanical pipe support baseplate assembly anchor bolts.

The coring of holes for the installation of mechanical and electrical equipment foundation anchor bolts was planned prior to the work being performed. Based on the sample reviewed by the NRC inspector, in every instance a Sargent & Lundy engineer performed a conservative estimate of the

maximum number of reinforcing steel bars which could conceivably be cut or damaged. This conservative estimate was again based on the diameter of the proposed core hole and the spacing of the reinforcing steel. The location of all holes which were cored for the installation of mechanical and electrical equipment foundation anchor bolts were plotted on Cored Hole Schedule (CHS) drawings. Table 2.5-1 of the May 7, 1982 CECo report provides a summary of reinforcing steel damage due to cored holes for the installation of mechanical and electrical equipment foundation anchor bolts.

The coring of holes for the installation of mechanical pipe support baseplate assembly anchor bolts was controlled by Mechanical Drawing No. M-1100, Sheet 23. This drawing required the contractor to carefully notch the concrete to locate reinforcing steel to preclude any damage. We have verified that this note was interpreted by the responsible contractor to strictly prohibit any reinforcing steel damage. Our review has not indentified any instances in which reinforcing steel was damage during th coring of holes for the installation of mechanical pipe support baseplate assembly anchor bolts.

d. Section IV, "Scope of Data Presented"

Statement: "Edison's written Response refers to LaSalle Units 1 and 2, as do the Expansion Anchor Specifications. The 90 RHS drawings submitted to the NRC staff, however, relate to Unit 1 only. Some of the buildings at the LaSalle County Station house equipment for Units 1 and 2 jointly, for example the Auxiliary Building. It is unclear, therefore, how Exhibit 3A treats rebar damage in such buildings."

Finding: The NRC has identified that the site contractors' programs apply to all safety related drilling activities. This includes the auxiliary building.

The May 7, 1982 CECo report clearly makes reference throughout its text to "structural elements in all Unit 1 areas and in those Unit 2 areas required for Unit 1 operation." This consideration adequately addresses the concern regarding both Unit 2 and common plant areas which are required for Unit 1 operation.

3. May 3, 1982 Filing by the Attorney General of the State of Illinois

The purpose of this document was to submit information regarding additional allegations of reinforcing steel damage at LaSalle County Station. The Attorney General's transmittal contained specific quotes from the affidavits of three former LaSalle construction workers (see paragraph 1 of the filing) and made reference to one other additional affidavit. The Government Accountability Project of the Institute for Policy Studies

had previously supplied the four referenced affidavits to RIII. (see paragraph 2 of the filing).

Each affidavit was reviewed in detail to identify those concerns dealing with drilling and coring activities. The concerns which the four individuals expressed regarding subjects other than drilling and coring are addressed in separate sections of this report.

Three of the four affidavits contained information concerning drilling and coring work at LaSalle County Station. An excerpt from each affidavit (see paragraphs 3, 4, and 5 of the filing) which deals specifically with coring activities and the NRC findings with regard to each follows:

a. First Affidavit, dated April 21, 1982

Statement: "From personal observation I can confirm that several years ago around 1000 holes were core-drilled into the containment wall and the reactor vessel pedestal around the 694 foot elevation of Unit I at the LaSalle plant. Construction crews core-drilled right through the reinforcement bars... [W]hen I left they had not replaced or repaired the reinforcing bars they cut through ... I personally observed another example at the 761 foot elevation of Unit II. Construction crews had to install supports to hold up the control rod casings. Fitters from Reactor Controls, Inc. ('RCI') were core-drilling eight to ten inches down into the concrete floor, which I estimated was about 18 inches thick. The fitters were not taking the time to check for and detect the reinforcement bars, however. As a result, the fitters were hitting the bars. I saw the core bits pulling out chunks of steel from the floor reinforcement bars. Again, the supports were installed without replacing the reinforcement bars."

b. Second Affidavit, dated April 21, 1982

Statement: "[D]amage [due to coring activities] occurred in the pedestal that the reactor sits on ... Between the pedestal and the containment wall long tubes called downcomers come down from the drywell to release excess pressure. Several years ago the Nuclear Regulatory Commission required nuclear plants to install supports for the downcomers.... Walsh, the construction firm, installed the supports by boring holes into the primary containment wall and the pedestal itself on three different levels. Walsh drilled holes to install bolts on the plates that hold the supports. They did this about 500 times on the containment wall and 500 times on the pedestal. In the process, Walsh drilled holes up to three feet deep in the concrete....Walsh core-drilled right through the reinforcement bars (rebars) in the reactor

pedestal and containment wall concrete. I know these facts, because I personally observed the work. Further, last week I confirmed the number of holes with the guys who did the work."

c. Third Affidavit, dated April 21, 1982

Statement: "Probably the most serious construction deficiencies that I personally observed occurred during a February-March 14, 1980 stretch that I worked at LaSalle. The flaws involved the concrete in the containment wall and the reactor pedestal. We were helping to install supports for large tubes that came out of the suppression pool between the reactor pedestal and the containment wall. Chicago Bridge and Iron cut out stainless steel panels and then the concrete was core-drilled to install the supports. I personally saw holes at least a foot to twenty inches deep being drilled into the containment at the 710 foot elevation. In the process, many of the reinforcement bars were severed. I personally saw a half dozen rebars severed on each of two or three occasions during the first few days of core-drilling....The problem of shattered rebars is not limited to the pedestal. I saw rebars severed all over the plant during core-drilling."

d. Finding: The affidavits from all three individuals indicate that each are principally concerned with coring work which was performed within the primary containment. The coring work which was performed in the primary containment was necessitated by the installation of downcomer bracing, supports for the safety relief valve lines, and modifications to the KWU quencher system.

Because of the uniqueness of this work, CECo implemented a rigorous program of quality and engineering controls. The extent of the controls which were established by the program was commensurate with the importance of the work being performed. The coring work was of a critical nature because it was being performed inside the primary containment. This augmented inspection program consisted of additional Walsh quality control inspection and monitoring of inprocess work by Sargent and Lundy engineering. Additionally, the cores which were taken during the work were maintained at the site and several cores were examined by the NRC during this inspection. Further details regarding the specifics of the augmented inspection program and the results of its implementation are contained in the May 18, 1982 submittal by CECo. This office has reviewed the May 18, 1982 submittal and finds it to be accurate and acceptable.

Additionally, extensive inspection effort has been expended by this office to review this program and monitor the in process work within the primary containment. The results of

this effort can be found in IE Inspection Report Nos. 50-373/79-07, 79-08, 79-11, 79-12, 79-16, 79-18, 79-21, 79-29, 79-32, 79-34, 79-35, 79-36, 79-41, 80-09, 80-11, 80-13, 80-21, 80-23, 80-26, 80-29, 80-31, 80-35, 80-42, and 80-44. These inspection reports represent 342 hours of NRC Region III inspection effort relating to the installation of supports for the safety relief valve lines, downcomer bracing and the quencer system.

This office finds that the three individuals' statements are substantially correct in fact. But, this does not imply that the structural integrity of safety related structures at LaSalle has been compromised since our review has established that damage to reinforming steel was controlled and evaluated. Conversely, the information reinforces what we already understand to be true. This is evidenced by the favorable inspection results documented in this report, the referenced IE Inspection Reports, and our understanding of the CECo program and its implementation.

In response to the general comments made in paragraphs 6, 7, 8, and 9 of the Attorney General's submittal of May 3, 1982, we note the following:

(1) CECo has adequately addressed the quality and engineering controls which were implemented for all contractors to control both drilling and coring activities in all safety related structures at LaSalle. The CECo reports of May 7 and May 18, 1982 summarize these controls and the results of their implementation.

(2) During this inspection, inspectors independently verified the acceptability of the drilling and coring programs for each major contractor who performed safety related work at LaSalle. The results of this verification can be found throughout this report, Inspection Report No. 82-21 and the Inspection reports referenced in Paragraph 3.d.

4. <u>May 26, 1982 Letter to the Director of Nuclear Reactor Regulation from the Office of the Attorney General, State of Illinois</u>

The intent of this letter from the Attorney General's Office was "to comment on a few questions which [were] raised by Edison's Final Report of May 7, 1982 and which in the opinion of this office, remain to be addressed in the pending inquiry..." The following documents our response to each concern expressed by Judith S. Goodie of the Illinois Attorney General's Office.

a. <u>Statement (paragraph 1)</u>: "Edison's Final Report purports to address rebar damage in 'all structural elements in all Unit 1 areas and in those Unit 2 areas required for Unit 1 operation.' There is no indication on the record thus far that Edison or the NRC staff intends to investigate possible

damage to the integrity of Unit 2. It is obvious that Unit 1 has been reviewed first because of Edison's intention of keeping to its most recently revised startup schedule. However, we trust that the safety of Unit 2 will also be addressed before the NRC rules on our Section 2.206 request."

Response: Our inspection of the drilling and coring activities at LaSalle encompasses the work of all major site contractors in all safety-related structures (i.e. Unit 1, Unit 2, and common areas). This inspection effort consisted of procedure review, personnel interviews, observation of inprocess work, and review of quality records. Documentation of this effort is provided in this report and in Inspection Report Nos. 50-373/79-07, 79-08, 79-11, 79-12, 79-16, 79-18, 79-21, 79-29, 79-32, 79-34, 79-35, 79-36, 79-41, 80-09, 80-11, 80-13, 80-21, 80-23, 80-26, 80-29, 80-31, 80-35, 80-42, 80-44, and 82-21.

Further, because concrete drilling and coring work is still underway in Unit 2, the completion of the remaining work will be inspected as part of the NRC routine inspection program.

b. Statement (Paragraph 2): "Neither Edison nor Region III has addressed the question of how non-conformance reports were treated in the current investigation. At the hearing on March 31, 1982 Edison admitted that two incidents of rebar damage in non-conforming cored passageway holes, which were cited in Mr. Garrison's affidavit in our original petition, had in fact occurred. Yet to date Edison has not reported on:

(1) The procedures for reporting all non-conformances in cored passageway holes.

(2) The total number of non-conformance reports filed with respect to rebar damage in cored passageway holes.

(3) The manner, if any, in which non-conforming cored rebar damage was accounted for in the total assessment of rebar damage."

Response: The American National Standards Institute standard N45.2.10-1973, as endorsed by NRC Regulatory Guide 1.74, defines Nonconformance as "A deficiency in characteristic documentation, or procedure which renders the quality of an item unacceptable or indeterminate."

No instance was identified during this inspection in which the structural integrity or shielding capabilities of the LaSalle plant structures were rendered either unacceptable or indeterminate due to concrete drilling or coring work.

All cutting or damaging of reinforcing steel at LaSalle was either: (1) approved by Sargent & Lundy prior to the work being performed or (2) subsequently reported to Sargent & Lundy for engineering analysis. This means that cut or damaged reinforcing steel does not constitute a nonconforming condition when the designer (i.e. Sargent & Lundy) has taken into account the effect the damage or cut reinforcing steel has on the design.

c. Statement (Paragraph 3): "The only written control on rebar damage in cored passageway holes was the use of instructional notes on an unknown number of structural design drawings. Edison's Final Report gives two examples of such notes, which call for the use of metal detectors in two specific instances. A total of 971 cored passageway holes have been documented. Edison has not reported on:

(1) The total number of holes for which metal detectors were required in drawing notes.

(2) How many bars, if any, were assumed to have been damaged in the drilling of such holes.

(3) What, if any, verification procedures were employed by the contractors to ensure that metal detectors were in fact used, and that undesired rebar damage did not in fact occur."

Response: Detailed discussion concerning the use of metal detectors during both drilling and coring activities are found in Paragraphs 2.a.(5), 2.a.(6), 2.b.(5) and 6. of this section. Resolution of these concerns can be found there.

5. Personnel Interviews

Interviews with Walsh Construction Company, Morrison Company, and Reactor Controls, Inc. crafts personnel were conducted to assess their knowledge of their respective drilling/coring programs and discuss any specific problems which they may have encountered. Each was selected because of his knowledge of past and present drilling/coring practices and policies. Interview were held with the following personnel:

- Walsh Ironworker: Employed in 1974; performed drilling to install concrete expansion anchors in the Unit 1 and 2 reactor buildings since 1979.

- Walsh Laborer: Employed in 1976; performed coring work in the Unit 1 and 2 reactor buildings since 1979.

- Morrison Company Pipefitter: Employed in 1977; performed both drilling and coring work in the Unit 1 and 2 reactor buildings since 1979.

- Morrison Company Pipefitter: Employed in 1981; performed drilling for the installation of concrete expansion anchors in the Unit 1 and 2 reactor buildings since his employment.

- Reactor Controls, Inc., Pipefitter: Employed in 1976; performed drilling for the installation of concrete expansion anchors in the Unit 1 and 2 reactor buildings since 1979.

- Reactor Controls, Inc., Pipefitter: Originally employed by Morrison Company during the period 1976-1981; employed by RCI since 1981; performed drilling for the installation of concrete expansion anchors in the turbine and radwaste buildings from 1976-1981 and in the Unit 1 and 2 reactor buildings since 1981.

Each individual provided a written statement at the conclusion of the interview. In summary, it was a consensus of opinion that the drilling/coring work had and is being conducted in accordance with procedural requirements. Each individual was knowledgeable within the scope of his assigned responsibilities. Each stated that record was always made of any damage to reinforcing steel which occurred during drilling or coring activities in safety related structures.

In addition to these interviews, Inspection Report 82-21 documents the results of interviews with eight additional individuals representing H. P. Foley and CECO. The results of the interviews, as documented in Report 82-21, are consistent with the results of the interviews conducted during this inspection.

