SARGENT & LUNDY
ENGINEERS
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603
TELEPHONE 312-269-2000

February 18, 1981
Project No. 4130-00

The Cincinnati Gas & Electric Company
Wm. H. Zimmer Nuclear Power Station-Unit 1

Cable Tray Loading Design Criteria

U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Attn: Mr. Paul Barrett

Gentlemen:

Enclosed, please find a copy of Sargent & Lundy's Electrical Drafting Standard, EDSB-126, Rev. 10/5/79; pages 2-43 through 2-48 of Sargent & Lundy's Electrical Installation Specification H-2173; and pages 8.3-29, 8.3-30 and 8.3-65 of the Wm. H. Zimmer FSAR.

The above documents are being sent to you at your request to aid the Region III office in understanding the tray loading criteria and the meaning of design index numbers. The basic design index of 1.00 means that the cables assigned to that particular reviewing point tray section gives a fill, if stacked diametrically, which will equal 40% of the depth of the tray. In reality, a 40% fill of the cross-section area of the tray is, in fact, a design index of 1.25, as the computer program works on a diameter squared basis rather than a pi x r^2 on a cross-section of the cable. Therefore, to stay within the maximum fill of 50% as noted in Section 8.3.3.1.3 of the FSAR, we keep all power trays below a design index of 1.5625 which meets this criteria. In extreme cases, instrument trays or controlled cable trays are allowed to fill to 60% as noted in the FSAR, however, this would be a design index of 1.875 and we do not have any tray sections approaching this quantity of fill.

50-358

COPY

Theoretically, it would be possible with a regimented lay to fill a tray to a design index of 2.5 and still be below the top of the tray. This is not a good practice, however, particularly in the case of power cables as a regimented lay concentrates the cables and does not allow the air movement through the cable groupings as a random lay will.

If you have any further questions regarding the above, please do not hesitate in contacting me.

Yours very truly,

R. E. COTTA

R. E. Cotta
Senior Electrical Project Engineer

REC:wg
In duplicate
Enclosures
Copies:
E. A. Borgmann (3)
J. D. Flynn (1)
RFS/R. J. Pruski (1)
L. J. Szumski (1)

GENERAL QUALITY ASSURANCE PROCEDURE	SARGENT & LUNDY ENGINEERS CHICAGO	PROCEDURE GQ- 3.05 REV. 3

Title: SAFETY ANALYSIS REPORTS (PSAR's AND FSAR's)

Revision	Date	Approved by:	
		Head, Quality Assurance Division	Director of Services
3	3/14/80	J.E. McFarland	L.E. Johnson

Form GQ-2.01.1 Rev. 4

TITLE: SAFETY ANALYSIS REPORTS (PSAR's AND FSAR's)

1.0 PURPOSE

3 This procedure describes the quality assurance requirements for the preparation and release of those chapters/sections of the safety analysis report, both preliminary and final, assigned to Sargent & Lundy.

2.0 DEFINITIONS

2.1 See the Glossary for the following definition:

A. Commentor

2.2 The following definition is applicable only to this procedure:

3 Responsible Engineer - A person responsible for one or more of the following functions:

Preparation of input for and resolution of comments on a section of a safety analysis report.

Providing specific input to amendments to a safety analysis report.

Revising, when required, the safety analysis report.

3.0 PREPARATION, COMMENT AND RELEASE

3 External Division of Responsibility

A.1 The Project Manager shall initiate the preparation of S&L's portion of the safety analysis report by directing the Licensing Project Engineer to prepare the external division of responsibility.

3

3 The external division of responsibility is a listing of the chapters/sections of the safety analysis report and the organization (Client, S&L, Vendor, etc.) that has responsibility for the preparation of each chapter/section.

3 A.2 The Licensing Project Engineer shall prepare an external division of responsibility of the chapters/sections of the safety analysis report and shall designate the organization (Client, S&L, Vendor, etc.) that is responsible for the preparation of

3 each chapter/section of the safety analysis report.

A.3 Each page of the external division of responsibility shall have, as a minimum, the following information:

3 Document identification

Project identification

Revision identification (The first page shall also include the revision date)

Page identification

Identification of the final or total number of pages in the document

TITLE: DESIGN CRITERIA

1.0 PURPOSE

This procedure describes the quality assurance requirements for the preparation, review and approval of design criteria.

2.0 DEFINITIONS

2.1 See the Glossary for the following definitions:

A. Approver
B. Design Criteria
C. Preparer
D. Resolution of Comments
E. Reviewer

3.0 PREPARATION, REVIEW AND APPROVAL

A.1 If the preparation of design criteria involves more than one department, the Project Director or Project Manager shall desginate which department shall have primary responsibility for the preparation, review and approval of the design criteria.

A.2 The Project Manager shall schedule the preparation of design criteria per the project design criteria status report (see QA Procedure GQ-3.12).

A.3 The Project Manager or Senior Project Engineer or Project Engineer or Division Head shall assign a preparer and reviewer for each design criteria.

B.1 The Preparer shall prepare the design criteria based on the effective issues of applicable regulations, codes, S&L and industry standards and other input supplied by the interfacing departments, as required. Figure 3.0.B.1 may be used for the outline in preparing the design criteria.

5 Applicable design inputs or requirements, such as design bases, regulatory requirements, codes and standards, used for the development of the design criteria, shall be referenced in the design criteria. Codes, standards and regulatory requirements referenced shall include the applicable issue and/or addenda.

Any applicable regulatory requirements or design bases as specified in the license application (PSAR) at the time a design criteria is prepared or revised shall be incorporated into the design criteria.

The following information shall appear on the first page of all design criteria:

GENERAL QUALITY ASSURANCE PROCEDURE	SARGENT & LUNDY ENGINEERS CHICAGO	PROCEDURE GQ- 3.15 REV. 1

Title: APPROVED PROCEDURAL DEVIATIONS

Revision	Date	Approved by:	
		Head, Quality Assurance Division	Director of Services
1	1/26/81	J. E. McFarland	L. E. Colmenares

Form GQ-2.01.1 Rev. 4

TITLE: APPROVED PROCEDURAL DEVIATIONS

1.0 PURPOSE

This procedure describes the quality assurance requirements for the identification and approval of a deviation from the requirements of an S&L quality assurance procedure or project instruction on a project.

