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CP3-SM-0051 **FRev. 1A**	**TITLE**: Hoisting and Rigging	Page 1 of 30

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REVISION/CHANGE LOG

Revision/Change Letter	Description of Changes	Pages Affected	Date of Revision/Change
FR0	Procedure Bluesheeted	All	08/16/2017
FR1	Non-intent revision to remove from Bluesheet	All	12/04/2017
FR1A	Intent change to add JHA Number, add Note above Step 6.1.14, clarify Step 6.1.14 and revise CP3-SM-0051-F06 and F07. Update appendices.	4, 9, 22-29	02/27/2019

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure establishes requirements for Hoisting and Rigging (H&R) operations and provides guidance for determining lift classification, developing lift plans, and pre-use checklists. The responsibilities and actions are defined for safe H&R activities, to ensure compliance with DOE Standard 1090-2011 and CP2-SM-0024, *PGDP Hoisting and Rigging Program*. This procedure also establishes the requirements for Towing and Recovery of stuck and disabled equipment at the Paducah Gaseous Diffusion Plant (PGDP) Deactivation & Remediation (D&R) contractor site.

1.2 Scope

This Level 3 procedure applies to PGDP self-performed work.

This procedure applies to PGDP employees and contract Labor Resources personnel working for PGDP at the PGDP site.

Subcontractors are subject to review and acceptance of their procedures by the Rigging/Designated Lift (DL) SME or designee in lieu of full PGDP procedure compliance.

This procedure does not address the use of helicopters as H&R devices, locomotive cranes (special procedures must be developed prior to their use onsite for H&R activities) and forklifts performing routine material handling activities that do not involve the use of hoisting & rigging equipment.

This procedure does **NOT** cover the use of a Tow truck being used by a vendor for towing a disabled or stuck vehicle.

2.0 REFERENCES

2.1 Use References

- CP3-CP-0001, *Request for Purchase*
- CP3-HS-2008, *Accident Prevention and Tags*
- CP3-OP-0002, *Developing and Maintaining Performance Documents*
- CP3-QA-2005, *Nonconformance Control*
- CP3-RD-0010, *Records Management Process*
- CP3-SM-0020, *Administrative Controls for Powered Industrial Trucks*
- CP4-SM-2102, *Inspection and Testing of Slings and Lifting Fixtures*

2.2 Source References

- 29 CFR 1910, *Occupational Safety and Health Standards*
- 29 CFR 1926, *Safety and Health Regulations for Construction*
- ANSI/ITSDF B56.1, *Safety Standard for Low Lift and High Lift Trucks*
- ANSI/ITSDF B56.6, *Safety Standard for Rough Terrain Forklift Trucks*
- ASME B30.2, *Over Head and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist*

- ASME B30.5, *Mobile and Locomotive Cranes*
- ASME B30.9, *Slings Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings*
- ASME B30.10, *Hooks*
- ASME B30.11, *Monorail Systems & Underhung Cranes*
- ASME B30.16, *Overhead Hoists (Underhung)*
- ASME B30.20, *Below the Hook Lifting Devices*
- ASME B30.21, *Manually Lever Operated Hoists*
- *Bob's Rigging and Crane Handbook*
- CP2-SM-0024, *PGDP Hoisting and Rigging Program*
- DOE-STD-1090-2011, *DOE Standard Hoisting and Rigging*
- Job Hazard Analysis (JHA)-18309, *Hoisting and Rigging* Chg A

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

None

4.2 Limitations

4.2.1 CP3-SM-0051-F07, *PGDP Hoisting and Rigging Checklist* shall be completed when planning and executing all ordinary lifts. Certain items on the checklist must be completed at the lift site during set up for the lifting operation. These items are highlighted on the checklist.

4.2.2 Critical lifts shall have a written Critical Lift Plan. Refer to CP2-SM-0024.

4.2.3 Pre-engineered production lifts shall have a lifting procedure prepared and approved in accordance with CP2-SM-0024 and CP3-OP-0002, *Developing and Maintaining Performance Documents.*

4.2.4 All personnel participating in H&R activities shall be trained and/or qualified per OSHA 29 CFR 1926 subpart CC, DOE-STD-1090-2011, DOE Standard: Hoisting and Rigging and CP2-SM-0024.

4.2.5 Personnel who perform the daily inspection of H&R equipment shall be documented as qualified.

4.2.6 Pre-operational inspections of H&R equipment must be performed prior to use of equipment daily or each shift and recorded on the appropriate daily equipment inspection form; rigging and lifting devices shall be inspected prior to each use by the Rigging/Designated Lift (DL) Supervisor.

