RECOMMENDED PRACTICE 1.0A
ADDENDUM
FOR LAND-BASED DRILLING RIGS
INSPECTION AND CERTIFICATION
OF
SUBSTRUCTURES
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Attachment 1 Mast Level III Inspection Form
INTRODUCTION

The Canadian Association of Oilwell Drilling Contractors (CAODC) Engineering & Technical (E&T) Committee has developed an Addendum to Recommended Practice (RP) 1.0, Mast Inspection and Certification, for the Inspection and Certification of Substructures. This document dated August 2012 supersedes all prior editions of this recommended practice. The recommendations contained in this document should be considered in conjunction with the requirements of provincial regulatory authorities. The CAODC does not accept any liability based on the recommendations contained herein.

This document standardizes the methodology involved in the inspection, repair and certification of substructures currently in service. This recommended practice also requires the use of the CAODC Mast and Overhead Equipment Log Book (or suitable alternative) as an integral component of the practice.

The CAODC E&T Committee believes that applying these practices to maintenance programs will greatly benefit the goal of increased safety in the workplace.

HISTORY

At the request of the Engineering & Technical and Safety & Technical Committees, CAODC Recommended Practice 3.0A section on substructures was deleted and the RP 1.0A practices adopted. This was because of the extremely small number of substructures in Canada used on Service Rigs.

REVIEW PROCESS

CAODC Recommended Practices are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Email any comments or items of concern to rpfeedback@caodc.ca.
1. CERTIFICATION OF SUBSTRUCTURES

A. 1000 Day Major Certification

After reaching a maximum of 1000 operating days, the following procedure is recommended for completing a substructure certification. One operating day is comprised of 24 accumulated operating hours from spud to rig release.

i) Clean substructure as directed or required by certifying Professional Engineer (P.Eng).

ii) Inspect the following areas of the substructure by a qualified Professional Engineer (P.Eng) or an authorized Original Equipment Manufacturer (OEM) agent. Actual inspection requirements will be at the certifying Professional Engineer (P.Eng) or the OEM agent’s discretion.
   a) Mast pinning stools.
   b) Rotary table beams.
   c) Racking floor beams.
   d) Main beams supporting stools.
   e) All other members deemed critical by the certifying Professional Engineer (P.Eng) or OEM agent.
   f) BOP handling system.

iii) All repairs to critical areas will be documented and completed by a Professional Engineer (P.Eng) or OEM agent. Upon completion, repairs should be recorded in the CAODC Mast and Overhead Equipment Log Book.

Any damage found during a Level IV inspection (Section 3) is defined as MAJOR or MINOR on the following basis:

MAJOR DAMAGE includes the following:

- Repairs to the rotary table beams requiring welding or replacement.
- Repairs to the setback area beams requiring welding or replacement.
- Repairs to the lifting structure and raising load points.
- Repairs or replacement to main substructure frame.
- Repairs to locking assemblies on telescopic subs.
- Repairs to mast saddles.
MINOR DAMAGE includes the following:

- Ladder damage.
- Cosmetic shell damage (providing it is not structural).
- Walking platforms on subs (fold down wings).
- Skid damage.
- Stair damage.

iv) All repairs to major damage must be certified by a Professional Engineer (P.Eng) or OEM’s agent. Repairs may be completed in a field environment, provided they can be done to the certifying person’s satisfaction.

v) One term extension, up to a maximum of 100 days, may be granted subject to a complete visual inspection by a Professional Engineer providing the inspection is performed prior to the 1000th operating day.

vi) A well spudded prior to the expiry of the original 1000 operating days may be completed.

vii) Final certification (see Section 4 Sample Certification Document) should include:

   a) Documentation author, and the date and location of the repairs.
   b) Manufacturer’s rating or Professional Engineer’s rating if applicable.
   c) Substructure serial number if available.
   d) Date and period of certification.
   e) Load rating of the BOP handling system.

B. Damage Repair Recertification

Damage to any critical members of a substructure, as described in Section 1A (ii), will be repaired under consultation of a qualified Professional Engineer (P.Eng) or an OEM agent. This recertification is for the repair of actual damage, to maintain certification during the 1000 day interval. This repair certification does not extend the 1000 day period, unless a complete certification is undertaken and documented by the certifying Professional Engineer (P.Eng) or OEM agent.

i) All repairs to major damage require the consultation of a Professional Engineer (P.Eng) or an OEM agent. The repairs must be documented in the CAODC Mast and Overhead Equipment Log Book and signed by the certifying party.
ii) Repairs to minor damage may be completed by operating personnel, at the discretion of the rig manager or higher authority, and do not require certification. If there is any question as to whether the damage is major or minor, a Professional Engineer (P.Eng) or OEM agent must be consulted.

iii) The above recertification is for the repair of actual damage to maintain certification during the 1000 day interval. This repair certification does not extend the 1000 day period, unless a major certification utilizing a Level IV Inspection is undertaken for the entire substructure.

