North American Transmission FORUM

Community *Confidentiality* *Candor* *Commitment*

NATF Redacted Operating Experience Report

Safety – Caisson Drop Accident

About NATF Redacted Operating Experience (OE) Reports

North American Transmission Forum (NATF) operating experience reports highlight positive or negative transmission (reliability or resiliency) experiences worth sharing for learning opportunities or potential trending. The overall goal is to help each other learn without experiencing the same issues first-hand. This sharing originates confidentially within the NATF membership.

Redacted operating experience reports are posted on the NATF public website to allow the NATF and its members to more broadly share information, especially safety-related alerts and learnings, with contractors and other utilities to benefit the industry at large.

The NATF member company that submitted the initial restricted distribution OE report for this topic/event has approved the NATF to issue this redacted OE report.

Open Distribution

Disclaimer

Topic

Caisson Drop Accident

Description

An employee jumped from an off-road 150-ton crane onto a matting below causing a significant injury. The employee jumped because a 35,000 lb. caisson fell from a rigging and landed on the crane, which caused an extensive amount of damage to the crane.

Lessons Learned

1. Crews failed to follow the approved work plan for caisson installation, which was due to a lack of communication between contract groups and a lack of oversight by both parties.
2. Material ordered for the job did not meet our company specifications.
3. A lack of communication and observation to ensure compliance contributed to event.

Actions Taken

- Shut job down for three weeks while the investigation took place and a return-to-work plan was submitted and vetted.
- Ensured that crews had a detailed plan on how to comply with maintaining positive control at all times for all subsequent caissons lifted.
- Sub-contractor changed out previous crew and had management on-site for remainder of work.
- Additional oversight was required at all times by prime contractor and our project management.

Extent of Condition

Our safety and operations leadership developed a safety alert and best practices presentation and distributed throughout all affected workgroups. Our safety department also developed a caisson installation field guide to help crews ensure that all steps are taken to complete this task safely.

Additional Information

Redacted Safety Presentation and Installation Field Guide

Please see subsequent pages of this report for a summarized presentation and a caisson installation field guide.

Transmission Caisson Drop

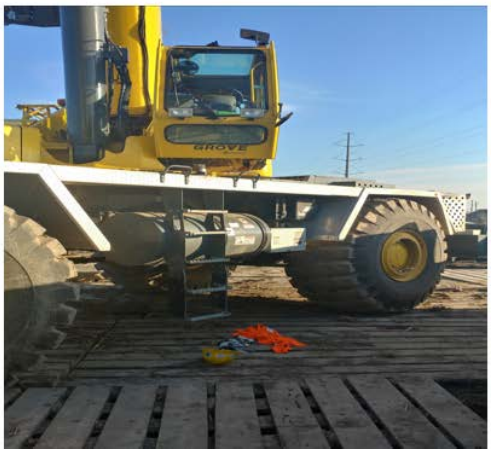
What was the Safety Event?

- Extensive damage to crane from 35,000 lb. caisson falling off of rigging and impacting crane.
- Significant injury caused by employee jumping from off-road 150 ton crane onto matting below.

Damage to crane.

Reference: NATF-OER-401

Crane and spot that employee fell onto.



How did the Safety Event Occur?

- Deviation from pre-approved execution plan of the job.
- Lack of communication between prime contractor to subcontractor of expected execution plan.
- Improper job setup.
- Oversight did not catch issues prior to event.

Reference: NATF-OER-401

How did the Safety Event Occur?

- Deviation from plan allowed crew to use machinery in a way manufacture did not intend and warned against.
- Driving ears on the caisson came improperly coated with galvanizing from the manufacture. This caused the teeth of the vibratory hammer to get fouled by galvanizing.

Galvanizing on caisson ears.

Reference: NATF-OER-401

Key Learnings

- Crews failed to follow approved work plan for caisson installation this was due to a lack of communication between contract groups and a lack of oversight by both parties.
- Material ordered for job did not meet our specifications.
- Lack of communication and observation to ensure compliance contributed to event.