4.2.7 Overhead Pendant, Cab, Jib and Monorail Crane cranes shall have a pre-use inspection and recorded on the appropriate form.

4.2.8 Forklifts using pre-engineered manufactured lifting devices do require a Lift Checklist (CP3-SM-0051-F07). The lifting devices must receive initial and periodic inspections by qualified personnel and visual pre-use inspections.

4.2.9 All towing activities shall be reviewed and approved by the Rigging/DL SME or designee. A written plan will be developed that includes the known weight of the equipment or vehicle being pulled, the planned rigging configuration, the rated capacities of each component in the rigging configuration, and the approving signature of the Rigging/DL SME or designee. The Rigging/DL SME or designee shall be present at and oversee all recovery operations.

4.2.10 ALL towing and recovery hardware and slings shall be marked FOR TOWING ONLY. This equipment shall not be used for Rigging/DL once used in a towing application. Equipment used for towing shall be inspected for damage prior to each use and after each use. CHAINS are prohibited from use for all towing operations. Only synthetic slings are permitted as the primary towing component in the rigging configuration. However, Wire Rope may be approved on a case by case basis by the Rigging/DL SME or Designee. The rigging configuration must have a rating of at least twice the weight of the load being pulled.

4.2.11 The Rigging/DL SME or Designee shall classify each lift into one of the PGDP lift categories: ordinary lift, critical lift, Pre-Engineered/Production lift, personnel lift. The Lift Classification will be documented on form CP3-SM-0051-F06, *Lift Classification Worksheet.*

4.2.12 All slings shall be adequately protected against abrasion, cutting and crushing. Sling protection must be used to prevent sling damage. Slings MUST be inspected by the user before and after each use. If softeners are applied to the slings, inspect UNDER the softeners for sling damage. NEVER use a sling that has damage; immediately remove it from service and report it to the Supervisor.

5.0 PREREQUISITES

None

6.0 INSTRUCTIONS

6.1 General

<u>Rigging/Designated Lift SME or Designee</u>

NOTE:

Any lift that could impact Safety Significant Structures, Systems and Components (SSCs) or impact Technical Safety Requirements (TSR), Safety Basis or Nuclear Criticality Safety (NCS) operations or requirements may be considered a pre-engineered or critical lift.

Any lift that could impact the Safety Basis, TSR or NCS requirements would require review through the Unreviewed Safety Question (USQ) process prior to the lift.

6.1.1 CLASSIFY the lift as one of the following: a critical lift, a pre-engineered production lift or an ordinary lift using CP3-SM-0051-F06. SEEK Engineering assistance, as needed.

Supervisor

6.1.2 ENSURE the following:

A. Only trained and qualified personnel per DOE-STD-1090-2011 shall operate equipment and perform rigging operations. Ensure the operator assigned to the lifting operation is proficient in operating the particular Mobile Crane or other type of equipment before performing the lift.

B. H&R equipment Pre-Use inspection is performed and recorded on CP3-SM-0051-F07, Box 10. Refer to the manufacturer's instructions as needed. Notify the Hoisting & Rigging SME of any deficiencies identified during H&R equipment and rigging inspections.

C. Construction equipment inspection and maintenance are current.

D. Refer to the manufacturer's instructions as needed. Notify the Equipment Manager of all changes identified during equipment inspections.

E. Documentation of current equipment inspection records is available prior to equipment use.

F. No modifications or additions to H&R equipment that affect capacity and safe operation are performed without the manufacturer's prior written approval or PGDP engineering evaluation and approval.

G. Equipment has been set up according to manufacturer's specifications and PGDP requirements.

H. The H&R crew who assist with rigging activities are current in rigging training.

I. A DLL is assigned for the routine H&R activity for ordinary lifts. A person in charge (PIC) shall be present for all critical lifts.

J. Appropriate paperwork (H&R checklist, Lift Plan sign-offs) has been completed prior to the operation.

K. Start work authority has been given by the applicable Facility Manager.

L. Request direction from the Rigging/DL SME on any technical questions associated with the lift including the proper selection of sling protection (softeners).

6.1.3 After the Pre-Job Brief, Conduct a pre-lift crew briefing to review the following at a minimum:

- H&R Checklist or Lift Plan.
- Personnel assignments and responsibilities.
- Hand signals to be used between ground crew and H&R equipment operator in accordance with applicable American National Standard Institute (ANSI) standard for the type of construction equipment in use.
- Emergency procedures to be used as needed.

- Stop work responsibilities.
- Any change of conditions that would impact the above documentation or the work to be performed.

