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 LASALLE COUNTY, UNITS 1 AND 2

Commonwealth Edison Company

Chicago, Illinois

March 31, 1982

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1.0 Summary of Allegation

The Office of the Attorney General, State of Illinois, has brought forward information alleging, "...that, during the construction of LaSalle County, Units 1 and 2, certain practices related to the drilling of holes in the concrete walls, floors and ceilings of the Units 1 and 2 buildings have created a potentially hazardous condition which, upon the operation of either unit at full power, may be injurious to the public health and safety." The subject petition contends that, as a matter of course, an unknown number of drilled holes, ranging in the order of thousands, were likely to have been cut through the reinforcing steel. The petition, which is based on the affidavit of [redacted] indicates that records of these situations were made at the time the alleged practices occurred, and that the practice of drilling through reinforcing steel was discontinued or subjected to the case-by-case approval of an engineer some time in late 1979, early 1980. The petition also states that the State of Illinois has no information which suggests that any engineering approval was ever obtained from Commonwealth Edison Company's engineering consultant prior to 1980. A second affidavit by Mr. Dale Bridenbaugh states that, if the reinforcing steel was damaged or severed <u>without</u>

appropriate structural analysis, and if the drilling practice was wide-spread, "...it seems nearly certain that some safety related structures...would have been affected."

2.0 Response to Allegation

2.1 Introduction

Commonwealth Edison Company, throughout the course of the LaSalle County, Units 1 and 2 construction, has controlled the drilling through concrete for either cored holes or the installation of concrete expansion anchors via appropriate quality control procedures and has documented and assessed reinforcing steel reported as having been contacted (hit or cut) during this operation.

A distinction is made between a cored hole and a hole drilled in the concrete for the installation of a concrete expansion anchor. A cored hole is one in which (a) the hole passes completely through the concrete element to allow for the passage of a mechanical or electrical component, such as a pipe or electrical conduit, or (b) the hole penetrates only partially into the concrete element, and in which an anchor bolt is set and grouted. A cored hole is typically 3" in diameter or larger. Holes drilled for the installation of concrete expansion anchors, on the other hand, vary from 1/4" in diameter to 1" in diameter, with the corresponding hole depth varying from 1-1/4" to 8". Holes drilled for concrete expansion anchors do not pass completely through the concrete element.

2.2 Disposition of Cored Holes

2.2.1 Cored Holes Passing thru Concrete Elements

The need for cored holes is determined in either the initial design phase during the routing of mechanical and electrical components, or by the contractor in the case of field routed electrical and mechanical components. In the first situation, the cored holes are located on the structural design drawings, and a conservative structural assessment is made by Sargent & Lundy for Commonwealth Edison Company of the effects of the removal or damage to reinforcing steel due to the installation of the cored hole. This assessment is made prior to the release of the drawings and the coring of the hole. In the second situation, the contractor is required to submit a Field Change Request (FDR), requesting permission to install a cored hole for field routed components prior to the coring operation. Commonwealth Edison Company, on the recommendation of Sargent & Lundy, approves this request only after a structural assessment has been made of the effects of reinforcing steel which may be removed or damaged during this operati- . These cored holes are subsequently indicated on the structrual design drawings. It should be emphasized that, in both these situations, engineering approval is obtained prior to cutting the reinforcing steel. Where the engineering assessment has determined that it is not permissible to cut or damage reinforcing steel during installation of cored holes, this requirement has been specified on the appropriate structural design drawing. The following are some examples of this situation:

A. General Note No. 44 on Drawing No. S-199 states that, "For cored holes marked E, less than 8" diameter, use metal detector to locate existing reinforcing prior to core drilling. In case of interferrence with rebar, holes may be cored in alternate location within ±3" radius from location shown on drawing."

B. Drawing No. S-213, concerning the Reactor Building floor framing plan at Elevation 761'-0", Note 11 requires the use of metal detectors to avoid cutting of reinforcing steel in this area.

2.2.2 Cored Holes for Grouted Anchor Bolts

Cored Holes for grouted anchor bolts are indicated on either the mechanical or structural design drawings. Grouted anchor bolts are utilized primarily to anchor equipment foundations or pipe support baseplates to concrete elements. These cored holes are, likewise, reviewed by the consulting engineer. This review consists of an assessment of the effects of the reinforcing steel likely to be damaged due to the installation of the cored hole.

The installation of cored holes for the support of pipe support baseplate assemblies essentially commenced during the summer of 1980. Mechanical Drawing No. M-1100, Sheet 23, issued in January, 1980, controls the coring of holes for these baseplate assemblies, and requires that the concrete be carefully notched to expose the reinforcing steel in both directions prior to coring the hole, to avoid damage to the reinforcing steel.

The location of the cored holes for the installation of grouted equipment anchor bolts are plotted and located on a separate set of structural design drawings for the purpose of assessing the effects of reinforcing steel likely to be damaged in the coring operation. The structural assessment has determined that the structural integrity of the concrete elements has not been impaired by the coring operation for grouted anchor bolts for mechanical equipment foundations.

2.3 Disposition of Drilled Holes for Concrete Expansion Anchors

The drilling of holes for concrete expansion anchors is controlled by Form LS-CEA. This form was initially issued in September, 1976, and contained the following strict provisions for the protection of the reinforcing steel:

A. During the installation of concrete expansion anchors, drilling through concrete reinforcement will not be permitted. For nuclear safety related work, contractor shall use a deep magnetic detector to locate the reinforcement in concrete.

B. For all anchors in a connection, drill holes into the concrete with carbide tipped solid masonry bits. (Carbide tipped solid masonry bits are not capable of drilling through reinforcing steel. These bits can produce only a shallow, 1/16" deep, smooth and well rounded depression in the reinforcing steel).

C. Concrete expansion anchors shall not be used for any other work without prior approval of the Consulting Engineers.

Form LS-CEA, Revision 1, was issued on December 7, 1976. This revision relaxed the requirements for the use of the metal detector in non-critical areas, based upon a structural assessment performed by Sargent & Lundy for

Commonwealth Edison Company. Specific guidelines were given, defining these areas, and required that the consulting engineers be notified of all cases in which a reinforcing bar was cut or nicked where a metal detector was required to be used. Sargent & Lundy has reviewed for Commonwealth Edison Company the damaged reinforcing steel reports submitted by the contractors in accordance with this requirement, and has determined that the structural integrity of the nuclear safety related structures has not been impaired.

Revision 2 to Form LS-CEA was issued on November 29, 1978, However, it did not alter the reinforcing steel control provisions of Revision 1.

Revision 3 to Form LS-CEA was issued on July 20, 1979. This revision incorporated a standard form for reporting cut or nicked reinforcing steel during the installation of concrete expansion anchors. In addition, the contractor was also required to document the location of nicked reinforcing steel in those non-critical areas in which a metal detector was not required. The contractor was also permitted to cut one reinforcing bar in these non-critical areas, the extent of such area being defined by the spacing of the reinforcing steel. Additional requirements were also given to the contractor to permit him flexibility in relocating concrete expansion holes when reinforcing steel was encountered.

Revision 4 to Form LS-CEA was issued on September 7, 1979. This revision differentiated. The documentation of the installation and inspection requirements by the following categories:

(a) Safety related work in safety related areas (complete documentation of installation & testing was required)
(b) Non-safety related work in safety related areas (documentation of inspection was waived).
(c) Non-safety related work in non-safety related areas (most documentation waived, cutting of rebar not permitted.)

Revisions 5, 6, and 7 to Form LS-CEA were issued on December 10, 1979, February 13, 1980, and October 27, respectively. However, these revisions did not alter the reinforcing steel control provisions of Revision 4.

During the period 1978 through 1981, Commonwealth Edison Company conducted extensive investigations to determine the effect on reinforcing steel which is nicked during the installation of concrete expansion anchors. These investigations conclusively demonstrate that reinforcing steel, nicked by a carbide tipped drill bit during the installation of concrete expansion anchors, does not impair the structural integrity of reinforced concrete elements. This conclusion was based upon both laboratory testing and analytical assessment. Form LS-CEA, Revision 8, was subsequently issued on May 13, 1981, deleting the requirements for reporting of nicked reinforcing steel.

3.0 Conclusion

In summary, the drilling operations performed at LaSalle County, Units 1 and 2, has not degraded the safety margins of safety related structures, and has not violated the quality requirements imposed by the U.S. Code of Federal Regulation, 10CFR, Part 50, Appendix A, General Design Criteria for Nuclear Power Plants, and Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants. Commonwealth Edison Company has implemented appropriate procedures to control reinforcing steel damage and exercised sound engineering judgement and due precaution with regard to the drilling of concrete for cored holes and holes for the installation of concrete expansion anchors.

EXHIBIT A

March 30, 1982

OFF-GAS BUILDING ROOF REPORT

PURPOSE

The purpose of the report is to present information regarding the second allegation (Page 6, Request to Institute a Show Cause Proceeding and for other Relief - Tyrone Fahner, Attorney General of the State of Illinois) on the Off-Gas Building roof.

BACKGROUND

The concrete enclosure above grade as part of the Off-Gas Building is a non-safety related structure which houses Off-Gas Building HVAC Air Handling Units, HVAC Water Cooled Condensing Units, HVAC Exhaust Filter Units, HVAC Control Panels and associated motor control centers and switchgear. The specification concrete compressive strength is 4000 psi at 90 days. While detailed quality assurance requirements were not required due to the building being non-safety related, they were applied as part of the overall Commonwealth Edison/Walsh Construction Company quality effort.

FINDINGS

The Off-Gas Building enclosure concrete (walls and roof) was poured on November 7, 1975. Walsh Construction Company (WCC) Q.C. Form QCP-9A (Pour Checkout Card) was signed by the appropriate construction and Q.C. personnel and countersigned by a Commonwealth Edison Company Field Engineer. Additionally, WCC Q.C. Forms QCP-6A(Reinforcing Steel Placement Audit) and QCP-9B(Concrete Placement Control Audit Form) were utilized and signed by WCC Q.C. personnel. Concrete testing during the pour by A&H Engineering Corporation showed the concrete was within specification requirements for slump, air content and placing temperature. The concrete met compressive strength requirements, the lowest cylinder break was 4670 psi at 90 days.

On September 25, 1979, Commonwealth Edison Company Quality Assurance pointed out some surface cracking in the bottom of the Off-Gas Building roof. The area had a high density of concrete expansion anchors. An inspection performed by WCC Q. A. Supervisor, WCC General Superintendant and CECo. Structural Engineer found the cracking to be surface in nature and no futher action was required.

A temporary construction power center transformer and switchgear were set on the roof in 1976. The unit weighed approximately 6700 pounds. The unit was set over a concrete beam in the longitudual direction and one end rested on the east concrete wall. A check was made to insure the roof would take the unit loading prior to installation. The unit was removed in late 1981 as it was no longer required.

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The slab thickness has been checked on two different occasions. On March 10, 1982 a single point check showed the slab as 1' - 2 1/4" thick including roofing material. Roofing material is approximately 1-3/4" - 2" thick. Additional slab thickness checks were made on March 29, 1982. Fifteen (15) points checks showed the slab plus roofing material varied from 1' - 1-5/8" to 1' - 3-3/4". A check made effectively eliminating the roofing material showed the slab thickness varied from 11-1/4" to 1'- 1-1/4".

A visual survey of the roof underside was made by WCC Q.A. and CECo. on March 27, 1982. The survey showed no abnormal concrete cracking. The area under the former electrical equipment showed no abnormal concrete cracking.

<u>SUMMARY</u>

The Off-Gas Building roof concrete is 12 inches thick per specifications. There is no abnormal concrete cracking due to concrete expansion anchors and/or the electrical equipment formerly placed there. The roof will serve its' intended function.