2.0 DEFINITIONS

2.1 Approved Procedural Deviation - A deviation from the specific requirements of an S&L quality assurance procedure or project instruction which 1) meets the requirements of the S&L Quality Assurance Program, 2) adequately specifies all quality procedural requirements and 3) has been approved by authorized project and quality assurance personnel. Unapproved procedural deviations are nonconformances.

3.0 IDENTIFICATION AND APPROVAL

A.1 To initiate the request for approval of a proposed procedural deviation, the Requestor shall complete the following items on Form GQ-3.15.1, Procedural Deviation:

Client

Project number

Station and unit

File No.

A description of the proposed procedural deviation, including the reasons for the deviation

List the documents affected by the deviation

The S&L quality assurance procedure or project instruction and the quality assurance requirements that are involved in the procedural deviation

Form GQ-3.15.2 shall be used if additional space is required for the description of the deviation.

The Requestor shall sign Form GQ-3.15.1 and forward it to the Project Manager.

A.2 The Project Manager shall review the proposed procedural deviation to determine whether or not the deviation is required and to consider the affect the deviation will have on the conduct of the project. Any comments shall be resolved with the requestor.

1 After reviewing the proposed procedural deviation, the Project Manager shall determine which Senior Project Engineers are affected by the deviation. If the Electrical or Structural engineering disciplines are not affected by the deviation the Project Manager shall insert the words "not applicable" (N/A) in the appropriate Reviewed by space on Form GQ-3.15.1. The Project Manager shall forward copies of the proposed procedural deviation to those Senior Project Engineers affected by the deviation.

1 B.1 The Senior Electrical Project Engineer and/or the Senior Structural Project Engineer shall each review the proposed procedural deviation for its adequacy and acceptability within his area of responsibility and forward comments to the Project Manager.

B.2 The Project Manager shall resolve the comments with the appropriate Senior Project Engineer and shall forward the procedural deviation form to the Quality Assurance Coordinator.

B.3 The Quality Assurance Coordinator shall review the description of the proposed procedural deviation to assure that it does not conflict with the S&L Quality Assurance Program and to determine that the quality assurance requirements specified are adequate. The procedural deviation shall not diminish the integrity of the S&L Quality Assurance Program. Any comments shall be forwarded to the Project Manager.

B.4 The Project Manager shall resolve the comments with the Quality Assurance Coordinator and redraft the description of the procedural deviation accordingly. If the content is altered, the Senior Project Engineers shall review the redraft.

With all comments resolved, the Project Manager shall forward the master copy of the procedural deviation to the Senior Project Engineers and the Quality Assurance Coordinator.

1 C.1 The Senior Electrical Project Engineer, and/or Senior Structural Project Engineer and Quality Assurance Coordinator shall sign the procedural deviation as reviewers and return it to the Project Manager.

C.2 The Project Manager shall assign a number to the procedural deviation, sign as approver and distribute copies to the individuals involved in the activities covered by the deviation, including the Quality Assurance Coordinator. At the time of

1 distribution, a copy of the approved procedural deviation shall be forwarded to the Quality Assurance Records Section for microfilming in accordance with QA Procedure GQ-17.02.

The Project Manager shall maintain a record of all deviations issued for the project. This record shall include the deviation number and the quality assurance procedure or project instruction involved for each deviation. Each page of the record shall be identified by a page number, with at least the first page also identified by the project name and number.

4.0 REVISION

Not applicable.

5.0 REFERENCES

S&L QA Program, Section 03.

S&L QA Procedure GQ-17.02.

NRC's 10CFR50 - Appendix B.

NRC's Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)."

NRC's Regulatory Guide 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants."

ANSI/ASME N45.2, "Quality Assurance Program Requirements for Nuclear Facilities."

ANSI N45.2.11, "Quality Assurance Requirements for the Design of Nuclear Power Plants."

6.0 FLOW CHART

Figure 6.0 is the flow chart for Approved Procedural Deviations.

OUTPUT DOCUMENTS REQUIRED		
KEY	FORM NO.	TITLE
A	GQ-3.15.1 (3.15.2)	Proposed Procedural Deviation
B	GQ-3.15.1 (3.15.2)	Approved Procedural Deviation

DEFINITIONS:

PM - Project Manager
QAC - Quality Assurance Coordinator
QARS - Quality Assurance Records Section
R - Requestor
SEPE - Senior Electrical Project Engineer
SSPE - Senior Structural Project Engineer

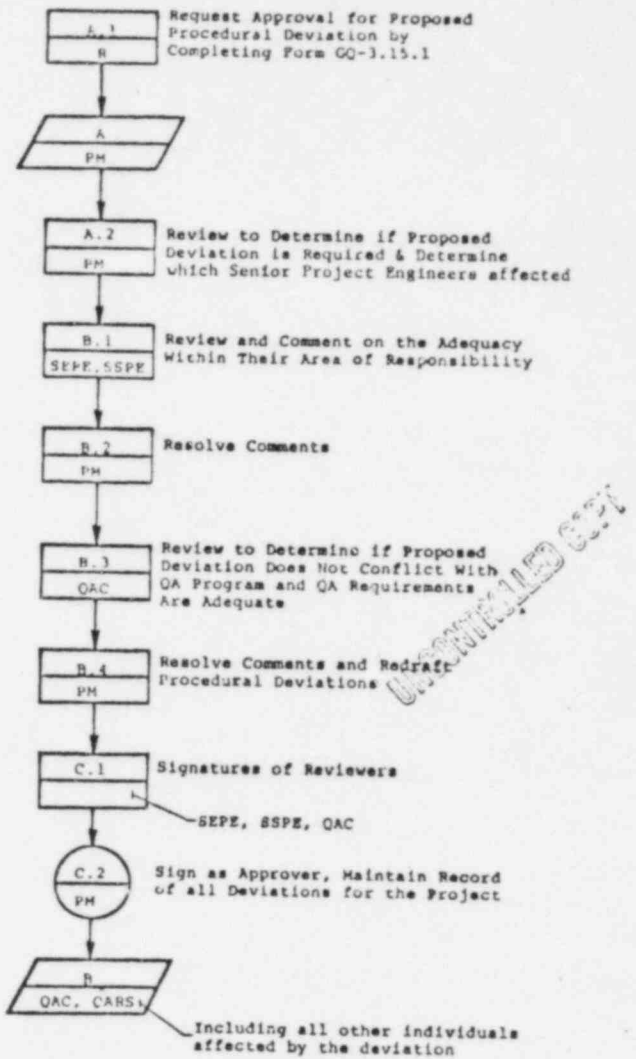

FIGURE 6.0 - FLOW CHART FOR APPROVED PROCEDURAL DEVIATIONS

to the extent that either may perform the required function regardless of the state of operation or failure of the other. Supp.4

b6. Safety Class Structures. Structures designed to protect Class 1E equipment against the effects of the design basis events.