NOTE:

Any changes to a Lift Plan shall be reviewed and approved by all parties who previously signed the original Lift Plan.

6.1.4 CONFIRM minor deficiencies have been corrected and/or approved prior to H&R activity.

Engineering/Rigging/Designated Lift SME/Safety/Rigging/Designated Lift Supervisor

6.1.5 ASSIST Work Control, Line Management and/or Competent Person Rigger in preparing a pre-engineered and/or critical lift plan. Refer to CP2-SM-0024.

6.1.6 REVIEW pre-engineered and critical lift plans and associated documents prior to submittal for final approval.

6.1.7 RESOLVE minor discrepancies or interpretation issues prior to seeking final approval.

6.1.8 APPROVE minor changes to checklists and lift plans by lining through, initialing and dating.

Rigging/Designated Lift Supervisor

NOTE:

Defective equipment shall be tagged out in accordance with CP3-HS-2008, *Accident Prevention and Tags*, and CP3-QA-2005, *Nonconformance Control*, as applicable.

6.1.9 ENFORCE the following:

A. Any substandard or unsafe equipment is immediately removed from service to correct safety issues before continuing the H&R activity.

B. Any substandard or unsafe practices are immediately stopped and corrected before continuing the H&R activity.

C. After correction, the issues are brought to the attention of the responsible management for further evaluation, as needed.

6.1.10 ASSIST with the applicable job hazard analysis **AND** COMPLETE the Hoisting and Rigging Checklist prior to the start of H&R activities.

6.1.11 PARTICIPATE in the pre-lift crew briefing ensuring that the H&R crew, prior to the lift, understands any job-specific issues required for H&R operations. These job- specific issues to be addressed in the activity hazard analysis include, but are not limited to the following:

A. Mechanical and Electrical Hazards – When H&R operations take place in close proximity to electrical or mechanical energy sources that are not locked out or de-energized and where danger to the riggers or other personnel involved in H&R activities may exist.

B. Moving Equipment Hazards – When H&R operations take place in close proximity to moving machinery, vehicles, or equipment and where danger to the riggers or other personnel involved in the H&R activities may exist.

C. Hazardous Materials – When H&R activities occur in environments where the presence or possible release of hazardous materials may endanger the riggers or other personnel.

D. Confined Spaces – When H&R operations take place in a confined space.

E. Public Protection – When H&R operations take place in close proximity to the public, where danger to the riggers or other personnel involved in the H&R activity exists from foreseeable activity of the public, or where danger exists to the public from foreseeable consequences of the H&R operation.

F. Ground and Support Conditions – When cranes, hoists, or loads are set on or moved over ground that is not compacted or where underground structures, vaults, trenches, pipelines, pits, or other structures or voids exist or may exist.

G. Temporary Supports – When loads are set on or moved across temporary structures or supports, or when cranes or hoists are set upon or are supported by temporary structures or supports during the H&R process.

H. Floor/Structure Loading – When loads are moved across floors, roofs, decks, or other portions of a permanent structure, riggers should give consideration to design loading capacity.

I. Weather Conditions – In conjunction with the Project Safety Representative, when weather conditions such as, but not limited to, high winds, storms, lightning, fog, ice, or snow may affect the operation and/or endanger the riggers or other persons.

NOTE:

Hoisting employees on a personnel platform is prohibited except when the use of conventional means of reaching the worksite such as personal hoist, ladder, stairway, aerial lift, mobile elevated work platform, or scaffold would be more hazardous or would not be possible because of structural design or worksite conditions.

J. Lifting of Personnel – Whenever personnel are lifted.

K. Multiple Crane Lifts, as applicable.

6.1.12 OBTAIN needed rigging materials.

6.1.13 INSPECT H&R equipment and material prior to performing the lift for deformities (cuts and gouges), cracks, arc strikes, excessive wear, distortion, missing bolts, and unapproved modifications. NOTIFY Supervisor of any faulty H&R Equipment and rigging.

NOTE:

If wind or other adverse conditions can cause the load to swing, rotate, or become unbalanced, **then** tag lines must be used to control the load. Conversely, **if** the weather and other conditions are such that the load can be controlled without tag lines, **then** tag lines are **NOT** required.

Chg A

6.1.14 ENSURE the following:

A. All loads that pose a hazard to employees are under control at all times.

B. H&R hardware and materials are configured correctly **AND** are properly attached to the lifting equipment.

6.1.15 ENSURE any discrepancies are resolved **AND** any changes to lift plans, checklists, or procedures are approved.

6.1.16 DOCUMENT inspections on CP3-SM-0051-F07 and CP3-SM-0051-F08.

6.1.17 ASSIST assigned lift personnel in the H&R process to ensure they are complying with applicable standards, requirements, and safe practices.