6. Procedure Review

The NRC inspectors examined procedures controlling the installation of concrete expansion anchors and for the core drilling of holes into or through concrete walls and slabs. Report No. 82-21 also documents the results of site contractor procedure reviews relative to drilling and coring activities. The contractors whose procedures were examined during this inspection were:

a. Morrison Construction Co. (MCCo). Mechanical and Piping Contractor

MCCo Procedure PC-42, Revision 0, dated March 1977 and entitled "Expansion Anchor Control Program for Nuclear Safety Related Work." is the MCCo procedure for the installation of concrete expansion anchors.

(1) Review of MCCo's records indicate that the first concrete expansion anchors were installed during the week ending March 25, 1977.

(2) Subsection 7.1 of the procedure establishes the use of a metal detector (R-meter) to determine reinforcement location prior to drilling.

(3) Subsection 8.1 requires that holes into concrete will be drilled with tungsten carbide drill bits.

(4) Subsection 15.1 requires that reinforcing contacts shall be reported to the engineering department by the quality control department on a weekly basis.

(5) The use of diamond carbide drill bits capable of cutting or penetrating reinforcing steel was authorized in September 1979 in Revision 2 of Procedure PC-42 and the first documented cut was in Report No. RT 1001 on September 26, 1979. The same revision requires documentation of damaged reinforcing on LS-CEA form 1.0 and forwarding of the form to Sargent & Lundy.

(6) Included with procedure PC-42 is Form PC 118A, "Checklist for Core Drilling" Line 8.1 requires check off of inspection of each core drilled hole for cut reinforcing Line 8.2 documents the hits. Line 8.3 checkoff that plates where hits or cuts occur are identified per PC-42 subsection 8.9.

b. Zack Company - HVAC Contactors

The Zack Company procedure for the installation of concrete expansion anchors is QCP 23, "Field Anchor Bolt Installation," Revision 0, dated October 13, 1977. Zack did not begin work on safety related system until June 1978.

(1) Subsection 4.7 of the procedure required the use of a metal detector to determine the location of concrete reinforcement prior to drilling holes in concrete.

(2) Subsection 4.9 requires that nicked or contacted reinforcement be documented on Form 1.0.

(3) Subsection 4.14 requires that cut reinforcing be documented on Form 1.0.

Form 1.0 is forwarded to the architect engineer through the owner.

(4) Zack checklist QCP-23A "Checklist for CEA Installation on line 12 has a checkoff for verifying that a metal detector was used. On line 15 there is a check off

for identifying reinforcing steel that was contacted during drilling.

(5) The Zack scope of work does not include core drilling into concrete. The largest bolt normally used is 3/4 inch. When a 3/4" bolt does not pass the torque pullout test the hole will be redrilled to one inch.

c. Mid-City Architectural Iron Company - Gallery Structural Steel Erection

This contractor's scope of work was limited to installation on nonsafety related platforms in the containment. However, they did install some concrete exparsion anchor to support structural steel. They did not perform core drilling.

(1) Section 6, "Expansion Anchor Program", of Mid-City's Quality Assurance Manual controlled the installation of expansion anchors in safety related concrete.

(2) Subsection 6.2.8 requires a metal detector be used and that if the metal detector indicates reinforcing the anchor assembly should be moved.

(3) Damage report Form 1.0, on Line 5, identifies damaged reinforcing steel and on Line 6 reports the depth of the damaged steel.

(4) The Safety Related CEA Installation Report, Form 2, on line 4, requires the identification of the metal detector used to locate reinforcing steel. On Line 5, the reinforcing steel damage is reported.

d. Reactor Controls, Inc. (RCI) - Reactor Vessel Components and Associated Equipments Installation

The RCI procedure for installing concrete expansion anchors and core drilling is CFIP-1, "Concrete Fastener Installation Procedure." The procedure effective date is July 14, 1980. RCI began installing fasteners in April 1981. The procedure follows the requirements of LS-CEA for metal detectors. It requires documentation and reporting #6 reinforcing steel contacts on Form 1.0.

The only area where RCI performs core drilling is for the control rod drive HCU frame supports at elevation 761. The inspector reviewed location drawings for the holes and the RCI QC data sheets indicating whether reinforcing was damaged, the size of the bar and its depth in the slab. In each case reviewed, the damaged steel was reported to the owner and Sargent & Lundy. No bar larger than #6 was indicated to have been contacted.

e. HP Foley Company - Electrical Contractors

The Foley procedure for controlling the installation of concrete expansion anchor and core drilling is HPFCo - WI - 601, "Concrete Anchor Installation." Revision 0 was issued December 7, 1976 prior to the commencement of drilling.

(1) Subsection 3.4 requires that metal detectors be used when drilling in the vicinity of reinforcement.

(2) Subsection 3.5 requires that the drill crew check each drilled hole for damaged reinforcing steel before installing the expansion anchor.

(3) Subsection 3.6 requires examination of cores from cored holes to determine whether any steel had been cut.

(4) Subsection 3.7 instructs the Foley Project Engineer to forward the location of the cut steel to the owner.

(5) The Daily Concrete Anchor Installation Report HPFCo - 016 requires on Line 5 an indication whether a metal detector was used. On Line 6, the metal detector serial number is recorded. Damaged concrete reinforcement is documented on Line 7.

f. Walsh Construction Company - Civil Contractor

Generally, Walsh did not install concrete expansion anchors and core drills were performed only as a result of design changes or when shown on a construction drawing. Drilling is controlled by QCP-16, "Expansion Anchor Installation," Revision 0, dated January 7, 1977.

(1) Subsection 5.8 requires use of metal detectors for holes larger than 1/4 inch.

(2) Form QCP-16A documents use of the metal detector and whether rebar was damaged during drilling.

7. Observation of Work

The inspector examined twenty-nine cores from the suppression pool area. The cores evidenced good aggregate distribution and consolidation. The findings were then compared with reports submitted to S&L. No discrepancies were noted.

In addition, one core drill in progress on the lower level of the auxiliary building was inspected. The reinforcing steel in the area had been exposed to minimize contact. One #18 bar was to be partially cut. Prior to cutting, the installation

was inspected by the contractor's field engineer and quality assurance, CECo field engineering and quality assurance, and the Sargent & Lundy site liaison field engineer.

Conclusion:

Based on the results of our inspection, we have concluded that (1) adequate procedures to control concrete drilling and coring are and have been in place at LaSalle, (2) these procedures are being successfully implemented, (3) the engineering disposition of damaged reinforcing steel by Sargent & Lundy was proper and complete, and (4) the completed drilling and coring represents no compromise to the structural integrity of the LaSalle plant structures.

This conclusion holds true for all site contractors throughout the time of their coring and drilling activities and is based on the inspection results presented in Report No. 82-21, Paragraphs 1. through 7. of this section, and Attachments B and C to this report.

SECTION II

Prepared by: J. F. Norton John F. Norton

J. R. Kniceley J.R. Kniceley

2. Concrete Discontinuities Were Observed in the Reactor Pedestals

Allegation: During the installation of baseplate assemblies in the Unit 1 and 2 wetwell to support bracing for safety relief valve and downcomer piping, discontinuities were discovered in the concrete of both reactor pedestals.

Finding: The Mark II Boiling Water Reactor (BWR) concrete containment consists of a primary and a secondary containment. The primary containment has a steel dome head and post tensioned concrete wall supported on a seven foot thick reinforced concrete basemat. The inner surface of the containment is lined with steel plate which serves as a leaktight membrane. The primary purpose of the secondary containment, which encloses the primary containment, is to confine any airborne radioactive materials which may potentially leak from the primary system, and provide a means for controlled elevated release to the atmosphere.

The primary containment is divided into the upper drywell area and the wetwell (sometimes referred to as the suppression chamber) area, which extends from the containment basemat to the heavily reinforced concrete slab separating the drywell/wetwell areas, a height of approximately 60 feet. The Wetwell is cylindrical in plan view, with an internal radius of 43 ft., 4 in.

The safety relief valve (SRV) and downcomer piping penetrate the drywell floor and outlet near the bottom of the wetwell. In the 1970s, an event at a European BWR facility precipitated a design review which eventually led to the adapting of structural modifications to the SRV and downcomer piping assemblies in BWR suppression chambers. The accident was caused by an SRV jamming open. This generated resonance not only in the pipe outletting steam, but in other piping and structural elements in the containment. The modifications included, among other things, adding lateral support bracing members, some of which anchor on the pedestal wall and others on the containment wall. Also, "T" quenchers were installed on the terminal ends of the SRV lines.

The reactor pedestal is a cylindrical reinforced concrete annulus centered in the containment. The outside diameter approximates 30 feet and the annular wall thickness is 4 ft. 10 in. Total height of the pedestal is approximately 82 ft. from the wetwell floor to the base of the reactor. All concrete surfaces in the wetwell are lined with 1/4 in. stainless steel.

The reactor pedestals for the two units were each constructed with four symmetrical 10 ft. 4 in. circular openings penetrating the annular walls in the lower inundation area. The openings were designed to

effect external and internal water mixing. The centerline elevation of the penetrations is 683 ft. 6 in., which is about 10 ft. above the wetwell floors. Design pool surface is about elevation 700. According to licensee records, Unit 1 pedestal concrete was placed in six pours from July 24, 1975 to October 30, 1975. Unit 2 concrete placement was in five pours from October 23, 1975 to February, 1976.

The design drawings for the pedestals were issued September 5, 1974. All loadings were considered in the design except dynamic pool loads, which were not known at the time.

Two major structural revisions were subsequently issued for the pedestals. On June 13, 1975 modifications were issued which provided for additional reinforcing steel in the pedestal walls and also called for reinforcement bars in the penetrations. When the pedestal concrete was placed, the outside face grid of reinforcement steel was continued across the penetrations. The grids consist of No. 11 bars (1.41 in. diameter) on approximately 6 in. centers vertically and horizontally. The bars near the inside pedestal face were stubbed in to the penetrations to provide the option of cadwelding bars across. The design rationale was that if it was decided to leave the penetrations open, the bars could be cut off. In the event it was decided to close the penetrations, cadwelding in additional bars would be accomplished to provide an integral inner grid across the penetrations. When the pedestal concrete was placed, the steel liner had been set on the outside face, and was poured against (used as a form). The liner was continuous across the outside face of the penetrations. However, the inside pedestal penetration face steel liner was absent. Thus, access was provided to enter the penetrations from inside the pedestal. Screenwire was placed around the pedestal/penetration interfaces to contain the concrete when the pedestals were poured.

On September 8, 1976, additional pedestal modifications were issued which provided for placing concrete in the pedestal cores and penetrations to elevation 699 ft. 10 in., which is the design pool level. Horizontal and vertical No. 11 bars were then cadwelded into the inner face pedestal steel across the penetrations. Licensee records indicate that in Unit 1 the concrete was placed in ten pours from January 24 to July 13, 1977. In Unit 2, ten placements were made from February 24 to August 29, 1977. The pour lifts were each approximately 2 ft. 8 in. (26 ft. 5 in. total height). The pedestal concrete is BA 45 mix ($f'c$ = 4500 psi). The internal concrete is BA 40 mix. The inner core concrete contains one horizontal grid of reinforcing steel in each lift.

On December 4, 1979, revisions were issued to install 34 bracing baseplate assemblies, 24 for the SRV lines and 10 for the downcomer lines on each pedestal.

The baseplates were to provide bearing and anchor for lateral support members. Installation of the baseplates required cutting out sections of the 1/4 in. stainless steel pedestal liner. When liner cutouts were removed at the abandoned penetration faces, concrete discontinuities

were apparent. Licensee records indicate the concrete deficiencies were discovered March 6, 1980 in Unit 1 and May 21, 1980 in Unit 2. These discontinuities were observed by construction laborers and were brought forth in allegations of construction deficiencies.

In the course of addressing the concrete deficiencies, the Region III inspector reviewed licensee documentation relevant to the problem; examined pertinent NRC inspection reports; interviewed construction and licensee personnel; and reviewed technical literature. Documentation reviewed included the following.

a. Nonconformance Report (NCR) No. 405, in which the licensee identified and described the concrete deficiencies in the Unit 1 pedestal on March 6, 1980.

b. NCR No. 197, identifying and describing Unit 2 pedestal discontinuities, dated May 21, 1980.

c. Procedures detailing the method of repair. One procedure was issued with NCR No. 405, and Revision No. 1 was issued May 19, 1980. Revision No. 1 also embraced Walsh Grouting Procedure for SRV and downcomer base plates, dated March 10, 1980.

d. Engineering drawings of repair details.

e. Detailed pre-repair photographs of the concrete discontinuities.

f. Specifications and physical data of the repair material (EMBECO 636 Grout)

g. Licensee quality control documentation recorded during the repair process.

Three distinct types of discontinuities were evidenced in the photographs and other documentation of the Unit 1 pedestal. These were top voids, honeycombing and screenwire displacement.

Top voids, at the upper levels of the penetrations, were triangular in section along the direction of the penetration. The largest had vertical dimensions of 1 ft. 4 in. at the outer pedestal liner plate and feathered out horizontally at 3 ft. 1 in. In sections transverse to the penetrations, the voids were contained in approximately the top quadrants of the penetration peripheries at the outer liner plate. The voids were caused by failure to displace entrapped air and effectively consolidate the concrete. Accomplishing this was complicated by the 4 ft. 10 in. pedestal wall thickness and by the inner and outer face grids of No. 11 reinforcement bars (with cadweld sleeves on the inner grid bars) on about 6 in. vertical and horizontal centers.