NOTE: For the purpose of this document, separate safety class structures can be separate rooms in the same building. The rooms can share a common wall.

b7. Separation Distance. Space without interposing structures, equipment, or materials that could aid in the propagation of fire or that could disable the Class 1E system.

c. General Separation Criteria:

c1. Methods of Separation: The separation of circuits and equipment shall be achieved by safety class structures, distance, or barriers, or any combination thereof.

c2. Compatibility With Mechanical System: The separation of Class 1E circuits and equipment shall be such that the required independence will not be compromised by the failure of mechanical systems served by the Class 1E systems. For example, Class 1E circuits shall be routed or protected such that failure of related mechanical equipment of one redundant system cannot disable Class 1E circuits or equipment essential to the operation of the other redundant system(s).

d. Specific Separation Criteria:

d1. Non-Missile Areas: The minimum separation distance between redundant Class 1E cable trays or between Class 1E trays and Class 1E conduits of a redundant division, shall be 3 feet horizontally and 5 feet vertically. Conduits assigned to different Class 1E divisions may have a minimum separation of 1 inch. Conduits of two different safety divisions may not occupy a common hanger. Where separation cannot be maintained, Constructor may proceed with work but must notify Sargent & Lundy of the actual clearances involved for required design action.

Supp.5

Channelized RPS (orange) circuits are essential but are not Engineered Safety Feature cables. Conduits containing sensor channel A1/B1 cables should not be supported on a common hanger with conduits containing sensor channel A2/B2 cables. Conduits containing cables of the four actuation groups G1, G2, G3 and G4 (to Hydraulic modules) may be commonly supported. "Orange" raceway may be supported by a common hanger with Yellow, Blue or Green divisional raceway. Supp.

d1.1 In general plant areas where the 3 ft. horizontal and 5 ft. vertical separation between redundant divisional trays, or conduit and trays cannot be met, qualified fire barriers shall be installed. Husky Products, Inc. have developed two piece panels with intumescent material as described and tested per Husky Products Engineering Report No. 77-7-FP-1, certified August 22, 1977. These panels or tray covers are acceptable as fire barriers as defined in 202.33b1. When barriers are required due to insufficient space separation, tray covers on the lower tray are acceptable as fire barriers. In cases of crossovers, these tray covers should extend 18 inches either side of the extremities of the upper tray. Supp.

d1.2 Where redundant division conduit cross parallel to or below a cable tray, one (1) inch air space provides acceptable separation. Where conduits cross above the tray, a single ventilated baffle protective cover, Husky Products, Inc. qualified in test report, 77-7-FP-1, applies provided:

d1.2.1 The air space between cover and conduit is at least one (1) inch.

d1.2.2 The tray cover extends at least 18 inches beyond the conduit.

d1.3 Locations and sizes of fire barriers will be indicated on a series of electrical cable tray drawings which will have an FB suffix. This work will be done at such time that basic issue of EI drawings is complete.

Supp.

d2. Missile Area: Redundant Class 1E conduits and cable trays shall have a minimum separation of 20 feet. Where this separation cannot be maintained, Constructor may proceed with work, keeping the maximum separation possible, but must notify Sargent & Lundy of the actual clearances involved for required design action. Supp.5 Supp.4

d3. High Energy Pipe Areas: High energy pipe lines are those lines which have an operating pressure exceeding 275 psi for more than 1 percent of plant operation. Redundant Class 1E conduits and/or cable trays shall have a minimum separation of 20 feet when one is less than 20 feet from a high energy pipe. Class 1E conduits or cable trays shall maintain a minimum separation of 20 feet to high energy pipes which are in piping systems in divisions redundant to the conduits or cable trays. The 20 feet separation does not apply to pipe and conduit or tray of the same division. Where 20 feet separation cannot be maintained, Constructor may proceed with work, keeping the maximum separation possible, but must notify Sargent & Lundy of the distances involved for required design action.

d4. Fire Hazard Areas: Redundant Class 1E circuits shall not be routed through fire hazard areas. If this type of routing cannot be avoided, only one of the two redundant circuits may be run in conduit through this area.

d5. Special Circumstances: Any special circumstances not covered by the above descriptions or not indicated on the electrical conduit drawings shall be brought to the attention of the Consultant Engineer for resolution.

e. Segregation Codes:

The following coding system has been established to identify cables, and the raceways with which they are associated, for separation purposes.

e1. Cable Tray and Conduit Segregation Codes:

		Power	Control	Inst.
Engineered Safety Features (ESF)	(ESF Yellow	1YP	1YC	1YK
	(ESF Blue	1BP	1BC	1BK
	(ESF Green	1GP	1GC	1GK
Non-Essential Tray	White	1WP	1WC	1WK
Non-Essential Junction Box	White	NSP	NSC	NSK

Supp.7

Supp.4

		Power	Control	Inst.
Reactor Protection System Inputs	(RPS Channel A1	-	A1C	A1K
	(RPS Channel A2	-	A2C	A2K
	(RPS Channel B1	-	B1C	B1K
	(RPS Channel B2	-	B2C	B2K
Reactor Protection System Outputs	(RPS Group G1	-	G1C	--
	(RPS Group G2	-	G2C	-
	(RPS Group G3	-	G3C	-
	(RPS Group G4	-	G4C	-
Reactor Protection System Trip Logics	(RPS Trip Logics A1&A2	-	-	NAK
	(RPS Trip Logics A1&B1	-	-	NBK
	(RPS Trip Logics A2&B2	-	-	NCK
	(RPS Trip Logics B1&B2	-	-	NDK

e2. Cable Segregation Codes:

ESF and RPS Cables	Identical to ESF&RPS Tray Codes Above		
Non-Essential Cables in Non-Essential Trays	Identical to Non-Ess. Tray Codes Above		
Non-Essential Cables in ESF Yellow Trays	11P	11C	11K
Non-Essential Cables in ESF Blue Trays	12P	12C	12K
Non-Essential Cables in ESF Green Trays	13P	13C	13K
Non-Essential Cables in Non-Ess. Junction Boxes but no trays	NSP	NSC	NSK

ESF and RPS Cables shall be run in their own trays or conduits only.