6.1.18 RETURN rigging materials to the approved storage location. **IF** rigging is damaged, **THEN** TAG out-of-service according to CP3-HS-2008, *Accident Prevention and Tags.*

Mobile Crane Operators

NOTE:

Mobile Crane Operators shall be trained and/or qualified per DOE-STD-1090-2011, OSHA 29 CFR 1926 Subpart CC.

6.1.19 PERFORM the applicable inspections pre-use, daily **AND** document on CP3-SM-0051-F07 and CP3-SM-0051-F08.

6.1.20 SET UP the equipment according to manufacturer's specifications and PGDP requirements as specified.

6.1.21 OPERATE in a smooth and controlled manner.

6.1.22 Do **NOT** OPERATE out of chart or manufacturer limits.

Spotter

6.1.23 TEAR DOWN **AND** MOBILIZE the equipment according to manufacturer's specifications and PGDP requirements, as specified.

6.1.24 DIRECT the operator's movement around any hazards and obstructions while traveling and setting equipment in position to perform hoisting activities.

Signal Person

6.1.25 For crane/equipment activity when performing lifting operations; when the operator does not have a clear line of sight, DIRECT all movements of the crane/equipment operator. A spotter may still be assigned to control the work area.

Equipment Requestor

6.1.26 SPECIFY on the purchase requisition when handling instructions, sling arrangement data, and/or certification(s) of conformance for rigging/lift points per manufacturer's design for equipment are required.

6.1.27 NOTIFY the Rigging/DL SME before ordering any H&R Equipment.

6.1.28 The Rigging/DL SME must approve all H&R purchases.

6.2 Equipment Requirements and General Operations

NOTE:

Manufacturer's specifications always take precedence. Always determine the lift classification.

Responsible Manager / Rigging / DL SME / Qualified Inspector

6.2.1 Powered Industrial Trucks (Forklifts)

NOTE:

An attachment can only be used when a manufacturer has supplied a load chart or engineering has evaluated and provided a chart for the attachment use. This is only specific to the forklift for which the attachment is evaluated.

A. ENSURE that only approved manufactured attachments for powered industrial trucks/forklifts are used and have the appropriate tag or information plate affixed to the attachment (for Lift Extension, Booms or other approved devices).

- **IF** there is not a manufacturer data plate on the forklift with load charts for the forklift attachment, **THEN** SUBMIT an Engineering Service Order (ESO) request to Engineering to assess and/or provide information for procuring a manufacturer nameplate to approve the use of the forklift attachment with particular forklift.

B. ENSURE that powered industrial trucks/forklifts selected for indoor use meet the requirements of 29 CFR 1910.178 (b)(12).

Competent Rigger

C. ENSURE all inspections (daily/pre-operational) have been performed and documented as required according to CP2-SM-0020, *Administrative Controls for Powered Industrial Trucks*.

Equipment Operator

D. PERFORM pre-operational checks **AND** ENSURE that periodic inspection and maintenance checks are current.

E. COMPLETE the pre-operational daily inspection forms for each piece of equipment used.

F. READ **AND** UNDERSTAND the operator's manual for the piece of equipment prior to operating the equipment.

G. OPERATE in a smooth, controlled manner.

H. FOLLOW proper signals from one designated signal person (obey an emergency stop signal from anyone).

I. STOP operations and correct for un-safe conditions including, but not limited to:

- Out-of-level loads
- Unsecured load
- Unstable center-of-gravity

6.2.2 Mobile Cranes (Crawlers, TMs, and RTs)

NOTE:

Manufacturer's specifications always take precedence.

Competent Rigger

A. ENSURE all inspections (daily/pre-operational, frequent, and periodic) have been performed and documented as required on applicable forms.

Equipment Operator

B. Crane setup:

1. PROPERLY DEPLOY all outriggers (if applicable).

2. Always USE blocking under all outrigger pads to spread the ground bearing pressure.

NOTE:

Crawler Rigs shall have a pad built, compacted and leveled within 1 degree to engineering specifications.

3. LEVEL crane, within 1 degree of level, in all directions (use additional cribbing if necessary).

4. ENSURE that **all** the tires are off the ground (if applicable).

C. PERFORM pre-operational checks and inspection per CP3-SM-0051-F08.

WARNING:

Be aware of the two-blocking hazard.