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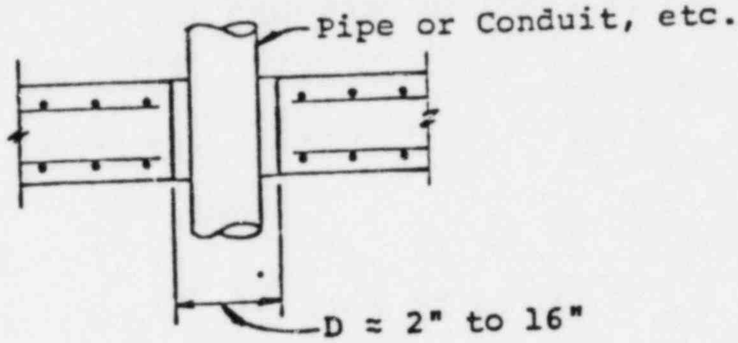
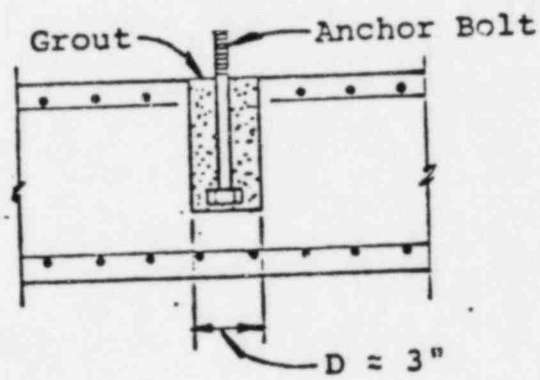
Exhibit 1

TYPES OF CORED HOLES

A. Holes passing through concrete element to allow for passage of an electrical or mechanical component.



B. Holes partially penetrating a concrete element for a grouted anchor bolt.



DRILLED HOLES FOR CONCRETE EXPANSION ANCHORS

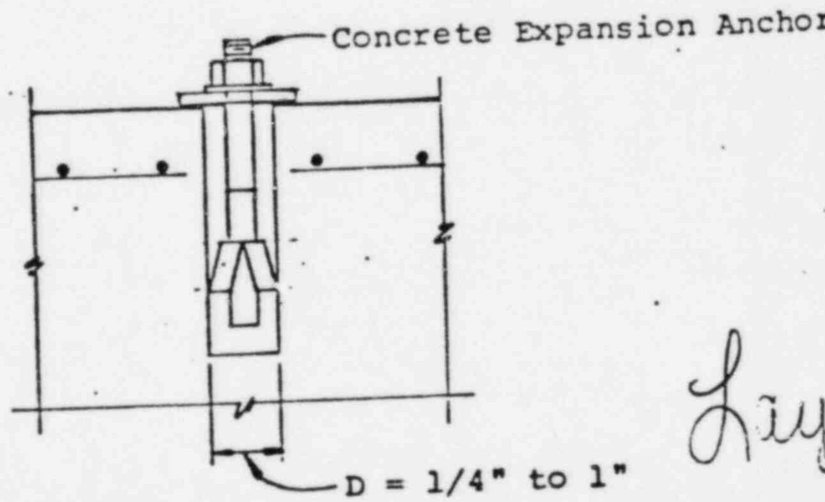


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Exhibit 2

SUMMARY OF ENGINEERING PEVIEW OF CORED HOLES

I THE LOCATION OF ALL CORED HOLES PASSING THRU CONCRETE ELEMENTS FOR OFFICE ROUTED COMPONENTS ARE LOCATED ON STRUCTURAL DRAWINGS. PRIOR TO THE RELEASE OF THE DRAWINGS, AN ENGINEERING ASSESSMENT IS MADE OF THE EFFECTS OF THE REINFORCING STEEL LIKELY TO BE DAMAGED BY THE CORING OPERATION. THIS ASSESSMENT HAS CONSISTED OF ENGINEERING JUDGEMENT BASED UPON THE STRESS LEVELS IN THE CONCRETE ELEMENTS IN RELATION TO THE LOCATION OF THE CORED HOLE.

II CORED HOLES FOR FIELD ROUTED COMPONENTS ARE REQUESTED BY THE CONTRACTOR VIA A FIELD CHANGE REQUEST (FCR). AN ENGINEERING ASSESSMENT, SIMILAR TO THAT PERFORMED FOR OFFICE ROUTED COMPONENTS, IS MADE PRIOR TO THE APPROVAL OF THE FCR. THE LOCATION OF THESE CORED HOLES ARE SUBSEQUENTLY INDICATED ON THE STRUCTURAL DESIGN DRAWINGS.

III SUBSEQUENT DETAILED CALCULATIONS RECENTLY PERFORMED FOR A SAMPLE OF CORED HOLES HAVE SUBSTANTIATED THAT ENGINEERING JUDGEMENT WAS APPROPRIATE.

IV CORED HOLES FOR EQUIPMENT FOUNDATION AND PIPE SUPPORT BASEPLATE ASSEMBLIES ARE INDICATED ON THE MECHANICAL DESIGN DRAWINGS.

A. THE CORING OF HOLES FOR PIPE SUPPORT BASEPLATE ASSEMBLIES, WHICH COMMENCED IN THE SUMMER OF 1980, WAS CONTROLLED BY DRAWING NO. M-1100, SHEET 23, WHICH REQUESTED THAT THE CONCRETE BE NOTCHED TO EXPOSE THE REINFORCING STEEL TO AVOID REBAR DAMAGE. THIS REQUIREMENT PRECLUDED ANY REBAR DAMAGE.

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Exhibit 3

B. CORED HOLES FOR EQUIPMENT FOUNDATION ANCHOR BOLTS ARE PLOTTED ON THE RHS DRAWINGS. AN ASSESSMENT BASED UPON ENGINEERING JUDGEMENT HAS BEEN MADE ON THE ASSUMPTION OF THE REINFORCING STEEL LIKELY TO BE DAMAGED BY THE CORING OPERATION IN RELATION TO THE EXISTING STRESS LEVELS IN THE CONCRETE ELEMENTS.

Exhibit 4

SUMMARY OF ENGINEERING REVIEW OF DRILLED HOLES FOR CONCRETE EXPANSION ANCHORS

I ENGINEERING CONTROL ON REINFORCING STEEL DAMAGED DURING CONCRETE EXPANSION ANCHOR INSTALLATION IS INITIALLY EXERCISED VIA FORM LS-CEA, WHICH:

A. DEFINES AREAS IN WHICH A METAL DETECTOR MUST BE USED TO AVOID REINFORCING STEEL DAMAGE, AND REQUIRES THE CONTRACTOR TO OBTAIN ENGINEERING APPROVAL PRIOR TO CUTTING A BAR AND TO SUBSEQUENTLY REPORT THIS OCCURRENCE.

B. PROHIBITS THE USE OF CONCRETE EXPANSION ANCHORS WITHOUT PRIOR APPROVAL FROM THE CONSULTING ENGINEER.

C. DEFINES AREAS IN WHICH CONCRETE EXPANSION ANCHORS MAY NOT BE INSTALLED WITHOUT THE SPECIFIC APPROVAL OF THE CONSULTING ENGINEER.

II INITIAL ENGINEERING REVIEW AND DISPOSITION OF DAMAGED REINFORCING STEEL REPORTS SUBMITTED BY THE CONTRACTOR

A. INDIVIDUAL DAMAGED REBAR REPORTS WHICH ARE SUBMITTED ARE REVIEWED BY THE CONSULTING ENGINEER TO DETERMINE THE IMMEDIATE, LOCAL IMPACT OF THE DAMAGED BAR. THIS REVIEW, IN MOST INSTANCES, CONSISTS OF ENGINEERING JUDGEMENT BASED UPON THE EXISTING STRESS LEVELS IN THE CONCRETE ELEMENT.

B. THE REBAR DAMAGE REPORTS ARE SUBSEQUENTLY LOGGED IN, INDEXED AND PLOTTED ON A SEPARATE SET OF STRUCTURAL DRAWINGS (RHS DRAWINGS).

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Exhibit 5

SARGENT & LUNDY
ENGINEERS

September 30, 1976
Rev. 3. 7-20-79

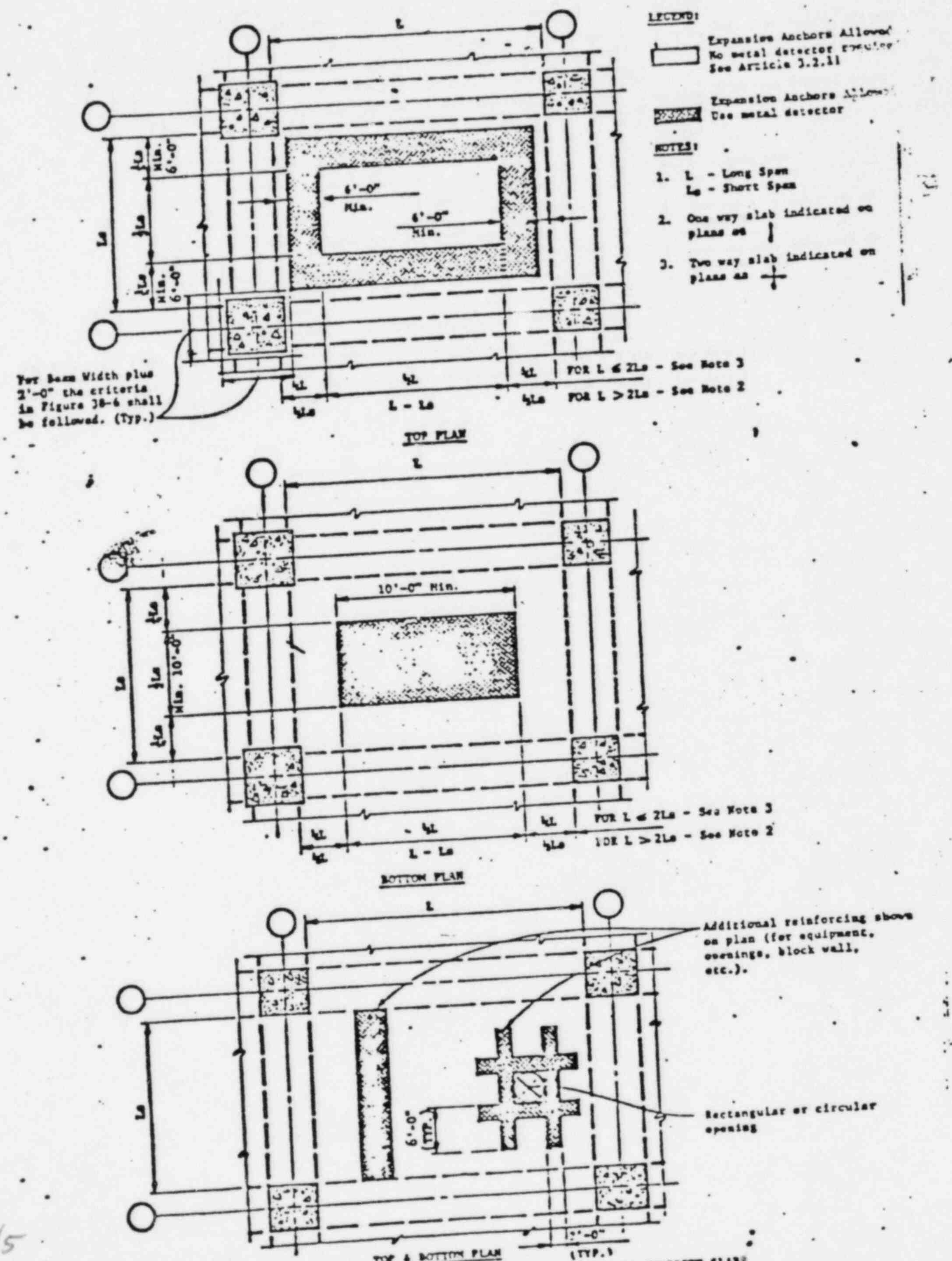

FIGURE 3B-7 CRITERIA FOR DRILLING OF HOLES FOR EXPANSION ANCHORS IN CONCRETE SLABS

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Exhibit 6

III Final Engineering Review and Disposition of Damaged Reinforcing Steel

A. THE ASSESSMENT OF THE OVERALL EFFECTS OF THE ACCUMULATION OF DAMAGED REINFORCING STEEL OCCURS DURING THE FINAL LOAD CHECK, JUST PRIOR TO INITIAL FUEL LOAD.

