

TRIP REPORT NO. 2201

VISIT TO  
ROBERT L. CLOUD AND ASSOCIATES (RLCA)  
BERKELEY, CA

January 29, 1986

Purpose: Meeting and Audit of RLCA Activities on Cable Tray Supports

TES Personnel: R.D. Ciatto, E.A. Solla

The consulting firm of Robert L. Cloud and Associates was requested to participate in the Comanche Peak cable tray verification program by Mr. J.B. George. This recent addition to the program was prompted by the recognition of the need to coordinate and overview the activities of EBASCO and Impell. According to Harvey Harrison, the CPSES Cable Tray Project Manager for TUGCO, the Cloud organization is not involved in conduit supports at this time, although their participation in this activity at a later date is possible.

Representing the NRC at this meeting was Mr. David Jeng of the NRC staff. Assisting him were Mr. Paul Bezler of Brookhaven National Laboratory and Mr. Victor Ferrarini of Engineering Analysis Services in addition to R.D. Ciatto and E.A. Solla. Attachment 1 gives a complete attendance list.

Mr. Harrison introduced Mr. Edgar Hee, the RLCA project manager for this effort, who presented a summary of his company's role in this project. Mr. Hee's presentation followed the outline given in Attachment 2 of this trip report. Besides their overview of EBASCO and Impell, RLCA will also overview the cable tray tests performed by ANCO. Both Units 1 and 2 are included in RLCA's workscope. They will review and coordinate design criteria, procedures, and computer programs to ensure uniformity between the two analysis organizations in addition to technical adequacy and consistency with licensing commitments. Mr. Hee documents the results of RLCA activities, including technical audits of the analysis and testing organizations, in letter reports to Mr. Harrison of TUGCO. These reports are auditable by the NRC.

8602190303 860131  
PDR ADOCK 05000445  
A PDR

Trip Report 2201  
January 29, 1986  
Page 2

In their overview of procedures, RLCA uses checklists consisting of external source issues including Cygna concerns to ensure that all pertinent items are addressed. They are also verifying computer codes to some extent. Mr. Harrison requested RLCA to benchmark the programs to verify items such as method used for modal combinations. In determining if Impell's procedures are equivalent to EBASCO's procedures, RLCA has uncovered a few differences:

- o One organization refers to cable trays as Seismic Category 1 structures where as the other refers to them as Safety-Related structures.
- o Impell procedures provide for the use of stiffness coefficients at concrete baseplates whereas EBASCO assumes these to be fixed restraints. (EBASCO's position is that their method is conservative.)
- o There were minor differences in selection of response spectra.
- o For wall-mounted supports, Impell procedures provided for linear interpolation between floor spectra whereas EBASCO envelopes the floor spectra.
- o Impell procedures favor dynamic analysis whereas EBASCO tends to use static methods.

On this last point it was noted that EBASCO started with Unit 2 which perhaps was better suited for static methods of analysis. However, in Unit 1 both EBASCO and Impell will use dynamic system analysis and static methods depending on which is more appropriate for a particular system. Overviews of procedure development have already been documented in letter reports by RLCA. TUGCO (Harrison) committed to provide the checklist comparison to the NRC.

During the implementation phase of the cable tray verification program, RLCA will audit Impell and EBASCO. They will review samples of detailed calculations but in a few instances they expect to perform independent calculations. Although they will not concentrate on QA aspects, RLCA will review interfaces as-well-as technical adequacy of calculations. They will try to identify trends of deviations from procedures. Their audits will commence in mid-March. Mr. Jeng voiced concern about the sampling technique to be used by RLCA, particularly the application of Appendix D of the CPRT program plan and MIL-STD-105D. RLCA stated that the sample would be "engineered" rather than totally random.

Trip Report 2201  
January 29, 1986  
Page 3

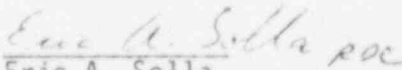
Observations/Recommendations

Since RLCA activities started recently and since our time was limited to a few hours, it was neither appropriate nor possible to audit RLCA documentation. However, the overview of the procedure development is complete and this report should be audited when it is submitted. This will include a comparison of EBASCO and Impell procedures and a checklist of pertinent issues.

One of the important parameters affecting analysis results is the baseplate stiffness coefficient. CPSES uses rolled angles as baseplates with concrete inserts or expansion anchors. Since EBASCO routinely assumes the connections to be rigid this assumption should be reviewed to determine its appropriateness. It is EBASCO's opinion that this is conservative but, this may not necessarily be true in all cases.

