

ASSOCIATED BUILDERS AND CONTRACTORS

Construction Industry Crane Safety Summit Report

JUNE 2009



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Forward

Ninety representatives from more than 60 commercial and industrial construction contractors, construction industry trade associations, employee groups, crane manufacturers, rental companies and insurers convened Sept. 25-26, 2008, in Houston for a Crane Safety Summit, hosted by Associated Builders and Contractors (ABC). The initiative was spurred, in part, by a series of crane accidents that occurred in the first half of 2008. In addition, the ABC membership believed a systemic approach to crane safety, outside of the regulatory arena, was needed. ABC felt that a summit focused on crane safety would be helpful in identifying issues and practical solutions that are often overlooked during the regulatory process. It also was expected that discussion among summit participants would lead to the identification of practices to assist in the prevention of crane accidents, and that these practices could be developed and refined as a compliment to the federal regulations governing crane safety or independently from the federal regulations.

This report provides practical guidance and identifies issues end users may wish to address when building or improving their crane safety programs. Summit participants recognize that not every jobsite is the same and that numerous variables need to be taken into account in order to achieve effective crane safety operations.

An 11-member steering committee representing a broad cross section of crane operations developed the structure and focus of the meeting. ABC thanks the members of the steering committee for their invaluable input and assistance. (*See Appendix A.*)

ABC especially wants to express its gratitude to the summit's seven corporate sponsors: the National Center for Construction Education and Research (NCCER), CNA Insurance, The Shaw Group, STARCON International, Austin Industries, CIANBRO and Baker Concrete. Their financial support helped defray costs for the summit's participants.

ABC also thanks all summit participants and the companies for which they work. Participation was voluntary and stemmed from a willingness to work together toward a single goal — sending every employee home safely at the end of each and every day.

Mission and Structure of the Summit

Mission

Identify and/or develop safety practices and remedial tools that would benefit employers and employees with respect to the operation of cranes and derricks for construction purposes in the following areas: crane operations; operator qualifications; rigger qualifications; rigging standards; inspection procedures; and accident investigations.

Structure

The steering committee determined the summit's discussions and outcomes would be optimized by holding two general sessions: one at the beginning defining the mission of the summit and providing background on recent crane incidents, and one at the end to bring the ideas and recommendations together from the five concurrent breakout workgroup sessions, each focusing on a specific area. The workgroup format was intended to facilitate the maximum amount of discussion and interaction among group members. The five working groups were: (1) Operator and Signaller Qualifications; (2) Rigger Qualifications; (3) Rigging Standards; (4) Inspection Procedures; and (5) Accident Investigations.

Summit participants were assigned to a specific workgroup based on their knowledge and experience. Each workgroup was facilitated by a moderator and met for a total of eight hours. During that time, workgroup participants identified and discussed the key issues relevant to their specific area, and identified practices, checklists, functional tools and information resources they believed could benefit construction industry employers and employees.

During the closing general session, a representative from each workgroup reported on each group's discussions and recommendations. Included in this report are executive summaries and full reports from each workgroup developed during the two-day summit. The ideas contained in the report emanate from the experiences of group participants and/or from practices and procedures successfully being employed. Workgroup participants believe their contributions represent an initial step toward complementing the regulatory revisions currently being developed by the Occupational Safety and Health Administration (OSHA), as well as modeling methods used by the construction industry to promote construction worksite safety.

Executive Summary

ABC's Crane Safety Summit took place while a formal crane safety rulemaking procedure was pending before OSHA. As a result, although issues and recommendations were discussed that could be considered and addressed in comments submitted to OSHA, the discussion focused on turning the knowledge and experience of individual participants into practical guidance.

Following are the general policies and positions on which agreement was reached within the individual workgroups:

- Employers and employees would benefit from using minimum operator qualifications. These minimum operator qualifications are included in the American Society of Mechanical Engineers' (ASME) B30.5-2007 voluntary standard, "American National Standard on Mobile and Locomotive Cranes."
- Any crane operator certification program that may be established by the federal government should be based on the ASME B30.5-2007 standard. It also should be portable so that a crane operator can operate the particular types and/or models of equipment on which he/she has been certified without limitation (i.e., anywhere in the country).
- Effective supervision of new and experienced crane operators, as well as consistent operator training, would be beneficial to crane safety.
- Employers must ensure employees who operate a crane are properly trained and qualified.
- Employers of crane operators would benefit from conducting an initial "check-out ride" for operators who are either new to the company, have not previously operated the specific type or model of crane for that employer, or would be operating a crane for the first time on a jobsite after obtaining their certification.
- There is no "one-size-fits-all" approach to training. Also, customized training is not always possible or economically feasible.
- Crane manufacturers should offer more training courses and guidelines for crane owners and employers to integrate into their own training programs.
- All signalpersons must be able to speak and communicate in clear, understandable English, using universally recognized words and speech.
- A standardized definition of "qualified rigger," including appropriate levels of qualification, would be beneficial.
- The training curriculum and minimum knowledge required for riggers (including the levels of riggers) should be standardized.
- If the federal government establishes a rigger certification or an employer uses a voluntary rigging certification, the certification should be viewed as a minimum competency standard for riggers.
- A standardized set of employer responsibilities for rigging would be beneficial.

Qualifications for Operators and Signalpersons Workgroup

Mission

The Qualifications for Operators and Signalpersons workgroup was tasked with identifying crane operator and signalperson qualifications and, if possible, developing recommendations on how to ensure crane operators and signalpersons are qualified to perform their jobs.

Workgroup Report

Operator Qualifications

Minimum Operator Qualification Criteria

The group discussed whether there is a need for a minimum set of crane operator qualifications to be established and, if so, what they believed those qualifications should be. The group agreed employers and employees would benefit from having a minimum set of operator qualifications to refer to and also believed the qualification criteria contained in the B30.5-2007 American National Standard on Mobile and Locomotive Cranes (referred hereafter as B30.5), a voluntary standard developed by the American Society of Mechanical Engineers (ASME), provides an appropriate minimum set of qualifications for crane operators. Updated in 2007, B30.5 enumerates basic qualifications as well as identifies the duties a crane operator would normally be responsible for both prior to and during lifting operations. *(Additional information about the ASME B30.5 standard can be found in Appendix B, E and G.)*

Operator Certification

The workgroup discussed the growing efforts by state and local governments to implement crane operator certification requirements that are independent of the proposed certification requirements currently being considered by OSHA as part of its pending revision of existing federal regulations governing cranes and derricks. As a result of increasing government interest in certification, the group's discussion focused on how a certification program should be structured, as well as certain specific requirements being considered at the federal and/or state level (not whether the need for government to mandate operator certification exists).

The workgroup considered several certification options, including third-party certification, employer certification and state/local jurisdictional certification. The group agreed that any certification program established should be based on the ASME B30.5 standard. It also should be portable so crane operators can operate the particular types and/or models of cranes on which they have been certified without limitation (i.e., anywhere in the country).