B. THIS REVIEW HAS CONSISTED OF ENGINEERING JUDGEMENT BASED UPON THE FINAL STRESS LEVELS IN THE CONCRETE ELEMENTS WITH RESPECT TO THE LOCATION OF THE DAMAGED REBAR. DETAILED CALCULATIONS WERE NOT WARRANTED DUE TO THE RANDOM DISTRIBUTION OF THE DAMAGED REINFORCING STEEL IN THE SAFETY RELATED AREAS. CALCULATIONS RECENTLY PERFORMED IN RESPONSE TO THE PETITION HAVE SUBSTANTIATED THAT ENGINEERING JUDGEMENT WAS APPROPRIATE.

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Exhibit 7

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Margins in Sample Areas with Congested Rebar Hits for

LaSalle County, Unit 1

Table 3-1

Area No.	Building	Slab/Wall (Panel Size)	Elevation	Wall Location or Slab Panel No.		No. of Damaged Rebar Locations	No. of Cored Holes	Margin Without Holes	Margin With Holes	Ratio Margin With Holes / Margin Without Holes
1	Reactor (S-201)	Wall 19.67'x56'	Above 673'-4"	Diagonal Wall at Col. C & 14		5	2	1.25	1.05	1.19
2	Reactor (S-211)	Slab 12.5'x32'	740'-0"	56" Slab between Col. J & H, 11-2 & 12-8		31	0	2.24	1.23	1.82
3	Reactor (S-215)	Beam 3'x24.5'	786'-6"	Beam at Line 14 between Col. D & E		1	0	3.55	3.13	1.13
4	Reactor (S-219)	Slab 10'x26' Each Slab	820'-6"	IRS	719	2	1	1.71	1.36	1.26
					720	5	0	1.88	1.50	1.25
5	Reactor (S-219)	Wall 14.7'x33'	Above 820'-6"	Between 11 & 13 & Col. J & G		12	1	2.16	1.27	1.70
6	Reactor (S-223)	Wall 21.2'x27'	Between 673'-0" & 694'-6"	Col. Row J between 14 & 15		19	2	4.00	3.00	1.33

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7	Reactor (S-237)	Wall 19.17'x28'	Between 673'-0" & 694'-6"	Row 15	9	0	2.85	2.53	1.13
8	Reactor (S-274)	Wall 19.17'x27'	Between 673'-4" & 694'-6"	At Line 8 - 9 between Col. J & G	6	0	1.73	1.34	1.29
9	Auxiliary (S-572)	Wall 18'x25'	Above 731'-0"	At Line 11 - 3 running	9	0	1.34	1.22	1.10

*All these bar damages are in top of slab scattered in the entire bay.

Exhibit 8

Table 3-1 (Continued)

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UCLEAR REGULATORY COMMI[illegible] ION

ORIGINAL

In the Matter of:

COMMONWEALTH EDISON COMPANY

LaSalle County Nuclear Generating Station, Unit 1 and Unit 2

DOCKET NOS. 50-373 and 50-374

DATE: March 31, 1982 PAGES: 1 - 77

AT: Bethesda, Maryland

8206020299 PDR

ALDERSON REPORTING

400 Virginia Ave., S.W. Washington, D. C. 20024

Telephone: (202) 554-2345

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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In the Matter of	:	
COMMONWEALTH EDISON COMPANY	:	Docket Nos. 50-373
LaSalle County Nuclear	:	and
Generating Station, Unit 1	:	50-374
and Unit 2	:	

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Room P-422,
7920 Norfolk Avenue,
Bethesda, Maryland.
Wednesday, March 31, 1982.

The meeting in the above-entitled matter was convened at 1:03 p.m., when were present:

APPEARANCES:

H. Denton
R. Purple
A. Bournia
R. Tedesco
A. Schwencer
C. Norelius
C. Williams
B. Shoemaker
R. Hoefling

APPEARANCES (continued):

P. T. Kuo

S. P. Chan

R. E. Lipinski

J. Bigley

B. Lee

L. Delgeorge

M. Miller

P. Steptoe

D. Shamblin

T. Quaka

K. Kostal

V. Reklactis

C. Schroeder

M. Morris

T. Longlais

J. Goodie

* * *

P R O C E E D I N G S

(1:03 p.m.)

MR. DENTON: Let me thank you for attending this meeting on such short notice and tell you what I would like to do. I want to call your attention to the fact that a transcript is being taken. We will provide a transcript to the various parties. The reason I am taking a transcript is to facilitate our review of this information. So we will assume that whatever we hear from the company today is valid information and we can use it in doing our review of this issue, unless you choose to modify the information you present here today.

I received a petition from the Attorney General of the State of Illinois dated March 24th, requesting that we initiate a show cause proceeding and initiate other relief because of some circumstances alleged at LaSalle. There are two types of problems that the petition is concerned with. One is the boring of holes through important walls in the building or either partially the way through, and the other is with regard to the adequacy of the roof design on the off-gas building.

We have made a cursory examination of what we know about these issues and have talked to the Region regarding their knowledge of these issues. What I would like to do today is to give the company an opportunity to explain its position on the matters of concern.

One reason for not just noticing this for 30 days and going with our normal pace in these matters is the pendancy of the completion of the plant and its readiness for an OL review. We have been meeting with the company quite extensively over the last few months in anticipation that the plant would be finished in the near future. I understand it may be finished in the next week or so.

So the kind of information that we would be interested in hearing about today, if you have it available, relate to the number of holes drilled, the size of the holes including the depth of penetration, your procedures for mapping the holes that get rebars, tendons, liners, on the general layout drawings, describe the condition of the damage that you might have expected to have occurred in each case; namely, with a rebar cut, partially cut, was the concrete cracked.

We will also be interested in the load conditions that exist in these wall panels that are affected by the holes. We would be interested in where the rebar reinforcement is placed in these walls where the holes have been drilled. We will also want to hear about the procedures and acceptance standards that you have issued to the drilling crews and the field engineerings, including the dates for when these procedures were implemented. And most importantly, I want to understand your methodology and techniques for evaluating the safety significance of any such penetrations drilled through walls.

Let's see, Bob, any other points I should cover at the beginning here?

MR. PURPLE: Well, we would want similar information on the design questions relating to the roof of the off-gas building. We are not involved with the drilling of holes, but the questions of the thickness in its design.

MR. DENTON: With that introduction then, let me go around the room and make sure we all know who is attending here. I am Harold Denton from NRR. Why don't we turn to the right?

MS. GOODIE: I am Judith Goodie, Assistant Attorney General of Illinois.

MR. BOURNIA: Anthony Bournia, from NRR.

MR. SCHWENCER: Al Schwencer, from NRR.

MR. NORELIUS: Chuck Norelius, Region 3.

MR. KNIGHT: Jim Knight, NRR.

MR. PURPLE: Bob Purple, NRR.

MR. HOEFLING: Dick Hoefling, counsel for the Staff.

MR. LEE: Byron Lee, Commonwealth Edison.

MR. DELGEORGE: Lou Delgeorge, Commonwealth Edison.

MR. LONGLAIS: Tom Longlais, Sargeant & Lundy.

MR. STEPTOE: Philip Steptoe, Isham, Lincoln & Beale.

MR. MILLER: Mike Miller, Isham, Lincoln & Beale, for Commonwealth Edison.

MR. BIGLEY: Jack Bigley, NRC staff.

MR. SHOEMAKER: Bob Shoemaker, IE.

MR. WILLIAMS: Cordell Williams, Region 3.

MR. KUO: Jim Kuo, NRR.

MR. CHAN: Sy Chan, NRR.

MR. LIPINSKI: Ron Lipinski, NRR.

MR. SHAMBLIN: Dan Shamblin, Commonwealth Edison.

MR. QUAKA: Tom Quaka, Commonwealth Edison.

MR. KOSTAL: Ken Kostal, Sargeant & Lundy.

MR. REKLACTIS: V. Reklactis, Sargeant & Lundy.

MR. SCHROEDER: Chuck Schroeder, Commonwealth Edison.

MR. MORRIS: Mike Morris, Commonwealth Edison.

MR. DENTON: With that introduction, Byron, why don't I turn it over to you to tell us what you know about these issues, and let me point out that we are pleased to have Ms. Goodie here, and I will provide you an opportunity to comment at some periodic intervals but figure that you are mainly here as an observer.

MS. GOODIE: I understand that.

MR. DENTON: And don't feel that we will expect you to contribute directly more than you have done in raising the issues in the petition.

MR. LEE: Thank you. We do, too, also appreciate the holding of this meeting on short notice, but we agree that it is absolutely necessary. I would start by saying that we are deeply concerned about the potential delay of low power licensing of LaSalle Unit 1, especially based on a single construction worker's allegation of some possible concerns. And even reading the affidavit, it is pretty much an indication that there were fairly decent controls in place in marking and so forth.

We are concerned that the Attorney General's office did not come to us with this issue as they have done with several other technical issues in the past, and we have been able to resolve those issues. We continue to believe that our practices and our control of engineering and construction at LaSalle County are excellent. We have had many discussions in the last few months with you on that issue with NRR and with Region 3, and we think that all of that has pretty much indicated that we have had good records. I think that what we will tell you today will just support and substantiate that even further, as we are now into some details.

One of our other major concerns is the diversion of some key people, both ours and yours, from the major effort that we have all been at for the last several months. This does have some significant impacts on our customers and on our stockholders. We do need LaSalle County Unit 1 for capacity. It is not an excess capacity unit that we are building just because we want to complete it.

So it is important to us in that respect. And of course, it is always important to our customers and stockholders to finish. Even our own Illinois Commerce Commission has reached that decision. As a result, we do ask for a quick review and resolution of the problem. And we do appreciate your getting into it so quickly.

In any event, I think that after today we can hopefully give you enough of an indication to show you that there is absolutely no reason for interrupting the issuance of a low power license and the testing process. So with that, I would like to ask Lou Delgeorge, who is our Director of Licensing who has been deeply involved in the LaSalle County project for quite a few years, to kind of narrate and handle our presentation.

MR. DELGEORGE: What I would like to do is review the allegations presented in the petition as we understand them, stating the facts and the information we have which we think will resolve the concerns that have been raised in your mind.

I would like to start with the questions raised relative to the off-gas building because we feel that to be a less complicated issue that can be more easily dispositioned.

First, there is an allegation that the roof thickness is eight inches as opposed to the 12 inch design thickness. I would like to say at the outset that although this building is a non-safety related building containing no safety-related equipment and not requiring the implementation of our quality assurance program, we did in fact apply our quality assurance program to the construction of this building, which has given us greater confidence in the accuracy of the information that we will be providing to you.

As a result of our receipt of the petition we made a survey specific to verifying the thickness of the slab in question. This was done within the last week. We took 15 measurements of that slab thickness and determined that the average thickness of the slab was slightly greater than 12 inches. Of the measured thicknesses, the lowest value was 11 1/4 inches. This measure was taken in what we believe to be an area of a floor drain on the slab roof and can be justified on that basis.

We have no reason to believe that the thicknesses that we have measured and the thickness of that slab is not consistent with the design requirement for the off-gas building roof.

The second allegation that was made --

MR. DENTON: Can we discuss that one just a bit? I have forgotten how big this roof is. We described it as the roof of the off-gas building. Is there a separate building called the off-gas building? Can you characterize the size of the roof that we discussed?

MR. DELGEORGE: I will call on Dan Shamblin from our site construction staff.