RLCA audits do not specifically include QA reviews of the analysis and testing organizations. The staff should consider QA audits, particularly as related to design change control.

  
Raymond D. Ciatto

  
Eric A. Solla

RDC/EAS/mam

cc: D.F. Landers  
J.Q. Cragin  
Project 6410 Trip File

Attachment 1

Meeting - CPSES @ RLCA 2:30pm 1/21/86.

Edgar Hee	RLCA
Rene Alexandru	EBASCO
John W. Reed	JBA
Charlie Kircher	JBA
H.A. Harrison	Tuglo
R.D. Ciatto	NRC/TES
David C. Jeng	NRC
Victor Ferrarini	NRC/TRT
Eric Solla	NRC/TES
Paul Bezler	NRC/BNL
Per Svensson	RLCA
R.L. Cloud	RLCA

*Robert L. Cloud and Associates, Inc.*

---



Comanche Peak Steam Electric Station

Audit of Robert L. Cloud Associates, Inc.

January 21, 1986

Berkeley, California

## I RLCA Scope of Work and Responsibilities

- o Mr. Joe B. George requested that RLCA assist TUGCO in their overview of the Ebasco and Impell cable tray structural verification activity. Mr. George personally instructed both Ebasco and Impell of TUGCO's desire to have them cooperate with and support RLCA in the overview assignment.
- o Overview scope includes Unit 1 and 2 cable tray systems and hangers. RLCA's initial focus is Unit 1. Overview scope includes:
  - Ebasco engineering activities
  - Impell engineering activities
  - Project as-built program
  - Other assigned project technical activities such as the Dynamic Testing program
- o Resonsibilities and Objectives:
  - To confirm the adequacy of Ebasco and Impell technical criteria, procedures, instructions and computer codes.
  - To confirm that the criteria, procedures and instructions are properly implemented, i.e., the work is complete and correct.
  - To assist TUGCO in the presentation of work to the NRC.

## II RLCA Overview of Procedure Development

### A. Scope

All Ebasco and Impell technical procedures (criteria, including project instructions).

### B. Tasks

1. Comparison of technical content (are Ebasco and Impell procedures technically the same?)

2. Verify the adequacy of the technical procedures (are the procedures complete and correct?).

- Licensing commitments
- Concerns raised by Cygna and others
- Sound engineering practice.

3. Audit of computer codes.

- Consistency with licensing commitments
- Consistency with project procedures

4. Confirmation of solutions to technical issues.

- Slenderness ratio ( $KL/r$  7200)
- Multiple mode factor
- Etc.