C. General

Any new load bearing attachment points must be certified by a Professional Engineer (P.Eng) or OEM agent and identified with a capacity rating. Application of loads to members within the substructure not considered in the original design must be approved and certified by a Professional Engineer (P.Eng) or OEM agent.

2. PERSONNEL QUALIFICATION AND DOCUMENTATION

The certifying Professional Engineer (P.Eng) must have previous experience in structural analysis and have a practical working knowledge of substructures and other drilling structures.

Welders must hold a valid journeyman welding ticket.

Non Destructive Testing (NDT) personnel will meet appropriate standards, as required by the certifying Professional Engineer (P.Eng).

Drilling company personnel undertaking Level III Inspections (Section 3) must be individuals designated by the company who have adequate experience and knowledge in substructures and attachments to substructures. Drilling company representatives must be given a training course either with a Professional Engineer (P.Eng) or a designate with more experience. Training for Level III Inspections must be kept on record at the drilling company to identify persons authorized by that company to do the inspections. Designates may include experienced field superintendents, engineers, technologists, rig up superintendents, shop foremen, and operations managers.

The certifying Professional Engineer (P.Eng) will issue a certification document for the work completed. This document will indicate items as stated in Section 1 A (v) of this Recommended Practice 1.0A Addendum.
3. INSPECTION TYPES & FREQUENCY

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<thead>
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<th>DAILY</th>
<th>R &amp; L*</th>
<th>250 DAYS**</th>
<th>500 DAYS</th>
<th>750 DAYS</th>
<th>1000 DAYS</th>
<th>DOCUMENTATION</th>
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<td>Tour Sheet</td>
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<td>MAST &amp; OVERHEAD EQUIPMENT LOG BOOK</td>
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<td>X</td>
<td>MAST &amp; OVERHEAD EQUIPMENT LOG BOOK</td>
</tr>
</tbody>
</table>

* Raise and lower.

**Service Rig substructures must follow an annual Level III inspection schedule.

Level I: Visual observation of the substructure by the rig crew during normal operations or during routine maintenance. This inspection should also be carried out by the driller or rig manager and be included as part of the daily rig *walkaround* as documented in the tour sheet.

Level II: Level I Inspection plus a more thorough inspection of, but not limited to, load areas and sheaves for cracks, damage and premature wear. Record this on the tour sheet.

Level III: A thorough visual inspection of critical members, as described in Section 1A (ii), by a qualified individual. The individual supervising the Level III Inspection must possess adequate knowledge and experience. Typical persons qualified would be a Professional Engineer (P.Eng), an NDT technician, a senior drilling operations person designated by the company, or others provided they meet the above criteria of experience and knowledge. This inspection must be documented in a CAODC Mast and Overhead Equipment Log Book (or equivalent) by the inspection personnel. Any repairs will be performed as described in Section 1B of this Recommended Practice 1.0A Addendum. See Attachment #1 Substructure Level III Inspection Form.

Level IV: The entire substructure must be inspected by a Professional Engineer (P.Eng) or an OEM or his agent. This inspection should, at the inspector’s discretion, include NDT of all critical load bearing areas. All deficiencies and repairs will be corrected, as indicated in Section 1A (iii) of this Recommended Practice 1.0A Addendum.
4. SAMPLE CERTIFICATION DOCUMENT

Sample - Substructure Certification

for

ABC DRILLING COMPANY
RIG 1
GEE BEE One Piece Substructure
Date: March 1, 2012

The Substructure Specifications and Ratings are as follows:

Serial No: XX-XXX
Floor Height: XX'-X" Ft / XX Meters
Casing Capacity: XXX,XXX lbs / XXX,XXX daN
Setback Capacity: XXX,XXX lbs / XXX,XXX daN

Caution: Utilizing unitized drawworks skid requires table to be supported properly to transmit casing loads to substructure

During February 2012 the ABC Drilling Rig 1 substructure was refurbished in ABC's yard in Nisku, Alberta. Repairs to defects as identified by XYZ Engineering's P.Eng and MPI Company (file no. xxxx) were repaired by the DEF Welding Company (Work Order no. xxxx). The substructure was sandblasted and painted.

Based on these repairs and inspections, it is my opinion that the substructure is safe to operate within its rated capacity when used in accordance with manufacturers specifications and/or industry standards provided that the owner performs routine inspections as per the CAODC RP1.0A Guidelines. This certification is valid for 1000 Operating Days or until such time that the substructure is structurally damaged by operations, handling, or transportation.

XYZ Engineering Ltd.

John Smith, P.Eng
123 Avenue Street
Edmonton, Alberta, XXX-XXX
Phone: (XXX) XXX-XXXX
Fax: (XXX) XXX-XXXX
File No: XXXX