MR. SHAMBLIN: My name is Dan Shamblin, I work at the LaSalle Commonwealth station. I guess the simplest way to show you this is with this picture here. This is the roof we are talking about here for this concrete enclosure (indicating). It is roughly dimension-wise, it is roughly 34 feet by 75 feet.

MR. PURPLE: Lou, one part of the allegation I did not hear you address was transformers sitting on the roof and cracks through the --

MR. DELGEORGE: I am just going to get to that.

MR. PURPLE: I see, okay.

MR. DENTON: Do you think there is any confusion in nomenclature that the allegation should not be read narrowly to be the off-gas building? Have you read the whole text? Do you think you have identified the roof they had in mind?

MR. DELGEORGE: I will ask for any comments from our staff if they disagree with what I am about to say, but there is no information contained in the affidavits presented in the petition from which we can conclude that any slab other than the off-gas building roof is the slab in question.

And I am not aware of any additional information that may have come to our attention that would suggest some other slab being involved.

MR. DENTON: Have you had this allegation called to your attention before?

MR. DELGEORGE: Sir, it is my understanding that until the issue was raised through the attorney general's office that we were not aware of this potential deficiency.

MR. DENTON: Let me ask the regional representatives if they would like to ask any questions about the building.

MR. SHAMBLIN: Excuse me. The issue of the roof thickness was presented to us in early March through our legal department.

MR. DELGEORGE: But it was as a result of information developed through the inquiry by the attorney general.

MR. SHAMBLIN: That is correct, yes.

MR. DENTON: Chuck, do you have any questions on this?

MR. NORELIUS: No, I don't think I have any questions on this particular subject.

MR. DENTON: Let me ask you how you measured it. Did you have access to --

MR. DELGEORGE: To address your previous question of whether we could conclude that we have, in fact, covered the area in question, the specifics of other portions of the allegation relative to the placement of a transformer and identified surface cracking, we have in fact identified the transformer in question and were aware of surface cracking in this particular slab identified on our own initiative sometime ago. And taking those facts into account I think we can conclude that we are addressing the slab that was discussed in the affidavit.

MR. DENTON: Why don't you go ahead, then?

MR. DELGEORGE: The next allegation I had intended to address was the placement of the transformer on the roof of the off-gas building. It is, in fact, true that a temporary construction-related transformer was placed on that slab. The transformer has been removed from the slab and it was removed in late 1981 before we became aware of the issue in controversy here. The placement of that transformer did not exceed any of the posted live loads allowable for that slab.

We have surveyed the under surface of the slab and detected no apparent damage in the vicinity of the placement of the transformer. We have no reason to believe that the placement of that transformer caused any structural damage to the off-gas building roof.

MR. DENTON: How big a transformer was this? What was it intended to do?

MR. DELGEORGE: It provided

construction-related loads and weighed, as I understand it, on the order of 6700 pounds.

MR. DENTON: Let me go back to a question I asked earlier about how did you determine the thickness of the roof.

MR. DELGEORGE: We conducted a field survey. Given a reference zero, we were able to determine the height of the under surface of the slab, and from the same reference zero, we determined the height of the top surface of the roof, which included both the concrete slab and surface roofing materials. In order to verify the thickness at the points of survey, we measured the thickness of the roofing material; subtracting those values allowed us to establish the concrete thickness. We have prepared a report which discusses those measurements and we are prepared to leave that report with you.

MR. DENTON: I take it these are measurements made in situ and not taken off of drawings?

MR. DELGEORGE: That is correct.

MR. DENTON: I think we would like to have the report. Perhaps you can give us a copy and we will attach it to the transcript and make sure it is available.

MR. NORELIUS: This may be in the report, Lou, but how did you come to the conclusion that 15 selected points was appropriate to give you a good picture of what the roof thickness was?

MR. SHAMBLIN: The roof is made up of a series of beams, and I essentially told the surveyors to take measurements between the beams. Essentially, the center span of the slab. It worked out to be three measurements per span between the beams, turning out to be 15 measurements.

MR. PURPLE: There is yet another item in that particular allegation. Are you going to get to that?

(Laughter.)

MR. DELGEORGE: I am ready. The last allegation suggested that the concrete associated with this slab had been cracked substantially. Commonwealth Edison discovered surface cracking of the subject slab through its own site quality assurance department in September 1979. As a result of the deficiency identified, an inquiry was made at that time which included an engineering evaluation and which also included the tracing of the crack depth by chipping at the concrete in the vicinity of the cracks.

As a result of that review, it was established that the crack depth did not exceed one quarter inch; that the cracking was, in fact, surface cracking, and as a result, it was patched. We have no reason to believe, based on that investigation, that the cracking alleged is the result of drilling of anchor bolt holes. It is our opinion, based on that evaluation, that the cracks observed are normal shrinkage cracks associated with this type of slab.

MR. DENTON: Now, from the dates you gave, you observed those cracks before the transformer was placed on the top.

MR. DELGEORGE: No, sir, the transformer was placed at the time the observation was made.

MR. DENTON: So the transformer was taken off the date you measured, but it had been on for a considerable period of time?

MR. DELGEORGE: Yes.

MR. SHAMBLIN: That is correct. The transformer was placed sometime in 1976. We do not have the exact date, but we suspect it was in the second half of 1976.

MR. DENTON: And when you repaired the cracks then, or examined for depth, the transformer was still there?

MR. DELGEORGE: Yes, sir.

MR. DENTON: And you did not remove it until--

MR. DELGEORGE: Until late 1981.

MR. SCHWENCER: None of these cracks went through the support points of the transformer?

MR. SHAMBLIN: That is correct.

MR. DELGEORGE: I am not sure I understand your question.

MR. SCHWENCER: The point at which you fastened the transformer to the roof or where it was in contact with the roof, none of the cracks were associated with that contact area?

MR. SHAMBLIN: That is correct, none of the cracks were associated with the contact area of the transformer.

MR. DENTON: Let me ask the project manager what categorization we gave that roof.

MR. BOURNIA: It is a non-safety grade building. I have the reviewer here. We did not consider this as a safety grade building.

MR. DENTON: What is under the roof?

MR. BOURNIA: What is this?

MR. DENTON: What is under it?

MR. DELGEORGE: That is described in our report. The concrete enclosure above-grade as a part of the off-gas roof is a non-safety related structure which houses off-gas building, heating/ventilating/and air conditioning, air handling units, HVAC, water cooled condensing units, HVAC exhaust filter units, HVAC control panels and associated motor control centers and switchgear.

MR. DENTON: Does that mean there is no Category 1 safety-related equipment in that building?

MR. DELGEORGE: Yes, sir.

MR. DENTON: Any questions? We can come back to this, but I thought we would give the company a chance.

MR. PURPLE: There still remains yet one more feature of that particular allegation. Maybe you are going to get to it. It is the part that says there were holes drilled through rebars in the roof. I have not heard an answer that you did not have such holes or if you did, what they meant.

MR. DELGEORGE: We did not address the potential for drilling of bar in that roof, separate from the question presented in the primary allegation which we will address. You will see, based on the evaluation that we have done relative to the overall question of rebar damage, that we have addressed all slabs. Correct me if I am wrong. Is it true that our evaluation would have included that building.

We can verify that for you, but it is our --

MR. RECKLACTIS: It did include this building, also.

MR. PURPLE: Can you say whether or not the roof of this building was in fact drilled and did go through some rebar specifically?

MR. RECKLACTIS: As I understand it, the transformer did not even have any bolts. That is what I was told.

MR. DELGEORGE: I am not sure we are prepared to answer that question completely. We will get back to you, though.

MR. DENTON: What is the design basis for the thickness of that roof? Why did you pick 12? What controls?

MR. LEE: Why 12 inches?

MR. KOSTAL: Why 12 inches? Okay. My name is Ken Kostal from Sargeant & Lundy. The thickness of a number of slabs -- we generally have a minimum thickness of concrete related to structural elements such as slabs and walls. The 12-inch thickness is typically associated with a certain amount of load which would accompany that particular slab. So I would say in general, the 12-inch represented the thickness required to support a live and dead load attributable to that particular area.

MR. KNIGHT: May I ask, by that you mean there was a, let us call it, a design live load that is selected for convenience and utility, if you will?

MR. KOSTAL: Yes.

MR. KNIGHT: Keeping in mind they you are in a heavy industrial area, you provide sufficient capacity for--

MR. KOSTAL: We provide a certain minimum capacity -- meaning we provide a certain minimum live load capacity-- to allow for construction conditions, to allow for initial installation, equipment storage such as the example given by Mr. Delgeorge relative to the transformer, and that generally constitutes our initial criteria in terms of original design load capabilities.

MR. KNIGHT: Did you have a standard live load used throughout the facility?

MR. KOSTAL: A minimum live load for this particular plant is 100 pounds per square foot. That is associated with all concrete slabs.

MR. DENTON: Can you describe the construction of the slab a bit more? Is it reinforced?

MR. KOSTAL: It is a typical concrete reinforced one-way slab with concrete beam elements. I do not know the exact spacing of them, but it is a general one-way beam type slab design, reinforcing top and bottom, top reinforcing across the beams carrying negative moment, bottom carrying positive moment, and temperature reinforcing to account for normal construction and shrinkage cracking that could occur.

MR. DENTON: Any other comments on this part?

(No response.)

MR. DENTON: If not, let me ask Ms. Goodie if you would like to comment on this part before we go ahead.

MS. GOODIE: My only comment here would be that as I understand it, someone at Region 3 has spoken to the informant who provided us with this information, and I understand there is a report in Region 3 about this information. It is my understanding from the person I spoke to at Region 3 that the allegations of the less-than-design thickness of the roof were correct. I have not seen this report.

MR. DENTON: Would you like to comment?

MR. NORELIUS: We received allegations on this some months ago and evaluated it in-office. I do not have those with me. I am not sure that I know they say exactly what she said, and I have not read them carefully. But we were aware of the allegation. It was evaluated within our office and I think, in recognition of our manpower considerations, we chose not to delve deeply into this at the field level because of its

Category 2 nature.

MR. DENTON: I think on this one it might be well to just reiterate that Staff silence does not mean consent with the utility's view on this.

MS. GOODIE: I understand.

MR. DENTON: It is more the fact that we are trying to get the facts from which we would proceed to do a review.

MR. NORELIUS: Could I ask Ms. Goodie, did you speak to someone in our office on that?

MS. GOODIE: Yes.

MR. NORELIUS: Who did you talk to?

MS. GOODIE: I spoke to two different people. I believe this one was from Jim Foster. I can check my notes on that.

MR. NORELIUS: Jim was one of our investigators.

MR. DENTON: All right, let us move to the second issue.

MR. DELGEORGE: The second issue addressed the damage to reinforcing steel by the drilling through reinforced concrete slabs. I attempted to outline the allegations presented by that petition item, and I will address each of them as I understand it.

We have also prepared a report in this area describing the procedural controls that we have had in place. That report identifies the controls, their date of implementation, and attempts to describe why we believe this prevents the type of unrestricted damage that has been suggested by the petition.

The first allegation presented is that thousands of holes are drilled through reinforced concrete slabs as a matter of course. I believe that we can, through the report, demonstrate to you that the process of drilling all reinforced slabs has been a control process, that this program was implemented in late 1976 before the time period at which the contractor employee, whose affidavit is contained in the petition, made his -- discusses the problem that he alleges exists.

And in fact, we have conducted an engineering evaluation of all reported structural -- or reinforcement steel damage and have concluded, based on that evaluation, that the structural integrity of all the walls, of all the concrete reinforced slabs in the plant have not been repaired.

I would point out at this point in time that our review is not yet complete. However, it is substantially complete, and we have no reason to believe at this point that there is any question relative to the structural integrity of the slabs.

The second allegation presented is that there is an unknown number of holes. We are also in a position to discuss with you the numbers of holes that have been either cored or drilled at LaSalle County. A rough estimate of the number of holes, inasmuch as we have not fully tabulated all our records, is on the order of 50,000.

