



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

May 31, 2000

MEMORANDUM TO: File

THROUGH: Dr. Dale A. Powers, Acting Branch Chief */RA/*
Engineering and Maintenance Branch
Division of Reactor Safety

FROM: J. E. Whittemore, Senior Reactor Inspector */RA/*
Engineering and Maintenance Branch
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SUBJECT: REGION IV 10 CFR PART 50 LICENSEE RIGGING PROBLEMS

The Attachment contains information that was obtained on Region IV Part 50 licensee rigging activities. This information identifies problems that were experienced because of rigging techniques and tools, or other rigging equipment, during the lifting and transport of various plant components and equipment. The data applies to events that occurred between mid 1996 and November 1999.

At the most recent NRC Regulatory Information Conference, a Region IV power reactor licensee requested that this information be made available. Therefore, this information is being placed in the Public Document Room.

Attachment: As stated

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ATTACHMENT

RIGGING PROBLEM RESULTS

SITE AND DOCKET NUMBERS	DATE OF OCCURRENCE	NATURE OF PROBLEM
Arkansas Nuclear One Docket Nos.: 50-313 50-368	9/25/99 4/14/98 1/26/98 Unknown	Craft personnel dropped an improperly rigged nonsafety-related transformer oil pump. While upending a condenser waterbox cover on a transport cart, the cover fell and damaged the cart because it was not properly secured to the cart. One end of a service water pump shaft was dropped on the intake structure deck during pump disassembly because the custom rigging apparatus was improperly designed. A kevlar sling was damaged when a turbine rotor was landed because there was insufficient clearance to accommodate the sling as it was attached to the load.
Callaway Plant Docket No. 50-483	10/20/96	A sling failed during the lift of a heavy load (reactor coolant pump motor) outside the power block. The typical nylon sling had a small diameter eye at each end. One eye was placed over the crane hook. The circumference of the sling eye was less than the circumference of the crane hook at its thickest point. Load application caused the sling eye seam to be strained in a manner and direction for which it was not designed, and the seam was observed to be failing when the load was applied.
Comanche Peak Steam Electric Station Docket Nos. 50-445 50-446	10/6/99	An electric chain hoist suspended from a polar crane hook for lifting a reactor coolant pump motor failed during the lift.
Cooper Nuclear Station Docket No. 50-298	11/2/99	While lifting a reactor vessel head bolt, the friction clamp used to form the cable lifting sling impacted interference during the lift. The continued application of lifting force caused a cable end to pull through the friction clamp and drop the head bolt.

SITE AND DOCKET NUMBERS	DATE OF OCCURRENCE	NATURE OF PROBLEM
Diablo Canyon Power Plant Docket Nos. 50-275 50-323	11/5/99 8/5/99 3/7/99	<p>The rigging used to remove a Unit 1 turbine building sump pump from the sump interfered with sensitive equipment. The rigging closed a manual valve in the main generator cold gas system and increased the temperature of the generator. Closure of the valve had the potential to cause a turbine/generator runback imposing an unscheduled plant transient.</p> <p>The rigging used to remove a Unit 2 turbine building sump pump from the sump interfered with sensitive equipment. The rigging damaged a position switch for a valve in the main generator cooling system.</p> <p>A gang box was dropped in the Unit 1 auxiliary building while lowering it through an equipment hatch when a sling caught on the deck grating and was displaced toward the other sling.</p>
Fort Cahoun Station Docket No. 50-285		No recent problems identified.
Grand Gulf Nuclear Station Docket No. 50-416	11/15/99 5/7/98 10/28/96	<p>One end of a 7000 pound high pressure turbine stop valve was dropped when a sling on one end failed. The 24,000 pound rated sling failed when it changed positions during a lift and impacted a sharp edge which cut the sling.</p> <p>A core shroud inspection tool ring was dislodged from 2 suspension points when a large volume of air was released from the core area which lifted and upset the tool ring. The lifting device was not designed for use under upset conditions.</p> <p>While lifting a reactor recirculation pump motor with 2 chain hoists, the rear chain hoist freewheeled and dropped the end of the motor about 7 inches. The load did not impact other objects or equipment.</p>
Palo Verde Nuclear Generating Station Docket Nos. 50-528 50-529 50-530	2/18/98	A radioactively contaminated waste filter was dropped as it was lifted from its housing for replacement. A vendor-supplied special grappling device designed for filter removal/installation was not properly installed and seated before the lift was commenced.