The workgroup also discussed the need for, or benefit of, a minimum "in the seat" time requirement prior to an operator being certified, but failed to reach consensus on this issue. Two conflicting positions were presented: Proponents of a seat-time requirement believe such experience prior to an operator seeking certification would enhance the operator's skill level and equipment knowledge, while assisting in his/her ability to obtain certification by passing written and practical exams. The argument against a seat-time requirement is that a majority of crane accidents are not caused by inexperienced or new operators, but rather by employees who have operated cranes for a number of years. However, the group did agree that some level of effective supervision of new and experienced crane operators, as well as consistent operator training, are important to crane safety.

The workgroup agreed that if the government mandates third-party operator certification programs, it would be beneficial for the programs to be accredited by a recognized accrediting body such as the

National Commission for Certifying Agencies (NCCA), American National Standards Institute (ANSI) or other recognized accrediting body. The group identified four certification programs that have been accredited to date:

- National Commission for the Certification of Crane Operators (NCCCO)
- National Center for Construction Education and Research (NCCER)
- Crane Institute of America Certification (CIC)
- International Union of Operating Engineers (IUOE)

Information on each of these certifying organizations is provided in Appendix B.

Operator Training and Supervision

The workgroup discussed training and the appropriate level of post-training supervision that would best ensure an operator is qualified. The consensus was that employers have a duty to ensure employees responsible for operating cranes are properly trained and qualified.

The workgroup felt the ASME B30 standards (in particular, the B30.3 and B30.5 standards) provide quality guidance for employers developing a training program. Additionally, the workgroup expressed that it can be more effective for operator training to be individualized for each company rather than relying on a “one-size-fits-all” approach, but also recognized that not every aspect of training requires customization and that customized training may not always be possible or economically feasible.

The workgroup recommended that employers consider the following when developing an operator training program:

- specific operator needs/requirements
- physical competence of operator
- type of lifts that will be performed
- materials that will be lifted
- type of equipment to be operated
- anticipated environmental conditions (e.g., weather, ground conditions, etc.)

The workgroup agreed employers could benefit from conducting an initial “check-out ride” for operators who are new to the company, who had not previously operated the specific type or model of crane for that employer, or who would be operating a crane for the first time on a jobsite after obtaining their certification.

The workgroup also thought it could be beneficial for employers to conduct periodic “check-out rides” and/or practice lifts, and that employers should consider increasing the degree of lift difficulty for operators during these procedures. However, no consensus or recommendations were reached with respect to the frequency of such activities and/or the feasibility of their application based on a company’s size or other operating characteristics (e.g., the types of cranes being operated and frequency of lifts).

As an adjunct to the discussion on operator supervision, the workgroup discussed the need for employers to institute an hourly “seat-time” limit for operators. Because every operator possesses different capabilities, no consensus was reached on an appropriate hourly limit. But, the workgroup generally agreed that individual crane owners and operators should establish such limits. The workgroup also generally agreed that the operator’s supervisor should conduct a periodic check on the crane operator each hour and that employers should mandate periodic operator breaks (e.g., every four hours).

The Role of Manufacturers in Operator Training

The workgroup recommended that crane manufacturers offer more training courses and guidelines for crane owners and employers to utilize and integrate into their own training programs. While crane manufacturers currently offer some guidance in operational training, the workgroup suggested more detailed training in the form of actual courses and training guides should be provided either free of charge or for a nominal fee. The workgroup also recommended that manufacturers make technicians more readily available for consultation by crane owners/employers. *Contact information for various crane manufacturers is provided in Appendix C.*

Finally, during the workgroup's wrap-up session, it was suggested that employer representatives work with manufacturers to create an online "clearinghouse" where original equipment operating manuals and training guides is made readily available.

Signalperson Qualifications

The workgroup suggested signalpersons should be qualified based on the requirements listed in the ASME B30.5 (mobile and locomotive cranes) and B30.3 (tower cranes) American National Standards. Jobsite "slang" (words not universally recognized or understood as signals) should be eliminated from signalperson communications, and only workers essential to the lift/crane operation should be permitted to speak to the operator via radio. The workgroup further recommended that all signalpersons should be able to speak and communicate in clear, understandable English, using universally recognized words and speech. The workgroup raised concerns about the lack of uniformity in hand signals, but could not reach consensus on how to establish a standard method.

Until a certification program can be properly defined through industry consensus, the workgroup agreed certification for signalpersons should not be required.

Rigger Qualifications and Rigging Standards Workgroups

Mission

The Rigger Qualifications Workgroup was tasked with developing guidance and suggestions on a minimum rigger qualification for the different levels of riggers, including the feasibility and potential impact of requiring riggers to be certified. The Rigging Standards Workgroup also was tasked with developing guidance and suggested operational standards for riggers to follow before and during rigging and lifting operations. After reviewing the findings, it was determined that both workgroups reached similar outcomes and therefore are presented jointly in this report.

Workgroup Report

The two workgroups agreed on four principles fundamental to rigging safety:

- The construction industry would benefit from the establishment of a standard definition of “qualified rigger,” including appropriate levels of qualification.
- The training curriculum and minimum knowledge base required for riggers (including the levels of riggers) should be standardized.
- If the federal government establishes a rigger certification, or an employer uses a voluntary rigging certification, the certification should be viewed as a minimum competency standard for riggers.
- The construction industry would benefit from the establishment of a standardized set of employer responsibilities for rigging.

The workgroups also developed the following recommended “dos and don’ts” for rigging:

- The weight of the load to be lifted should always be known in advance of the lift.
- The manufacturer’s rated capacity for the rigging should never be exceeded.
- Rigging should be inspected at the beginning of each day.
- Synthetic slings should never be used to lift loads with sharp or rough edges.
- Tag lines should be utilized when they do not create additional hazards, i.e. potential contact with personnel, power lines, etc.
- Slings made with wire rope clips should never be used for lifting.
- The manufacturer’s name and rated capacity should be legibly and permanently identified on all rigging hardware and synthetic slings.
- A legible maximum capacity tag should be displayed on all wire rope slings.
- A master link or shackle should be utilized when placing more than two eyes on a hook.
- When utilizing more than two sling-legs back to a common point, the rigger should calculate the load or rated capacity based on two legs supporting the entire load.

Additional guidance for conducting safe lifts is provided in Appendix F.

Inspection Procedures Workgroup

Mission

The Inspection Procedures Workgroup was tasked with developing guidance and suggestions for conducting crane inspections, including the type and frequency of inspections, who should conduct the inspections, and what the qualifications should be for both in-house and third-party inspectors.

Workgroup Report

In-House Inspector Qualifications

The workgroup deemed the following minimum qualifications appropriate for in-house crane inspectors:

- ASME B30 provides a helpful definition of “qualified” for employers to use.
- The individual should have a minimum number of years (e.g., five) of work experience in construction industry erection, operation, maintenance, inspection and/or a supervisory capacity.
- The individual should have experience with the specific type of crane to be inspected.
- The individual should successfully complete appropriate equipment training, preferably from the manufacturer or distributor of the equipment, on the specific crane types to be inspected. Additionally, initial inspection training should be conducted by or through an industry recognized crane inspection entity, and the individual should successfully complete at least continuing education inspection training class per year.