Reference: NATF-OER-401

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Caisson Installation Field Guide

Key Things to Remember:

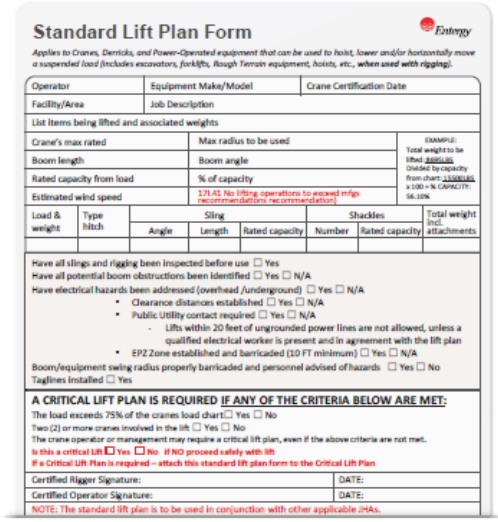
1. Know the crane's failure zone
2. Know the grapple's failure zone
3. Know the vibratory hammer's failure zone

Apart from operators in equipment cabs, keep all personnel out of failure zones.
STAY OUT OF THE LINE OF FIRE.

HAZARDS
What could go wrong?

Equipment failure

- Develop a Lift Plan.
- Ensure equipment and rigging have adequate capacity.
- Verify ground stability checks are completed.
- Use only certified crane operators.



Standard Lift Plan Form

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Applies to Cranes, Derricks, and Power-Operated equipment that can be used to hoist, lower and/or horizontally move a suspended load (includes excavators, forklifts, Rough Terrain equipment, hoists, etc., when used with rigging).

Operator	Equipment Make/Model	Crane Certification Date
Facility/Area	Job Description	
List items being lifted and associated weights		
Crane's max rated	Max radius to be used	EXAMPLE: Total weight to be lifted: 8000 LBS. Divided by capacity from chart: 15000 LBS x 100 = % CAPACITY: 56.10%
Boom length	Boom angle	
Rated capacity from load	% of capacity	
Estimated wind speed	17.41 No lifting operations to exceed mfgs recommendations recommendation	

Load & weight	Type hitch	Sling			Shackles		Total weight incl. attachments
		Angle	Length	Rated capacity	Number	Rated capacity	

Have all slings and rigging been inspected before use ☐ Yes
Have all potential boom obstructions been identified ☐ Yes ☐ N/A
Have electrical hazards been addressed (overhead /underground) ☐ Yes ☐ N/A
- Clearance distances established ☐ Yes ☐ N/A
- Public Utility contact required ☐ Yes ☐ N/A
  - Lifts within 20 feet of ungrounded power lines are not allowed, unless a qualified electrical worker is present and in agreement with the lift plan
- EPZ Zone established and barricaded (10 FT minimum) ☐ Yes ☐ N/A

Boom/equipment swing radius properly barricaded and personnel advised of hazards ☐ Yes ☐ No
Taglines installed ☐ Yes

A CRITICAL LIFT PLAN IS REQUIRED IF ANY OF THE CRITERIA BELOW ARE MET:
The load exceeds 75% of the cranes load chart ☐ Yes ☐ No
Two (2) or more cranes involved in the lift ☐ Yes ☐ No
The crane operator or management may require a critical lift plan, even if the above criteria are not met.
Is this a critical Lift ☐ Yes ☐ No if NO proceed safely with lift
If a Critical Lift Plan is required – attach this standard lift plan form to the Critical Lift Plan

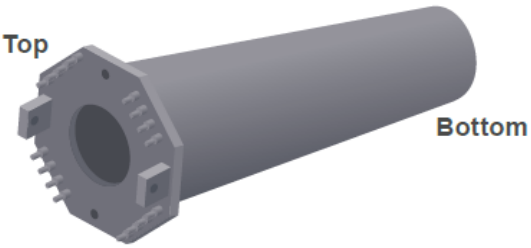
Certified Rigger Signature:	DATE:
Certified Operator Signature:	DATE:

NOTE: The standard lift plan is to be used in conjunction with other applicable JHAs.