A Non-Essential Cable may be run in Non-Essential or ESF Trays, but shall not occupy more than one ESF division tray system.

NS - No Seg. check made by CIS3. Non-Essential Cables not in any tray.
(NOTE: This is not a division, but an identification for computer programming convenience.)

e3. Segregation Check Truth Table: Segregation check determines whether the cable segregation code is identical to the tray segregation code or should follow the following truth table:

Tray Codes / Cable Codes	1YP	1BP	1GP	1YC	1BC	1GC	1YK	1BK	1GK	NSP	NSC	NSK
11P	1	0	0	0	0	0	0	0	0	1	0	0
12P	0	1	0	0	0	0	0	0	0	1	0	0

103

Supp.4

Tray Codes	1YP	1BP	1GP	1YC	1BC	1GC	1YK	1BK	1GK	NSP	NSC	NSK
Cable Codes												
13P	0	0	1	0	0	0	0	0	0	1	0	0
11C	0	0	0	1	0	0	0	0	0	0	1	0
12C	0	0	0	0	1	0	0	0	0	0	1	0
13C	0	0	0	0	0	1	0	0	0	0	0	1
11K	0	0	0	0	0	0	1	0	0	0	0	1
12K	0	0	0	0	0	0	0	1	0	0	0	1
13K	0	0	0	0	0	0	0	0	1	0	0	0
1WP	0	0	0	0	0	0	0	0	0	1	0	0
1WC	0	0	0	0	0	0	0	0	0	0	1	0
1WK	0	0	0	0	0	0	0	0	0	0	0	1"

Supp.

		A1 (C or K)	A2 (C or K)	B1 (C or K)	B2 (C or K)	G1C	G2C	G3C	G4C
Input Circuits	A1 (C or K)	x		x					
	A2 (C or K)		x		x				
	B1 (C or K)	x		x					
	B2 (C or K)		x		x				
Output Circuits	G1C					x			
	G2C						x		
	G3C							x	
	G4C								x

RPS Circuits (x = may be run in same enclosure)

Note: RPS field cables may be bundled with related ESF cables within panels

Supp.

Supp.6

Essential locally mounted safety related instruments installed by the electrical contractor shall be provided with color coded plastic tags identifying the separation division of the instrument.

The separation divisions for the safety related instruments are shown on the Piping and Instrumentation Diagram (P&ID) and the Control and Instrumentation Detail (C&ID) drawings and should be the same as that of the cable(s) associated with an instrument.

The color code for the tags shall be as follows:

Separation Division	Tag Color	Tag Inscription
ESS-1	Yellow	---
ESS-2	Blue	---
ESS-3	Green	---
RPS-A1	Orange	A1*
RPS-A2	Orange	A2*
RPS-B1	Orange	B1*
RPS-B2	Orange	B2*

*Black characters on orange field.

Tags shall be 1-7/16" X 2-1/8" in size. The alpha-numeric identification number of the instrument will be embossed on the tag with 3/16" high black characters. Tags will be secured to instruments with nylon cable ties in such a manner that the tag will remain with the instrument if the instrument is removed from its installed location.

Project No. 4130-00

The Cincinnati Gas & Electric Company
Wm. H. Zimmer Nuclear Power Station-Unit 1

Cable Tray Loading Design Criteria

U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Attn: Mr. Paul Barrett

Gentlemen:

Enclosed, please find a copy of Sargent & Lundy's Electrical Drafting Standard, EDSB-126, Rev. 10/5/79; pages 2-43 through 2-48 of Sargent & Lundy's Electrical Installation Specification H-2173; and pages 8.3-29, 8.3-30 and 8.3-65 of the Wm. H. Zimmer FSAR.

The above documents are being sent to you at your request to aid the Region III office in understanding the tray loading criteria and the meaning of design index numbers. The basic design index of 1.00 means that the cables assigned to that particular reviewing point tray section gives a fill, if stacked diametrically, which will equal 40% of the depth of the tray. In reality, a 40% fill of the cross-section area of the tray is, in fact, a design index of 1.25, as the computer program works on a diameter squared basis rather than a pi x r^2 on a cross-section of the cable. Therefore, to stay within the maximum fill of 50% as noted in Section 8.3.3.1.3 of the FSAR, we keep all power trays below a design index of 1.5625 which meets this criteria. In extreme cases, instrument trays or controlled cable trays are allowed to fill to 60% as noted in the FSAR, however, this would be a design index of 1.875 and we do not have any tray sections approaching this quantity of fill.

fill a tray to a design index of 2.0 and still be below the top of the tray. This is not a good practice, however, particularly in the case of power cables as a regimented lay concentrates the cables and does not allow the air movement through the cable groupings as a random lay will.

If you have any further questions regarding the above, please do not hesitate in contacting me.

Yours very truly,

R. E. Cotta
Senior Electrical Project Engineer

REC:wg
In duplicate
Enclosures
Copies:
E. A. Borgmann (3)
J. D. Flynn (1)
RFS/R. J. Pruski (1)
L. J. Szumski (1)

1039B - 1.39
1044A - 1.28
1052B - 1.51
1053B - 1.26
1055A - 1.26
1055B - 1.28

1057A - 1.44
1057B - 1.47
1058AB - 1.44
1058BC - 1.45

1059C - 1.33
1073A - 1.25

1085B - 1.46

1087B - 1.45

1088B - 1.35
1095B - 1.33
OK 1104B - 1.54
1236A - 1.28
17

2012A - 1.35
2012B - 1.25
2017A - 1.37

2018A - 1.36
2019B - 1.31
2024A - 1.37
2024B - 1.36
2025A - 1.46.
OK 2025B - 1.55

2027A - 1.46
2029A - 1.27
2029B - 1.48

2031B - 1.31

2038A - 1.44

2062AB - 1.44

2068B - 1.31

2157A - 1.32

2159A - 1.35

2160A - 1.40
19

3008E - 1.29
2 3015E - 1.35

4007A - 1.30
4010A - 1.45

4011A - 1.41

4012B - 1.41

4022A - 1.40

4044BC - 1.27
4047B - 1.30

4074C - 1.38
4078K - 1.36
4079K - 1.27
4080K - 1.44

4086C - 1.27
4088C - 1.31

4152BA - 1.26

4120B - 1.36
4120C - 1.30
4121B - 1.38
4121C - 1.36
4122C - 1.29
4145CB - 1.42
4503 - 1.29
4151B - 1.29
4182B - 1.36
4183B - 1.28
4290A - 1.34
4293A - 1.42