SITE AND DOCKET NUMBERS	DATE OF OCCURRENCE	NATURE OF PROBLEM
River Bend Station Docket No. 50-458	1/14/99 9/24/97	<p>Craft personnel were lowering scaffolding material by hand with a rope to the deck near the inclined fuel transfer system pool. A scaffolding bar impacted a ladder and the knots in the rope loosened and dropped the bar into the fuel pool. No fuel was impacted.</p> <p>A turbine control valve bonnet was dropped a distance of 6 - 12 inches, when the swivel eyebolts attached to the bonnet pulled out. This occurred because of a different thread pitch between the swivel bolts and the bonnet bolt holes.</p>
San Onofre Nuclear Generating Station Docket Nos. 50-361 50-362	8/6/99 1/15/98 12/15/96	<p>An empty multi-purpose waste container was dropped when the lifting grapple was not properly attached.</p> <p>A tending line was ignored while the load was being moved, became entangled in a light standard, and bent the standard 30 degrees before crane motion was stopped.</p> <p>Personnel rigged the lift of a section of turbine hood in an unbalanced condition to eliminate the need to re-rig the load while it was suspended. The unbalanced load inadvertently impacted a structural wall and damaged the concrete.</p>
South Texas Project Electric Generating Station Docket Nos. 50-498 50-499	9/29/98	<p>A trailer used for snubber inspection was dropped from an elevation of about 1 foot in the Unit 2 Fuel Building truck bay. A leather glove that was used for a softener to protect a nylon sling from contact with a sharp edge was not sufficient to prevent the sling from severing.</p>
WNP-2 Docket No. 50-397		<p>No recent problems identified.</p>

SITE AND DOCKET NUMBERS	DATE OF OCCURRENCE	NATURE OF PROBLEM
Waterford 3 Steam Electric Station Docket No. 50-382	3/8/99 2/23/99 8/4/98 9/9/96	<p>A spring can actuator was being rigged into place when one of the swivel hooks installed on the actuator failed. The failure occurred because an incorrect size shackle was used.</p> <p>A bus enclosure was being lifted when it swung and impacted other equipment. A tending line would have prevented the load from swinging.</p> <p>An evacuation pump gear box was dropped as it was being elevated for removal by a fork lift when the rigging attached to the fork lift tine shifted.</p> <p>A circulating water traveling screen water pump was dropped into the screen bay when the rigging sling broke. The sling failed because it was configured in a choker rather than a cradle configuration.</p>
Wolf Creek Generating Station Docket No. 50-482	10/29/97 Mid 1996	<p>A rigging assembly clamp loosened due to improper installation and a main steam isolation valve actuator dropped about 12 inches to a scaffold.</p> <p>An auxiliary feed pump room cooler was dropped because of inadequate chafing material between a sling and a sharp edge, causing the sling to sever.</p>

COMMENTS AND ANALYSIS OF RESULTS

- Most licensees had missed the performance of some required programmatic tests and inspections of rigging equipment, and these occurrences were entered into the corrective action systems. None of the missed programmatic tests or inspections of passive rigging equipment (i.e., eyebolts, swivels, shackles, or slings) resulted in any rigging events or problems.
- Two sites apparently had not experienced any recent issues associated with rigging: Fort Calhoun Station and WNP-2.
- Nearly all the events reflected the use of improper rigging techniques.
- There were events that resulted because of poorly-designed custom rigging equipment.
- Although there were no failures of passive rigging equipment that was properly used, there were failures of passive equipment that was not properly used during rigging tasks. There were two failures of active equipment (i.e., chain hoists) that were apparently being properly used during risk significant activities. These failures occurred during the lift of heavy loads in the containment/drywell and could have impacted the reactor coolant boundary.