In-House Inspection Recommendations

In addition to recommending a checklist be developed for in-house inspectors to use, the workgroup determined the following should be covered during an in-house inspection:

- Verify compliance with the OEM specifications, including whether the crane has been erected in accordance with the manufacturer’s recommended erection procedures.
- Verify that the maximum allowable ground bearing pressure document is onsite.
- Verify that the actual matting arrangement beneath outriggers or crawlers is arranged per the manufacturer’s recommendation (if not, give the reason why).
- Verify if any modifications have been made to crane equipment and, if so, what.
- Verify whether compliance has occurred with the following:
 - a. ASME B30.3
 - b. ASME B30.5
 - c. Structural Engineering Institute (SEI)-American Society of Civil Engineers (ASCE) 37-02 (“Design Loads on Structures During Construction”); recommendations for crane base foundation, tie-ins, freestanding height and height above the uppermost tie-in
 - d. Federal (OSHA)/state/local rules and standards
 - e. Factory technical bulletins

Third-Party Inspector Qualifications

The workgroup deemed the following minimum qualifications appropriate for third-party crane inspectors:

- The individual conducting the inspection should have, and be able to document, construction work-related experience with mobile and/or tower cranes, depending on the crane(s) to be inspected.
- The individual should have, and be able to document, a minimum number of years (e.g., five) of work experience in construction industry erection, operation, maintenance, inspection and/or a supervisory capacity.
- The individual's experience should be specific to the type(s) of cranes to be inspected.
- At least one of the recommended five years of experience should involve conducting crane inspections for a construction employer for purposes of determining the employer's compliance with applicable OSHA rules and ASME B30 national standards.
- The individual should have successfully completed an inspection training course on the specific equipment to be inspected and conducted by the crane manufacturer or distributor.
- The individual should not have any conflicts of interest, including:
 - a. he/she is not employed by the crane owner, the lessor or lessee of the equipment, or the manufacturer of the crane
 - b. his/her employer is not wholly or partially owned by an equipment owner or equipment manufacturer in the crane and hoisting industry
 - c. he/she does not receive any financial support from an equipment owner or manufacturer in the crane and hoisting industry
 - d. he/she has a minimum of \$2 million in professional liability insurance
 - e. he/she has a minimum of \$2 million in general liability insurance

Inspection Criteria

Taking into account the fact that the extent of an inspection varies depending on the type of inspection being conducted, the workgroup members recommended inspectors use the following general criteria:

- Original equipment manufacturer specifications
- ASME B30.3
- ASME B30.5
- Structural Engineering Institute (SEI)-American Society of Civil Engineers (ASCE) 37-02 ("Design Loads on Structures During Construction") applicable to crane base foundation, tie-ins, freestanding height and height above the uppermost tie-in
- Federal or state OSHA (as applicable)

Crane Accident Investigation Workgroup

Mission

The Crane Accident Investigation Workgroup was tasked with developing recommended procedures for responding to a crane accident and identifying new and existing resources that employers—particularly medium and small-sized companies—can use when responding to and/or investigating a crane accident.

Workgroup Report

Because accident scenes are often chaotic, the workgroup recommended employers establish a crisis management plan that is readily available onsite. The workgroup also recommended that the plan include a checklist that identifies, in order, the actions to be taken following an accident. The following outlines the prioritized step-by-step actions:

- Provide medical assistance to any injured parties.
- Implement the company's crisis management plan (normally located in the corporate safety manual).
 - a. Instruct employees to refrain from discussing the situation with the media.
 - b. Ensure an appointed spokesperson is onsite to handle media requests.
- Secure contact information for any injured parties and notify family members.
- Secure the accident site to preserve evidence and prevent any further injury. In some instances, the situation may require shutdown of the jobsite and/or dismissing employees for the day.
- Gather any witnesses to the accident as quickly as possible. Separate witnesses in order to limit conversations and preserve their recollection of the chain of events.
- If applicable, activate the rescue plan found in the corporate safety manual. Situations that ordinarily trigger a rescue, including emergency egress, include power line contact, equipment rollover and confined space extraction. Depending on the nature of the construction and the specifics of the worksite, other situations may require rescue (e.g., if the jobsite is on or adjacent to water).
- Begin to gather the following facts surrounding incident, but do not collect statements from eyewitnesses unless directed by the corporate legal department/counsel. (Refer to the next step if directed to take eyewitness statements.)
 - a. Complete a site map of the incident scene.
 - b. List equipment location and other physical information (buildings, power lines, ditches, etc.).
 - c. Take photographs of the scene beginning at the outer perimeter of the incident and working inward.
 - d. Begin taking measurements prior to movement/removal of equipment.
 - e. Do not remove any equipment unless directed by police, fire department or EMS personnel. Equipment removal can be dangerous and should only be attempted using qualified lifting experts to eliminate the possibility of further damage or injury.
 - f. Determine who controls/owns the jobsite and/or equipment.
- Collect eyewitness information to be used as key components for the company's investigation records, including:
 - a. Location in relation to the incident/scene
 - b. Other individuals working nearby at the time of the incident

- c. Activity being performed at the time of the incident
- d. What he/she saw
- e. What he/she heard
- f. Other individuals spoken to after the incident
- g. Witnesses' timeline of activities (before, during and after the incident)

A Model Employer Rescue and Recovery Plan is provided in Appendix H.

Appendix A

Construction Industry Crane Safety Summit Steering Committee

P.D. Frey, Austin Industrial

Tony O'Dea, Gilbane

Ted Blanton, Sr., North American Crane Bureau

Allan Ulrich, ABC Florida East Coast Chapter

Doug Sidelin, CIANBRO

Beth O'Quinn, Specialized Carriers & Rigging Association

Troy Allen, The Shaw Group

Bill Holder, STARCON International

Randy Proos, USI Insurance Services of Florida

Jeff York, SignalRite

Joel Oliva, National Commission for the Certification of Crane Operators

Appendix B

American National Standards for Crane Operations and Inspections

American Society of Mechanical Engineers (ASME) B30 Series

Available for purchase through ASME

Phone: (800) 843-2763

Email: infocentral@asme.org

Website: <http://catalog.asme.org/home.cfm?CATEGORY=CS&TaxonomyItemID=3117>

American National Standards Institute (ANSI) A10.42: Safety Requirements for Rigging Qualifications and Responsibilities

Available for purchase through the American Society of Safety Engineers (ASSE)

Phone: (847) 768-3411

Email: tfisher@asse.org

Website: <https://www.asse.org/cartpage.php?link=standards>

American Society of Civil Engineers (ASCE)-Structural Engineering Institute (SEI) 37-02: Design Loads on Structures During Construction

Available for purchase through SEI

Phone: (800) 548-2723

Website: <https://www.asce.org/bookstore/book.cfm?book=4242>

Occupational Safety and Health Administration (OSHA) 29 CFR 1926 Subpart N: Cranes, Derricks, Hoists, Elevators and Conveyors

Available free of charge through OSHA's website: www.osha.gov

Appendix C

Crane Operator Certifying Agencies

National Center for Construction Education and Research (NCCER)

3600 NW 43rd St.
Bldg. G
Gainesville, FL 32606
Phone: (888) 622-3720
Website: www.nccer.org

National Commission for the Certification of Crane Operators (NCCCO)

2750 Prosperity Ave.
Suite 505
Fairfax, VA 22031
Phone: (703) 560-2391
Website: www.nccco.org

Crane Institute of America Certification (CIC)

1 Carlson Parkway
Suite 230
Minneapolis, MN 55477
Phone: (763) 476-4242
Website: www.craneinstitutecertification.com

International Union of Operating Engineers (IUOE)

1125 17th St. NW
Washington, DC 20036
Phone: (202) 429-9100
Website: www.iuoe.org

Appendix D

Crane Manufacturers

Includes manufacturers of cranes, other material-handling equipment, power systems, controls and other crane-related products.