Honeycombing occurred in two of the Unit 1 penetrations near the outside penetration face centers. It was contained between the outside face reinforcing grid and the steel liner plate. The honeycombing

was caused by inadequate concrete consolidation. One penetration had about 4.5 square feet of honeycomb area at the liner plate face and the other evidenced about 2.0 square feet. Maximum depth of the cavities perpendicular to the liner plate was about 5 in. Average depth was approximately 3 in.

As mentioned previously, screenwire was used at the pedestal/penetration interfaces to contain the concrete when the reactor pedestals were poured. The screenwire was not secured adequately at the outside periphery of the penetrations in Unit 1. This resulted in wadded up ridges of screen displacing concrete during the placements. The screenwire discontinuities ranged up to about 1 ft. wide along the liner plate face and 6 in. deep perpendicular to the liner plate around the circumference of the penetrations.

In Unit 2, top voids were also discovered. They were generally as those previously described for Unit 1. The largest void had vertical dimensions of 1 ft. 8 in. at the outer liner plate and wedged out at 4 ft. 2 in. along the top of the penetration. Again, in sections transverse to the penetrations, the voids were contained in approximately the top quadrants of the penetration peripheries at the liner plates. No honeycombing or screenwire displacement discontinuities were found in the Unit 2 penetration faces.

In the repair process, the outer pedestal liner plate was removed to expose the concrete discontinuities. Chipping hammers were then applied to remove unsound concrete and wadded screen wire. The areas were then flushed and cleaned by water blasting. After preparation, the areas were grouted back to design configuration with EMBECO 636 grout. This was done in accordance with engineered repair procedures and QC inspection and documentation.

Three other concerns relating to the pedestal concrete discontinuities were also expressed in the allegations. The first of these was a concern that all of the concrete deficiencies may not have been located. A review of design/construction chronology and construction methods makes clear how the discontinuities occurred. No deficiencies in the annular pedestal concrete were evident except the screenwire displacement in Unit 1 previously described. This was generally contained between the outer face reinforcing bars placed across the penetrations and the inside face of the 1/4" thick stainless steel liner on the outside circumference of the pedestal. The areas averaged approximately 3 in. deep transverse to the liner plate at the edge of the 10 ft. 4 in. diameter penetrations, then, feathered out at about 10 to 12 inches in a direction perpendicular to the circumference lines of the penetrations.

The top voids (in all 8 penetrations) and the honeycombing (in two of the Unit 1 penetrations) were all discontinuities in the mass concrete placed in the internal pedestal and penetration areas. This situation was observed by an NRC inspector and the following is excerpted from NRC Inspection Report 80-11 and addresses the pedestal concrete quality in Unit 1:

"Suppression Pool Modifications

The inspector toured the Unit 1 suppression pool and observed the work in progress. The contractor was removing the pool liner as required by the revised design. The concrete under the liner plate appeared solid, well compacted and no evidence of honeycomb was visible in the areas observed. Construction drawings specify the removal of 54 sections of liner plate in the pool wall and 31 from the reactor pedestal. Approximately 15 percent of the liner plate had been removed."

In the installation of 24 baseplate supports for the SRV lines and downcomers, a total of 192 holes were cored in the Unit 1 reactor pedestal. All of the cores were logged and retained by the licensee. The Region III inspector examined 29 of these cores. All cores examined evidenced good aggregate distribution, matrix qualities and consolidation characteristics.

When the pedestal liner plates were removed for installation of baseplate bracing supports and the concrete deficiencies discovered, additional liner plate was removed as required to trace the unsound concrete in the penetration faces. There is no evidence to substantiate that additional deficient concrete exists where plating has not been removed.

The second concern voiced was that in the repair process, reinforcing steel was heavily damaged or cut through by jackhammers when the unsound concrete was removed. Subsections 3, 4 and 5 of the repair procedures specified the following relative to reinforcing bar damage:

- Inspect reinforcing steel to assure that it is not damaged.
- Reinforcing with dents 1/8" in depth or less shall have the dents ground smooth.
- Reinforcing with dents deeper than 1/8" in depth shall be replaced by cadwelding in a new bar if so deemed necessary by the engineer (Sargent & Lundy).

Quality control documentation recorded during the repair process indicated the procedural items were inspected for compliance.

Also, the chipping hammers used were relatively lightweight models which are designed to be handled in overhead and lateral positions without undue operator fatigue. These hammers are capable of chipping and dressing concrete, but do not have adequate inertia to significantly damage reinforcing bars when operated with average care to avoid such damage.

The third concern was that concrete repaired with grout (or by other repair methods) is not as strong as the original monolithic structural element would have been if no deficiencies had existed. Extensive literature addressing research and testing by the concrete industry

and by major constructors such as the U.S. Army Corps of Engineers, the Bureau of Reclamation and other engineering entities involved in maintenance and repair of concrete and concrete structures has been published. Generally, these data conclusively substantiate that when unsound concrete is properly repaired in accordance with carefully engineered approved practices, original design structural integrity can be maintained, and even enhanced in many cases. This has also been substantiated in the experience of the Nuclear Regulatory Commission.

Conclusion: Concrete discontinuities existed in the Reactor Pedestals of both units as alleged. The deficiencies were identified by the licensee in nonconformance reports. The NCRs were properly dispositioned and repairs were engineered by Sargent & Lundy. The discontinuities were repaired under CECo QC surveillance which is documented. No additional followup action is planned.

3. 55-Gallon Drum Embedded in the Unit 1 Basemat Slab

Allegation: A 55-gallon drum was encased in the concrete slab under the Unit 1 containment.

Finding: On June 9, 1982, the Region III inspector interviewed the alleger in an attempt to obtain specific data relative to the location of the alleged embedded barrel in the basemat of Unit 1. The individual stated that the barrel is in Unit 1, and that it was buried in concrete which was placed in July or August of 1975. He also provided the identity of the Walsh Construction Company foreman responsible for pre-pour cleanup for the particular placement.

The individual related the following story: He was working as a cleanup laborer on the 5:30 a.m. shift. There were two shifts of reinforcement steel placers at the time. Reinforcement steel had been placed and tied proximate to the 55-gallon drum, which was laying on its side. To remove the barrel would have required either cutting it in pieces with a torch or removing the bars. There was pressure to expedite the cleanup operations because concrete placement was scheduled to begin about 9:00 a.m. The Walsh foreman came on duty about 7:30 a.m. The individual said he approached the foreman and told him about the drum. The foreman then left the immediate area for about 15 minutes, then returned. He then stated, "You didn't see a thing. We don't have time to remove it before the concrete gets here." The individual said he then left the area, but feels sure the 55-gallon drum was encased in the pouring operations.

The individual started working on pre-pour cleanup in January of 1975. The Region III inspector examined Walsh Construction records for the Unit 1 basemat pours. The Unit 1 basemat was placed in two pours, the south half by pour Nos. 1R4A and 1R4B placed October 29, 1974 and the north half by pour Nos. 1R4C and 1R4B placed November 17, 1974. Also, an NRC inspection report was located which addressed the south half pours which is excerpted in the following:

"Observation of Concrete Work Performance

The inspector observed concrete placement (pours No. 1R4A and No. 1R4B) for the south half of the Unit 1 containment basemat, and the following were determined:

(a) Forms appeared to be tight, strong, and clean.

(b) Rebars appeared to be spaced properly.

(c) All items on Walsh Pour Checkout Card, Form No. QCP-9A, were signed off as acceptable.

(d) Slump and air content tests and temperature (ticket No. 6579) were determined to be within the range as specified. The label on air content test equipment (I.D. B7786) indicated calibration was current.

(e) Four (4) placement crews were performing the work. Each crew consisted of nine (9) persons, and three (3) to four (4) vibrators were used."

It was also observed in examining the Four Checkout Cards (QCP-9A) for the basemat placements that the individual identified by the alleger was not the Walsh Foreman who signed off for pre-pour clean-up inspection.

A visit with the individual was again held on June 11, 1982 and the aforementioned data reviewed. When faced with the conclusive data that the basemat was not placed during his employment, he then indicated it may have been in the drywell floor of Unit 1. Subsequent examination of construction records regarding this pour revealed it was placed March 3, 1976. Again, the foreman identified by the individual was not the foreman who verified prepour clean-up. Further checking revealed that during July and August of 1975, the Unit 1 pours were in the containment walls from about elevation 681 to 717. The individual had indicated he remembered for sure it was a concrete slab with at least a 20 foot span. The containment walls are four feet thick below elevation 728'-8".

Walsh records indicate employment of the foreman identified by the individual began in February 1975 at LaSalle County Station. On November 11, 1975, he was promoted to General Foreman. He held this position until June 16, 1976 when he left the site. He is presently employed at the Braidwood, Illinois Nuclear Construction site.

On June 11, 1982, he was interviewed by Messrs. James Kniceley and John Norton of the Region III NRC office. During the course of the interview, the individual's story was related to the foreman. The two following paragraphs are excerpted from the sworn statement obtained from him:

"I was in charge of the clean-up crews to clean up before concrete pours. Mr. Dean Plese was my Superintendent. I worked on Unit 2 and I began work at the 710 elevation level. We cleaned up before wall pours. My job was to see that everything was cleaned up before concrete could be poured. I never worked on Unit 1.

Mr. Plese and I personally witnessed clean-up before we signed off that the area was ready. I do not recall anyone telling me that there was a 55-gallon drum left in the area before a pour. We cleaned everything and I am not aware of any debris left behind. Mr. Plese was very strict and did his job well. He was always walking around checking up on things. If anyone told you of any debris or 55-gallon drum in any area that I worked, they are lying because it is not true."

On June 14, 1982, the Region III inspector again examined Walsh pour records. The records indicated that the foreman identified by the individual signed off for 54 pre-pour clean-ups on Unit 2 and none for Unit 1.

Although it is not believed that a barrel is encased in Unit 1 concrete, the licensee was requested by the NRC to evaluate the effects of such a barrel in the Unit 1 basemat and drywell floor concrete. Design engineers Sargent & Lundy reviewed structural drawings. Their study concluded that reinforcing steel spacing in the drywell floor precludes the space required for a 24 in. diameter by 36 in. 55 gallon drum. Furthermore, the basemat also contains a relatively small percentage of area that could accomodate the drum due to reinforcing steel density. An engineering assessment was made by Sargent & Lundy for these areas postulating a void with the dimensions of a 55 gallon drum. Loading combinations considered included dead load, live load, pressure load, safe shutdown earthquake load, temperature load and pool dynamic loads. The results of the assessment indicate that the stresses, considering a void created by the drum, are less than the allowables committed to in the LaSalle FSAR.

Conclusion: No credible evidence could be developed to substantiate that a 55-gallon drum is embedded in Unit 1 concrete.

4. Debris in Concrete

Allegation: Cleanup activities prior to concrete pours were inadequate and debris was left in concrete. The allegations indicated the debris included paper cups, soda pop cans, beer cans and 2x4 boards.

Finding: The inspector reviewed pertinent NRC inspection reports, interviewed licensee and contractor personnel, toured the plant area with an alleger, reviewed selected QC and construction records of various concrete placements, and reviewed all nonconformance reports (NRCs) of structural concrete repairs. Also a report addressing Unit 1 reactor containment concrete integrity prepared by the licensee in late 1981 was reviewed.

On May 27, 1982, an alleger took the inspector on a plant tour. During this tour, an area of Unit 1 containment at about the 750 ft. elevation near the outboard main steam valves was pointed out and alleged to contain an embedded 2x4 board.

Subsequently, Walsh Construction concrete records were reviewed for two pours which contained the area identified - Pour No. 2RCW9B placed September 23, 1976 and 2RCW 10B placed October 4, 1976. The dates of these placements were then compared with the alleger's labor record cards. It was found that on September 23, 1976, the alleger was chipping concrete in the auxiliary building. On October 4, 1976 the alleger was not on site.

A selected sample of 75 Pour Checkout Cards (QCP-9A) was examined. The sampling included placements in the Reactor Vessel Pedestals, Containment Walls, Reactor Building columns and interior walls, columns, walls and floor slabs in the Auxiliary Building, and the Unit 2 RHR pump foundation. Cleanup was signed off as inspected and approved by the contractor and by CECo on all cards. In examining the pour checkout card for the RHR foundation pour, it was noted CECo reminded the Walsh General Foreman to watch cleanup better.

Nonconformance reports covering repairs for all structural concrete were reviewed. A total of 44 NCRs were written, nine of which were relevant to the debris allegations. Of these nine, two involved form spreader blocks inadvertently left in place, and one involved styrafoam blocking inadvertently left in place, when the pours were made. Therefore, six NCRs were generated because of embedded debris. The un-removed spreaders and styrafoam blocking is not considered to be a debris problem.

A search was made for NRC inspection reports addressing structural concrete placement. A total of 15 reports addressing various aspects of concrete activities were examined. Of these, four reports were considered relevant to debris cleanup effectiveness.

The reports are discussed in the following:

a. Report Nos. 75-05/75-05, 75-06 and 77-13/77-12: The reports identify four pours which were inspected by NRC before and during placement. Specific pours addressed are 1RCW3C (Unit 1 containment), 1R9E, 1R10E, and 2RB19W8. Statements are recorded for all of these pours that the placement areas were inspected by NRC inspectors to assure no debris existed prior to placement. All areas were found acceptable.

b. Report No. 75-06: This report documents an NRC review of licensee audits related to concrete placement activities during the period of March to July 1975. The audits were stated to be comprehensive and complete.

c. Report No. 77-11/77-10: Region III inspectors wrote a noncompliance report on concrete pours 1RB21W2 and 2RB2W1. They identified voids attributed to the following, "This condition was caused by debris, i.e., paper, wood polyurethane material and scrap wire which were not cleaned out prior to concrete placement". The location was Reactor Building J-line wall to elevation 840 ft. and 15-line wall.