4299A - 1.39

4310A - 1.33

4326A - 1.31
4328A - 1.36

4330A - 1.36

4352B - 1.29
53

4383B - 1.31

4394A - 1.43
4395A - 1.38

Attachment U

4421A - 1.28

4424B - 1.53

4433B - 1.39

4435B - 1.46

4438A - 1.31
4438C - 1.37

4439B - 1.35

4442B - 1.47

4462B - 1.43
4465B - 1.39 (= CY 27)

4564A - 1.46
4569B - 1.42

4585C - 1.36

4613A - 1.37

4614A - 1.46

4615A - 1.46

4620A - 1.37
4620B - 1.50

TRAY SECTIONS RELEASED FOR FIREPROOFING

RK4233	R4307	R4529	R4492
R 4234	R4308	R4530	R4493
R 4235	R4309	RK4537	
R 4236	R4313	R4586	
R 4237	R4320	R4593	
R 4238	R4322	R4528	
R 4239	R4327		
R 4240	RK4353		
RK4281	R4355		
R 4282			
R4283			
R4285			
R4298			

THESE ROUTING POINTS TO BE AVOIDED
O CABLE TO BE ROUTED THRU UNDERLINED PTS
ITHOUT APPROVAL. (OR -FU FIREPROOFED TRAYS)
S PRECEDED BY OK HAVE BEEN DOCUMENTED -U
OW THEY CONFORM TO FSAR COMMITTMENT OF 60%
SOLUTE MAX. LOADING WHICH IS D.F OF 1.53

NO.	REVISED	APPROVED	DRAWING RELEASE RECORD

ROUTING POINTS OVER 125
ZIMMER N.P.S.
CGE

14

IX-3330 TECHNIQUE FOR RADIOGRAPHIC EXAMINATION OF WELDED JOINTS

IX-3331 Preparation of Weld Surfaces

Welds to be radiographed shall have the weld ripples or weld surface irregularities, on both the inside and outside, removed by any suitable mechanical process to such a degree that the resulting radiographic image due to any irregularities cannot mask or be confused with the image of any unacceptable discontinuity.

IX-3332 Required Sensitivity of Radiographic Technique

Radiography shall be performed with a technique which will have sufficient sensitivity to indicate the features in IX-3334.5 of a penetrameter of the thickness specified for the thickness of the weld being examined, as shown in Table IX-3325-1 or IX-3325-2.

IX-3333 Radiographic Technique for Small-Diameter Butt Welds

In the case of small-diameter butt welds, such as nozzle attachments, piping and appurtenances, where the source is on the outside and the film is on the opposite outside surface, only that portion of the weld adjacent to the film and readable on the film shall be considered to have been examined and the penetrameter thickness shall be based on the single-wall thickness. Single wall radiography shall be used when practical.

IX-3334 Use of Penetrameters to Check Radiographic Technique

As a check on the radiographic technique employed, penetrameters, as herein described, shall be used as stipulated in the following subparagraphs to determine whether the requirements are being met.

IX-3334.1 Evaluation of Radiographic Quality. The radiographic quality shall be evaluated by the image of a properly located penetrameter.

IX-3334.2 Location of Penetrameter. A standard source-side penetrameter of the thickness shown in Table IX-3325.1 or IX-3325.2 shall be placed on the side nearest the radiation source. Where it is impractical to do this, a film-side penetrameter shall be placed on the film side of the joint, its thickness shall conform to Table IX-3325.1 and a lead letter "F" at least as high as the identification numbers placed adjacent to the penetrameter.

IX-3334.3 Number of Penetrameters to be Used. Except as required in IX-3334.5(b), one penetrameter shall be used for each exposure, to be placed so that the plane of the penetrameter is normal to the radiation beam. Each penetrameter shall represent an area of essentially uniform radiographic density as judged by density comparison strips, or a densitometer. If the film density through the diagnostic area varies by more than minus 15 or plus 30 percent from the density through the penetrameter, then an additional penetrameter is required for the exceptional area or areas. If the requirements of IX-3334.5 are met by two penetrameters, one penetrameter appearing in the lightest area of a film and the other in the darkest, the intervening densities on the film shall be considered acceptable. It is not necessary that these additional penetrameters be normal to the radiation source at their locations. The film density through the weld metal shall be 2.0 minimum for single viewing, and 2.6 minimum for composite viewing of double film exposures, each film of a composite set to have a minimum density of 1.3.

IX-3334.4 Placement of Penetrameters. The penetrameter shall be placed adjacent to the weld seam except in instances when the weld metal is not radiographically similar to the base material or the geometric configuration makes it impractical, in which case, the penetrameter may be placed over the weld metal. The shim thickness shall be selected so that the total thickness being radiographed under the penetrameter is the same as the total weld thickness, and backing strip if used and not removed.

IX-3334.5 Images Which Shall Appear on Radiographs.

(*a*) Except as permitted in IX-3335.3 and in Table IX-3325.2 the images of the identifying numbers, the penetrameter outline and of the 2T hole are all essential indexes of image quality on the radiograph, and they shall appear on the radiograph; except that for penetrameters 5, 7, and 10, either the 2T hole or

"C"

INTER-DEPARTMENT CORRESPONDENCE

TO: MR. A.E. ROTHENBERG

DATE: August 28, 1973

FROM: E.C. PANDORF

SUBJECT: WM. H. ZIMMER NUCLEAR POWER STATION
QUALITY ASSURANCE AUDIT
W.O. 57300-957, JOB E-5590

Attached is a report of a Quality Assurance Audit at M.W. Kellogg Company, Williamsport, Pennsylvania plant on August 15, 1973 by Mr. W.W. Schwiers.

This audit was performed to evaluate the Quality Assurance program of M.W. Kellogg as a vendor of essential components on Phase II Piping.

In compliance with AEC requirements, this report is to be reviewed and initialed by persons having responsibility in the area being audited.