Acco Material Handling Solutions

76 Acco Drive
York, PA 17402
Phone: (800) 967-7333
Fax: (717) 741-8572
Email: info@accolifting.com
Website: www.accomhs.com

Ace Industries, Inc.

6295 McDonough Drive
Norcross, GA 30093
Phone: (800) 733-2231
Fax: (800) 628-3648
Website: www.aceindustries.com

Ace World Companies, Inc.

10200 Jacksboro Highway
Fort Worth, TX 76135
Phone: (817) 237-7700
Fax: (817) 237-2777

American Crane & Equipment Corp.

531 Old Swede Road
Douglassville, PA 19518
Phone: (610) 385-6061
Fax: (610) 385-3191
Email: info@americancrane.com
Website: www.americancrane.com

Bushman Equipment, Inc.

W133 N4960 Campbell Drive
Menomonee Falls, WI 53051
Phone: (262) 790-4200
Fax: 262-790-4202
Website: www.bushman.com

Capco Crane & Hoist Inc.

58 Forest Ridge Drive
Rowley, MA 01969
Phone: (978) 948-29
Fax: (978) 948-2294
Website: www.capcocrane.com

Cattron Group International

58 West Shenango St.
Sharpsville, PA 16150
Phone: (724) 962-3571
Fax: (724) 962-4310
Website: www.cattrongroup.com

COH Inc.

801 Cure Boivin
Boisbriand
Quebec J7G 2J2
Canada
Phone: (450) 430-6500
Fax: (450) 430-6611
Website: www.coh.ca

Conductix-Wampfler

10102 F St.
Omaha, NE 68127
Phone: (402) 952-9319
Fax: (402) 339-9627
Website: www.conductix.us

Control Chief Corp.

200 Williams St.
Bradford, PA 16701
Phone: (814) 362-6811
Fax: (814) 368-4133
Website: www.controlchief.com

Crane Equipment & Service Inc.

801 W. Center St.
Eureka, IL 61530
Phone: (817) 740-79
Fax: (817) 740-8161
Website: www.ces-cranes.com

Demag Cranes & Components Corporation

29201 Aurora Road
Solon, OH 44139
Phone: (440) 248-2400
Fax: (440) 248-3874
Email: jim.tucker@demag-us.com
Website: www.demag-us.com

DeShazo Crane Company, LLC

190 Airpark Industrial Road
Alabaster, AL 35007
Phone: (205) 664-2006
Fax: (205) 664-3668
Website: www.deshazo.com

Drivecon, Inc.

820 Lakeside Drive, Suite 1 & 2
Gurnee, IL 60031-9165
Phone: (847) 855-9150
Fax: (847) 855-9650
Website: www.drivecon.com

Ederer, LLC

3701 South Norfolk St., Suite 301
Seattle, WA 98118-5650
Phone: (206) 622-4421
Fax: (206) 623-8583
Website: www.ederer.com

EMH, Inc.

550 Crane Drive
Liverpool Industrial Park
Valley City, OH 44280-9361
Phone: (330) 220-8025
Fax: (330) 220-8600
Website: www.emhcranes.com

Foley Material Handling Company, Inc.

11327 Virginia Crane Drive
Ashland, VA 23005
Phone: (804) 798-1343
Fax: (804) 798-7843

G.W. Becker, Inc.

2600 Kirila Blvd.
Hermitage, PA 16148
Phone: (724) 983-1000
Fax: (724) 983-1818
Website: www.gwbcrane.com

Harrington Hoists Inc.

401 West End Ave.
Manheim, PA 17545
Phone: (800) 233-3010
Fax: (717) 665-2861
Website: www.harringtonhoists.com

HBC-Radiomatic, Inc.

1017 Petersburg Road
Hebron, KY 41048
Phone: (800) 410-4562
Fax: (866) 266-7227
Website: www.hbc-usa.com

Heco Pacific Manufacturing, Inc.

1510 Pacific St.
Union City, CA 94587
Phone: (510) 487-1155
Fax: (510) 487-4466
Website: www.hecopacific.com

Konecranes America, Inc.

7300 Chippewa Blvd.
Houston, TX 77086
Phone: (281) 445-2225
Fax: (281) 445-9355
Website: www.konecranesamericas.com

Liebherr Construction Equipment Co.

4100 Chestnut Ave.
Newport News, VA 23605
Phone: (757) 245-5251
Fax: (757) 928-8701
Website: www.liebherr.us

Magnetek, Inc.

N49 W13650 Campbell Drive
Menomonee Falls, WI 53051
Phone: (262) 783-3500
Fax: (262) 783-3510
Website: www.magnetek.com

Manitowoc Crane Group

P.O. Box 21
1565 Buchanan Trail East
Shady Grove, PA 17256
Phone: (717) 597-8121
Website: www.manitowoccranegroup.com

Note: Manitowoc Crane Group also manufactures the following crane/crane equipment: Grove, National Crane, and Potain.

Mass Crane & Hoist

72 Progress Ave.
Tyngsboro, MA 01879
Phone: (800) 909-2299
Email: info@masscrane.com
Website: www.masscrane.com

Morris Material Handling, LLC

315 West Forrest Hill Ave.
Oak Creek, WI 53154
Phone: (414) 764-6200
Fax: (414) 570-2756
Website: www.morriscranes.com

Munk International, Ltd.

1440 Ben Franklin Highway
Douglassville, PA 19518
Phone: (877) 503-2972, ext. 4
Fax: (484) 945-0079
Website: www.munckintl.com

North American Industries

80 Holton St.
Woburn, MA 01801
Phone: (781) 897-4117
Fax: (781) 729-3343
Email: dannyp@naicranes.com
Website: www.naicranes.com

OMI Crane Systems, Inc.

1515 I-30 Service Road
Royse City, TX 75189
Phone: (972) 636-8000
Fax: (972) 636-3789
Website: www.omicranes.com

ProservAnchor Crane Group

455 Aldine Bender
Houston, TX 77060
Phone: (281) 405-9048
Fax: (281) 448-8734
Website: www.proservanchor.com

Sissco Material Handling Equipment

186 Route 206 South
Hillsborough, NJ 08844
Phone: (908) 359-9767
Fax: (908) 359-9773
Email: info@sisscohoist.com
Website: www.sisscohoist.com

Spanco, Inc.