1. UN-CRADLE the boom and scope out to the desired length (if applicable).

2. HOIST (up and down).

3. TEST the Brakes.

4. BOOM (up and down).

5. SWING (left and right).

6. DOCUMENT actions and complete the rest of the inspection.

D. Operation:

7. Always OPERATE in a smooth and controlled manner.

8. FOLLOW the proper signals from one designated signal person (obey an emergency stop signal from anyone).

9. Do **NOT** OPERATE out of level.

E. STOP operations and correct for unsafe conditions including, but not limited to:

1. Electrical hazards.

NOTE:

In the absence of crane manufacturer's instructions regarding maximum wind speeds for operation, operations undertaken at wind speeds in excess of 20 mph should be evaluated by a qualified person to determine if the size, shape & weight of load can be safely lifted. An Engineering Manager or Rigging/DL SME may make this decision.

2. Weather conditions.

3. Out-of-level loads.

4. Unsecured loads.

5. Unstable center-of-gravity.

6. Undersized rigging.

7. Unsafe equipment and/or practices.

F. Teardown and Mobilization:

1. STOW the boom and load block/ball.

2. RETRACT all stabilizer jacks and outrigger beams.

3. COLLECT the blocking.

4. FOLLOW the approved route.

6.2.3 Overhead and Gantry Cranes

Competent Rigger

A. ENSURE all inspections (daily/pre-operational, frequent, and periodic) have been performed and documented on applicable forms.

Equipment Operator

B. PERFORM pre-operational checks and inspection per CP3-SM-0051-F03:

1. Travel (back and forth).

2. Trolley (in and out).

3. Hoist (up and down).

4. Document actions and complete the rest of the inspection.

C. Operation:

1. Always OPERATE in a smooth and controlled manner.

2. FOLLOW the proper signals from one designated signal person (obey an emergency stop signal from anyone).

D. STOP operations and correct unsafe conditions including, but not limited to:

- Electrical hazards.
- Out-of-level loads.
- Unsecured loads.
- Unstable center-of-gravity.
- Undersized rigging.
- Unsafe equipment and/or practices.

6.2.4 Hoists (chain, cable, electric, air, manual)

Supervisor

A. ENSURE that each hoist has its rated load marked on it or its load block and that this marking is clearly legible to workers attaching the load.

B. ENSURE personnel involved in the lifting operations have the up-to-date required training for the associated activities.

C. ENSURE all inspections (daily/pre-operational, frequent, and periodic) have been performed and documented on applicable forms.

Equipment Operator

D. PERFORM pre-operational checks and inspection per CP3-SM-0051-F03:

1. Hoist (up and down).

2. Document actions and complete the rest of the inspection.

E. Operation:

1. Always OPERATE in a smooth and controlled manner.

2. FOLLOW the proper signals from one designated signal person (obey an emergency stop signal from anyone).

F. STOP operations and correct unsafe conditions including, but not limited to:

1. Electrical hazards.

2. Out-of-level loads.

3. Unsecured loads.

4. Unstable center-of-gravity.

5. Undersized rigging.

6. Unsafe equipment and/or practices.

6.2.5 Rigging Equipment (slings, rigging accessories, load hooks, below-the- hook lifting devices, and miscellaneous lifting devices)

Qualified Rigger

A. Prior to each use, ENSURE that rigging equipment for material handling has been inspected and that an annual inspection has been performed per CP3-SM-0051-F03 or CP3-SM-0051-F07, as required.

B. ENSURE the proper rigging equipment is in use and will not be overloaded.

C. ENSURE rigging equipment is being used according to the manufacturer's recommendations.

D. ENSURE that safe rigging practices are being used.

6.3 Storage

PGDP Management

6.3.1 PGDP shall PROVIDE appropriate weather-proof facilities for the storage of all applicable H&R equipment and hardware.

6.3.2 PGDP shall PROVIDE supervision and personnel for guardianship of the equipment and hardware.

6.3.3 Guardians shall MONITOR the whereabouts and the annual required inspections of H&R equipment and hardware.

6.3.4 Any slings, hoists or below the hook lifting devices that have not been inspected within a 12-month period shall be TAGGED OUT of service until the inspection is performed and recorded by a QC inspector per CP4-QA-2102, *Inspection and Testing of Slings and Lifting Fixtures*.

6.3.5 The guardian of the rigging equipment shall have Quality Control INSPECT the equipment within a twelve month period according to CP4-QA-2102, *Inspection and Testing of Slings and Lifting Fixtures*.