The concrete deficiencies were repaired and the noncompliance was closed out in Report No. 78-08/78-07 (See pages 3 and 4).

d. IE Report 82-11: This report details a comprehensive in-service concrete inspection embracing American Concrete Institute section 201 and surpassing it in some aspects. Placement Nos. 1R7A, 1RCW15A, 1RB19W and 1RB1W3 were evaluated. The inspection engulfs much more than the embedded debris aspect, but it is inclusive. The summarizing statement regarding the inspection follows:

> "It is the evaluators' conclusion that the results of the detailed inspection of these four concrete placements indicate an acceptable and functional level of concrete serviceability at LaSalle. This conclusion is enhanced by the favorable results of other concrete placement inspections in the reactor and auxiliary buildings which were conducted during this and previous civil inspections."

Also, a report was reviewed which the licensee prepared November 10, 1981, a portion of which addressed the structural integrity of Unit 1 containment concrete. The licensee accomplished a survey of the outside face (50% of the concrete surface area) of the containment wall. The survey showed that the concrete quality was excellent and no voids were detected.

The following observations are submitted based on the Region III inspector's personal experience accumulated through several years as a Civil Design/Construction Engineer involved with major concrete structure types such as locks, dams, spillways and other water resource type structures as well as nuclear construction.

Concrete, when placed in areas such as walls, columns and beams which have a relatively large heighth to width ratio tends to push low-density, lightweight debris laterally to the form faces. This is because normal fluid concrete weighs approximately 145 lbs/cu. ft. compared to a few lbs./cu. ft. for empty pop and beer cans, paper cups, sawdust, wood chips, and other light extraneous material. The first concrete in the placement is usually introduced toward the central area of the forms due to reinforcing steel grids near the form faces. Because of this phenomenon, any extraneous lightweight material is usually immediately apparent in the construction joint face when form stripping is accomplished. Any consistent or gross negligence in removing these types of extraneous materials would soon become evident.

The following was determined during the course of the inspection:

a. The individual who pointed out the area of the alleged embedded 2x4 was not at the pour area immediately prior to concrete placement. Therefore, it is not known whether or not a piece of timber he said he observed earlier was removed in the pre-pour cleanup.

b. A total of seven concrete repair jobs effected by the licensee were recorded. This included six NCR repairs and one repair associated with the NRC inspection finding. These seven repairs represent placement of 476,879 cu. yd. of structural concrete at the site.

c. A review of the nonconformance reports indicate that the deficiencies were identified by the licensee. The NCRs were properly dispositioned and repairs were engineered by Sargent & Lundy. The deficient areas were repaired under licensee QC surveillance which is documented. Also, the record review mentioned previously in this section indicated pour checkout cards were appropriately employed and completed.

d. Interviews held with the concrete superintendent, the Walsh Construction Quality Control Manager, a General Foreman responsible for pre-pour cleanup, a licensee Quality Control Inspector and others gave indications that pre-pour cleanup was properly accomplished.

Conclusion: Structural concrete deficiencies attributable to extraneous embedded materials existed as alleged. Some of the deficiencies were identified by the licensee in nonconformance reports (NCRs), and others were identified by Region III NRC inspectors. The resulting NCRs were properly dispositioned, and repairs for the deficient areas appropriately engineered by the design AE firm. Repairs were accomplished with licensee QC surveillance, which is documented. No evidence could be developed to indicate concrete debris exists which has not been identified. No additional followup action is planned.

Prepared by: R. E. Lipinski C. E. Norelius for REL

I. N. Jackiw C. E. Norelius for INJ

J. R. Kniceley J. R. Kniceley

5. Improper Concrete Work in the Screenhouse

Allegation: When the concrete was poured for the screenhouse, it hardened faster than it was supposed to. Chloride was added to the concrete to speed up the process.

Finding: Chloride is used in industry in small amounts, not to exceed 2 percent, in the form of calcium chloride to accelerate hardening of concrete. When used in this proportion it has no detrimental effect on concrete. Strictly speaking, chloride cannot be completely eliminated from concrete because of its presence in nature in various forms of chemical compounds. It is present in water, in aggregate, in sand, etc.

Review of the FSAR revealed that only part of the screenhouse should be considered as a Category I (safety-related) structure. This is the part which is protecting the pipeline which carries the water for the core spray cooling system (CSCS) and should be designed and constructed as a safety related structure. Review of the FSAR also indicates that the design of the screenhouse did incorporate all the loads as appropriate for the Category I structure.

In order to resolve the allegation that chloride is present in the concrete the inspector performed the following:

a. Review of Records

Mix records for the following dates of pour and portions of the screenhouse were reviewed:

Date	Location
4/15/75	Valve Pit
4/10/75	D Line Wall
4/9/75	Valve Pit
2/13/75	Partial Wall
12/20/74	Screenhouse
3/3/75	Wall
3/1/75	Screenhouse Wall

These are the parts of the screenhouse which are considered to be safety related becuase they house the equipment specified above.

The records indicate that no calcium chloride was added to the concrete mix. Furthermore, examination of records of tests performed on samples from the above pours indicate that all samples exceeded the minimum specified compressive strength which is 3500 psi at 90 days.

b. Statement from Concrete Superintendent

The Concrete Superintendent provided a written statement indicating that there is no chloride used in the construction of the lake screenhouse. Instead, the concrete consists of a richer mixture of cement and aggregate (BA-40 or BA-45) which designates concrete of compressive strength of 4000 or 4500 psi respectively and this accounts for quicker setting. Review of the test cylinder records indicated that the compressive strength achieved by the samples exceeded far above the minimum specified strength of 3500 psi at 90 days, in most cases being above 5000 psi and in some cases exceeding 7000 psi.

c. Chemical Analysis of Cored Samples

The inspectors requested that three samples be cored from the area which is surrounding the CSCS pipe. These were subjected to a chemical analysis performed by Wiss, Janney, Elstner and Associates, Inc., an independent Consulting and Research Engineering Company. This consulting company was selected by the NRC inspectors.

Chemical analysis results received from the independent testing lab showed that for the three core samples, the chloride content was in the range of 0.04 - 0.05% by weight of concrete. Wiss, Janney, Elstner and Associates, Inc. concluded that the amount of chloride ion content which was found in the concrete samples does not indicate that calcium chloride was added as an accelerator to the original concrete mix.

Conclusion: This allegation regarding addition of chloride to concrete has not been substantiated. No further followup actions are planned.

6. Misaligned Containment Wall

Allegation: One section of the outer containment wall is off-whack by about four inches.

Finding: On May 27, 1982, a tour was conducted with an alleger who pointed out the location in the reactor building where the outer containment wall appeared to be misaligned with respect to a nearby RHR shutdown cooling equipment room structure.

The inspector reviewed design drawings and specifications and interviewed licensee personnel. Section 30-30 of drawing S-254 shows the

as-built condition showing the reactor building wall butting into the reactor containment corbel. To an uninformed individual, the open space at the wall-corbel interface might appear as bulging. The inspector verified that both the corbel and wall are constructed per the drawings.

Conclusions: It is concluded this outer containment wall was constructed in accordance with design.

7. Improper Masonry Wall Construction and Mortar Quality

Allegation: High density masonry walls were constructed with insufficient amounts of mortar between the blocks and in some cases no mortar was used. Also, in many cases the reinforcing wire was not installed between the blocks. In addition, the mortar used in the construction of the masonry walls was not properly proportioned. Too much sand was used in the mixture.

Finding: This inspection was directed towards quality control and workmanship. The inspection consisted of the following:

a. Interviews with the applicant's personnel responsible for QA/QC of the walls.

b. Interview with the workers who were employed on construction of the walls.

c. Review of construction records pertaining to quality of materials and workmanship.

d. Review of tests on cored samples taken from the walls as a result of issuance of IE Bulletin 80-11.

On June 12, 1982 an interview was conducted with an employee of Walsh Co. who was knowldegeable in masonry wall construction. He stated that he was employed by Walgren as a bricklayer from October 1978 until June 1979. From June 1979 he worked as a foreman for Walsh. In January 1979, he was promoted to the position of supervisor. His duties involved field inspection and documentation of quality control of material and construction. In that capacity he was responsible for quality of construction of safety related masonry walls. According to him, the drawings and specifications pertinent to the masonry concrete walls (CMU) were originated by Sargent and Lundy. All of the safety related walls were designated on the drawings.

He inspected mixing of mortar twice a day, usually in the morning and in the afternoon. Proportioning of the mix was 1 part of cement to 3 parts of sand by volume for a mixer of 12 cu ft. capacity. He stated that this procedure resulted in a uniform mix throughout the job and was observed for all masonry construction. The in-process

testing of mortar was for every 25,000 blocks of construction and the specified minimum compressive strength was 2500 psi. The walls were reinforced with horizontal truss type reinforcing, consisting of 3/16 inch diameter side rods and No. 9 cross ties, for every other course of the blocks. The reinforcing was manufactured by AA Wire Products Company, Chicago, Illinois. Testing of the mortar was conducted by A and H Engineering Company.

He stated that it would be practically impossible to leave out mortar from the middle of the wall without being noticed by the quality control personnel because each layer of mortar has a thickness of about 3/8 inch and after several layers a depression would be formed in the middle of the wall thus revealing lack of mortar. Furthermore, construction was continuously supervised by the foremen who were responsible for the quality of the workmanship.

When asked about quality of construction before and after the period of time when he was in charge of quality control inspection he stated that to the best of his knowledge he did not observe any change in the procedures.

On June 24, 1982, four former employees of Walgren, the contractor in charge of masonry walls at the LaSalle Nuclear Generating Station, volunteered to provide the inspectors with first hand knowledge of construction practices regarding safety related masonry walls. They were working as bricklayers in various parts of the plant and therefore, were familiar with the construction of the masonry walls. According to them, during the peak of construction, the workers were pressured to rush with the job to the point that a proper workmanship could not be exercised. As a result, in many cases, the amount of mortar placed between concrete blocks was insufficient or sometimes omitted altogether. Also, the reinforcing which was called for on the drawings was skipped. The personnel who were responsible for quality control were not always present during construction of the walls.

The interview was followed by a tour through the plant during which the aforementioned workers pointed out several masonry walls where to their knowledge proper workmanship was not applied.

In most cases, according to the former bricklayers, the deficiencies were in the upper part of the walls or in those sections where because of presence of other equipment, such as cable trays or piping, the walls were not easily accessible. During the tour, the former workers pointed out two walls in the Unit 1 reactor building where they believed deficiencies existed. Examination of similiar walls in Unit 2 revealed that in a relatively large pipe penetration, local small voids were present due to absence of mortar between blocks located inside of the walls. The walls thus examined were located at elevation 710'-0" between column lines G and J and on column lines 14 and 15.

In order to further verify how wide spread the dificiencies in workmanship were, the NRC inspectors requested that several blocks be removed from the Unit 1 wall thus forming an opening of approximately 3'-0" long, 20 inches wide and 12 inches deep exposing joints between several blocks. The inspectors verified that horizontal reinforcing was present as specified on the drawings and that the mortar was present between the blocks. Furthermore, cores were taken from two other walls. One was in the Unit 1 turbine building, in the wall at floor elevation 735'-0" on column line 13.8, about 5 feet east of line S. This wall was first identified by another alleger during a tour conducted on May 27, 1982. During that tour this wall was identified as one where mortar was omitted from blocks on the inside of the wall. This wall was constructed from high density blocks, and was 4'-7 5/8" thick and about 30 feet high. The core taken was 3'-8" long and 4" in diameter. No voids due to absence of mortar were found.

The other core was taken from the Unit 1 TIP room at floor elevation 740' 0" between column lines 15 and 16. This wall was also made of high density blocks and was 2'-11 5/8" thick. Again, no voids due to absence of mortar were found, and the inspectors noted that reinforcing was present between the blocks.

Based on the taking of cores from the walls and review of records there was no evidence that the walls were constructed in violation of the specifications or design requirements as stated on the drawings. The records of the material tested indicate that they are acceptable. The examination of the openings in the walls either by removal of the blocks or by coring indicate that reinforcing wire and mortar were present according to the design criteria and to normal engineering practice. In view of the above, the inspectors conclude that the structural integrity of the safety related masonry walls will not be adversely affected by the local deficiencies and that they will perform their design function.

The inspector further reviewed licensee records and noted that in response to IE Bulletin 80-11, the licensee identified the walls which are considered to be safety-related and described the design criteria used for analysis of these walls. In view of the ongoing review of these criteria against the corresponding criteria proposed by the NRC staff, a license condition was imposed in the LaSalle license. In a letter from Commonwealth Edison to A. Schwencer, dated April 24, 1981, the licensee stated that the QA/QC information for the safety related masonry walls is available at the LaSalle County site for review by the NRC staff.

The inspectors also reviewed the records pertaining to the construction of the concrete block walls for a period from February 23, 1979 through June 8, 1979. These records consisted of verification of quality control of mortar mix and contained such information as time of mortar mixing, how clean was the sand and water and penetrometer

readings to verify the initial set of the mortar. The other information contained in the records referred to placing of the blocks, i.e., quality of joints, joints construction and thickness and joint reinforcing.