604 Hemlock Road
Morgantown, PA 19543
Phone: (800) 869-2080
Fax: (610) 286-0085
Website: www.spanco.com

Terex American Cranes

Waverly, IA
Phone: (319) 352-3920
Email: inquire@terexwaverly.com
Wilmington, NC
Phone: (910) 395-8500
Email: american@american-crane.com
Website: www.terex-cranes.com

Thern, Inc. USA

5712 Industrial Park Road
P.O. Box 347
Winona, MN 55987
Phone: (507) 454.2996 ext. 244
Fax: (507) 454.5282
Website: www.thern.com

Tulsa Winch Group

P.O. Box 1130
Jenks, OK 74037-1130
Phone: (918) 298-8300
Fax: (918) 298-8367
Website: www.team-twg.com

Virginia Crane

P.O. Box 289
11327 Virginia Crane Drive
Ashland, VA 23005
Phone: (804) 798-1343
Fax: (804) 798-7843
Email: info@virginiacrane.com
Website: www.virginiacrane.com

Appendix E

Guidelines for Developing Rigger Qualifications and Certification Standards

1. **Definitions of Rigger Types and Potential Certification Program**
 - A. Basic – A craftsman who has been trained and can demonstrate the ability to perform occasional rigging tasks, including selecting and attaching the rigging hardware and slings appropriate to a specific load or loads. The demonstration would be conducted through a practical exam.
 - B. Intermediate – A basic rigger who has demonstrated the ability to determine load weights; execute complex rigging plans; calculate load centers of gravity; block calculations; and sling tension calculations. A working knowledge of applicable regulations and standards, as well as jacks and skates, also is required.
 - C. Advanced – An intermediate rigger who has demonstrated the ability to develop, analyze and execute complex rigging operations, including a working knowledge of load movement equipment.
 - D. Certification – A knowledge and skills test used to determine if an individual has the minimum knowledge and skills required to perform rigging duties safely. It can be administered through a third party and/or accredited by a recognized independent accrediting agency.
2. **Recommended Minimum Rigger Training, Knowledge and Qualifications**
 - A. Load Assessment
 - i) Basic Rigger
 - (1) Basic knowledge of math
 - (2) Basic knowledge of rigging charts/cards/books
 - (a) Use of rigging reference cards
 - (3) Basic understanding of rigging charts and application
 - (4) Ability to communicate
 - (5) Judgment to ask for help when needed
 - (6) Right to stop lift when necessary
 - (7) Basic knowledge of attachment points and lugs
 - (8) Basic knowledge and understanding of center of gravity
 - (9) Basic knowledge of and ability to conduct pre-task analysis/jobsite safety analysis (JSA), including individual's contributions to pre-lift meeting/briefing
 - (10) Basic knowledge of proper rigging hardware storage, including hardware's exposure to the elements
 - (11) Awareness of potential electrical hazards during rigging and lift
 - ii) Intermediate/Advanced Rigger (must also fulfill Basic Rigger requirements)
 - (1) Knowledge of material weights and effect on rigging hardware
 - (2) Ability to calculate load weights
 - (3) Ability to read drawings, blueprints, tables and charts
 - (4) Knowledge and understanding of ASME B30.9, B30.10, B30.20 and B30.26 American National Standards, as well as applicable OSHA and other ASME standards

- (5) Understanding of the concepts of load positioning, swing path, crane and load rotation, and ground conditions and their effect on crane operations
 - B. Equipment Selection
 - i) Basic Rigger
 - (1) General knowledge of slings and hardware, including sling length and angle clearance
 - (a) Slings
 - (i) Wire Rope
 - (ii) Synthetic Rope
 - (iii) Mesh
 - (iv) Chain (Note: Not recommended for general rigging)
 - (v) Synthetic
 - a. Round
 - b. Web
 - (2) Awareness of each component's safe working load (SWL)
 - (3) General knowledge of "below the hook" storage and maintenance of hardware
 - (4) Ability to determine properly sized shackle for lift lug
 - (5) Knowledge of rigging style/application of each sling type
 - (6) Knowledge of rigging combinations and impact of ratings
 - (7) Knowledge of environmental hazards to rigging and lifting, including weather, chemicals and various exposures
 - (8) Knowledge of various rigging configurations, including sling position and hitch types
 - (9) Awareness of diameter of load-to-diameter of sling ratio (Note: minimum recommended ratio is 1:1 for connections and 20:1 for basket hitches)
 - (10) Experience and knowledge of chain falls and lever hoists
 - ii) Intermediate/Advanced Rigger (must also fulfill Basic Rigger requirements)
 - (1) Knowledge of and experience with different and specialized lifting devices
 - (a) Spreaders
 - (b) Swivels
 - (c) Trunnions
 - (d) Lifting lugs
 - (e) Adjustable rigging devices
 - (2) Knowledge and understanding of specifications and capabilities of different sling types
 - (3) Ability to use spreader bars and lifting beams
- C. Pre-Use/In-Use Inspections
 - i) Basic Rigger
 - (1) Ability to perform:
 - (a) Visual inspection to determine if rigging equipment is in working order and properly selected for lift
 - (b) A check on wire rope slings for broken strands and wires, kinks and other potential hazards.
 - (c) Inspection of nylon slings for potential hazards, including oily outer fabric or damage.

- (d) A previous-use inspection analysis to determine when, where and how sling and rigging equipment were previously used
 - (e) A hook inspection to determine whether hook is properly rigged and in good working order
 - (f) Rigging hardware inspection
 - (2) In addition:
 - (a) Understands how to document issues and problems identified during inspection process, including the codes and tags used to identify when equipment was last fully inspected by a qualified inspector
 - (b) Knows to put equipment out of service when defects and other potential safety hazards are identified
 - ii) Intermediate/Advanced Rigger (also must fulfill Basic Rigger requirements)
 - (1) Ability to:
 - (a) Review ground conditions and site setup to determine if lift can safely occur
 - (b) Identify and understand shackle manufacturer's standards and certifications
 - (c) Understand ANSI A10.42 & ASME B30.9 American National Standards
 - iii) Inspector Qualifications
 - (1) Competent and qualified person (as defined by 29 CFR 1926.32)
 - (2) Knowledge of ASME B30 and ANSI A10.42 American National Standards
- D. Application of Knowledge
- i) Basic Rigger
 - (1) Basic knowledge and understanding of proper use of wire rope slings, chain slings, nylon slings and rigging hardware, including capacities and effects of lift angles on rigging hardware
 - (2) Basic knowledge and understanding of proper use of wear guards, nylon slings and softeners
 - (3) Ability to identify pinch points
 - (4) Knowledge and understanding of center of gravity (CG) testing prior to load movement
 - (a) Ability to position hook directly above the load's center of gravity to prevent load shift
 - (b) Load attachment location—attachment above center of gravity is more stable than below
 - (5) Tag line use and applications, including where, when, how and knots
 - (6) Load handling hazard identification
 - (a) Falls
 - (b) Electrical
 - (c) Struck-by
 - (d) Caught in-between
 - ii) Intermediate/Advanced Rigger (also must fulfill Basic Rigger requirements)
 - (1) Ability to properly use multiple slings and calculate proper angles
 - (2) Knowledge and understanding of multiple sling angles, capacity and performance

- (3) Experience and knowledge of rigging multiple cranes and lifting device lifts
- (4) Knowledge and understanding of lift equipment capacity and performance