We have developed as a practice, given the program we have implemented, a program of recording the placement of the holes and reporting any rebar reinforcement damage associated with the drilling of a hole.

MR. DENTON: Let me ask you, how does a driller know that he has struck rebar or reinforcing steel?

MR. DELGEORGE: In general, the techniques used for producing the hole would have used drill bits that are not capable of penetrating reinforcement steels. That practice was not 100 percent uniform, however, and I will ask the people from the site to address this also, where he did use a bit capable of penetrating the steel.

MR. KOSTAL: It sounds different.

MR. DELGEORGE: It would be decidedly different. Again, I will ask our site people, our engineering people to discuss that further.

MR. KOSTAL: Do you want to discuss that?

MR. SHAMBLIN: Relative to hardness of steel versus concrete, when you hit it with a soft drill bit, it just will not go through it. It will meet a stiff resistance there, plus the sound that it produces, the different sound when you hit that reinforcing rod.

MR. QUAKA: In some cases you will get a very large squeaking sound when you come in contact with steel. So it is not only you being the driller, but 20 feet around you, you know, everybody knows you have contacted the steel.

MR. DELGEORGE: I think we would agree with your statement in the affidavit that your ability to drill through the concrete once steel has been contacted is significantly diminished.

[redacted] whose affidavit is attached to the petition, made it clear that [redacted] knew when [redacted] had contacted steel. And I guess our general feeling is that that would be representative of both people put in that position.

MR. DENTON: Did you make measurements everywhere or only for the steel that was struck?

MR. DELGEORGE: Tom Quaka, from our site assurance department will address that.

MR. QUAKA: As a normal course, work is not done unless there is some engineering document that either specifies that an anchor be installed in a location, or there there has been some request to install one and appropriate approval given to do that. So there is a record that demonstates where the hole is or where the anchor is going to go. And then ther is a separate set of records that identifies situations where the rebar is contacted or cut through.

MR. DENTON: Can you describe normal engineering practice of the architect-engineer in this area? Do you try to locate these holes from the knowledge of the rebar in the wall from the drawing, or is it more of a field installation kind of thing where you take your chances when you drill such a hole?

MR. DELGEORGE: Mr. Denton, we have a full presentation on that engineering evaluation, which will follow my discussion.

MR. DENTON: All right, we will postpone that.

MR. DELGEORGE: A point we would like to make here is the fact that we believe the petition clearly indicates that records were kept of rebar damage. This point is noted in many places both in the petition and in the contractor employee's affidavit. This information, we believe, supports the integrity of our control program, which is described in more detail in the report.

The records involved here are substantial, and we have over the course of the years during which this program has been in place -- and as I say, that began in 1976 -- we have monitored the performance of the contractors under this program.

The next allegation presented is that no information exists which suggests an engineering approval occurred relative to the potential for damaging rebar prior to 1980.

Unfortunately, this conclusion was reached on the basis of a site laborer whom we would not expect to be privy to the fundamental basis for the program we had in place.

However, we have been able to verify that the foreman of the specific laborer whose affidavit is contained in the petition participated in more than one training session in which the overall control program for drilling and coring of holes, which included an engineering evaluation, took place.

In other words, the supervision for the laborer in question participated in four recorded training sessions, whose dates I can provide to you, which we believe is sufficient to assure that the program that we had in place was in fact followed.

We take greater confidence in this in the fact that [redacted] the laborer involved, attested to the fact that [redacted] was required to provide rebar damage reports.

MR. DENTON: Who conducted these training courses you referred to?

MR. DELGEORGE: The programs in question were conducted by site contractors. The site contractors, Foley being the contractor involved here, had received direction fromn our site management personnel associated with Commonwealth Edison's organization, although we do not provide that training ourselves.

As I have said earlier, the procedures in question have existed since 1976. In the case of cored holes, which are identified in the petition as larger holes, prior engineering review of the holes is done to either prevent reinforcement steel damage or to assess the impact of reinforcement steel damage.

For drilled holes that have been characterized in the petition as "smaller holes" used for concrete expansion anchor-bolted supports, our engineering evaluation program included the specification of certain areas in the plant where concrete expansion anchors were to be limited. So that we did an engineering evaluation in advance to limit the areas in which such drilling could take place.

In addition, there was an engineering evaluation made of all reported damage upon receipt by the architect-engineer of the drilling reports, which are recognized in the petition.

We have a more substantial presentation to review for you that engineering evaluation process. It may, in fact, be appropriate to do that now, inasmuch as the last issue of substance that we perceived in the petition dealt with the question of whether or not corrective action, if necessary, was required immediately. We can address that after the discussion by our architect-engineer, the evaluation program, if you would like.

MR. DENTON: Okay, let us go that route.

MR. DELGEORGE: I would like to introduce Tom

Longlais from Sargent & Lundy.

Let me say first that I have copies of the report prepared by Commonwealth Edison which discusses the procedural controls that have been in place at the LaSalle County site.

I will offer those for your review. We also have copies of the materials that Mr. Longlais is going to present now. And I will offer those for your review.

[Slide]

MR. LONGLAIS: I would like to start the presentation with first differentiating the different types of holes that have been drilled at LaSalle.

[Slide]

Exhibit 1 defines basically two types of holes: one which we call a core hole; the other is what we consider to be a drill hole.

There are essentially two types of core holes. The first type of core hole is one in which it is drilled through the concrete, and it passes completely through the concrete element. This hole has been put in the element to allow for the passage of the electrical and mechanical components, such as a pipe or conduit.

The second type of core hole is one in which it is only drilled partially through the depth of the concrete. The purpose of this type of core hole is to allow for the setting and grouting of an anchor bolt for either the support of equipment foundations, or for the support of mechanical piping and baseplate assemblies.

In the first situation for the cored holes which pass completely through concrete, their diameter varies anywhere from 2 inches to 16 inches in diameter.

In the case of holes that are cored partially through the concrete for the installation of an anchor bolt, that diameter is approximately 3 inches. Its depth would vary anywhere from 1 foot to maybe 2 feet, 2-1/2 feet, depending upon the size of the anchor bolt.

The second category of holes we have are what we consider to be drilled holes. Holes are drilled primarily for the installation of concrete expansion anchors. These holes tend to be much smaller in diameter. They vary from 1/4 inch to 1 inch, and the depth of embedment varies anywhere from 1-1/4 inch to 8 inches.

Again, it is important to have an understanding of the types of holes, since the engineering assessment is somewhat different for each type of hole.

[Slide]

Exhibit 2: I will discuss the engineering evaluation for cored holes. These are the holes that pass directly through the concrete or the holes that are partially drilled into the concrete for the setting of an anchor bolt.

For holes that pass directly through concrete elements, these holes are located, in the case of office-audited components -- in other words, when our engineers are auditing the piping and electrical components in the office, and they have got to penetrate a concrete element, they will indicate that penetration on a structural drawing.

Prior to the release of that structural drawing indicating the core hold, it is reviewed by structural engineers. It is at this point in time that our structural engineers make an assessment of the effects of the reinforcement steel that will be cut by this operation.

In most cases, this assessment has consisted primarily of engineering judgment based upon the stress levels in the reinforcing steel in relation to the location of the cored hole.

In the case of cored holes that are requested by a contractor in the field for field audit components, the contractor is required to submit to Commonwealth

Edison Company a field change request requesting permission to drill this hole.

This field change request is approved by the consulting engineers. And again, a similar assessment is made prior to approving this field change request.

We assess the reinforcing steel that is likely to be damaged by the coring of this hole prior to releasing of the FCR for the drilling operation.

MR. PURPLE: Question. Have you ever disapproved a field change request because the engineering evaluation told you that it was not right to put the hole there?

MR. LONGLAIS: Not to my knowledge. The location of the holes that are generated via a field change request likewise get picked up at a later date on the structural drawings. So a complete record of all cored holes does appear on the structural design drawings.

MR. PURPLE: The engineering assessment, is it written?

MR. LONGLAIS: Up to this point in time, all our engineering assessment on cored holes has been based upon engineering judgment.

MR. PURPLE: It is not written down?

MR. LONGLAIS: It is not been written down.

We have not made detailed structural calculations.

Over the last week or two, in response to the petition, we have made some detailed calculations for a sample of cored holes. And we have proved that our engineering judgment was appropriate in these instances and found that the effects of the reinforcing steel did not affect the structural integrity of any of the safety-related structures.

MR. LEE: Tom, "engineering judgment," I gather, is kind of the standard approach for this kind of evaluation?

MR. LONGLAIS: Yes, it is; yes, it is.

MR. KNIGHT: Could I pursue just one step further? What you are saying is the system was in force, the area to be drilled was identified, and an engineer in the office was made aware that the hole was to be drilled. And he said either yes or no based on his judgment?

MR. LONGLAIS: Yes; that is correct.

MR. DELGEORGE: And in the case of field change requests, there would be documentary evidence that the review had been completed, although there might not be analytical evidence of something other than engineering judgment?

MR. KUO: But the judgment was made one by one. Say, for instance, a slab may have more than 10 holes there. Do you make a judgment looking at all the 10 holes or just 1 where it was drilled?

MR. LONGLAIS: We make a judgment on both. We have to make it first individually as each cored hole is submitted and requested. As I mentioned before, all these core holes are eventually indicated on the structural drawings. So when our engineers are adding other cored holes in an area, they have a history of all the other cored holes that have been installed. They would take this into consideration when making the assessment of the effects of this additional cored hole that is being requested.

MR. KUO: So all the holes were considered, in your judgment?

MR. LONGLAIS: That is correct.

MR. KNIGHT: Can you give me a feel, there was a number mentioned earlier, 50,000 holes. I am going to assume that a very large percentage of that 50,000 were anchor bolts.

MR. LONGLAIS: That is correct.

MR. KNIGHT: Can you give me the other side of that number as far as 2 inches larger, this type of thing? Do you have any feeling for how many of those there were?

MR. LONGLAIS: I would venture a guess at something less than 1000 at this point. I believe 1000 could definitely be an upper bound.

MR. DENTON: Can you characterize the issues that you considered in reaching such a judgment about holes? What were the elements that are important in reaching that judgment?

MR. LONGLAIS: The critical decision was looking at the distress level in reiforcing steel where the hole is being put. In some areas, the cored hole is being put in an area where the reinforcing steel is not stressed. This would be totally acceptable to core the hole.

MR. LEE: Which you will get to in a moment.

MR. LONGLAIS: Yes. In other areas, the stress levels in the reinforcing steel have sufficient margin for the final design loads. We make an assessment on this basis that we can accept some reduction in the stress levels since we have sufficient margin currently available for those reinforcing bars.

MR. DENTON: Should I assume that you could put an 8-inch hole in any wall, safety-related wall; or are there some areas in that wall that are already near limits and this would degrade it?

MR. LONGLAIS: There are a number of areas where we have, after our engineering assessment, we have become concerned about additional coring in which if we assume that X number of bars would be cut by putting this cord hole in that we feel it would not be appropriate, would not be acceptable, we have put appropriate notes in our drawings and appropriate controls requiring that the contractor use a metal detector to find the reinforcing steel before he makes the coring.

MR. DELGEORGE: And we have examples of those notes which we can provide and show to you here. I think as a part of this package you will find three examples of notes of that type.

MR. LONGLAIS: There has not just been indiscriminate coring of bars. We have identified the areas, and where we have areas of concern we do require that the metal detector be used.

MR. SCHWENCER: Has that process been in effect since 1976?

MR. LONGLAIS: That process has been in effect once we determined that that particular concrete element could not tolerate many more bars. That could have been '77, '78, '79. There really has not been any for later years that, as the coring operations increased, that we can see as certain areas being defined that we do not want to lose any more strength margin that we put these notes on the drawings.

MR. DENTON: If you take a typical wall -- I am not sure you have a typical wall -- where are the moments the largest on the wall? Where would you least like to see a hole?