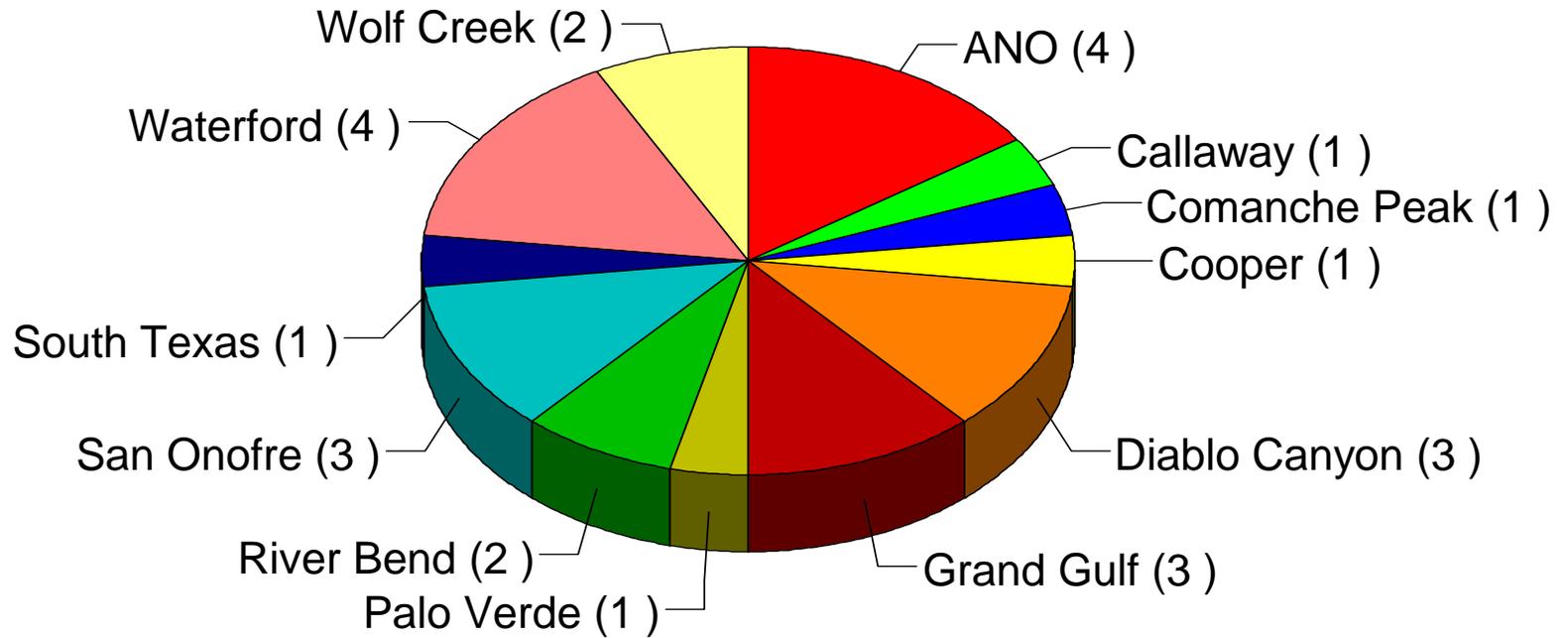
**REGION IV LICENSEE RIGGING PROBLEMS
SPECIFIC FAILURES**

TYPES OF FAILURES	ANO	CA	CP	CNS	DC	GG	PV	RBS	SO	STP	WF3	WC
Improperly Installed or Designed Rigging	3	1			2	1			1	1	2	2
Cut or Damaged Slings	1			1		1				1		1
Failed Chain Hoists			1			1						
Failed Slings		1									1	
Impact or Damage to Adjacent Equipment					2				2		1	
Load Upset or Drop	1		1	1	1	2	1	2	1	1	2	1
Improperly Installed Grappling Devices							1		1			
Failed Eyebolt, Swivels, or Shackles								1			1	