Worker struck by

- Barricade failure zone, load travel path, and landing area.
- Maintain safe distance (greater than caisson length) during lift.
- Do not stand beneath boom or hammer.
- Use trained signallers.

CONTROL MEASURES
What can I do?

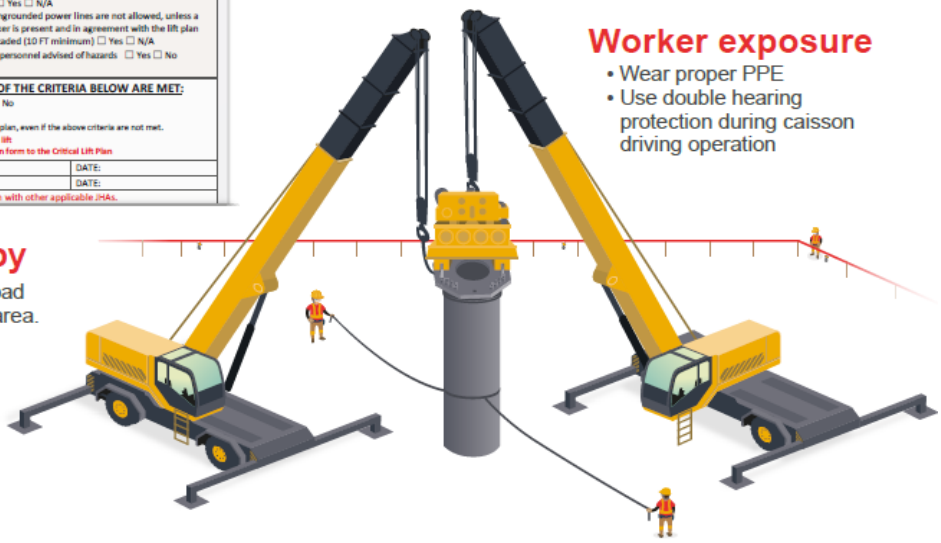


Material falls during lift

- Set up the worksite to ensure positive controls are maintained such as grapple crane or crane with rigging at all times.
- Inspect slings and rigging prior to use.
- Do not use quick connect rigging, until the caisson is set.
- Do not use the hammer without the grapple.
- Pick up caisson from side opposite other operations.
- Use tag line or push sticks to control load.

Worker exposure

- Wear proper PPE
- Use double hearing protection during caisson driving operation