MR. LONGLAIS: I would like to get into that in a few minutes when I talk about some of the concrete expansion anchors. I am prepared to discuss that.

MR. DENTON: I was wondering if you could just tell me is it near the top or near the bottom? I do not want to jump too far ahead, but I would like to have a feel for where moments are largest.

MR. MILLER: Exhibit 5.

MR. LONGLAIS: Exhibit 5, for example, for slabs. I do have other flimsies if you want to talk about other ones. This is a typical two-way slab. A typical area in a tewo-way slab. We are talking about the reinforcing steel on the top of the slab.

The critical area would be the exterior core span. That is this area that is shaded. This area would tend to have negative design moments, and the reinforcing steel would tend to be stressed in this area.

In the middle region of the slab, the area that is not shaded in, the reinforcing steel would not be stressed in these cases. The stress is all carried by the bars in the outer periphery.

In the case of the reinforcing steel on the bottom of the slab, it is the bars that are in the middle region of the slab, the middle half span of the bars, that primarily carry the stress. The bars toward the periphery are much less stressed than the bars in the center.

There are also other areas, bars that have been provided around trim steel for major openings or where additional bars have been provided in the slab to carry heavy elements, to carry a concrete wall or to carry a concrete block wall, where we have provided additional reinforcing steel. We have called for not drilling in those areas.

MR. DENTON: Thank you.

[Slide]

MR. LONGLAIS: Cored holes for anchor bolts and pipe support baseplate assemblies are indicated on the mechanical design drawings.

The coring for the mechanical baseplate pipe support assemblies commenced approximately in the summer of 1980. In January of 1980 we issued Drawing M-1100, Sheet 23, which required that all the concrete be notched to expose the reinforcing steel to avoid rebar damage under this operation.

So for any concrete, any coring operation for this particular application, it was controlled by requiring that the reinforcing steel be exposed before the drilling was done.

MR. DELGEORGE: That activity involving mechanical components would not have been observed by the contractor employee whose affidavit is contained in the petition, inasmuch as he worked as a subcontractor to our electrical site contractor, and he was gone at that time anyway.

[Slide]

Exhibit 3 is the continuation of the cored holes for equipment foundation anchor bolts. In this situation what we have done is we have plotted the location of all equipment foundation anchor bolts that require coring in a separate set of drawings called RHS drawings, rebar hit schedule drawings.

From these drawings we assess the amount of reinforcing steel that is likely to be damaged by this coring operation. The assessment which we performed subsequently is engineering judgment on the damage and the effects that this likely damaged reinforcing steel will have on the strength capacities of the concrete elements.

The engineering judgment again is based upon the location of the cored holes and the damaged reinforcing steel in relation to the existing stress levels in the concrete elements.

Exhibit 3A is a set of approximately 90 drawings, which we have marked all the rebar damage, both due to the coring operations and due to the drilling operations at the site.

MR. KOSTAL: There are approximately 90 drawings in there that will document exactly what Mr. Longlais commented on.

MR. DENTON: Are these drawings of different walls and such?

MR. LONGLAIS: This is all the reinforcing steel that has been contacted. "Contacted" means either nicked or cut.

MR. SCHWENCER: So that is 100 percent drawings of those that have been contacted or cut?

MR. LONGLAIS: Yes, that is for Unit 1.

MR. DELGEORGE: Based on those damage reports that have been received from the field at the time the drawing was prepared. And we are still in the process of verifying that all reports have been received and incorporated into the drawings.

MR. DENTON: Maybe we can look at them during a break to see if we need those.

MR. KOSTAL: I think it is relevant that these drawings have been in preparation over the last 6 years. So they are not drawings that we just made within the last few days.

We have been documenting these during the last 6 years as they have occurred and as we have received the data from various contractors.

MR. LONGLAIS: I should clarify that we have -- this item, the plotting of the core holes for the anchor bolts were made recently.

(Slide)

In Exhibit 4 I would like to pursue the engineering review of drill holes for concrete expansion anchors. The engineering control for the drilling of holes for concrete expansion anchors began long before the drilling is initiated.

By that I mean there are a number of engineering controls which are contained in Form LS/CEA which contains all the specification requirements for the drilling of concrete expansion anchors at La Salle. In Exhibit 4A we have here the entire eight revisions to the specification, which were issued between the period September 1976 and May of 1981.

There are a number of engineering controls in this particular document. Probably the most important is the recognition of the fact that there are stressed and nonstressed areas in the structures. LS/CEA defines the stressed and nonstressed areas. The areas which are stressed areas, we require that a metal detector be used to avoid reinforcing steel damage. It requires that the contractor obtain engineering approval prior to cutting a bar and to subsequently report any damage or nicks that may have been made to a bar by the use of a metal detector.

There are areas -- again, I did go through this slide before, but the areas where a metal detector would be required to be used in the case of a two-way slab would be the shaded area in the exterior quarter span, and the top of two-way slabs, in the middle span section, in the bottom of two-way slabs, and in areas adjacent to penetrations, and to areas where we have provided additional reinforcing steel on the slab to carry additional loads.

MR. PURPLE: A general question. All of these control programs, do they apply to all of the buildings for which you have design responsibility, unrelated to whether they are safety-related structures or not?

MR. LONGLAIS: That is correct. That is correct.

MR. DENTON: If you take a wall that is, say 20 by 50, what kind of spacing would you typically find on the reinforcing bars?

MR. LONGLAIS: I believe between 9 to 12 inches on center.

MR. DENTON: So when you are installing anchor bolts, then you would have enough discretion to move around a foot or two?

MR. LONGLAIS: Yes. Well, a foot or two? In the later versions of the concrete expansion anchor program, I believe when you get into Revisions 6, 7, and

8, we have added provisions in the specification which gives the contrator guidelines in relocating expansion anchor plates. If he does contact reinforcing steel, we give him the latitude to move the plate plus or minus 3 inches in either direction so he can avoid drilling through and damaging the bar.

(Slide)

It has consistently been our intention at the beginning of the job to minimize the use of concrete expansion anchors. However, when a field contractor is routing small bore piping or electrical conduit, he has an option of trying to attach to an embedded plate or existing structural steel or use expansion anchors.

We have a requirement in the specification that should he elect to use a concrete expansion anchor baseplate assembly, that he contact us for prior approval before he can use this type of anchor.

We have further defined in the specification areas in which a concrete expansion anchor may not be installed without the specific approval of the consulting engineer. This is irregardless of the stress level.

One example of the situation would be the containment building wall. The last control that we do have, and it was mentioned earlier, is that beginning in

1976 with Revision 0, we required that only a solid carbide-tipped drill bit be used for drilling the hole. Now this type of drill bit is not capable of drilling through reinforcing steel. The most damage this drill bit could do would be to make a very small, well-rounded depression approximately 1/16 of an inch deep in the reinforcing steel.

We have conducted a number a tests. The Commonwealth Edison Company has conducted a number of tests, both laboratory testing and analytical assessment, and we have proved that these type of nicks are not detrimental to the integrity of the reinforcing steel.

MR. DENTON: What size reinforcing steel is typically used in walls and floors?

MR. LONGLAIS: Walls, typically in safety-related structures would probably vary from number 9 to number 11 bars. Slabs would probably vary--

MR. LEE: Which is what size, for us nonstructural --

MR. LONGLAIS: Number 9 bar is about 1-1/8 inch in diameter, and Number 11 bar is approximately 1-3/8 inch in diameter. For slabs, the reinforcing steel would vary from probably a Number 6 bar which is about 3/4 inch in diameter, again to a Number 11 bar which is 1-3/8 inch in diameter.

(Slide)

What I just described is the engineering precautions that have taken place in the specifications and are in force prior to going into operations. During the drilling operations should a contractor contact or drill through a reinforcing bar with our approval, it is required that the contractor submit a rebar damage report.

When these damage reports are submitted, they are reviewed by the structural engineers to determine what I consider to be the immediate local impact of the damaged bar. Again, we look at where the damaged bar occurred, whether it be a cut or a nick, in relation to stress level in the slab to determine if it is acceptable.

Should we not determine it is acceptable, we would have to come back and do some subsequent modifications. However, we have never found this to be the case in any of the holes that have been contacted or drilled at La Salle. This review on the part of the engineer was based primarily on judgment, again with respect to location of the hole, and the existing stress level.

After the engineer has reviewed the effect of this damaged reinforcing steel, the damaged bar, be it hit -- by that I mean nipped or cut through -- is plotted on the BHS drawings, which we have submitted as Exhibit 4-A.

MR. LIPINSKI: Excuse me. Since when did you start this practice?

MR. LONGLAIS: This practice was initiated in September 1976.

MR. DENTON: That includes Steps II-A and II-B?

MR. LONGLAIS: The II-A, the review of the damaged rebars was performed when the first damaged rebar report was submitted to us, which I believe was in early 1977. II-B, the plots were started, I believe, towards the latter part of 1978 or 1977, the early part of 1978. It really was not until this latter part of 1977 that we had substantial enough rebar hit reports to warrant studying of the drawings at that time.

MR. KNIGHT: Along those lines, to work up the numbers like 50,000 holes or 1000 or so poured, which makes a pre-assessment, could you give me a ballpark figure for the number of rebar hit reports or rebar damage reports that have accumulated over the years?

MR. LONGLAIS: We estimate today there are approximately 3000 to 3500 reinforcing steel bars that have been damaged. Of that 3000 to 3500 bars, we believe a number of these bars to be only nicked bars. Between the period 1977-1979, contractors were not required to differentiate between a cut and a nicked bar

After Commonwealth Edison Company did the laboratory investigation on the effect of nicked bars and concluded that nicked bars were not detrimental, did we eliminate the requirement for reporting of nicked bars.

MR. KUO: In making your engineering judgment, do you have any guideline or criteria as to what percentage of the steel could be damaged or cut?

MR. LONGLAIS: The guideline is that as long as you don't impair the safety or the integrity of the concrete structure, as long as you still have sufficient margin to carry the design loads, whether that be one bar, two bars or ten bars. That has to be determined on a case-by-case basis. That is not a function of a percentage.

MR. KNIGHT: Somewhere in your discussion there is a distinction between a cut and a nick.

MR. LONGLAIS: Yes.

MR. KNIGHT: You show situations where you take about half a bar out sometimes. Do you have any way to differentiate?

MR. LONGLAIS: The nick that I am speaking of is the nick that would be made by a solid carbide-tipped drill bit in which you get this -- .

MR. KNIGHT: Okay. When I am talking about taking a half-bar --

MR. LONGLAIS: That would be a core.

MR. KOSTAL: To clarify, the kind of drills used are like your everyday household drills. Unless you have a tempered steel bit, I think all of us have been aware of the difficulty of trying to drill through anything with a typical carbon steel bit that you buy at Sears Roebuck. That is the kind of drill we are talking about here. It is impossible to go through a rebar with that bit. You will eat up the bit before you will go through the bar.

MR. LIPINSKI: Do you know of any cases or can you quantify perhaps for us when a remedial action or a design change was necessary as a result of --

MR. LONGLAIS: We have never run across a case at LaSalle. In any -- we are positive that of all our drilling operations we have not found one place where the structural integrity of any concrete element has been impaired.

MR. CHAN: Does the driller of the holes know whether the hole is going to be in the tension area or the compression area?

MR. LEE: The driller, you said?

MR. CHAN: Yes, the driller.

MR. LEE: I would say probably not.

MR. SHAMBLIN: He is given the direction to drill a hole in this location.

MR. DELGEORGE: The driller would not be aware whether he was drilling in an area of tension or compression, the driller as opposed to the contractor supervision to whom that man reports. Let me paint what I think is an accurate picture.

The driller is only aware that his job is to drill a hole. The contractor, based on the program we have in place, is aware that with certain restrictions, he is able to drill holes in concrete elements in certain areas of the plant. The engineer, Sargent & Lundy, has through his design specifications and design drawings identified those areas capable of having holes drilled. So there is a different level of understanding of what the impact of an individual hole would have on the reinforcing steel.