In all cases, the records were found to be in proper order and there was no evidence of workmanship of unacceptable quality.

The inspector noted that as a result of the issuance of IE Bulletin 80-11, the status of some of the masonry walls had been changed from non-safety related to safety related. In view of the fact that these walls were originally constructed as non-safety related, there were few QA/QC records for the walls and the applicant was requested to evaluate their integrity. In response to this NRC inquiry, the licensee initiated a program to verify their acceptability. To accomplish this task, one sample was cored for every 5000 square feet of the wall and tested by A&H Engineering Company. The cores were taken in 3 1/4 inch diameters and then cut to the size of 2 inch by 2 inch cubes to be used as samples. The samples were then tested as per specifications. Ninety-six samples were taken altogether. This included 52 of combination of solid block and mortar cores and 44 of block units. Of the 96 samples, 11 failed on the first test. The failures were attributed to disturbing of mortar during preparation of the cubed samples. For the samples which failed, the tests were repeated with another sample taken from the area as close as practicable to the original sample (usually within 5 feet). All of the examined samples for which the records have been reviewed exceeded the minimum specified compressive strength of 2500 psi.

Conclusion: Based on the inspection findings above, the inspectors concluded that the masonry walls at LaSalle were constructed in accordance with design requirements.

SECTION IV

Prepared by: J. Creed J.R. Creed

J. Knideley J. Knideley

8. Inadequate Security

Allegation: Forced long work hours by security personnel have led to violations of the licensee's security plan.

Finding: Several members of the guard force were interviewed to obtain specific information. Four NRC inspectors were onsite during the period June 14-17, 1982. The licensee's general implementation of the security program was assessed, records were reviewed, and control points were observed. Some examples of violations of the licensee's security plan were identified. These were brought to the management's attention and corrective action was initiated. The details are considered to be Safeguards Information not subject to public disclosure.

Conclusion: It was found that some security personnel had worked many hours of overtime. The extent to which this may have contributed to the violations observed is not clear. The licensee was in the process of increasing the numbers of guards. The details of the findings regarding the security inspection will be reported in a separate report (Inspection Report 50-373/82-39.) While examples of violations occurred, we concluded that the security system at LaSalle provides an overall adequate level of protection.

SECTION V

Prepared by: J. Neisler C. E. Norelius for JN.

J. K. Kniceley J R. Kniceley

9. Improper Vibration of Concrete

Allegation: In 1975 - 1976 concrete was not properly vibrated.

Finding: No specific information was provided by the alleger as to locations where this may have occurred. Therefore, general program requirements and records were reviewed. Review of concrete placement procedure, QCP9, "Concrete Placement Control" shows a requirement in Subsection 3.3.5 for the use of mechanical vibrators for consolidation of fresh concrete while Subsection 3.3.1 describes the methods for vibrating previous pours to assure the establishment of a bond between pours or layers of concrete.

NRC examination of concrete placement records for pours made during 1975-1976 shows that the compaction (vibration) of each of the pours was inspected and found to be acceptable by quality control inspectors. The placement records examined consisted of pours in containment walls, reactor building columns, auxiliary building walls, columns and slabs.

The inspector's review of training records shows that the concrete contractor was conducting training in the correct methods of vibrating concrete at frequent intervals prior to and during the period of questionable vibration practices. Training sessions were conducted on:

4/17/74 for 17 personnel
9/16/74 for 9 personnel
10/26/74 for 50 personnel
1/29/75 for 32 personnel
2/28/75 for 29 personnel
4/9/75 for 8 personnel
4/28/75 for 11 personnel
5/17/75 for 17 personnel
5/21/75 for 12 personnel
6/6/75 for 9 personnel
6/16/75 for 10 personnel
7/22/75 for 35 personnel
8/12/75 for 18 personnel
10/13/75 for 6 personnel
10/15/75 for 24 personnel
12/8/75 for 8 personnel
2/9/76 for 11 personnel
9/21/76 for 18 personnel

Since procedures for placement of concrete were developed and implemented before the concrete was placed, the procedures included instructions for vibrating the concrete. Personnel were trained in

the proper use of external concrete vibrators. Each pour was supervised by engineers, superintendents, foremen, and inspected by quality control during and subsequent to the pour. The NRC inspector examined 29 drilled cores from concrete poured during 1975-1976 and did not detect evidence that the concrete was improperly vibrated.

Conclusion: This allegation was not substantiated.

SECTION VI

Prepared by: R. D. Lanksbury R.D. Lanksbury

10. Secondary Containment Test

Allegation: In 1978 a reactor building pressure test blew the roof off.

Finding: The reactor building encloses the reactor and the primary containment and provides secondary containment integrity when the reactor is in service. The reactor building up to and including the operating floor (refueling floor), is of reinforced concrete. The operating floor is the uppermost level in the reactor building and consists of a structural steel super-structure enclosing the floor and supporting the sheet metal siding and decking. The decking is covered with insulation and composition roofing as a water proofing covering.

As reported by the resident inspector in inspection report 50-373/81-30, sometime during the weekend of July 18-19, 1981, while LaSalle was in the process of conducting the Secondary Containment Leak Rate Test, the reactor building was inadvertently overpressurized, causing damage to the reactor building composition roofing and insulation. This damage was reported to the NRC by Commonwealth Edison pursuant to 10 CFR 50.55(e) in Report 81-05, dated 8/18/82 (the event was verbally reported on 7/20/81). Several NRC inspectors, including the Senior Resident Inspector, inspected the structural area above the operating floor. No deficiencies were identified.

Secondary containment integrity testing was performed on April 14, 1982 and again on April 24, 1982, with both tests being acceptable and meeting all FSAR and technical specifications requirements. Both of these tests were witnessed by an NRC inspector to verify compliance with all requirements, as reported in inspection reports 50-374/82-20 and 50-373/82-26, respectively.

The 1978 date given in the allegation appears to be in error. In 1978, the walls, decking, and roof of the reactor building were under construction and no testing was performed until 1981. This has been verified through review of photographs of the site that are taken on an appoximate monthly basis and by discussions with NRC and construction personnel who were present during this time period.

Conclusion: The inspector found that during a Secondary Containment Test in 1981, the reactor building was overpressurized causing damage to the roof. The inspector reviewed records and verified that the roof was repaired and two successful tests were conducted in April 1982. No further followup action is planned.

11. Improper Installation of Hanger Supports

Allegation: Metal in hanger supports is identified by a color code. When construction (the piping erection contractor) had the right size supports, but not enough of the right color, the hanger colors were changed. This practice was observed in an area near Unit 1 reactor.

Finding: The inspector interviewed representatives of the licensee and piping erection contractor organization who are responsible for the work and materials in question. It was stated that no color coding system is in use for the identification of hangers, or other piping support elements, by material or other characteristic. This position was reinforced by reviewing the contractors procedure for "Erection of Supports-Restraints and Final Installation Verification," and touring the yard lay-down area where hangers are stored. The procedure makes no reference to any color coding scheme. No evidence of color coding could be identified in the lay-down area.

During the inspection it was determined that all safety related hangers installed by the piping installation contractor are supplied by a single vendor, with the exception of those hangers which are fabricated or modified at the site. The same material is used in the fabrication of all safety related hangers, and each hanger is supplied with a letter of conformance which identifies that material. The same manufacturer also supplies the material (with letters of conformance) which is used by the contractor for field fabrication or modification of hangers.

One practice was identified which is included in this report because it could conceivably be misconstrued and result in the basis for this allegation: All hangers are painted to provide suitable corrosion protection. The type of paint to be used is specified by the architect engineer. It appears that all hangers supplied in the past were painted with a paint containing lead. The station design, however, does not allow for the use of lead bearing protective coatings inside of the reactor containment. As a result, all hangers designated for use inside of one of the containments, and which are painted with lead bearing paint, are stipped to base metal at the site and repainted with a lead free paint which is a different color. This practice may have been misconstrued as misapplication of the hangers themselves.

Conclusion: The inspection findings do not support the allegation. No further followup action is planned.

12. Water Leakage Through Auxiliary Building Basement Wall

Allegation: The J-Line wall in the Auxiliary Building basement is leaking water, and has been for some time.

Finding: Interviews with the licensee's Lead Structural Engineer and the cognizant contractor's Quality Assurance Supervisor, in addition to review of two existing non-conformance reports (NCR's) established that this condition exists and that the licensee had been aware of this condition since about August 1979. The inspector toured the wall and the surrounding area and observed:

a. The wall was dry, however, latent water stains on the concrete wall confirmed that leakage had occurred in the past.

b. A series of floor drains existed in a parallel line approximately six feet from the walls. The drains were capable of collecting and removing leakage.

c. No safety related equipment was located in the immediate vicinity of the wall.

Several days later the inspector verified that minor leakage (surface moisture) was occurring. Contractor personnel were in the process of repairing the leaking portions of the wall. The findings and repair methods were discussed with regional based construction inspectors. It was concluded that the repair methods were in conformance with industry practice and were acceptable.

It was also noted that no requirements concerning leakage were included in the design of this wall.

Conclusion: Although the allegation was substantiated, the situation represents no threat to the operability of safety related equipment; it is being repaired by the licensee. No further followup action is planned.

13. Reactor Building Settlement

Allegation: The northeast side of the Unit 2 reactor building is settling, and has already settled four to five inches.

Finding: The reactor building for Unit 2 is common with Unit 1, so this matter was included in items requiring a prompt review. The inspector interviewed licensee and structural contractor personnel who are responsible for the monitoring and evaluation of settlement of structures which are important to safety. Site records of Reactor Building settlement data and applicable portions of the Final Safety Analysis Report (FSAR) were also reviewed.

The responsible licensee and contractor personnel were not knowledgeable of settlement or differential settlement of four to five inches. The Reactor Building settlement data for Units 1 and 2 through May of 1981 had previously been compared to the theoretical predictions in

the FSAR by NRR. It was concluded that the recorded data was in reasonable agreement with the FSAR predictions. The inspector then compared the settlement data of May 1981 through May 1982 to predicted values. It was noted that Reactor Building settlement has apparently stabilized at approximately 2.4 inches. No indications of unacceptable differential settlement were noted in the NRR or inspector reviews.

Conclusion: While settlement of the reactor building has occurred, it has not occurred to the specific amount alleged. Settlement is within the limits specified in the FSAR.

SECTION VII

Prepared by: F. W. Reimann

R. D. Lanksbury

J. R. Kniceley

14. Acts of Sabotage (Broken Gauges and Controls and Flammable Liquids in Fire Extinguishers)

Allegation: Equipment was damaged during installation. In 1979 gauges were broken and flammable liquids were being placed in fire extinguishers.

Finding: The Station Construction Fire Marshall stated that he had no knowledge of flammable fluids being placed in fire extinguishers. The Operations Fire Marshall stated that he had heard rumors of this practice, but that in the last five years, no evidence to support the rumor has surfaced. He also stated that he has no knowledge of any individual who had found the rumor to be a fact.

The inspector reviewed the site annual fire extinguisher maintenance records for 1980, 1981, and 1982. The maintenancep rocedure requires disassembly of the fire extinguishers, and, therefore, should reveal the existance of flammable or other foreign substances in them. No flammable or foreign substances were recorded in the records. A review of the site security records for 1979 revealed no acts of sabotage that would collaborate this allegation.

The Operations Fire Marshall also stated that fire extinguishers had been used on several occasions for training exercises in fighting actual fires and to extinguish fires. No cases of flammable liquid in fire extinguishers were noted as a result of this usage.

The matter of instrumentation being damaged during or after installation is not new to the NRC. Inspection Report 50-373/80-15 addresses this issue and contains a noncompliance for inadequate control of damaged instruments. This matter has been resolved between licensee management and Region III, the Office of Nuclear Reactor Regulation (NRR), and the Office of Standards Development. The improvement of cleanliness and controls to protect installed instruments was discussed in several meetings with the licensee, and in some cases, the licensee's contractor management. The issue was considered resolved when reasonable assurance was provided to the NRC that adequate tests, surveillance, and calibrations were planned prior to fuel load to assure that instruments were in good working condition at the time of fuel load. Such preoperational tests have been performed, and a routine surveillance program is required during plant operations.

The inspector's observations of approximately 150 safety related instruments randomly selected during plant tours of Units 1 and 2 on June 17 and 23, 1982 resulted in no adverse findings. Degraded or potentially degraded instruments were properly identified in accordance with applicable licensee procedures.

Conclusion: Some problems with broken and damaged gauges had been identified in the past. Because of licensee corrective actions and subsequent testing, these matters are considered closed. No further action is necessary.

SECTION VIII

Prepared by: H. M. Wescott H. M. Wescott

R. N. Sutphin C. E. Norelius for RNS

J. R. Kniceley J. R. Kniceley

15. Welder Unqualified or not Properly Certified

Allegation: There were problems with the certification of welders by the architect engineer in 1977 and 1978. When section III documents of welder certification were checked, it was found that approximately 1% of the documents were done by uncertified welders.

Welders at the site of specified national origins were performing safety related welding and were not certified (or qualified) welders.

Findings: The inspectors interviewed the responsible members of the architect engineer's QC Division, and reviewed the AE's scope of work in regard to welding, the procedures which control that scope of welding work, QC records of AE activities, internal audit reports, and documentation of welding activities performed at the site. Licensee individuals who control welding and welder certification at the site, and site procedures and records were also reviewed. It was found that the AE had many responsibilities in the area of weld design, weld procedure certification, and the review of welding data.