Please review this report, initial the report, and forward to the next recipient.

The completely initialed report will be returned to the QA&S Section and retained in the Quality Assurance Records.

E.C. Pandorf

ECP:dsb
Enclosure
cc: KEI - Site Document Center

ATTN	NOTED
AER	
WHD	
JDF	
CAB	
HCB	
GMI	
RETURN TO:	
P.O. NO.	

August 17, 1973

Subject: Phase II Piping Fabrication
Quality Assurance Audit of M. W Kellogg
Williamsport, Pennsylvania

On August 15 and 16, a Quality Assurance Audit of the Williamsport, Pennsylvania facilities of M. W. Kellogg was conducted. The purpose of this audit was to assure that the implementation of their Quality Control Program was consistent with the manual submitted by M. W. Kellogg. Prior to conducting this audit, the Quality Assurance Program of M. W. Kellogg was reviewed by Cincinnati Gas & Electric and also the Quality Control group of Sargent & Lundy. Various comments were generated by the two organizations and a letter was submitted to Kellogg for clarification. There were five items under consideration and Kellogg answered these questions to the satisfaction of both CG&E and S&L. If future revisions are necessary to comply with AEC requirements, M. W. Kellogg has indicated that they will supplement their program to our satisfaction. The Quality Assurance Manual submitted by Kellogg was basically generated to comply with Section #3 of the ASME code. In order to comply with 10CFR50, individual supplements to the manual are prepared in accordance with requirements for each project site and request from the subject licensee.

Attached is a check list titled, "Evaluation of Vendor Quality Assurance Program". The check list is generally self-explanatory, however, there are individual items which require clarification. Item #2-7, concerning the Quality Control Procedures, should be clarified to indicate that there is a program specific to ASME, Section #3 and a separate Quality Control Program which is applicable to Section 1 and Section 8. The Section #3 program will include those supplements to the manual required by regulatory or owner requests. Items #8-5 and #8-6, concerning Acceptance Processing and Withholding Stamps, is not applicable since a tagging system is used rather than a stamp system. Item #10-3, concerning In-Process Inspections, is implemented by the use of a Shop Traveler. The shop traveler is always reviewed by the Quality Assurance Group prior to its implementation. Item #17-4 and 17-5, concerns Documentation, and Kellogg was agreeable to supply documentation in accordance with our requirements. If this documentation, reference in these two items concerns material that they receive, the documentation is always available upon receipt of the item shipped.

The internal audits performed by M. W. Kellogg of their own Quality Assurance Program were reviewed. The audits reflected that there were certain deficiencies and corrective action was recommended. In most cases, the corrective action was that the Quality Assurance Manual required it and therefore, an appropriate letter was submitted to the division responsible for the deficiency. One audit indicated that various shop travelers had not been approved by Quality Assurance. It was recommended that an item be

ATT'N	NO:
AER	G
WHD	
JDT	
CHR	
	4
SEE REPLY TO	
P.O. NO.	

included in the inspection requirements, that no work will be started until an inspector verified that Quality Assurance had reviewed the shop traveler. This required adding an additional check off on the shop traveler and Kellogg agreed that this would eliminate the possibility of shop travelers being implemented without appropriate review.

The control of weld rod was reviewed and the procedure was properly implemented and included adequate controls. During the review of the weld rod control, the acceptance and hold tag procedures were also reviewed and were found to be adequately implemented. In addition to the tagging procedure, a quarantine system was established which did not necessarily indicate that the material had been rejected, but that a deficiency existed which required disposition.

The records on welders including approved procedures, qualifications and performance were reviewed with the plant weld engineer. The records were neat, adequate and demonstrated good control of such items. Individual performance records and requalification on a three month basis, when required, were included with this documentation. Also, records of calibration of all welding machines were reviewed. During the tour of the plant facilities, various welding machines were reviewed to see if calibration labels were attached. The calibration tag attached to each machine indicates only a date of calibration. It was requested that evidence of the person performing the calibration should also be included on the machine. Kellogg's present procedure requires that for all other equipment and that which is sent to a foreign source for calibration, the person performing the calibration signs the record which is attached to the equipment. Kellogg feels that their present procedure is adequate and they indicated that the AEC had previously accepted the procedure applied to welding and magna-flux machines.

The procedure for identifying materials received and transferring the necessary information to smaller size pieces which are generated from the piece shipped was reviewed. The purchase order issued for material purchased by M. W. Kellogg requires that all material be marked with the purchase order and item number assigned by M. W. Kellogg. The purchase order and item are stamped on each piece of equipment by the supplier and as smaller pieces are made, this purchase order number and item are transferred by M. W. Kellogg to the subsequent piece. Our project will be assigned a consecutive set of purchase order numbers. Documentation, which is of a repetitive nature, that is, applies to more than one piece within several spool pieces will be sent to us for review upon receipt of the material. All documentation of stock type material will be filed by this same purchase order and item number. If there is stock material purchased by M. W. Kellogg for more than one project it will reflect the purchase order and item number. All documentation will reflect the purchase order number and item number, and

can be filed by piece number if one of a kind or separately by purchase order number. This system provides adequate means of tracing the documentation for all parts and components of a system.

As indicated on the attached check sheet, there are presently approximately 350 total employees at the Williamsport plant. This total includes Accounting, Management, Supervision, etc. The total number of personnel assigned to Quality Assurance is approximately 30. All inspection reports directly to Quality Assurance. The manager of the Quality Assurance Section has been with M. W. Kellogg approximately 40 years, most of which time has been spent in Quality Control. Two other Quality Assurance Engineers have a combined service of 25 years. These personnel demonstrated a superior rating concerning the M. W. Kellogg Quality Assurance Program. Their attitude was one of conscientious, with the realization that any of the deficiencies which could result within the program would be a direct reflection on themselves and the program which they have established and for which they are responsible.

In conclusion, M. W. Kellogg has been audited by many other utilities and the AEC. As a result of these audits, refinement of their procedures has resulted in a very acceptable program. The audit conducted on the 15th and 16th of August similarly demonstrated the implementation of a satisfactory Quality Assurance program and it is recommended that their Quality Assurance Program be accepted relative to the award of the Phase II Piping Fabrication contract.

Wm H. Schmieder, Jr.