We do not believe that it is essential that the individual performing the drilling operation be aware of the entirety of that program or how we reach the point that he drill a specific hole.

MR. LONGLAIS: The final disposition in the review of damaged reinforcing steel in the drilling operations occurs at the time of load check performed just prior to fuel load. In this instance we are looking at the effect of the accumulation of all the damage to the reinforcing steel which is plotted on the RHS drawings.

This review again consists primarily of engineering judgment based upon the final stress levels in the concrete elements with respect to the location of the damaged reinforcing steel. Detailed calculations were not warranted due to the random distribution of the damaged reinforcing steel in the safety-related areas.

By random distribution I mean that the density in any one area is very, very low. We see the bars nicked, scattered here, maybe up in that corner, down in the bottom corner, but they are not concentrated effects. We have subsequently performed some calculations in response to this petition and we have substantiated that this engineering judgment is appropriate.

MR. PURPLE: Question. Independent of the petition, was this review you are discussing, has it been completed?

MR. LONGLAIS: The engineering judgment has been completed.

MR. PURPLE: And documented?

MR. LONGLAIS: Yes -- Well, engineering judgment?

MR. PURPLE: No, I mean but there is a final review?

MR. LONGLAIS: The final load check is completed and documented.

MR. DELGEORGE: To the extent that the architect engineer has received all the reports from the field.

MR. SCHWENCER: That is the tie-in I was -- you mentioned earlier you were not sure that had all the reports in it yet. The only ones you are aware of.

MR. DELGEORGE: We are in the process now of verifying that he is in receipt of all the reports.

MR. SCHWENCER: So Item A is not done yet.

MR. LONGLAIS: Not to the extent that we have received all the reports. But I believe from what we have seen so far we are confident that it is.

MR. LEE: We are confident that it is, but since that question obviously will come up, we felt it necessary to go back and assure ourselves.

MR. KOSTAL: To clarify, we believe we have every report in the house. The documents that were just submitted to us are nothing more than a -- we are going to scrutinize each one of those documents regarding the document we have in house to make sure that we have the same corresponding document.

That is the review that is taking place. The review of the final load check has totally been complete, but it covers a lot of other multitude of ingredients besides this ingredient of the damage to rebar.

MR. LONGLAIS: What we have done is we have taken a look at what we feel to be nine areas in which the concentration of the damaged rebar has been somewhat higher than what you normally would see looking at the entire sets of drawings. We have calculated the design margins in the slabs both before and after the coring operations.

(Slide)

I should first define what we mean by design margin. The design margin, we consider it to be the ratio of the strength of a concrete element as determined by ACI 318 divided by the actual design stresses that have been calculated in accordance with the LaSalle FSAR commitments.

What you are looking for is a design margin equal to or greater than one. You would like to design for a margin exactly equal to one. This represents an economical and optimally designed structure.

Now there are a lot of reasons why design margins do exceed one. There are many cases in safety-related structures, particularly in a nuclear power plant, in which shielding controls a design and structural strength does not control. So we have a lot of concrete elements that are a lot thicker and a lot bigger than required by structural design.

So you will see some margins greater than one. You will see some up here of about three or so. What we would like to see is about one.

MR. LIPINSKI: Before you take this down, I see that in area number 2 there is no number of holes cored, and yet the design margin is different. Why is that?

MR. LONGLAIS: I am sorry?

MR. LIPINSKI: Second line.

MR. MILLER: It says 31 damaged rebar.

MR. SCHWENCER: Drilled to the core.

MR. LONGLAIS: These are the reinforcing steel damaged due to drilling; these are the numbers due to damage due to coring.

MR. LIPINSKI: So the number of bars damaged were due to --

MR. LONGLAIS: Drilling, and this column is casing.

MR. LIPINSKI: Okay.

MR. KUO: Can you explain the last item there, the ratio of margin of holes as against margin without holes? Is that 1.13?

MR. LONGLAIS: Well, this is the percent decrease. The number was put down wrong. This is the percent decrease in margin. For this case the design margin without the holes was 3.55, the design margin with the holes was 1.33. This represented about a 13 percent reduction in design capacity. The ratio was computed wrong here. I must admit that when we prepared these tables, we were pulling them off the typewriter yesterday as we were heading for the plane, but that is a percent you are looking at.

MR. KUO: That is a decreasing margin?

MR. LONGLAIS: Yes; 13 percent is the percent reduction in the design margins. These design margins that you see listed here are very conservative design margins. One item of conservatism is the fact that when we do the final load check, we assume a minimum piping load of about one kip per square foot. In many areas the actual component support load is less than one kip per square foot.

We also have not taken into account any actual material strengths in the field such as the actual poured-in-place concrete strength or the actual strength of the reinforcing steel. This would typically increase your design margin from anywhere from 10 to 15 percent.

MR. DENTON: How did you pick these locations for samples?

MR. LONGLAIS: We looked at the density of the number of bars in a given area, the number of areas that stand out as looking like it has a high concentration of bars.

MR. DENTON: These are average cored and damaged locations or more severely damaged? How would you characterize them?

MR. LONGLAIS: I would characterize these areas as having a greater density of nick bars.

MR. KNIGHT: Take in item number 3, this is probably just one bar. How does that fit into the framework of what you were just saying?

MR. LONGLAIS: This one bar happened to be what we consider to be a critical area. It was in a highly stressed area.

MR. LIPINSKI: So just to pursue this line a little bit further, did you give any consideration to the stress concentration of the given particular area that he selected for this, or just density of the holes?

MR. LONGLAIS: Density was the primary one. In this situation here, stress was the critical one.

MR. LIPINSKI: So both factors were considered?

MR. LONGLAIS: Yes.

MR. LIPINSKI: Density of the holes and stress concentration?

MR. LONGLAIS: Yes.

MR. DENTON: How did you go back and calculate a margin with the damaged bar? Did you assume that the bar did not exist analytically?

MR. LONGLAIS: Yes, we had discounted the entire bar.

MR. DENTON: And the concrete, or does it matter?

MR. LONGLAIS: Concrete has no effect.

MR. NORELIUS: Even on the damage basis you are discounting the entire bar?

MR. LONGLAIS: We assumed in this case the damage to be a cut. As I said, between the period 1977 and 1979, the contractors were not required to differentiate between a cut and a nick, so unless we saw specific notes on the rebar damage report that would lead us to believe the fact that we did have only a nick, we considered these to be cuts.

MR. DENTON: How do you do such a

calculation? You have otherwise uniformly distributed slabs on a bar and one is cut. How do you go about determining the margin?

MR. LONGLAIS: Let's say in the case of a two-way slab you divide that slab up into middle strips and end strips. You calculate a design moment for the middle strip and then subsequently the area of steel required for that design moment. If you knock one bar, or two bars, or three bars out of that middle strip, you subtract that area, recompute a new moment, and compare that with your applied moments.

MR. DENTON: So it is as though the bar was not there at all.

MR. LONGLAIS: That is how we have done that calculation, correct.

MR. LIPINSKI: Perhaps you can explain why you said that the area of concrete removed has no effect. I will agree with you that it is in the zone where there is a tension, but in the case of compression, concrete is the vital element.

MR. LONGLAIS: The concrete area removed would be so small.

MR. LIPINSKI: Depending on the diameter of the holes. If you have a little hole, that is fine, but if you have holes, say, 12 -- we know the diameter of the holes was up to 16 inches, right?

MR. LONGLAIS: Typically in these plants, and structural considerations for the most part do not govern the design. It is shielding requirements. The reinforcement steel ratios that we have used are very low. And subsequently the concrete compressive stresses are very low. So if we drill out a 16-inch core out of a slab, the stresses could redistribute itself to adjacent concrete elements, and there would be really no effect on the slab itself.

The stresses are very low. The compressive stresses do not govern concrete design. You have to get up to very, very high reinforcing steel ratios before compressive stresses govern, and we are not anywhere near those reinforcing steel stresses.

MR. DENTON: Are any of these walls or floors pressure bearing, and by that I mean pressure-retaining walls or floors?

MR. LONGLAIS: Do you recall off-hand?

MR. REKLACTIS: We had some holes in the containment wall, a few holes, but they were not true through holes through the walls. They were for expansion anchors up to 6 inches deep and maybe one inch in diameter.

MR. KNIGHT: How thick was that wall?

MR. REKLACTIS: That wall would be 6-foot thick.

MR. DELGEORGE: And those were all on the outer surface.

MR. REKLACTIS: On the outer surface. They did not compromise the boundary of the containment.

MR. KOSTAL: That is a post-tension element.

MR. LIPINSKI: In the affidavit there was a statement that the drillings were holes made in the reactor building at elevation 710 and 735 in the reactor building wall. Now in this presentation you do not show an area -- these are internal walls. Is that right?

MR. LONGLAIS: These are all the walls and slabs.

MR. DELGEORGE: On a BWR containment you have to be sure to distinguish between the primary containment boundary and the reactor building walls. Those are two different surfaces.

MR. LIPINSKI: If I remember right in the affidavit a statement was made that it was the elevation that I indicated, and in the reactor building and the primary containment. Is that correct?

MR. DELGEORGE: No reference was made to primary containment that I can remember.

MR. DENTON: I had assumed the reference was to so-called secondary containment, not primary containment. That is a good point.

MR. SCHWENCER: On page 4 of the affidavit, the affidavit says reactor building, Unit 1 at elevation below 710.

MR. CHAN: In that table in the last column, do you think the numerator and the denominator ought to be reversed?

MR. LONGLAIS: Yes, that's right, it should be. That is why we are getting a number greater than one. Yes.

MR. DELGEORGE: One point of interest that we might comment on is that there are two specific allegations in the affidavit by [redacted] with respect to [redacted] activities in two areas of the plant. We believe, because of the record-keeping process that we have had in place, that we have been able to identify the records associated with those two areas.

In fact, I believe we have one of them here. You will remember from the affidavit an indication that the phalanges of a beam were contacted as the result of drilling through a floor. We have identified what we believe to be the source of that report. There is, in fact, a non-conformance report written and documented evidence of an engineering evaluation of the reported damage.

Now, given the vagaries of the information provided in the affidavit, we cannot be certain that what we found was what was alleged to have existed. However, it appears to us that we can find the damage suggested in the affidavit.

This is true of the other instance as well, but I am reluctant to talk about that one in more detail because we have not confirmed it ourselves, the point of the discussion being that we believe our records are very complete.

MR. NORELIUS: What confidence do you have that these hits and all have been put into the record?

MR. DELGEORGE: As we indicated earlier, that have been both audits and surveillances conducted by site contractor and Commonwealth Edison QA personnel during the course of drilling and coring of the holes initiated in the late seventies through 1981-1982. We have, because of the emphasis placed by this petition, gone back to assure ourselves by requesting each site contractor to identify all damage reports so that we can cross-correlate those records received by the architect engineer versus those records prepared by the site contractors, and we are in the process of verifying that we have in fact reviewed each of the reports developed at the site.

Based on the raview that has been conduct.d tc date, we are not vare of any discrepancies in that process.

MR. NORELIUS: You mentioned that the program started in 1976, the control program that you have. How does that relate to the drilling that has been done?

MR. LEE: Dan?

MR. SHAMBLIN: Yes. We went back and took a look at where we stood on electrical and mechanical installation from our progress reports, and in the electrical area from a cost control report for the period ending October 20, 1976, which is a period of approximately when the first revision of LSC came out, the first draft of it. Cable pan installation, we had 11,260 feet of cable pan out of 119,800 feet of cable pan installed. The 119,000 was based on two units. That represents 9.4 percent of the cable tray installed.

Exposed conduit: We had no exposed conduit installed at that point in time. Lighting: We had 2,163 of 9,876 fixtures installed at that point in time. I think we used the shorter anchors on the lighting, quarter-inch anchors. We had no cable pulled, and this again is consistent with if we didn't have any exposed conduit installed we wouldn't have any cable pulling.