The AE was not, however, responsible for the certification or maintenance of the certification of welders. Responsibility for the review, approval, or acceptance of welder certifications is retained by the licensee. There were occasions when the licensee involved the services of the AE in the resolution of items relating to the welder certifications of contractors or vendors. The AE personnel who assisted in the resolution of problems appeared to be qualified.

The inspectors reviewed licensee records and procedures and noted that all welders who performed work at the site were tested prior to employment, and appeared to be qualified and capable individuals. Each welder is assigned a unique welder identification number, and that number is recorded with the remainder of the pertinent data for all welding which is safety related. A review of welding specifications, procedures, quality control procedures, welder certification procedures, and resulting records of work performed, quality documentation, and welder certification failed to identify any deficiencies in this area.

In addition to the above inspections, the records of 13 selected welders of the national origin identified were reviewed. No deviations, departures, or practices different from the remainder of the certification program were noted. No adverse findings were noted.

Conclusion: The allegation was not substantiated. No followup action is planned.

SECTION IX

Prepared by: R. N. Sutphin C. E. Norelius for RNS

J. Kniceley J. Kniceley

16. Inadequate Training of Quality Control Personnel

Allegation: Quality Control personnel employed in the mid-1970's in the QC Division of the Architect Engineering firm (Sargent and Lundy) were not given adequate training to perform assigned work, and the required certifications were not maintained.

Finding: The inspector interviewed the Head, Quality Assurance Division, the QC division Project Quality Control Supervisor, a Quality Assurance Team Leader, and six current and former employees of the QC Division.

The architect engineer's internal procedures and documentation for training, qualification, and certification were reviewed and no deficiencies were identified. The results of two internal Quality Assurance audits, which were conducted to evaluate the conformance of the Quality Control, Mechanical (DMD), Electrical (EPED), and Structural (SPED) divisions to procedural requirements, were reviewed.

The alleger supplied the names of other individuals who, in the alleger's opinion, would confirm the concerns. One individual who worked in the same capacity and during the same time period when the alleged problem occurred stated that she had no knowledge of the conditions cited, and provided a statement that in her case training was acceptable and good. The other individual could not be located.

The following are details of the inspection of the Sargent & Lundy Training Program:

a. GQ-1.04 states in paragraph D.1, "An individual shall not perform any quality related activities prior to approval of his employee qualifications statement" (Form GQ-1.02.2)

b. GQ-2.04 states in paragraph A.1, "Training shall be required to the extent necessary to assure that each individual shall achieve and maintain a suitable knowledge of the requirements of the QA program and QA procedures pertinent to the individual's position and to assure that suitable proficiency is achieved and maintained".... "Personnel who direct, manage, supervise or perform quality related activities as outlined in the S&L QA Manual shall require training when one or more of the following criteria apply: when an individual is promoted, or transferred, or loaned..., when an individual is hired, exhibits an inadequate proficiency when revisions are made, etc."

c. GQ-2.05 states in part - paragraph 1.0, "The objective of the technical training shall be to indoctrinate and train personnel who are performing quality-related activities, to assure that suitable proficiency is achieved and maintained."

Paragraph 3.0 B.1, "Training may include, but not be limited to, the use of NRC regulations, industry codes and standards, and S&L administrative and technical standards, as they apply to the design of nuclear power plants."

Paragraph 3.0 C.1 "A trainee's proficiency record shall be maintained in the department/division training file."

S&L General Quality Assurance Procedures GQ-1.04, GQ-2.04, and GQ-2.05 covering employee experience records, qualification statements, QA/QC indoctrination and training, and technical training provide an adequate basis for training and certification of S&L personnel, and the maintenance of required proficiency for personnel working in quality related activities.

An Internal Audit No. G-23 conducted on December 16, 1976 covered the following:

a. Organization chart for the Quality Control Division

b. The description of organizational functions and responsibilities of the QC Division

c. The roster of personnel for Quality Control Division

d. The Position Descriptions for the Personnel of QC Division

e. The employee experience records of QC Division personnel

f. Employee qualification statements for QC Division personnel

No deficiencies were found during the audit; this audit appeared to be complete.

To determine whether divisional personnel of PMD (Mechanical), EPED (Electrical), and SPED (Structural) are complying with the requirements of the QA procedures, internal Audit No. G-58 conducted on June 28-30, 1981 covered the following:

a. GQ-1.01, Rev. 4 - S&L Plan of Organization

b. G-1.03, Rev. 3 - Organization of Position Descriptions

c. GQ-1.04, Rev. 2 - Employee Experience Records and Qualification Statements

d. GQ-1.04, Rev. 4 - QA Training

e. GQ-1.05, Rev. 3 - Technical Training

f. ME-1.14, dated December 16, 1976 - Mechanical Department Technical Training Program

g. ESI-230, dated April 27, 1977 - Electrical Department Technical Training Procedure

h. SAS-24, Rev. 0, dated December 3, 1976 - Technical Training of Structural Department Employees

No deficiencies were identified during this audit.

Records of the QA Training Section for 1977 show that QA training was given to 82 of the 102 employees in the Project Management Division, 61 of the 71 in the Electrical Project Engineering Division, and 22 of the 28 in the Structural Project Engineering Division. A substantial number of persons from the three engineering divisions had received retraining in the first half of 1978 for those QA procedures which have been revised.

Employee Qualification Statements and Employee Experience Records were reviewed for a selected group of individuals, including specific individuals who were alleged to be unqualified. These were found to be properly documented showing conformance to the company's procedures.

Conclusion: Sargent & Lundy had a continually improving training and certification program during the 1970's. Records were maintained and appropriate qualifications, training, and certification programs were in effect. Adequate programs for work orientation and training were in effect and seemed to be effectively implemented. There were no deficiencies found in the program or in the related documentation for selected individuals.

17. Coverup of Deficiencies

Allegation: An architect engineer supervisor with responsibility at the LaSalle Project allegedly told an employee that he knew of many mistakes in the plant and how they were covered up.

Finding: The alleger provided no specifics regarding the nature of the alleged mistakes or portion of the plant affected.

It is noted that throughout the history of the project, a continuing program of inspections, audits, and investigations have been conducted by the NRC. Deficiencies that have been identified during these inspections have been documented and corrective action had been taken.

The individual who expressed the concern gave the names of two other former architect engineer employees who could provide additional information. One of the individuals could not be located. In a telephone interview with an investigator, the second individual stated that any problems she found were corrected through her supervisor, she was not aware of any attempts to cover up or hide anything, and she was not aware of statements attributed to any supervisor which were alleged.

The inspector interviewed six architect engineer and licensee managers in addition to reviewing eleven AE procedures, audits, and standards which control the AE scope of work. No adverse findings were identified.

Conclusion: The allegation could not be substantiated.

18. Nonconforming Material

Allegation: Metal for a valve was rejected because it did not meet the carbon content requirements. The original number was changed to meet the requirements.

Finding: The inspector interviewed personnel and reviewed records pertaining to valve specifications. The inspector also reinterviewed the alleger by phone to try to obtain more details regarding this allegation. The alleger could not provide any additional information.

In the absence of specific details, the inspector interviewed personnel and reviewed records pertaining to certification of material. The following records and documents were reviewed:

a. Quality control documentation lists (QCDL) for 4 specifications:

(1) J-2937 Control Valves (Section III)
(2) J-2938-02 Globe Valves (Section III)
(3) J-2961 Piping System Prefabrication
(4) J-2950-01 OFF Gas Valves (Section III)

The quality control documentation lists provide a record of documentation that is required, received, reviewed, and transmitted to CECo and the site. It covered technical administration requirements and detailed item requirements.

b. Q.C. correspondence files and document record files for 3 specifications:

(1) J-2937 Control Valves (Section III)
(2) J-2938-02 Globe Valves (Section III)
(3) J-2950-01 OFF Gas Valves (Section III)

QC Correspondence and Document Record files contained copies of all record transmittals, reviews, comments, concerns, rejections, requests for missing documents or information, responses, acceptances, and final record copy.

c. Quality control inspection certificates, certified material test reports, and ASME Code (Form NPV-1) data reports for several sample valves. Certified material test reports contained detailed data on the chemical composition and mechanical properties for each item or part number, as required. Several certified material test reports for valves covered by the 3 specifications referenced were reviewed and checked for irregularities or nonconformances and none were found. No changes or missing data was evident.

d. Audit reports. Audit Report No. 34 of audits performed on July 25 through 28 and 31, and August 1 and 2, 1978, covered 16 items associated with the QCDL review and acceptance process.

Two items were questioned in a sample data package relating to a wall thickness measurement and a review of a radiograph. However, these did not affect the chemical composition or mechanical properties of the valve material. Subsequent information indicated the particular questions raised applied to a valve installed in the off gas system for Unit #2.

Subsequent to this question on a valve body wall thickness, the valve was located in the field and a complete ultrasonic wall thickness examination performed. The report of the examination, Report No. 28, dated June 16, 1982, indicates that the smallest reading found was 0.60". The minimum required was 0.58", so the valve body appears to meet the specification. The radiograph in question was reviewed and found to have been covered by a repair and reradiograph identified as 17-10 R on the radiograph examination report dated December 7, 1978. At this time these two questions have been addressed in a satisfactory manner.

All of the data on the certified material test report for sample valve No. 2N62-F042A was checked against the 8 ASTM specs that applied and all data were found to be within specified limits.

Conclusions: All data observed and checked regarding material chemical composition and mechanical properties appeared to be correct original data and was within specified limits. Therefore, without specific identification, it is concluded that this allegation has not been substantiated.

19. Conflict Between Specifications and NRC Requirements

Allegation: Specifications made by the Architect Engineer were in conflict with NRC requirements.

Finding: Since the alleger was not able to provide specific details regarding this allegation, the Region III inspector reviewed procedures and records relating to the handling of specifications. The following procedures and records were reviewed:

a. General QA Procedure GQ-4.01, Procurement Specifications

b. Project Instructions (La Salle) PI-LS-03, Project procurement and conformed technical specification requirements; and PI-LS-IS, Processing of Commonwealth Edison nonconformance reports and Sargent & Lundy Engineering Change Notices.

c. Audit Reports (Internal) No. 22 8/12-13/76, G-23 12/23/76, 34 8/22/78, and G-58 7/27/78;

d. Status of Project Specifications, reports dated 6/1/76, 5/1/82, and 6/1/82;

e. Interoffice Memoranda Re: Reviews & Comments on Specification J-2937 (as a sample), dated 1/11/73, 11/14/74, 11/25/74, 12/3/74, 1/17/73, 4/7/73, 9/23/73, 10/27/73, and 3/5/76.

The S&L General Quality Assurance Procedure GQ-4.01, Procurement Specifications, includes reference to several pertient standards and requirements including NRC's 10 CFR 50 Appendix B, NRC's Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction);" NRC's Regulatory Guide 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants;" NRC's Regulatory Guide 1.123, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants;" ANSI/ASME N45.2, "Quality Assurance Program Requirements for Nuclear Facilities;" ANSI N45.2.11, "Quality Assurance Requirements for the Design of Nuclear Power Plants;" ANSI N45.2.13, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants."

Instructions were documented on the manner in which revisions could be made to the specifications. Revisions must be prepared, reviewed and approved in the same manner as the original issue as required by the nature of the revision.

The procedures states that technical requirements must be specified in each procurement specification either directly or by reference to specific drawings, specifications, codes, regulations, standards, procedures, or instructions, by their specific titles, numbers, and revision and/or due dates, which describe the items or services being procured.

Specifications must identify, or provide for later identification of test, inspection and acceptance requirements, and any special instructions and requirements for activities such as designing, identification, fabrication, cleaning, erecting, packaging, handling, shipping and extended storage.

Specifications require that the contractor have a documented quality assurance program that implements applicable portions of Appendix B of 10 CFR 50, as well as all other applicable nationally recognized codes and standards. Specifications also require that the contractor include appropriate quality assurance program requirements in all sub-tier procurement documents.

LaSalle Project Instruction PI-LS-03 establishes the requirements for project procurement and conformed technical specifications and amendments thereto for the LaSalle County Station - Units 1 and 2. This Project Instruction supplements the requirements of GQ-4.01 for procurement specification and establishes specific requirements for preparation of conformed technical specifications.

Conclusion: The inspector found that Sargent and Lundy programs for developing specifications, for their review and approvals, for revisions, for compliance and for adequacy are well defined and followed; the audits reviewed showed compliance with the necessary requirements. Detailed reviews of the files for 3 specifications developed no items of concern or lack of compliance with NRC requirements. In the absence of a specific specification identified to be potentially in conflict with NRC requirements, no information was identified to substantiate the allegation.

SECTION X

Prepared By: R. Lanksbury R.D. Lanksbury

F. Reimann F.W. Reimann

H. Wescott H. Wescott

F. Jablonski F. Jablonski

J. Kniceley J. Kniceley

20. Calibration of Torque Wrenches

Allegation: Records for torque wrench calibrations by the site piping contractor (Morrison) were falsified.

Findings: The contractor's program for controlling, issuing, calibrating, and record controls for torque wrenches used for construction of safety related equipment was evaluated. It was found that approximately sixty torque wrenches of the dial indicator and slip (clicker) type were maintained for use by Morrison personnel. The wrenches are stored in one of two locked tool cribs, and are logged out by serial number for each job. Verification of calibration is maintained in the field by the presence of a gummed calibration sticker which identifies the wrench, the date of latest calibration, and the due date for calibration verification. Each wrench is calibrated weekly, except for wrenches which are removed from the tool cribs for maintenance or repair. In the event of damage to or loss of a wrench, procedures require that each job on which the wrench was utilized since its previous calibration be rechecked.