THE CINCINNATI GAS & ELECTRIC COMPANY

EVALUATION OF VENDOR QUALITY ASSURANCE PROGRAM

Vendor's Name M. W. Kellogg Co. Report No. _____

Address Williamsport, Penn. Report Date _____

Date of Visit 8-15-73 Telephone 717-323-9991

Purchase Order Number Vendor's Req. No.

Material or Equipment of Interest to CG&E Co.
Phase II Piping Fabrication

General Information

Management Level Contact: W. J. Mitchell Title QA Manager

Personnel Contacted: K. Morgan Titles QA Engineer

General Product Line: Pipe Fabrication

Distribution of Work:

Nuclear 70 % Government % Commercial 30 %

Total Number of Personnel in Quality Assurance: 30/346 Total (Mg't.Acc't.etc.

General Comments:

W. W. Schwiers
Auditor's Name

QA Engineer
Title

		Yes	No	N/A	Comment
1-1	Are the Vendor's Quality Control functions formally organized in accordance with recognized procedures or applicable specifications?	X			
1-2	Does the Quality Control organization have sufficient authority and organizational freedom to identify quality, problems, to recommend or provide solutions and verify implementation of solutions?	X			
1-3	Is the Quality Control organization independent of the individual or group directly responsible for performing the specific activity? Reports to Plant Mgr.	X			
2-1	Is the Vendor's Quality Control manual or applicable specifications approved and supported by management? VP Power Piping (T D Landale)	X			
2-2	Give date of manual and last revision. 7/25/72	X			
2-3	Does the Quality Control manual recognize				
(a)	10CFR50 Appendix B, 18 QA Criteria?	X			
(b)	ASME Boiler & Pressure Vessel Code, Section III?	X			
2-4	Are activities affecting quality accomplished under controlled conditions?	X			
2-5	Does the Inspection Organization have authority to withhold acceptance of production items when quality is compromised?	X			
2-6	Does the program consider special controls, processes, test equipment tools and skills including proper training and qualification of personnel?	X			
2-7	Are the quality control procedures implemented throughout the manufacturing area? (Sect.III), (Sect. 1 & VIII)	X			
3-1	Are measures established to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled?	X			
3-2	Is a system in effect to control customers' furnished drawings and specifications?	X			

		Yes	No	N/A	Comment
3-3	Is the adequacy of design verified or checked by individuals or groups other than those who performed the original design? QA approves all procedures	X			
3-4	Are design changes including field changes subject to design control measures commensurate with the original design?	X			
3-5	Are measures established for the identification and control of design interfaces and for coordination among participating design organizations including the review, approval, release, distribution and revision of design documents?	X			
4-1	Are measures necessary to assure adequate quality, included or referenced in all procurement documents when purchasing from subcontractors? QA approves all specifications	X			
4-2	Are subcontractors required to provide quality assurance programs consistent with 10CFR50 Appendix B and ASME Code Section III as applicable?	X			
4-3	Is a procedure used to assure that sub contractors and suppliers have up-to-date drawings and specifications?	X			
5-1	Are activities affecting quality prescribed by documented instructions, procedures, or drawings, which include quantitative or qualitative acceptance criteria? All specs., spool dwgs. reviewed by QA	X			
5-2	Is inspection and shop planning reviewed against contract and specification requirements?	X			
5-3	Are detailed work instructions and procedures available at the work and inspection locations?	X			
5-4	Does Quality Control review and approve acceptance and test procedures against contractual compliance?	X			
6-1	Are measures established to control issue of documents such as instructions, procedures and drawings including all revisions?	X			

		Yes	No	N/A	Comment
6-2	Are the procedures reviewed for adequacy, approved for release by authorized personnel and distributed to and used at the location where the prescribed activity is performed?	X			
6-3	Are inspection personnel promptly and properly notified of changes to drawings, specifications and purchase order requirements?	X			
7-1	Are purchased materials, equipment and services verified to assure conformance to the procurement documents?	X			
7-2	Are subcontractors selected based upon source evaluations which demonstrate objective evidence of quality in those products to be supplied? No expediting	X			
7-3	Will documentary evidence that material and equipment conform to the procurement requirements be available upon delivery of such products ? P.O. & Item. for identification	X			
7-4	Is quality controlled consistent with the importance, complexity and quantity of the product or services?	X			
7-5	Does receiving inspection check incoming shipments to the requirements of the purchase order, referenced specification and applicable drawings?	X			
7-6	Is material, when accepted on test reports and/or specifications of conformance, subject to verification testing ?	X			
7-7	Is an adequate source inspection conducted?	X			
8-1	Are materials, parts, components and partially fabricated assemblies, identified and controlled?	X			
8-2	Is the identification maintained by heat number, serial number, or other appropriate means, either on the item or records traceable to the item, during fabrication? P.O. and Item No.	X			
8-3	Does the vendor have a formal "Hold Area" for unaccepted material?	X			

		Yes	No	N/A	Comment
8-4	Does the vendor segregate material or articles waiting inspection or test results from those which already have been accepted or rejected?	X			
8-5	Are acceptance, processing and withhold stamps in use?) Tagging system used		X		
8-6	Are stamps controlled and traceable?)		X		
9-1	Have measures been established to assure that special processes, including welding, heat treating, and non-destructive testing, are controlled and accomplished by qualified personnel using procedures in accordance with applicable codes, standards, specifications and other special requirements?	X			
9-2	Are special process procedures available at work stations?	X			
9-3	Do records reflect items tested and procedures and operations used?	X			
10-1	Has a program of inspection been established to assure those activities affecting quality conform to documented instructions, procedures and drawings?	X			
10-2	Are inspections performed by individuals other than those performing the activity?	X			
10-3	Are in-process inspections preplanned with check lists, so as to be compatible with manufacturing operations?	X			
10-4	Shop Traveler Is design change incorporation verified as part of the final acceptance process?	X			
10-5	Are inspection findings immediately recorded?	X			
10-6	Are specific hold points beyond which work may not proceed without consent of contractor indicated in appropriate documents issued to subcontractors?	X			
10-7	Are rework procedures reviewed by Quality Control?	X			