E. Load Movement

i) Basic rigger

- (1) Determine actual weight of load prior to lift
 - (a) Bill of lading
 - (b) Scale ticket
 - (c) Load cell
 - (d) Manufacturer's weights
- (2) Clear path for lift
- (3) Load control by tag line
- (4) Prevention of load slippage/properly securing load prior to lift
- (5) Cribbing for rigging operations
- (6) Determine if weather conditions are acceptable to proceed with lift, including ability to determine load's sail area and wind load in different weather conditions
- (7) Know and understand signaling and communication methodologies
- (8) Pick points, access, and obstructions (protrusions)
- (9) Knowledge of and experience in implementing personnel protection procedures, including procedures for impact loading and sudden release

ii) Intermediate/Advanced rigger (also must fulfill Basic Rigger requirements)

- (1) Knowledge and experience with lift equipment assembly and disassembly
- (2) Ability to perform block calculations
- (3) Knowledge and understanding of use of jacks and skates

3. **General References**

A. American Society of Mechanical Engineers B30 American National Standard

- i) B30.9 (Slings)
- ii) B30.20 (Below-the-Hook Lifting Devices)
- iii) B30.26 (Rigging Hardware)

B. American National Standards Institute (ANSI) A10.42 American National Standard
Manufacturer data

- i) Manufacturer's information
- ii) Independent rigging manuals
- iii) Wire Rope Technical Board (<http://www.domesticwirerope.org/wrtb/>)
- iv) Web Sling & Tiedown Association (<http://www.wstda.com/>)
- v) Employer's training procedures

Appendix F

Checklist for Conducting Safe Lifts

1. **Know the Weight of the Item Being Lifted**
 - A. Center of gravity
 - B. Load composition
 - i) Liquid?
 - ii) Number of pieces?
2. **Crane Configuration and Setup**
 - A. Solid ground or adequate matting
 - B. Level (or properly positioned on outriggers)
 - C. Barge work has special considerations and load charts
 - i) Crane is secure on barge
 - ii) Listing is within acceptable limits
 - D. Proper counterweight configuration and secure placement
 - E. Proper outrigger placement with pads and/or dunnage
 - F. Protected swing radius
 - G. Landing area for rigging and placing loads
3. **Boom Configuration**
 - A. Length of boom
 - B. Attachments
 - i) Jibs
 - ii) Luffers
 - C. Pin hydraulic booms
 - D. Angle of boom
4. **Radius of Load from Center of Crane**
 - A. Within capacity of the chart
5. **Proper Rigging**
 - A. Properly sized for load to be lifted
 - B. Proper configuration for load
 - C. Properly sized slings and shackles
 - D. Weight of rigging is added to weight of load
 - i) Block
 - ii) Rigging
 - iii) Line
6. **Environmental Concerns**
 - A. Wind
 - i) No more than 25 mph (or manufacturer's recommendation)
 - ii) Consider added surface area of load when determining speed
 - B. Visibility
 - i) Operator must be able to see the load to the landing site or be under the direction of a rigger (voice or eye contact)

- C. Added weight
 - i) Snow
 - ii) Ice
- 7. **External Obstacles to Consider**
 - A. Power Lines
 - B. Buildings
 - C. Previous excavations/trenches
 - D. Underground hazards
 - i) Vaults
 - ii) Pipes and/or other utilities
- 8. **Communication with Riggers**
 - A. Sight – hand signals
 - B. Voice – contact with rigger/signalperson
 - C. Blind lifts
 - i) Hand-off responsibility from rigger
 - ii) Load ownership from lift to set down
- 9. **Qualified Lifting Personnel**
 - A. Load director
 - B. Crane operator(s)
 - C. Riggers
 - D. Signalperson
 - E. Oiler/Trainee
 - F. Management/Supervision

Appendix G

Model Timelines for Recommended Crane Inspections

1. **In-House Inspections**
 - A. Mobile Cranes
 - a. "Taxi service" (onsite less than 24 hours)
 - b. Pre-use inspection performed by the operator
 - c. Periodic crane setup inspections
 - d. Frequent (as outlined in ASME B30.5-2.1.2)
 - e. Periodic (as outlined in ASME B30.5-2.1.3)
 - f. Post-incident (following any incident and/or significant event, including weather and shock loading, that may affect operation or structural integrity as determined by the operator and/or supervisor/qualified person)
 - B. Tower Cranes
 - a. Component inspection prior to erection (for OEM specifications and ASME B30.3)
 - b. During erection
 - c. After erection
 - d. Frequent (as outlined in ASME B30.3)
 - e. Periodic (as outlined in ASME B30.3)
 - f. Post incident (following any incident and/or significant event, including weather and shock loading, that may affect operation or structural integrity as determined by the operator and/or qualified person)
2. **Third-Party Inspections**
 - A. Mobile Cranes
 - a. Initial setup inspection by a qualified inspector in the presence of a representative of the crane owner/lessor/lessee in order to ensure accountability for responsible party. (At the discretion of the crane owner/lessor/lessee, the company representative may be an employee of the company, crane manufacturer and/or other qualified person)
 - b. After initial setup/configuration of mobile lattice crane with live jib configuration
 - c. Annual
 - d. After any major alteration or modification to the equipment (after changes to crane equipment that result in significant changes to the operating parameters of the equipment, such as load capability, maneuverability, boom length, etc.)
 - e. Post incident (following an incident and/or significant event, including weather, that may affect operation or structural integrity as determined by the operator and/or supervisor/qualified person onsite)
 - f. As needed (based on usage, extended periods of non-use and/or duty cycle)
 - B. Tower Cranes (Note: technicians employed/hired by equipment owners should set/verify all technical limits and certify crane prior to erection)
 - a. Component inspections prior to erection
 - b. Initial inspection—after crane is erected and control is transferred to the end user
 - c. Quarterly or when crane is "climbed" and/or modified

- d. Post incident (following any incident and/or significant event, including weather and shock loading, that may affect operation or structural integrity as determined by the operator and/or supervisor/qualified person)
- e. As needed (based on usage, extended periods of non-use and/or duty cycle)

Inspection Chart				
Equipment	Initial Setup	6 Months	Annual	Other
Boom Truck		X	X	X
Mobile Hydraulic		X	X	X
Mobile Lattice	X	X	X	X
Mobile Hydraulic with Active Boom/Jib	X	X	X	X

3. Helpful Inspection Documentation

- A. Invoices
 - a. Equipment
 - b. Third-party inspections
- B. Certifications
- C. Service reports
- D. Inspection reports
 - a. Signed and dated reports, including daily/frequent inspections
 - b. Ensure all reports are filled out in non-erasable ink
- E. Records indicating any repairs to deficiencies indicated in inspection reports
- F. Sample forms
- G. Records covering at least 60 months (statute of limitations)
- H. Operator logbook and equipment operator’s manual (keep in cab of crane)
 - a. Onsite master file
 - b. Logbook
 - c. Operator’s manual
 - d. Service records
 - e. Engineering records
 - f. Qualifications and certification record (if required)
 - g. Inspection records
 - h. Initial equipment certification