Once each week the wrenches are returned to the Morrison construction office for calibration verification. This verification is performed using a bench testor which serves as a transfer standard. The accuracy of the transfer standard is verified using calibrated standard weights (traceable to the NBS) by the licensee (CECo) every six months. The physical work of verifying torque wrench calibrations, performing minor wrench repairs, and recording calibration data is accomplished by two craft personnel (millwrights), employed by Morrison. The same individuals have performed this task for at least the past two and one half years. The same QC inspector has been assigned to inspect the quality of the work, and maintaining the records of calibrations, repairs, and nonconformance reports (which are required if a wrench is found out of specification or broken) for at least the five previous years. The inspector is also employed by Morrison.

Morrison's procedures and records indicate that torque wrenches were used for installing concrete expansion anchors (which support components, supports, and restraints), in bolting flanges, valve parts, and similar mechanical fastenings. Bolted fastenings which have critical preload requirements (such as jet pump support beams, large

equipment assemblies, etc.) are not torqued (they are preloaded by elongating the bolt using hydraulic pressure), as is standard industry practice.

A sample of about 1,500 of the approximately 6,000 records of weekly torque wrench calibrations were reviewed. Fifteen records of semi-annual verifications of the torque wrench calibrator by CECo were also reviewed. Of this sample approximately 70% of the records were found to exhibit one or more of the following questionable record keeping practices (Attachment E is a sample of the torque wrench calibration record PC-139. Numbers have been added to assist in referencing to the report text):

a. Three cases where the records of calibration for a single wrench were photocopied from the results obtained for a different calibration interval. The master used to make the copies was found to be the next record, chronologically, after the copies. The number of consecutive weeks for which results were photocopied ranged from three to twelve weeks.

b. Frequent instances where the information in Form PC-139 columns 3, 4, 5, and 6 were written in ink, but all or combinations of items 7, 8, 9, 10, or 11 were photocopied, indicating that signatures verifying that the work had been correctly done and performed were affixed prior to the work being performed.

c. Frequent instances where the value recorded in column 2 of Form PC-139 was repeated in columns 3 and 4 rather than recording actual data. Errors were then recorded as 0. There were also frequent instances where the values recorded in columns 3, 4, 5 and 6 were repeated week after week with no variance. This occurrence is unlikely based on the difficulty of repeating an exact reading.

d. A small number of instances (less than 1%) where the actual recorded data was out of tolerance a few percent, and later altered to acceptable values. Reading of the final recorded values was not physically possible because they required the calibration device be read to one tenth of a foot-pound or inch-pound on a scale calibrated in five foot-pound (inch-pound) increments.

e. In a small number of cases (less than 1%), the actual data recorded exceeded allowable tolerance limits by a few percent. A few mathematical errors were also found. This data was reviewed and approved by the QC inspector (items 7 through 9 on Form PC-139) and not challenged.

f. The records of torque wrench calibrator records were found to contain approximately six calibration point records which were 5% or less out of tolerance. The records were reviewed and approved, and not identified as being out of tolerance, nor were corrective actions taken.

Following the discovery of the above questionable records, the inspection was divided into three separate initiatives: (a) the re-evaluation of work performed in the field to determine if actual unacceptable work on safety related equipment existed (this initiative had actually started prior to this time and was underway when the questionable records were identified); (b) a further evaluation of the suspect records and subsequent engineering analysis to determine whether the worst case out-of-tolerance conditions indicated in the records could result in conditions adverse to safety; and (c) an examination of other Morrison records for Measuring and Test Equipment (M&TE), and an evaluation of torque wrench programs of other site contractors to quantify the extent of the observed records problem.

a. Work Re-Evaluation

The NRC inspector randomly chose three safety related valves for verification of proper torquing. The inspector witnessed the torque verification. Two of the three valves were found to have bolted fastenings which were verified to be at least equal to the minimum torque requirement. The third valve was found to have two of the four bolts which hold its motor operator to the valve yoke to be loose (not threaded to the hand tight condition). This condition was not related to torque wrench accuracy. Morrison's records for this valve (mechanical joint checklist) indicated that the loose bolts had been torqued to 50 foot-pounds and verified by a QC inspector. Maintenance records indicated that no work had been performed on the valve since its installation. A second group of bolted fastenings on the same valve was determined to conform to at least the minimum torque requirement. The loose bolts were retorqued.

As a result of this finding, CECo, at the NRC's request, committed to verify the integrity of all bolted joints relating to the operability of safety related air and motor operated valves. Bolted joints which form a pressure retaining boundry were exempted on the basis that their integrity had been tested when the system hydrostatic test was performed.

(1) Valves inside of the containment have since been verified to be torqued to the minimum required value. Of the approximate 6,000 bolts checked by CECo, four motor operator to yoke bolts on four different valves were found to be only hand tight and one bolt was found to be approximately 10 ft-lbs below the required torque. These bolts have been retorqued to the required values.

(2) Valves outside of the containment will be checked by January 15, 1983.

A random sample of 10% of Morrison's torque wrenches were selected for a recalibration test which was witnessed by an NRC inspector. In all cases the data was in disagreement with the

latest routine calibration records, and the trends established in the previous several weeks. In all but two cases, however, the results were acceptable. The out-of-tolerance results for the two wrenches were less than 5% beyond acceptable limits. Nonconformance reports were initiated for the out-of-tolerance wrenches. The differences between NRC witnessed results and earlier records is considered corroborative of finding c. above.

NRC investigators and inspectors interviewed five Morrison individuals primarily responsible for torque wrench calibration testing and QC acceptance. They denied that they had ever made up a record without performing any calibration at all. It was determined, however, that calibration data was not always taken as required by procedures. For example, those individuals who performed calibrations said that on certain occasions they may have checked only three of the five calibration points on a wrench. They also stated that if the readings were within the acceptable range, they sometimes recorded the acceptance value rather than the actual reading. The QC inspector stated he did presign blank calibration data forms which were used by the millwrights. This was done as a short-cut to speed up the QC acceptance process. The millwrights provided conflicting statements at different times as to whether or not they entered data on presigned forms. QC routinely reviewed these forms later for completeness, but not necessarily for technical accuracy. Everyone interviewed stated they never changed any numerical data on any calibration form, and they are not aware of anyone who has. Forms and procedures have now been changed and QC now witnesses all calibrations.

The largest single category of work involving the use of torque wrenches was the installation of concrete expansion anchors (CEA's). In addition to the verification of proper installation of CEA's for wrenches with suspect calibrations (discussed above), it was determined that the installation quality was additionally verified immediately following initial installation (at least six hours after but not more than two weeks after) by an independent testing contractor retained by CECo. The QC effort has continued as the anchors were installed. The independent test contractors program of inspecting CEA installation consisted of sampling one CEA on each base plate, or 10% of the bolts, whichever was greater. The adequacy of CEA installation was further verified by the licensee's actions in response to NRC Inspection and Enforcement Bulletin 79-02 (which specifically addresses failures of CEA's). This included verifying and providing information on various aspects of the design criteria utilized and verification of proper installation, including installation torque, test torque, embedment length and anchor size. Their response and actions are documented in the final report, dated February 8, 1982, provided by CECo.

As part of their commitment to the NRC, CECo checked the torque values for any item whose initial torque was questionable based upon suspect calibration records for the torque wrench utilized. A portion of these checks were witnessed by an NRC inspector. A total of 67 hangers with approximately 392 CEA's and the bolting of two valves were checked. The two valves were checked as part of the verification noted in a.(1)., above. Of the 392 CEA's checked, fourteen CEA's on nine hangers failed to meet the specified verification torque. Upon retorquing the fourteen CEA's and again checking the verification torque, two CEA's failed. These two CEA's will be replaced per established procedures. It was noted by CECo that upon recalculation of the loading forces on the two base plates involved that they would have functioned without these two CEA's.

b. Engineering Evaluation

Two NRC experts in mechanical fasteners and two NRC consultants, one an expert in mechanical fasteners and one an expert in code requirements, conducted an evaluation of the engineering implications of deficiencies which could arise as a result of torque wrenches which were either out of calibration or potentially out of calibration. The experts independently evaluated the problem and met with CECo and Sargent and Lundy representatives who were performing a similar evaluation.

At the meeting, CECo addressed three primary areas of concern: (1) Motor Operator to Yoke Bolts, (2) Expansion Anchor Bolts, and (3) Torque Wrench Calibration Accuracy. The following paragraphs discuss each area of concern.

(1) Motor Operator To Yoke Bolts

This concern originates with the problem identified by the inspector on the two loose motor operator to yoke bolts. As previously stated, CECo agreed to check for tightness all non-pressure boundary bolts on safety-related valves, with motor or air operators, that could affect valve operability. While one of the consultants included in his recommendations specific provisions for checking both upper and lower torque values, the NRC staff required that these bolts be checked only to assure that they met minimum torque values. Valves within containment have been checked, as discussed above, and valves outside containment will be checked by January 15, 1983. An NRC inspector reviewed the licensee's procedures for re-checking torque valves and found them acceptable.

(2) Expansion Anchor Bolts

Sargent and Lundy presented their study of anchor bolt seating torques and their justification for the values chosen for their verification torques. Studies made of the torque, holding power, and slip characteristics were presented and copies of a portion of their report on their

findings were given to those present. It was explained that the preload on the anchor dissipates, due to concrete creep, over a period of time after installation and that the preload is not required for the anchor to withstand cyclic loading but is used to verify that the anchor bolts are properly installed. This was the justification provided for the 60% of installation torque value assigned to the verification torque. All parties present agreed that the above was technically satisfactory. CECo stated that when anchor bolts are found to turn prior to the verification torque, they would be taken all the way up to the installation torque and then rechecked. If they failed to meet the verification torque the second time, a nonconformance report (NCR) would be written to disposition that anchor bolt.

(3) Torque Wrench Calibration Accuracy

The "worst case" of torque wrench miscalibration was established from the recorded data and rechecks of the torque wrenches in question, and was stated by CECo to be less than 15% (including allowed calibration error). It was noted by the NRC consultants that typically torque wrenches are accurate to approximately ±10% and that analytical calculations are considered accurate at ±20%. It was also established by CECo that the known applications of the questionable torque wrenches did not require close tolerances (i.e., primarily anchor bolts).

It was also noted that torque does not produce an accurate bolt preload. Where an accurate bolt preload is required, it is normally accomplished using a more accurate method such as by hydraulic tensioning (e.g., jet pump holdown beam bolts, reactor vessel head bolts, etc.). It was concluded by the NRC experts and the NRC consultants that from a design standpoint, the effect of the out-of-spec torque wrenches does not have a significant impact on the bolted components ability to perform its intended function. Thus, providing no bolt applications are found where questionable torque wrenches were used and where an accurate preload is required, it was concluded that the inaccuracies of the torque wrenches is not a significant safety concern with respect to design.

As a result of these analyses, it is concluded that the worst case out of tolerance conditions (less than 15%) which could result from the conditions observed to exist would not result in a reduction of safety margins. The NRC consultants' reports are included as Attachments F and G. The final results of CECo's analysis were also submitted to the NRC experts and consultants for evaluation. All parties have agreed that the reported results, along with the inspector's site verification of the procedures used, are acceptable to demonstrate that the licensee's program met the NRC staff's requirements.

c. Additional Record Review

A review of records of and interviews with representatives of other site contractors were performed to determine whether the deficiencies observed in the Morrison torque wrench program could affect work in other contractor scopes of work. It was found that with two exceptions, other contractors who use torque wrenches used equipment supplied by other manufacturers, and that the calibration programs for them were independent of the Morrison program. The two exceptions to this finding are Reactor Controls, Inc. (RCI) and the Zack Company (Zack). RCI had a contractual agreement since 1980 by which Morrison performed their torque wrench calibrations. Prior to 1980 the RCI calibrations were performed by Gage Laboratories (an independent corporation). No questionable findings were found in the Gage records.

The Morrison records for RCI wrenches were found to have many of the same findings as Morrison's own records. However, RCI had performed a documented independent review of results, and their records did not show out of tolerance results. It was also found that RCI routinely performs and documents a check of one torque wrench against another (both calibrated) both before and again after each use. The above findings were corroborated by CECo during their audit of RCI M&TE documentation. It is also noted that for CEA installation work performed by RCI, the same type of independent verification program was in effect as noted above for Morrison.

CECo performed an audit of Zack M&TE records and found that the only calibration work performed by Morrison for Zack was for torque wrenches. Zack's use of torque wrenches was limited to CEA installation and equipment holddown bolts. In December 1980, Zack instituted a recheck of all work performed previously. Therefore, only records from December 1980 to the present were reviewed. This review revealed problems with repetitive data, as noted above, but no other problems were noted. As with Morrison and RCI, the CEA installation was sampled by the independent testing contractor retained by CECo.

A review of approximately 10% of other types of Morrison M&TE documentation was also performed by the NRC. Documentation problems similar to those encountered for torque wrenches were found in less than 20% of the sample. Evaluations of the magnitudes of errors which may have resulted, and, particularly, the observed condition of equipment which was recalibrated in the presence of NRC inspectors indicate that the findings relate to poor record keeping rather than deficiencies in installed plant equipment.

d. Licensee Audit

As a result of the questionable status of Morrison's QC records and the records of those contractors utilizing Morrison's calibration service, the NRC requested CECo to perform an audit of 100% of Morrison's records for M&TE (including those calibrations which Morrison performed for RCI and Zack), and additionally to

audit a minimum of 75 to 100 documents for each type of Morrison's QC records other than M&TE records. The results of this audit, conducted between June 29 and July 8, 1982, are included as Attachment H to this report.