6.4 Accountability and File Maintenance System

Qualified Inspector

6.4.1 DEVELOP **AND** MAINTAIN an accountability record system for H&R equipment. The accountability system shall include:

- A method to identify and track H&R equipment and devices.
- An inventory (database) of H&R equipment and devices.
- A method of identifying and tracking defective or unacceptable equipment to ensure that it is not used until properly dispositioned.
- A means of identifying the status of H&R equipment and devices.
- A separate file for each piece of identified H&R equipment.

NOTE:

The accountability system is also used to identify and track defective or unacceptable equipment to ensure it is not used until repaired and re- inspected.

Supervisor

6.4.2 IDENTIFY H&R equipment and devices within your facility that must be included in the accountability system **AND** report to Deactivation Manager for inclusion in the Preventative Maintenance program.

6.4.3 ENSURE H&R equipment and devices are identified by a standard marking or labeling system as required.

6.5 Identification and Tagging

Qualified Inspector

6.5.1 ENSURE that each device is tagged in a manner to allow tracing back to last periodic inspection.

6.6 Inspection and Testing

Qualified Inspector

6.6.1 IDENTIFY defective H&R equipment and devices and tag them out of service according to CP3-HS-2008, *Accident Prevention and Tags* to ensure they are not used.

6.6.2 DOCUMENT the action taken on the appropriate inspection form.

6.7 Towing and Recovery

NOTE:

Factors including the ground conditions and the amount of surface area submerged in mud, soil must be taken into account when determining rigging size. The pulling capacity of the rigging configuration must have a minimum breaking strength of at least two times the Total Effective Weight (Appendix B) determined for the stuck vehicle/equipment.

6.7.1 The weight of the vehicle/equipment must be obtained or estimated by a competent person prior to sizing the rigging gear.

6.7.2 The Towing/Recovery Check Sheet CP3-SM-0051-F05 must accompany the work activities.

6.7.3 The Rigging/DL SME or designee must oversee the operation.

6.7.4 **IF** heavy equipment is used, **THEN** a qualified operator must operate the equipment and assist in advising the rigger in attachment locations.

6.7.5 The rigging configuration shall have a minimum breaking strength of at least 200% of the Effective Vehicle Weight.

6.7.6 Softeners shall be used in all areas where damage to the sling would be anticipated.

6.7.7 Shackles may be used at each or any connecting point; however, shackles do not have to be used. Do **NOT** use a shackle to connect slings together for extra length without approval from the Rigging/DL SME.

6.7.8 An inspection of the rigging/pulling equipment shall be performed, as required on CP3-SM-0051-F05, before it is used. Defective, damaged and worn equipment shall not be used, and removed from service immediately.

6.7.9 CP3-SM-0051-F05 must be reviewed by all personnel involved in this operation (operator, riggers, drivers, Rigging/DL SME or Designee).

6.7.10 The Rigging/DL SME or Designee must be present for all recovery activities, and sign the pull plan upon approval of the plan.

6.7.11 All personnel not involved with the extracting of the stuck equipment/vehicle shall remain at least 1.5 times the length of the rigging away from the pulling activity. Only those persons essential to the operation (rigger, spotter, operator, driver, etc.) shall be allowed within the work area.

6.7.12 After the vehicle/equipment is extracted, all rigging equipment shall be inspected for damage and stored properly. Defective, damaged and worn equipment shall be removed from service and be properly disposed.

7.0 ACCEPTANCE CRITERIA

None

8.0 POST PERFORMANCE WORK ACTIVITIES

None

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- CP3-SM-0051-F03, *Hoisting and Rigging Equipment Pre-Operational Inspection Form Overhead Cranes-Hoists*
- CP3-SM-0051-F05, *Towing and Recovery Check Sheet*
- CP3-SM-0051-F06, *Lift Classification Worksheet*
- CP3-SM-0051-F07, *PGDP Hoisting and Rigging Checklist (Ordinary Lifts Only)*
- CP3-SM-0051-F08, *PGDP Mobile Crane Pre-Operational Checklist*

Forms are to be completed in accordance with CP3-OP-0024, *Forms Control*.

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RD-0010, *Records Management Process*.

APPENDIX A - ACRONYMS / DEFINITIONS
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ACRONYMS

A. **ASME** – The American Society of Mechanical Engineers

B. **D&R** – Deactivation & Remediation

C. **DL** – Designated Lift

D. **ESO –** Engineering Service Order

E. **H&R –** Hoisting and Rigging

F. **PGDP** – Paducah Gaseous Diffusion Plant

G. **SME –** Subject Matter Expert

DEFINITIONS

A. **Authorized Fork Attachment –** A forklift manufacturer approved attachment or an attachment approved by a licensed registered professional engineer.