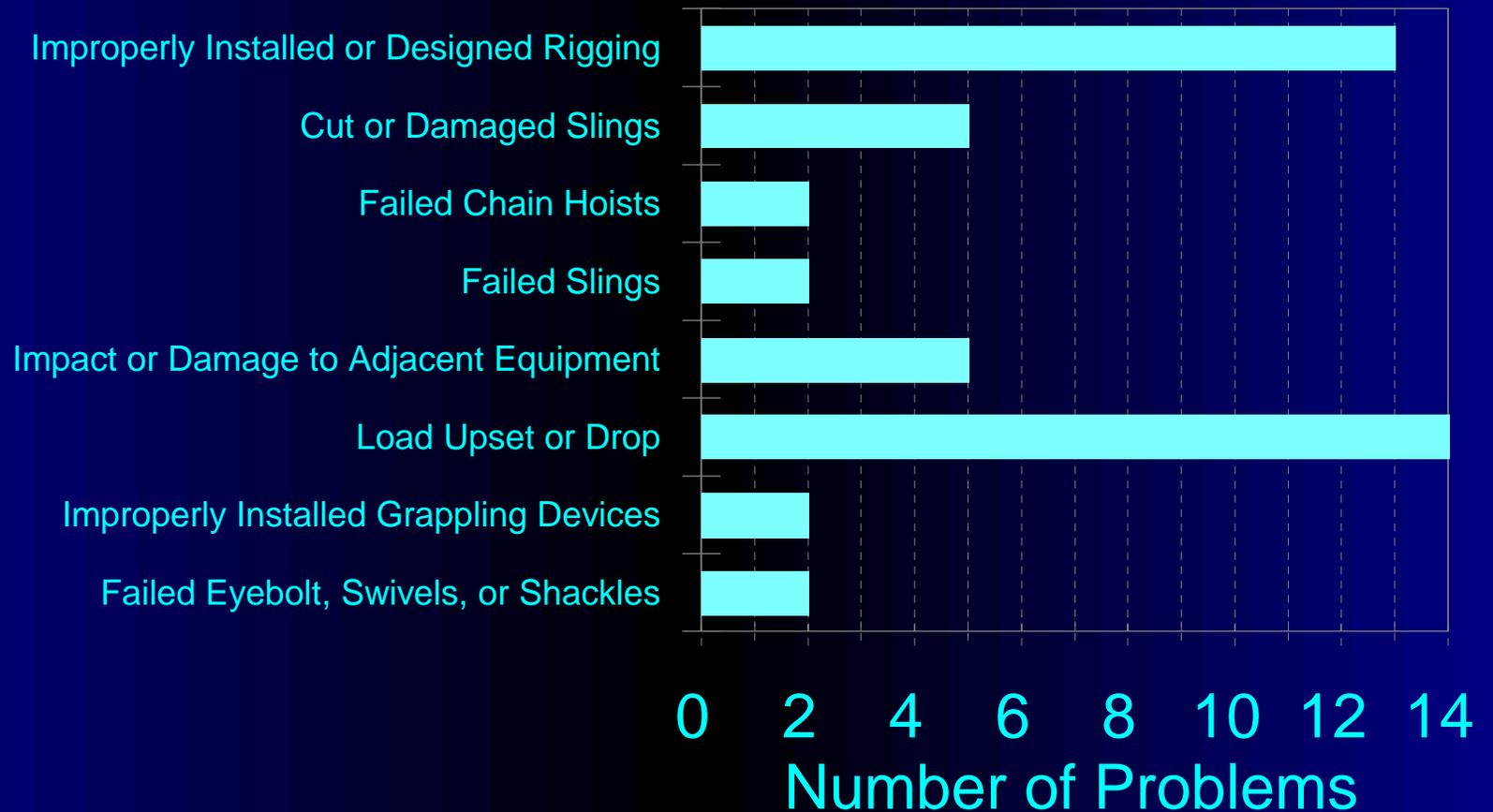
REGION IV LICENSEE RIGGING PROBLEMS FAILURE ANALYSIS

NATURE OF PROBLEM	ANO	CA	CP	CNS	DC	GG	PV	RBS	SO	STP	WF3	WC
Number of Events in the Last Three Years or Within 2 Cycles	4	1	1	1	3	3	1	2	3	1	4	2
Events Involving Safety-Related Equipment	1			1		1						2
Events with Safety-Related Implications and Nonsafety-Related Equipment			1		1	1		1				
Events Related to Poor Design of Equipment	1					1						
Events Involving Improper Use of Equipment, Poor Technique, Failure to Follow Procedures or Apparent Lack of Knowledge or Skill	3	1				1	1	1	2	1	4	2
Events Related to an Apparent Lack of Attention	1			1	3			1	1	1	1	
Events Caused By Failure of Properly Designed and Used Equipment			1			1						
Events Attributed to the Improper Care of Rigging Equipment			1									
Events Resulting In Lateral Motion of a Load or Impact with Rigging Equipment, Adjacent Equipment, or Structures		1			1	1			2		2	
Rigging Events That Caused or Contributed to Plant Events /Transients					1							

Region IV Licensee Rigging Problems Per Site



Region IV Licensee Rigging Problems Specific Failures



Region IV Licensee Rigging Problems Failure Analyses