Appendix H

Model Employer Rescue and Recovery Plan

1. **Rescue Plans and Communication Activities**

- A. Power line contact
 - i) Ensure safe egress from machine for operator
 - ii) Use insulating thimbles and ground rods to de-energize machine
- B. Removal from higher elevations
 - i) Fire rescue/EMS protocol may take precedence over onsite procedures
 - ii) Basket recovery via fire department control
- C. Priority contacts list (should be maintained onsite at all times as part of safety/response manual)

Sample Contacts List	
Internal Contacts	<ul style="list-style-type: none"> • Safety personnel • Onsite contact (superintendent, qualified person) • Corporate contact (PR, emergency response, etc.) • Senior management (operations) • Insurance/in-house legal counsel • Equipment department
External Contacts	<ul style="list-style-type: none"> • Insurance carrier • Outside legal counsel • Outside crane expert • Product manufacturer • Ambulance/fire department • Police department • Communication/public relations professional • Subcontractors • Union representatives (if applicable) • Personnel/translator (if necessary) • OSHA (if three or more injured or a fatality) • Outside grief counselors

2. **Equipment Recovery Tips**

- A. Do not move equipment unless absolutely necessary
 - i) Equipment may cause danger to rescuers/adjoining activities
 - ii) Equipment may be unstable and cause further movement, damage or injury
 - iii) May provide important evidence in investigation
 - iv) May require legal intervention or control to recover
- B. Equipment should not be returned to service until inspected by manufacturer/qualified manufacturer’s technician
- C. Damaged equipment should not be salvaged without manufacturer’s approval

Appendix I

Sample Forms

CRANE ACCIDENT INVESTIGATIONS

Identify key individuals to be contacted:

	CONTACTS	NAME	PHONE NUMBER
Internal	Safety Personnel		
		Site	
		Corporate	
	Operations/Management		
	Insurance/Inside Legal Counsel		
	Equipment Department		
	Communication/Public Relations		
	Personnel/Translator (if necessary)		
	Quality Control		
	External	Insurance Carrier	
Outside Legal Counsel			
Outside Crane Expert			
Product Manufacturer			
Ambulance/Fire Department			
Police Department			
Subcontractor/Union Representative			
OSHA- if 3 or more injured or a fatality			
Outside Grief Counselors			

- ### ACCIDENT SITE ACTIVITIES
1. Provide medical assistance to any injured parties.
 2. Institute Crisis Management Plan- instruct employees NOT to talk to press. (Refer to internal guidelines/policies)
 - a. Select individual to supervise emergency response and medical activities
 - b. Select individual to address press and be "the" point of contact
 3. Secure contact information for any injured parties and notify family,
 4. Secure site to preserve evidence and prevent any further injury (may require shutting down the site and sending employees home).
 5. Gather witnesses, keep separate and calm
 6. Initiate Rescue Plan (if necessary)- power line contact, roll-over, personnel extraction may require different responses
 7. Begin to gather incident facts- do NOT collect statements unless directed by legal
 - a. Complete site map of incident scene (if site plan is available, make copies and use it). List equipment location and other physical information (buildings, power lines, ditches, personnel)
 - b. Begin taking photographs of the scene (from outer perimeter, working in)
 - Take overview photos of specific items to be photographed prior to close-up photos in order to locate specific items.
 - c. Begin taking measurements- before moving anything
 - d. Do not move or remove any equipment unless directed by Police/Fire.

Notes: this can be very dangerous and should only be attempted with qualified lifting experts to eliminate further damage or injury.
 8. Contact OSHA/MSHA in case of fatalities or more than 3 injuries.

The lists below are key areas to identify during your investigation. These items may be used as key components of your investigation process and should become part of your investigation records. NOTE: The investigation process should proceed under direction of legal counsel and information protected by attorney/client privilege. Consult with your attorney on how to protect this information.

- EYEWITNESS INFORMATION TO BE COLLECTED-** The site plan should be used to identify locations of people and machinery
1. Location in relation to incident scene?
 - a. Building
 - b. People
 - c. Machinery
 2. Other individuals working nearby?
 3. Activity being performed at time of incident?
 4. What did they see?
 5. What did they hear?
 6. Who have they spoken to about the incident?
 7. Timeline of activities: before, during and after incident?
- RESCUE PLANS/ACTIVITIES**
1. Power line contact
 - a. Safe exit from machine
 - b. Insulating Thimbles and ground rods
 2. Consider structural stability of debris before moving something- clear all unnecessary personnel from the site
 3. Removal from higher elevations
- EQUIPMENT RECOVERY ACTIVITIES**
1. Do not move equipment unless absolutely necessary
 - a. May be a danger to rescuers or adjoining activities
 - b. May be unstable or possibility of further movement, damage or injury
 - c. May provide important evidence in investigation
 2. Equipment should NOT be put back into service until it has been inspected by manufacturer
 3. Damaged equipment should not be salvaged without manufacturer's approval

Identify key individuals to be contacted:	
ORGANIZATION	NUMBER
Safety Personnel	
Site	
Corporate	
Operations/Management	
Insurance/Inside Legal Counsel	
Equipment Department	
Communication/Public Relations	
Personnel/Transfer (Insurance)	
Quality Control	
Insurance Carrier	
Outside Legal Counsel	
Outside Crane Expert	
Product Manufacturer	
Ambulance/Police	
Department	
Subcontractor/Union	
Representative OSHA, if 3 or more injured or a fatality	
Outside Chief Counsel	

ACCIDENT SITE ACTIVITIES

1. Provide medical assistance to any injured parties.
2. Initiate Crisis Management Plan - instruct employees NOT to talk to press. (Refer to internal guidelines/policies)
 - a. Select individual to supervise emergency response and medical activities.
 - b. Select individual to address press and be "the" point of contact for any injured parties and notify family.
3. Secure contact information for any injured parties and injury (may require shutting down the site and sending employees home).
4. Secure site to preserve evidence and prevent any further injury.
5. Gather witnesses; keep separate and calm.
6. Initiate Rescue Plan (if necessary) power line contact, roll-over, personal extraction may require different responses.
7. Begin to gather incident facts: do NOT collect statements unless directed by legal
 - a. Complete site map of incident scene (if site plan is available, make copies and use it). List equipment location and other physical information (buildings, power lines, ditches, personnel working in).
 - b. Begin taking photographs of the scene from outer perimeter.
 - Take overview photos of specific items to be photographed prior to closeup photos in order to locate specific items.
 - c. Begin taking measurements before moving anything.
 - d. Do not move or remove any equipment unless directed by Police/ Fire.

Notes: this can be very dangerous and should only be attempted with qualified lifting experts to eliminate further damage or injury.

8. Contact OSHA/MSHA in case of fatalities or more than 3 injuries.

The lists below are key areas to identify during your investigation. These items may be used as key components of your investigation process and should become part of your investigation records.

NOTE: The investigation process should proceed under direction of legal counsel and information protected by attorney/client privilege. Consult with your attorney on how to protect this information.