### III RLCA Implementation Audit

#### A. Scope

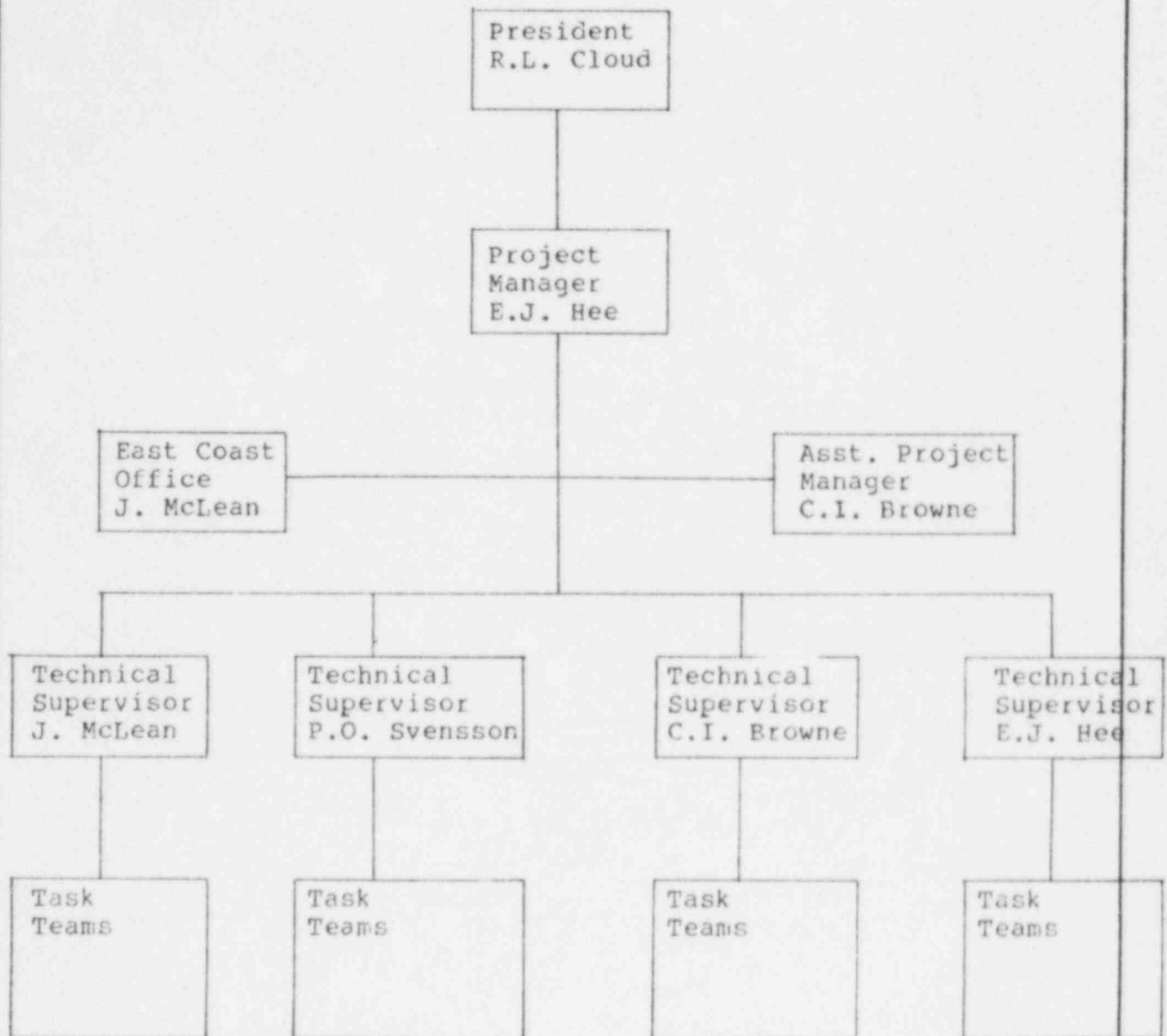
Completed and approved Ebasco and Impell design documents.

#### B. Tasks

1. Develop audit check lists.
  - Conformance to procedures
  - Address technical licensing issue
2. Select audit sample
  - Sample size based on 95%/95% confidence/acceptance level
  - Biased towards effective engineering review of work and representative cross section
3. Detailed review of calculations.
  - Written audit observations
  - Independent analysis of non-standard items
4. Deviation analysis (if required).
  - Deviation impact and trending
  - Possible cause (generic significance)
  - Safety significance
5. Audit report.