		Yes	No	N/A	Comment
10-8	Does final inspection assure that all contractual requirements have been satisfied before shipment?	X			
11-1	Are test procedures written by responsible personnel? By whom? QA				
11-2	Are testing personnel qualified?	X			
11-3	When outside test facilities must be used, are adequate instruction issued? By Whom? QA				
11-4	Do test records reflect actual measurement values?	X			
12-1	Are procedures in effect to control tools, gages and test equipment?	X			
12-2	Does the system provide for mandatory recalibration of all calibrated tools, gages and test equipment?	X			
12-3	Do calibration or inspection records reflect:				
	a) Item identification number and name?	X			
	b) Frequency of calibration or inspection?	X			
	c) Procedure for calibration or inspection?	X			
	d) Date calibrated or inspected and date due for next calibration or inspection?	X			
	e) Personnel performing calibration or inspection? Welding & Magna-Flux machine - not on sticker. Records - yes	X			
	f) Identity of master used to perform calibration?	X			
	g) Deviations from standard values?	X			
12-4	Do Standards currently used for calibration have certification on file traceable to National Bureau of Standards?	X			
12-5	Are calibration frequencies realistic and compatible with environments, use and purpose of the instruments?	X			
13-1	Is purchased material identified by stamp or tag to show inspection status prior to release to production or stock?	X			

		Yes	No	N/A	Comment
13-2	Is a check list used to verify shipping requirements and documentation to be enclosed in the shipment?	X			
13-3	Are written instructions covering packaging, packing, marking and shipping utilized by shipping or inspection personnel?	X			
14-1	Are non-conforming items identified?	X			
14-2	Are parts, supplies, assemblies identified to indicate partial, in progress or final acceptance?	X			
15-1	Does the vendor have a procedure for the control of non-conforming material?	X			
15-2	Does engineering participate in evaluating requests for waivers promptly after a discrepancy is discovered?	X			
15-3	Do written procedures provide for:				
	a) Identification and segregation of non-conforming material from normal production?	X			
	b) Review of repetitive discrepancies?	X			
	c) Periodic management reviews?	X			
15-4	Is Quality Control represented in the review of non-conforming products?	X			
15-5	Are management reports on non-conforming products published and acted upon?	X			
15-6	Is the customer consulted on reworked material?	X			
16-1	Does the vendor maintain a corrective action system?	X			
16-2	Are defective products and related data analyzed to determine cause and extent of discrepant condition?	X			
16-3	Is inspection data collected and analyzed to establish quality levels in processes and work performance?	X			

		Yes	No	N/A	Comment
16-4	Are corrective action requests issued to a supplier when a quality problem exists?	X			
17-1	Are adequate records maintained in order to trace assembly and sub-assembly parts back to a specific lot of raw material?	X			
17-2	Are product quality and processing records stored? How long? Varies with customer requirements	X			
17-3	Are repairs documented completely and available in Quality Control files?	X			
17-4	Is requested documentation supplied when shipment of material is made?	X			
17-5	If requested documentation is not supplied with shipment, is it to be supplied? When?		X		
17-6	Are inspection and test records maintained which display:				
	a) Receiving inspection?	X			
	b) In-process inspection?	X			
	c) Special processes?	X			
	d) Final assembly?	X			
	e) Test inspection?	X			
18-1	Does vendor audit his subcontractors?	X			
18-2	Does vendor perform internal audits?	X			
18-3	Are audit check lists used?	X			
18-4	Are audit results documented?	X			
18-5	Are audit results and audit programs reviewed by management?	X			

SUMMATION OF COMMENTS

Program has been industry accepted; however, basically for ASME Section III AEC requirements covered by supplements. Implementation appears satisfactory.

Wm. W. Schwiers

Signed

GOVERNMENT ACCOUNTABILITY PROJECT
Institute for Policy Studies
1901 Que Street, N.W., Washington, D.C. 20009 (202) 234-9382

April 20, 1982

FREEDOM OF INFORMATION ACT REQUEST
FOIA-82-206
Rec'd 4-22-82

Director
Office of Administration
Nuclear Regulatory Commission
Washington, D.C. 20555

To Whom It May Concern:

Pursuant to the Freedom of Information Act ("FOIA"), 5 USC §552, we request the investigative file, including all drafts, memoranda, statements, affidavits, computer printouts, notes, telephone logs, diaries, or any other information connected with NRC IE Report No. 50-358/81-13. The documents may be at Region III Nuclear Regulatory Commission ("NRC") Headquarters, the NRC Office of Inspector and Auditor ("OIA") headquarters, or retained in the personal or office files of IE and OIA investigators who worked on the Zimmer case.

Although the Zimmer investigation is ongoing, Report No. 80-358/81-13 is for all intents and purposes a finished agency product which should be open for public inspection, notwithstanding exemption #5 of the FOIA. A document that is pre-decisional at the time of preparation may lose exempt status if "adopted formally or informally, as the agency position on an issue or is used by the agency in its dealings with the public." Coastal States v. Dept. of Energy 617 F. 2d. 854,866 (D.C. Cir. 1980). Report No. 80-358/81-13 was used by the NRC as a basis for imposition of a $200,000 civil penalty against Cincinnati Gas & Electric ("CG&E"), as well as for the Agency's decision to delegate to CG&E the responsibility of conducting an in-house reinspection entitled "The Quality Confirmation Program." If the NRC can use the report to make this final agency policy commitment in its dealings with the public and the utility, then clearly the report must be post-decisional in nature.

On March 18, 1982, Mr. Bert Davis, Region III Deputy Director, told me that priorities have yet to be established for Part II of the investigation. As a result, it is unfair to characterize the ongoing investigation as a mere continuation of work on the previous issues.

In order to comply with the provisions of the Privacy Act, we would consent to deleting the names of any parties whose names are mentioned in the appeals and whose right to privacy would be threatened through public disclosure.

We are requesting this information as part of a monitoring project on the adequacy of the Commission's efforts to protect puclic safety at nuclear power plants. As a result, we request that fees be waived because "furnishing the information can be considered as primarily benefitting the general public." 5USC § 552 (a)(4)(A).

8205230058
PDR

For any documents or portions of documents that you deny due to a specific exemption, please provide any index itemizing and describing documents or portions of documents withheld. The index should provide a detailed justification of your grounds for claiming such exemption, explaining why each exemption is relevant to the document or portion withheld. This index is required under Vaughn v. Rosen (I), 484 F.2d 820 (D.C.Cir. 1973), cert. denied, 415 U.S. 977 (1974).

We look forward to your reply within ten working days.

Sincerely,

Tom Devine
Legal Director

Jay Rosenthal
Staff Associate

TD/jr