EYEWITNESS INFORMATION TO BE COLLECTED: The site plan should be used to identify locations of people and machinery

1. Location in relation to incident scene
 - a. Building
 - b. People
 - c. Machinery
2. Other individuals working nearby
3. Activity being performed at time of incident
4. What did they see?
5. What did they hear?
6. Who have they spoken to about the incident?
7. Timeline of activities: before, during and after incident

RESQUE PLANS/ACTIVITIES

1. Power line contact
 - a. Safe exit from machine
 - b. Insulating Thimbles and ground rods.
2. Consider structural stability of debris before moving something: clear all unnecessary personnel from the site
3. Removal from higher elevations

EQUIPMENT RECOVERY ACTIVITIES

1. Do not move equipment unless absolutely necessary
 - a. May be a danger to rescuers or adjoining activities.
 - b. May be unstable or possibility of further movement, damage or injury.
 - c. May provide important evidence in investigation
2. Equipment should NOT be put back into service until it has been inspected by manufacturer
3. Damaged equipment should not be salvaged without manufacturer approval

CRANE ACCIDENT INVESTIGATIONS

SAFE LIFTING
CHECKLIST

In order to safely perform any lifting operation, there are a number of items that must be properly evaluated and planned into the lifting process. The following checklist may help ensure that the basic information needed has been provided. This list may not address "all" the issues but can be used as a good starting point to assemble all the necessary information.

Before Starting to Lift, Check the Following:

- 1. KNOW THE LOAD-**
 - a. Weight of the item being lifted
 - b. Know the center of gravity
 - c. Load Composition/Considerations
 - i. Liquid
 1. Additional Weight
 2. Potential movement of load
 - ii. Components of load
 1. Number of pieces
 2. Pieces properly attached
 - iii. Structural integrity of load
 1. Lifting points properly positioned and adequate
 2. Consider the need to use a spreader bar
- 2. CRANE CONFIGURATION AND SET-UP**
 - a. Solid ground or adequate matting
 - b. Level- within 10%^c. Barge work has special considerations and load charts
 - i. Crane is secure on barge
 - ii. Lifting is within acceptable limits
 - d. Proper counterweight configuration and secure placement
 - e. Proper outrigger placement with pads or dunnage
 - f. Protected Swing Radius
 - g. Secure Landing area, proper rigging and movement of load
 - h. Load Moment Indicator (LMI) properly used
 - i. All operator aids working properly
- 3. BOOM CONFIGURATION**
 - a. Length of boom- does it match the job (Not too long or too short)
 - i. Attachments- Properly Secured?
 1. Jibs
 2. Luffers
 - ii. Pin hydraulic booms
 - b. Angle of boom-
 - i. Clears obstacles
 - ii. No interface with other cranes
- 4. RADIUS OF LOAD FROM CENTER OF CRANE**
 - a. Within capacity of the **correct** chart

PROPER RIGGING

 - a. Properly sized for load to be lifted
 - b. Proper configuration for load
 - c. Weight of rigging is added to weight of load or deducted from the capacity
 - i. Block _____ lbs.
 - ii. Rigging _____ lbs.
 - iii. Line _____ lbs.
- 5. ENVIRONMENTAL CONCERNS**
 - a. Wind
 - i. No more than 25 MPH or manufacturer's recommendation
 - ii. Consider added surface area of load when considering speed
 - b. Visibility
 - i. Operator must be able to see load to landing site or be under direction of rigger (voice or eye contact)
 - c. Added weight- Considerations from:
 - i. Snow
 - ii. Ice
 - iii. Water
- 6. EXTERNAL OBSTACLES TO CONSIDER**
 - a. Power lines
 - b. Buildings
 - c. Previous Excavations/Trenches
 - d. Underground hazards
 - i. Vaults
 - ii. Pipes/Utilities
- 7. COMMUNICATION WITH RIGGERS**
 - a. Sight- hand signals
 - b. Voice- contact with rigger/signal person
 - c. Blind lifts
 - i. Hand-off responsibility from rigger
 - ii. Load ownership from lift to set down
- 8. QUALIFIED LIFTING PERSONNEL**
 - a. Lift Director
 - b. Crane Operator(s)
 - c. Riggers
 - d. Signal person
 - e. Oiler/Trainee
 - f. Management/Supervision

In order to safely perform any lifting operation, there are a number of items that must be properly evaluated and planned into the lifting process. The following checklist may help ensure that the basic information needed has been provided. This list may not address "all" the issues but can be used as a good starting point to assemble all the necessary information.

- 1. KNOW THE LOAD.**

 - a. Weight of the item being lifted
 - b. Know the center of gravity
 - c. Load Composition/Considerations
 - i. Liquid
 - 1. Additional Weight
 - 2. Potential movement of load
 - ii. Components of load
 - 1. Number of pieces
 - 2. Pieces properly attached
 - iii. Structural integrity of load
 - 1. Lifting points properly positioned and adequate
 - 2. Consider the need to use a spreader bar
- 2. CRANE CONFIGURATION AND SET-UP**

 - a. Solid ground or adequate matting
 - b. Level- within 10%
 - c. Barge work has special considerations and load charts
 - i. Crane is secure on barge
 - ii. Lifting is within acceptable limits
 - d. Proper counterweight configuration and secure placement
 - e. Proper outrigger placement with pads or damage
 - f. Protected Swing Radius
 - g. Secure Landing area, proper rigging and movement of load
 - h. Load Moment Indicator (LMI) properly used
 - i. All operator able working properly
- BOOM CONFIGURATION**

 - a. Length of boom- does it match the job (Not too long or too short)
 - i. Attachments: Properly Secured
 - 1. Jibs
 - 2. Luffers
 - ii. Pin hydraulic booms
 - b. Angle of boom
 - i. Clears obstacles
 - ii. No interface with other cranes
- 3. RADIUS OF LOAD FROM CENTER OF CRANE**

 - a. Within capacity of the correct chart
- 4. PROPER RIGGING**

 - a. Proper sized for load to be lifted
 - b. Proper configuration for load
 - c. Weight of rigging is added to weight of load or deducted from the capacity
 - i. Block _____ lbs.
 - ii. Rigging _____ lbs.
 - iii. Line _____ lbs.
- 5. ENVIRONMENTAL CONCERNS**

 - a. Wind
 - i. No more than 25 MPH or manufacturer's recommendation
 - ii. Consider added surface area of load when considering speed
 - b. Visibility
 - i. Operator must be able to see load to landing site or be under direction of rigger (voice or eye contact)
 - c. Added weight- Considerations from:
 - i. Snow
- ii. Ice
 - iii. Water
- 6. EXTERNAL OBSTACLES TO CONSIDER**

 - a. Power lines
 - b. Buildings
 - c. Previous Excavations/Trenches
 - d. Underground hazards
 - i. Vaults
 - ii. Pipes/Utilities
- 7. COMMUNICATION WITH RIGGERS**

 - a. Sight hand signals
 - b. Voice contact with rigger/signal person
 - c. Blind lifts
 - i. Hand-off responsibility from rigger
 - ii. Load ownership from lift to set
- 8. QUALIFIED LIFTING PERSONNEL**

 - a. Lift Director
 - b. Crane Operator(s)
 - c. Riggers
 - d. Signal person
 - e. Oiler/Trainee
 - f. Management/Supervision

SAFE LIFTING CHECKLISTS