In the area of piping installation, for the period ending December 31, 1976, piping supports, we had 1,917 of 17,745 piping supports installed. Piping, 2-1/2 inch and larger, we had 51,657 feet of 310,926 feet installed; and stainless steel piping, we had 3,909 feet of 79,269 feet of stainless steel piping, all sizes, installed. Now these numbers include the whole plant, both safety and nonsafety-related areas.

In reviewing one of the progress reports at that point in time, we did find out that the HVAC contractor was not working in any safety-related areas at that point in time. This was the progress report dated December 10, 1976. He was working in the nonsafety areas only and he had not started work in the safety-related areas.

MR. LEE: Primarily in the service building?

MR. SHAMBLIN: Primarily in the service building, and the lower elevations of the turbine building. The main electrical contractor was installing lighting in reactor number one and number two and in the aux buildings.

He was installing cable pans in the reactor one turbine and aux buildings, and he was installing communications, which is a -- the type of anchors you may use on that is similar to the lighting in the reactor area aux building, service building, and lake screen house.

The piping contractor was installing service water, cycle condensate, clean condensate, closed cooling water piping in the reactor building Unit 1, and he had just started the installation of Section 3 high and low pressure core spray and residual heat removal hangers.

You have to remember that the amount of expansion anchor work that would have been going on at that time would have been very, very minimal, because it was a clear building that the contractors were able to get into and hang from the embedment plates. So we are concluding that the amount of concrete expansion anchor work that went on prior to September 1976 or the fall of 1976, was very, very minimal.

MR. NORELIUS: Thank you.

MR. DENTON: Let me return to the slide that you have shown. The lowest margin appears to be in area number one. That is down to 1.05. Your sample is actually rather small. In view of the large number of potentially damaged bars. How far do you intend to look for remedial action? Are you going to look back, wall by wall? Do you consider this a sample to base a judgment on?

MR. LONGLAIS: We feel satisfied that our initial engineering judgment was adequate. We feel that we have picked out nine critical areas. We have demonstrated that we still have a factor of greater than one. We do not feel it is necessary to go back at this point in time.

MR. DENTON: It is not very much greater than one. Your sample is --

MR. LONGLAIS: All we need is "one."

MR. LEE: We have been accused of overbuilding there, or some of the utilities have recently, that we have not paid enough attention to quantities, and what have you, and that we are overdesigned. So "one" does not mean here that if we go to .99 the building is going to fall down.

MR. DENTON: Well, I was trying to relate to the number that Jim Knight raised where he said there may be 50,000 holes either drilled or cored. There may be a thousand of those that are greater than 2 inches, or some such number. Of those 1000 holes that may be greater than 2 inches, how many of them are sampled in this table? It looks like --

MR. LONGLAIS: Maybe less than 1 percent.

MR. LEE: There were only 3000 that had any kind of even a nick report, let alone a cut or an actual rebar replacement. So out of the 50,000, only 3000-and-some had any indication of contact with a reinforcing bar.

MR. DENTON: Well in the column labeled "number of damaged rebar locations," do you assume all these are cut?

MR. LONGLAIS: We assume all of these to have been cut, when in fact the number may have only been nicked.

MR. KOSTAL: I would like to clarify one thing. that 1.05 in Tom's earlier comment regarding the margins that exist, if we took the actual concrete strength, that number is actually 1.2. It is not 1.05, because we typically have 10 to 30 percent increase in capacity of the concrete and steel that exists out in that plant compared to the original design. So that is not even taken into account.

So when it says "from an engineering point of view we feel we have adequate safety margins," there are additional margins on top of that 1.05 that are available to us, if any additional assessment was required, which we do not believe is needed.

MR. DENTON: Are you saying then that these calculations of margins with and without holes are using design strength, not --

MR. KOSTAL: That is design strength, not actual material strength; and it is automatically required required that the actual material strengths must be greater than design strengths, and we have-- you know, Edison has documentation to show that the level of that increased capacity range is well above the 15 percent range.

MR. LIPINSKI: But that depends on how we define the margins. If the margin is defined on the basis of ACI 3.18, then we are using the code allowables.

MR. KOSTAL: The margin is defined based upon what is committed to in the FSAR, which was reviewed and agreed to by Staff.

MR. LIPINSKI: Fine. Then we are talking about--

MR. KOSTAL: Which is greater than ACI. Your margins are less than what is allowed for ACI.

MR. LIPINSKI: No, but you bring up another point. You bring up the actual concrete strength.

MR. KOSTAL: I am saying that it is available if it is required to be called upon, which is not taken into account in this assessment.

MR. LIPINSKI: We are aware of that fact, but if we are assessing the margin on the basis of code allowables, then this is one thing. But you bring up another point.

MR. LONGLAIS: The margin is based upon the design strength of the concrete element. That design strength is calculated per the applicable requirements of ACI 3.18. That is divided by the design stresses in the concrete element, which were calculated using the committed-to design requirements in the LaSalle FSAR.

MR. DENTON: I want to get back to statistical confidence just one more time. The number of damaged bars for which you have done this calculation cannot add up to much over 100.

MR. LONGLAIS: That is correct.

MR. DENTON: And you are saying the number of bars actually damaged is what? 3000?

MR. LONGLAIS: Approximately that, yes.

MR. DENTON: And then you tried to select these, picking ones that you thought were more likely to show deterioration than not. But still, what level of confidence do you think this represents where you have identified holes that will actually keep the structure from performing its function?

MR. LONGLAIS: I personally feel we have done a complete job in this assessment. I believe we have been very conservative in our engineering assessments throughout the entire program. And in all the areas we have looked at in selecting highly congested rebar damages, be they nicks or cuts, we have demonstrated that we have a factor of safety greater than one. Again, I think the proof of the pudding is in looking at the drawings and looking at how sparsely most of these reinforcing steel damages do occur.

We have tried to select areas that appear to be congested. One area here where it appeared that we had a stress problem, we did isolate that and showed that we still had sufficient margin.

MR. DELGEORGE: The point that needs to be made is that the engineering evaluation is 100 percent complete for all concrete elements. That is, we have reviewed these drawings and performed an assessment for each of the concrete elements. We have done an additional analytical assessment to verify the evaluation that has been done for all walls, and we have found that there is nothing in this analytical assessment of the nine walls shown to suggest that the 100 percent review that we did was inadequate.

So on that basis statistcally we have looked at 100 percent of the elements involved, and we have done an over-inspection of a limited number of those walls, or concrete elements.

MR. DENTON: I propose that we take a break in a moment to perhaps mull over what we have heard; but before we do, let me ask Mrs. Goodie if she would like to make any comments?

MS. GOODIE: Not at this point, thank you.

MR. PURPLE: One part of the petition speaks to asking us to not allow fuel to be loaded, because if fuel would be loaded you would be unable to have access to areas that needed repair, and so forth and so on. Do you have anything to provide on that?

MR. DELGEORGE: Yes. If you will remember, I asked that we defer that, and now looks like a good time to talk about it. The patition does say that immediate attention is required prior to plant operation. In materials that we have submitted to the Staff, you are aware that our low-power test startup program involves certain hold points.

From the date at which fuel is started to be loaded into the reactor vessel, there is a period of approximately two months before the first criticality is reached. During that period of time, we do not feel that there is any jeopardy to the continuation of an evaluation, and there is no radiation level that needs to be addressed anywhere in the plant.

Beyond that, it is our view, based on the experience in starting up similar reactors at Dresden and Quad Cities, that over the full course of the five percent power license that we have requested, that the radiation levels in those areas of the plant subject to inquiry here would not be such that a continuing review or inspection would be precluded. So it is our feeling that the immediacy suggested in the petition is overstated.

MR. LEE: And I guess I would say that in fact after 12 years of operation on Dresden, it would not, from a radiation standpoint, preclude evaluations and inspections. After all, we do maintain all of that equipment.

MR. DENTON: Any other questions anyone would like to raise before we take a break?

(No response.)

MR. DENTON: Let us break for about 10 minutes and try to get back a few minutes before 3:00.

(Recess.)

MR. PURPLE: Let's get started again.

(Pause.)

Harold was unable to come back. He was called away. He asked me to continue the meeting -- continue, or close the meeting, I suspect. I think Commonwealth Edison has presented all you intended to present today, I trust?

MR. DELGEORGE: I would like to supplement the record with one fact.

MR. PURPLE: All right.

MR. DELGEORGE: Early in the discussion a question was raised relative to whether or not we had performed a reinforcement steel assessment of the off-gas building roof. We have verified by conversations with our consultant, and we have in fact performed a similar evaluation of the off-gas building roof to what has been described here. And is it true that a drawing like this exists for that slab?

MR. REKLACTIS: There are two cuts that were noted, and they were observed, and there are several nicks which are not detrimental.

MR. DELGEORGE: The point being that although only safety related concrete elements are addressed in the package we have provided you today, we have been able to determine that the off-gas building roof, which is a non-safety related structure, was also evaluated in a similar way.

MR. PURPLE: Okay. Well, I bring Harold's thanks for everybody who came on such short notice. The information we have received today will certainly help us kick off our review.

We will accept those 90 drawings and turn them over to the Staff for a subsequent look. We are, and have been I guess from an earlier notification of possible problems with holes at the site, the Regional Office has initiated its own inquiry into the facts, and that is continuing and will continue.

We cannot identify today any specific additional information we need from the utility to help us complete it. It is possible that we may ask for some. If so, we will certainly get the request to you promptly. Recognizing your scheduler needs, we certainly would intend to put what resources we need to finish this up as rapidly as possible.

Harold did ask me to pass on, in follow-on to the question he asked a couple of times, his concern about the last chart we saw with statistics, and whether or not that really gives you and him and us sufficient statistical confidence that you really have found all the places. I think if there had not been one number that came as low as 1.05, he might not have been as concerned; but again, I do not know that we are going to ask that you do any more, but you may want to be thinking about that.

I think you have delivered today all the reports that you mentioned? Do we have all of that information?

MR. DELGEORGE: I believe so. Before we leave we will check with whoever you think has a complete package, and we will --

MR. PURPLE: The Project Manager, I hope.

MR. LEE: I might just say, by responding to that last concern of Harold Denton's, that in fact, I think as Lou has said, that we have looked at we think 100 percent.

MR. PURPLE: Yes; I understand that.

MR. LEE: It is really only a sampling verification, in a sense. So that a look by your experts at these prints hopefully will give the same conclusions. Again, we can only make the plea that we have spent a lot of time on this effort.

We, just on a kind of a back-of-the-envelope estimate, while we were having a quick sandwich before we came over here, estimated that we probably spent more than one man-year worth of effort in five days, and that is not counting all the effort that is indicated here by the people who have come who should be back at the site trying to move that facility along.

If there is a problem, we would be anxious to get into it as quickly as anybody. We are convinced that there is no problem here, and that we ought to move as quickly as we can. And there is certainly no justification for holding up low-power testing.

MR. PURPLE: Mrs. Goodie, are there any comments you wish to make?

MS. GOODIE: We certainly appreciate the prompt response to the NRC to the petition. We recognize that the decision is yours to make. Unfortunately, we were not able to have our consultant here, so there was very little, or nothing that I could say technically, obviously. But he will be looking at all the information as soon as I can get it to his office.

MR. PURPLE: We were very glad to have you here today.

If there is nothing further, the meeting will be closed. Thank you very much.

(Whereupon, at 3:10 p.m., the meeting was adjourned.)

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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: Commonwealth Edison Company (LaSalle County Nuclear Generating Station, Unit 1 and Unit 2)

Date of Proceeding: March 31, 1982

Docket Number: 50-373 & 50-374

Place of Proceeding: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Jane N. Beach

Official Reporter (Typed)

Jane N. Beach

Official Reporter (Signature)