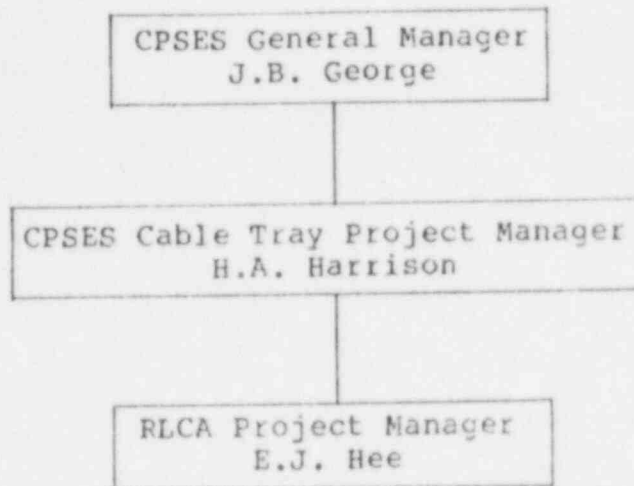
#### IV RLCA Organization and Interface

##### A. Internal RLCA Organization

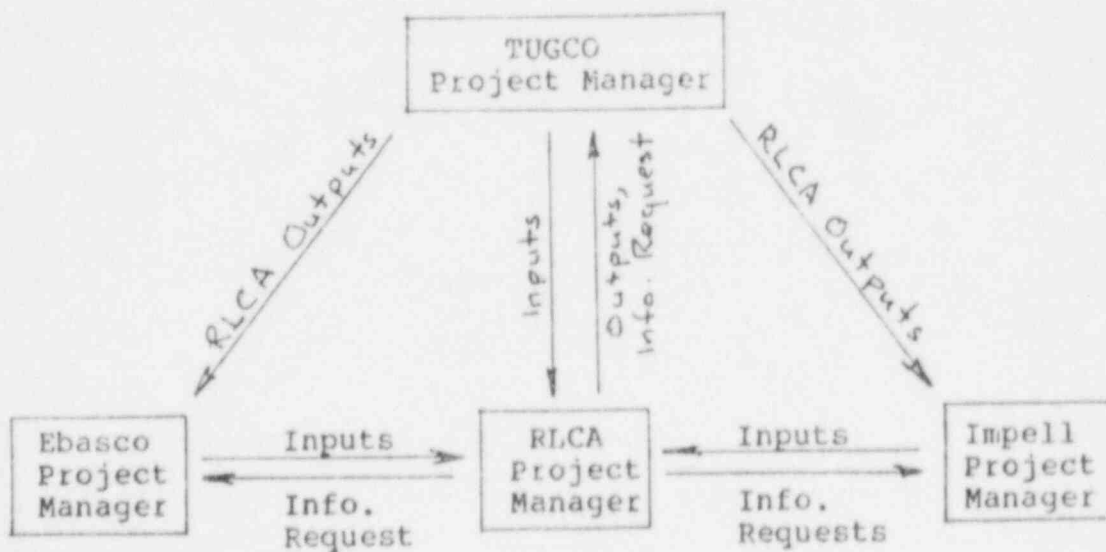


## B. Project Interface

### 1. Policy and Direction



### 2. Information Flow



V Personnel Qualifications

A. Key personnel

Robert L. Cloud - President  
Edgar J. Hee - Project Manager, Technical  
Supervisor  
Charles I. Browne - Assistant Project  
Manager, Technical Supervisor  
John McLean - Assistant Project Manager,  
Technical Supervisor  
Per O. Svensson - Technical Supervisor

B. Project Qualifications

# RLCA Experience Summary for CPSES

<u>Name</u>	<u>Highest Degree</u>	<u>School</u>	<u>Grad. Year</u>	<u>Years Eng. Experience Nucl. Total</u>		<u>Reg. PE</u>
Robert Cloud	PhD/ME	Univ. of Pittsburgh	64	23	30	X
Edgar Hee	MS/Struc	Univ. of California, Berk	70	13	15	X
J.L. McLean	MS /AE	College of Aeronautics	59	17	26	X
Charles Browne	MS/ME	Univ. Southern California	67	13	19	X
Per Svensson	MS/CE	Univ. of California, Berk	75	10	10	X
Paul Anderson	MS/Eng Mec	Virginia Polytechnical Inst.	83	9	9	
Pete Beazley	MS/Eng Mec	Univ. of Wisconsin	79	5	6	
Mike Becker	MS/CE	Univ. of California, Berk	84	1	1	
Craig Boyak	MS/CE	Oregon State Univ.	84	4	5	
D. Chatterji	MS/Eng	Cleveland State Univ.	74	11	15	
Jim Culley	MS/ME	Northeastern Univ.	76	5	13	
	MBA	Western New England College	82			
Jim Leung	MS/ME	Univ. of California, Davis	73	6	13	X
Hanson Loey	BS/ME	Univ. of California, Berk	81	4	4	
Tim Ludington	MS/ME	Stanford University	78	5	7	
Gil Madrid	BS/CE	Calif. State Univ., Northridge	74	8	10	X
P.C. Mainali	MS/CE	Univ. of Illinois	73			
	MS/Ct.Mgt.	Univ. of Waterloo, Canada	71	13	15	X
Tom Muraki	PhD/Naval Arch.	Univ. of Tokyo	72	10	13	X
David Quinones	BS/Physics	New Mexico State Univ.	76	5	10	
Charlie Wu	MS/CE	Univ. of North Dakota	70	14	16	X
Ken Wu	MS/Struc	Univ. of California, Berk	82	3	3	X
Shig Yamahara	MS/CE	Univ. of California, Berk	62	6	26	X
Ming Yang	PhD/CE	Univ. of California, Berk	82	3	3	X
Fan Yuan	MS/CE	Univ. of California, Berk	79	6	6	X
	MS/Chem	Univ. of Pittsburgh	77			

## Nucl. Total

Total Years Experience

194 275

Average Years Experience

9 12