CECo's twelve man audit team concluded that the documentation problems identified by the NRC were limited to calibration records. Their evaluation of the reports where torque wrenches were found to be out of calibration or had questionable calibration data or records concluded that they had no adverse impact on plant construction. This conclusion was based on the records reviewed and the results of the independent testing agency's results of bolt torquing inspections. It was found that the independent testing agency examined 6,756 Morrison installations between 1977 and June 1982. Of these, 81 (1.2%) were rejected for low torque values during the six year period. In addition, they stated that examination by Quality Assurance (QA) of follow-up checks conducted by Project Construction of other calibration areas (e.g., thermometers, hygrometers, calipers, etc.) did not identify any cases where the installed condition of Unit 1 equipment appeared questionable.

CECo stated that many qualified individuals had looked at this area but that without being specifically attentive to looking for record alterations they would not have identified them as a quality issue. In addition, their examination of the overall surveillance and audit process indicated that their auditing methodology involving large numbers of similar records needs to be changed to provide that larger samples be taken to achieve a better assessment. The CECo QA department committed to implement this change.

The NRC received this report on July 9, 1982. On July 12, 1982, the NRC met with CECo management to discuss the report. The NRC also performed an independent sampling audit of Morrison's QC records and reviewed some of the detailed data which supported the report findings. NRC inspectors independently reviewed calibration records for torque wrenches, micrometers, dial indicators and temperature measuring devices. A sample of pressure test records were reviewed. Also, a sample of several other types of QA records maintained by the licensee (welding travelers with associated nondestructive testing records, nonconformance reports, receipt inspection reports, welder qualifications) were reviewed. A review of the audit qualification records for seven (7) of the principal auditors performing this audit was also performed. The qualifications met the requirements of ANSI-N45.2.23. This independent sample tended to confirm the validity of the CECo audit. The scope of the audit was compared to the commitments made by the licensee, and documented in the J. G. Keppler to C. Reed letter of July 8, 1982. While it was found that the sample size for documents handled by individuals who generated other questionable documents was not as large as CECo had committed to, the Region III staff concluded that the existing audit and followup inspection by the NRC has resulted

in the identification of all technical problems which exist. The licensee has been directed to complete a 100% check of documents handled by individuals who generated records which were found to be suspect.

Conclusion: The allegation has been substantiated by the findings described above. As a result of the analyses and evaluations performed and the licensee's actions in retorquing bolts where questions remained, it is unlikely that conditions exist which would reduce the margins for safe operation in regard to the installed equipment. Based on the CECo audit and the NRC's review, we believe the technical issues related to Morrison's activities have been properly identified and resolved. The licensee has committed to additional auditing of a wider sampling, and the NRC staff will continue to pursue QA program deficiencies which have been identified. A separate report is being prepared which will contain the enforcement sanctions resulting from unacceptable QC practices.

CATEGORIZATION OF ALLEGATIONS

CATEGORY 1 ITEMS - ITEMS OF SIGNIFICANCE WHICH MAY EFFECT UNIT 1 OPERATION

1. IMPROPER CORING AND DRILLING ACTIVITIES
2. VOIDS IN REACTOR PEDESTAL
3. 55 GALLON DRUM IN CONTAINMENT BASEMAT
4. DEBRIS IN CONCRETE
5. IMPROPER CONCRETE WORK IN THE SCREENHOUSE
6. MISALIGNED CONTAINMENT WALL
7. IMPROPER MASONRY WALL CONSTRUCTION AND POOR MORTAR QUALITY
8. INADEQUATE SECURITY
9. INADEQUATE CONCRETE VIBRATION
10. SECONDARY CONTAINMENT TEST EVENT
11. IMPROPER INSTALLATION OF HANGER SUPPORTS
12. AUXILIARY BUILDING WALL LEAKING
13. EXCESSIVE REACTOR BUILDING SETTLING
14. ACTS OF SABOTAGE IN 1979
15. WELDERS UNQUALIFIED OR NOT PROPERLY CERTIFIED
16. INADEQUATE TRAINING OF QUALITY CONTROL PERSONNEL
17. COVERUP OF DEFICIENCIES
18. NONCONFORMING MATERIAL
19. CONFLICT BETWEEN SPECIFICATIONS AND NRC REQUIREMENTS
20. FALSIFICATION OF TORQUE WRENCH CALIBRATION RECORDS

CATEGORY 2 - RESOLUTION REQUIRED (BUT NOT IMMEDIATE)

1. ADVANCED KNOWLEDGE OF NRC INSPECTIONS
2. ARCHITECT ENGINEERS INABILITY TO CLEARLY COMMUNICATE
3. IMPROPER INSTALLATION ACTIVITIES IN UNIT 2
4. IMPROPER MANAGEMENT ATTITUDE
5. INSTALLATION OF DAMAGED EQUIPMENT
6. EVENT RELATING TO UNIT 2
7. CONDITION OF UNIT 2

CATEGORY 3 - REFER TO LICENSEE; STATE; OSHA; OR OTHER AGENCY/ NO FURTHER INVESTIGATIVE ACTION REQUIRED

1. NRC INSPECTOR CONDUCT
2. IMPROPER INSTALLATION OF PIPING
3. INADEQUATE WORKER SAFETY
4. WASTE AT LA SALLE
5. DEFECTIVE CIRCULATING WATER PIPE
6. INSTALLATION OF PARTS NOT IN ACCORDANCE WITH PRINTS
7. LOOSE BOLTS ON BEAMS IN UNIT 2 TURBINE BUILDING
8. BULGE IN CONDENSER PIT CONCRETE WALL
9. ALCOHOL AND DRUG USE

EVALUATION REPORT ON THE ATTORNEY GENERAL OF ILLINOIS ALLEGATIONS FOR LA SALLE PLANT

STRUCTURAL ENGINEERING BRANCH

BACKGROUND

The allegations made by the Office of the Attorney General, State of Illinois, on March 24, 1982, in the matter of La Salle County Nuclear Generating Station, Units 1 and 2, (Reference 1) can be summarized as follows:

1. That thousands of drilled holes may have been cut through the reinforcing steel and that the potential degradation in structural quality may cause failure of the structures and systems.
2. That the concrete roof of the Off-gas building was actually 8 inches thick instead of 12 inches that the specifications called for.

On March 31, 1982, a meeting was held in Bethesda, Maryland. Participants included NRC staff members; representatives of the Commonwealth Edison Company; Sargent and Lundy; and a representative of the Attorney General, State of Illinois. Mr. Denton of NRR conducted the meeting and the applicant presented his response to the petition made by the Attorney General of Illinois. Discussions among participants ensued and a transcript of the entire proceedings has been taken (Reference 2). The applicant later made some comments and clarification on this meeting transcript (Reference 3). At the end of this meeting the applicant left us for reference a copy of the specification for concrete expansion anchor work and a set of 109 engineering drawings showing the number and locations of drillings through concrete (References 8 and 9).

On April 7, two staff members of the Structural Engineering Branch went to the La Salle plant site to observe and to gather information on practice of drilling holes through concrete elements. The staff also attended the meeting at Sargent and Lundy in Chicago on April 8. Preliminary findings of this trip were documented in a trip report (Reference 4).

Other reports by IE and Region III concerning the issue of hole-drilling and

the Off-gas Filter Building have also been sent to us for review (References 5, 6 and 7). We have also reviewed the final report on allegations regarding rebar damage and Off-gas Building roof thickness submitted by the applicant (Reference 10).

DISCUSSION

The applicant has kept a complete record of cored and drilled holes passing through concrete elements, this includes permanent records for all reported damaged rebars due to drilling. We have verified at the plant site several groups of drilled holes through the use of the set of drawings that have been provided to us and believe that the record of drilled holes is reasonably accurate. In spite of the fact that thousands of holes have been drilled and thousands of rebars have been hit, the actual damage is believed to be too small to affect the structural integrity of the plant. Furthermore, there are no holes cored completely through the primary containment walls.

We have reviewed the applicants' quality control procedures and documentation procedures for cored holes either passing through or partially penetrating concrete elements and for damaged reinforcing steel due to drilling operations for concrete expansion anchors. These procedures require accurate records of drilled and cored holes and damaged bars, are consistent with good engineering practice, and are therefore acceptable. Although recorded details concerning damaged bars in drilled holes prior to 1976 were insufficient in our opinion, the conservative approach of assessment by taking hit bars as completely cut compensates for this deficiency.

We looked into the method of engineering assessment performed by the applicant. We are satisfied that the applicant distinction between a "nicked" and "cut" bar was appropriate as implemented; in particular that partially cut bars were regarded as completely cut because the residual strength of a partially cut bar is uncertain and unreliable. We questioned the basis of selecting sample groups and panels for assessment and subsequently agreed that the sampling based on

density of holes was appropriate. We have also audited and spot-checked engineering calculations performed to assess the significance of cut bars and found them to be acceptable.

In regard to the thickness of the roof of the Off-gas Building, we have visited the building and witnessed some crucial field measurements. Based on this field data and on the reports of IE and Region III (References 5, 6 and 7) we believe that the thickness of the roof slab is definitely 12 inches and not 8 inches as alleged.

CONCLUSION

In conclusion, we confirm our earlier observation with the following findings:

1. The controls and engineering evaluation of the effect of drilled and cored holes were such that there is reasonable assurance that they will not result in unacceptable degradation of structural elements.

2. The roof of the Off-gas Building is 12 inches thick.

In view of the above we are of the opinion that the allegations filed by the Attorney General of the State of Illinois are without merit.

REFERENCES

1. "Request to Institute a Show Cause Proceeding and for Other Relief" transmitted through a letter dated March 24, 1982 from T. C. Fahner, Attorney General of Illinois to Secretary, U. S. Nuclear Regulatory Commission. Attachments include affidavits by E. Garrison and D. G. Bridenbaugh.

2. Transcript of the March 31, 1982 meeting held in Bethesda, Maryland, in the matter of Commonwealth Edison Company, La Salle County Nuclear Generating Station, Units 1 and 2. Attachments include: (a) Off-gas Building Roof Report, dated March 30, 1982, (b) Exhibits 1-8 at the meeting, and (c) Response to Petition made by the Office of the Attorney General, State of Illinois, in the matter of Reinforcing Steel Damaged during the Installation of Cored Holes and Concrete Expansion Anchors, La Salle County, Units 1 and 2, by Commonwealth Edison Company, dated March 31, 1982.

3. Comments and Clarification on Meeting Transcript, March 31, 1982, transmitted by Commonwealth Edison Company on April 22, 1982 to U. S. NRC.

4. "Trip Report - Visit to La Salle Plant and Meeting on Hole-Drilling and Cut Rebars in Concrete" by R. E. Lipinski and S. P. Chan, April 14, 1982.

5. "Assessment of the Off-gas Filter Building at La Salle Nuclear Station" by R. E. Shewmaker, April 8, 1982.

6. "Assessment of the Response by Region III to Allegations concerning the Off-gas Filter Building at the La Salle Station" by E. C. Gilbert, April April 16, 1982.

7. Region III Inspection Report No. 50-373/82-21 (DETP).

8. Sargent and Lundy: Specification for Concrete Expansion Anchor Work (Form LS-CEA) Rev. 0, September 23, 1976; Rev. 1, December 7, 1976, Rev. 2, November 29, 1978; Rev. 3, July 20, 1979; Rev. 4, September 7, 1979; Rev. 5, December 10, 1979; Rev. 6, February 13, 1980; Rev. 7, October 27, 1980; Rev. 8, May 13, 1981.

9. Sargent and Lundy: Engineering drawings showing locations of drilled holes and reinforcing steel bits. Partial list of CHS, RHS and RCS Series drawings.

10. Commonwealth Edison Company: Final report in response to petition made by the Office of the Attorney General, State of Illinois, in the matter of reinforcing steel damaged during the installation of cored and drilled holes and the matter of the Off-gas Building roof for La Salle County, Units 1 and 2, May 7, 1982.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

APR 27 1982

Docket No. 50-373

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, IL 60690

Gentlemen:

This refers to the special safety inspection conducted by Mr. F. C. Hawkins of this office on March 24 and April 6, 1982, of activities at LaSalle County Station, Unit 1, authorized by NRC Construction Permit No. CPPR-99 and to the discussion of our findings with Mr. C. Schroeder and others at the conclusion of the inspection. This report also refers to the continuation of that inspection conducted by Messrs. F. C. Hawkins, S. P. Chan and R. E. Lipinski at the LaSalle site on April 7, 1982, and at Sargent and Lundy Engineers in Chicago, Illinois on April 8, 1982.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

No items of noncompliance with NRC requirements were identified during the course of this inspection.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractors) believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within ten (10) days from the date of this letter of your intention to file a request for withholding; and (b) submit within twenty-five (25) days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than seven (7) days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with Section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of

the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons which are the bases for the claim that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, a copy of this letter and the enclosed inspection report will be placed in the Public Document Room.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

C. E. Norelius, Director
Division of Engineering and
Technical Programs

Enclosure: Inspection Report
No. 50-373/82-21(DETP)

cc w/encl:
Louis O. DelGeorge, Director
of Nuclear Licensing
R. Cosaro, Site Construction
Superintendent
T. E. Quaka, Quality
Assurance Supervisor
R. H. Holyoak, Station
Superintendent
B. B. Stephenson, Project Manager
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
Mary Jo Murray, Office of
Assistant Attorney General