Reference: NATF-OER-401

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HAZARDS
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CONTROL MEASURES
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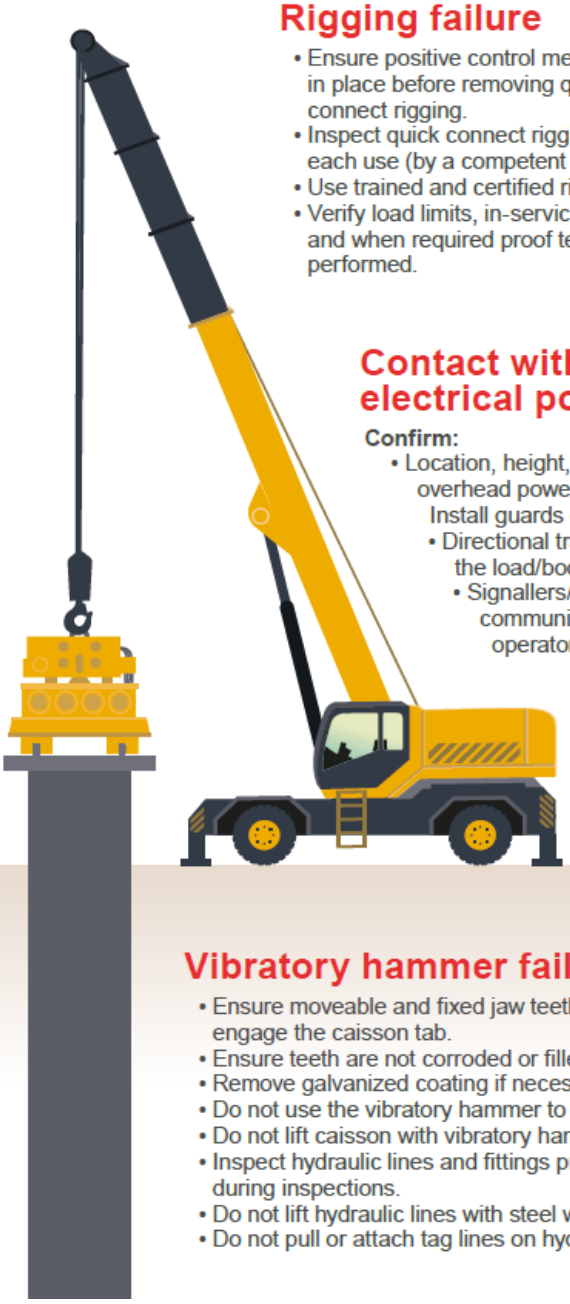
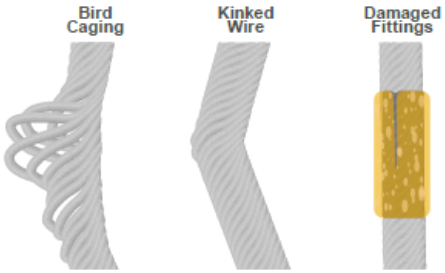


Rigging failure

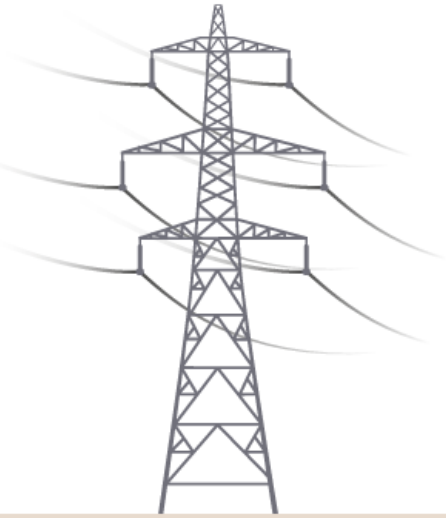
- Ensure positive control measures are in place before removing quick connect rigging.
- Inspect quick connect rigging prior to each use (by a competent person).
- Use trained and certified riggers.
- Verify load limits, in-service dates, and when required proof tests were performed.



Contact with electrical power lines

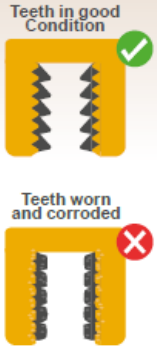
Confirm:

- Location, height, and voltages of overhead power lines in the area. Install guards on lines if necessary.
- Directional travel and angle of the load/boom.
- Signallers/riggers have clear communication with the crane operator/grapple operator.



Vibratory hammer failure

- Ensure moveable and fixed jaw teeth are not worn and allow all teeth to engage the caisson tab.
- Ensure teeth are not corroded or filled with debris.
- Remove galvanized coating if necessary.
- Do not use the vibratory hammer to lift the caisson.
- Do not lift caisson with vibratory hammer teeth.
- Inspect hydraulic lines and fittings prior to use. DO NOT use hands during inspections.
- Do not lift hydraulic lines with steel wire.
- Do not pull or attach tag lines on hydraulic lines.



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