B. **Blocking –** (also referred to as "cribbing") **–** Wood or other material used to support equipment or a component and distribute loads to the ground. It is typically used to support lattice boom sections during assembly / disassembly and under outrigger and stabilizer floats.

C. **Certificate of Conformance** – A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements.

D. **Rigging/Designated Lift (DL) Supervisor** – A qualified rigger whose experience, education, background, training and evaluation demonstrates his/her ability to competently and safely perform the task. The Rigging/DL Supervisor is capable of identifying existing and predictable conditions that may be hazardous or dangerous to employees both in the area surrounding and in the working area of an H&R activity. The Rigging/DL Supervisorhas the authorization to take prompt corrective measures to eliminate hazardous or unsafe conditions. A Rigging/DL Supervisor shall be present during all H&R activities.

E. **Cribbing –** Wooden blocks built up, tightly spaced, between the outrigger pan and the blocking, to allow the crane to be within 1 degree of level, in all directions, on uneven ground.

F. **Critical Lift –** A lift with one or more of the following characteristics:

- If loss of control of the item being lifted would likely result in the declaration of an emergency as defined by the facility's emergency plan or construction site emergency plan.
- The load item is unique and, if damage, would be irreplaceable or not repairable and is vital to a system, facility, or project operation.
- The cost to replace or repair the load item, or the delay of operations of having the load item damaged, would have a negative impact on facility, organizational, or DOE budgets to the extent that it would affect program commitments.
- If mishandling or dropping of the load would cause any of the above noted consequences to nearby installations or facilities.

APPENDIX A – ACRONYMS / DEFINITIONS (CONTINUED)
Page 2 of 3

- If the load being lifted is 80% or more of a mobile cranes load chart rating in the setup configuration.
- If two or more mobile cranes are used to make a lift other than a tail crane.
- For steel erection:
- The lift requires the use of more than one crane or derrick.
- A lift that exceeds 75% of the rated capacity of a crane or derrick during steel erection.

G. **Forklift** – A lifting device, generally attached to mobile equipment, with two long rigid steel bars (fork-like prongs or tines) that can be raised and lowered, used especially to move or stack pallets loaded with boxes or other goods.

H. **Forklift Material Handling** – Routine movement of material with a forklift properly rated for the load weight.

I. **Hazardous Material** – Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. Also, any substance designated by the United States Environmental Protection Agency (EPA) to be reported if a designated quantity (reportable quantity) of the substance is released into the environment (water, air, soil, etc.).

J. **H&R Activities –** Activities involving the raising, lowering or otherwise changing the elevation and/or location of a piece of equipment, component or materials (the load) using one or more lifting devices as described in H&R equipment below.

K. **H&R Equipment –** Includes, but is not limited to, the following: lifting eyes, shackles, lifting clamps, hoists and hoist systems, monorail hoist, pulley systems, forklifts, chain falls, come-a-longs; air, hydraulic or electrical jacks or winches; and rigging devices such as wire rope, chain, metal mesh slings, synthetic-web slings, sling systems; and special below the hook attachments and fixtures, such as H-frames.

L. **Lift –** Hoisting of a load, or the maximum safe vertical distance through which a hook can travel.

M. **Load –** Total weight superimposed on the load block or hook.

N. **Load Block –** Assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting ropes.

O. **Maximum Intended Load –** The total load of all personnel, tools, materials, and other loads reasonably anticipated to be applied to a personnel platform or personnel platform component at any one time.

APPENDIX A – ACRONYMS / DEFINITIONS (CONTINUED)
Page 3 of 3

P. **Minor Deficiency –** Any field change that keeps the minimum requirements of the checklist, lift plan/procedure but is needed for a safe lift (i.e., change a 10' sling to a 12' sling of the same capacity).

Q. **Ordinary Lift –** Any lift not designated as a critical lift or as a pre-engineered lift. Requires a completed H&R Checklist.

R. **Person-in-Charge (PIC) –** Required for critical lifts (optional for other lifts); the Rigging/DL SME or other responsible person (other than the equipment operator) qualified and appointed to be responsible for the safe handling of critical loads.

S. **Power Operations** – Point of contact for electrical utilities and for providing engineered controls, such as isolation of overhead utility lines when transporting large loads or construction equipment, and/or during H&R activities.

T. **Pre-engineered Lift** – A repetitive, production type hoisting operation in which the probability of dropping, upset, or collision is reduced or eliminated by engineering controls.

U. **Qualified** – A person who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience has successfully demonstrated the ability and competence to solve or resolve problems relating to the subject matter and work.

V. **Qualified Inspector** – One whose competence is recognized by the HSS&Q Program Manager and whose qualification to perform specific inspection activities has been determined, verified, and attested to in writing.

W. **Subject Matter Expert (SME)** – An individual who has demonstrated a high degree of skill, knowledge, and proficiency in a particular discipline or subject matter.

X. **Two-blocking** – Accidental contact between the load block or overhaul ball and the boom point, causing structural damage to the sheaves, wire rope, Becket, and load block or overhaul ball.

APPENDIX B - LOADED AND EFFECTIVE WEIGHT

The **Loaded Weight** of vehicle is the Gross vehicle weight plus any gas, tools, materials, etc. Mire resistance is figured as follows: (Mire is an area of very marshy ground or deep slushy mud)

A pull of 100% LW will be required if the vehicle/equipment is stuck to a depth of the side walls on the tires.

A pull of 200% of LW will be required if the vehicle/equipment is stuck to the hubs.

A pull of 300% will be required if the vehicle/equipment is stuck to the frame.

The Loaded Weight of the vehicle/equipment multiplied by the appropriate factor above will give you the Mire resistance or (MR) of the stuck vehicle/equipment

Grade (slope) resistance is figured as follows:

Recovery on an upgrade of 15 degrees; add 25% of LW Recovery on an upgrade of 30 degrees; add 50% of LW Recovery on an upgrade of 45 degrees; add 75% of LW Recovery on level ground is 0; (no correction required) Recovery on an downgrade of 15 degrees; subtract 25% of LW Recovery on an downgrade of 30 degrees; subtract 50% of LW Recovery on an downgrade of 45 degrees; subtract 75% of LW

The total of the Mire resistance and the Slope resistance is considered the **Effective Weight** of the stuck vehicle/equipment. This is the weight you will use to size the rigging.

Example- A truck weighing 5000 lb. loaded stuck in the mud up to the hubs and setting on a grade of 45 degrees to be pulled up the grade to retrieve = (5000 X 2) + (5000 X .75) = 10,000 + 3,750 = 13,750 lb of “pull” required to recover the vehicle. The Rigging Configuration is required to have a minimum breaking strength of 2 X 13,750 lb. or 27,500lb.

Use CP3-SM-0051-F05, *Towing and Recovery Check Sheet*, to figure the Effective weight of the vehicle/equipment and record that rigging inspections have been completed.

CP3-SM-0051-F03 – HOISTING AND RIGGING EQUIPMENT PRE-OPERATIONAL INSPECTION FORM – OVERHEAD CRANES/HOISTS

Chg A

Record No. xxxx-_____
(YYMMDD)

SHIFT _____ DATE _____

SERIAL NUMBER _____ TYPE _____

MANUFACTURER _____ MODEL _____

DESCRIPTION	CONDITION	COMMENTS
Check one: ☐ **Hoist** ☐ **Overhead Crane**		
Inspect all operating mechanisms for proper adjustment, unusual sounds, or unacceptable wear, as determined by the inspector.		
Verify controls and operating mechanisms are labeled and operating.	☐SAT ☐UNSAT ☐N/A	
Verify hoist upper-limit switch is operating	☐SAT ☐UNSAT ☐N/A	
Crane/Hoist Ropes/Chains: ☐ Chain ☐ Rope Inspect hoist rope for kinking, crushing, birdcaging, corrosion, or broken strands or wires. Inspect the hoist chain, including end connections, for nicks, gouges, distorted links, unacceptable wear, cracks, corrosion, twist, or stretch, as determined by the inspector. Inspect hoist chain bag or box securing mechanism for deterioration or damage. **NOTE**: Run out as much of the rope or chain as is necessary to visually examine those portions that flex over sheaves, sprockets and similar features, and other areas subject to wear or abrasion.	☐SAT ☐UNSAT ☐N/A	
Hoist Hook: • Inspect the hook for cracks, nicks, gouges, deformation, damage from chemicals, evidence of heat damage, and wear. • Inspect hook latch for engagement and damage. • Inspect hook attachments and securing means for damage.	☐SAT ☐UNSAT ☐N/A	
Verify hoist braking system is operating..	☐SAT ☐UNSAT ☐N/A	
Verify crane/hoist rope reeving and parts are not twisted about each other.	☐SAT ☐UNSAT ☐N/A	
Verify the chain is not twisted and that the load sprocket and chain rollers are operating correctly and parts are not twisted about each other.	☐SAT ☐UNSAT ☐N/A	
Inspect hand lever for bends, cracks, and other damage.	☐SAT ☐UNSAT ☐N/A	

CP3-SM-0051-F03 – HOISTING AND RIGGING EQUIPMENT PRE-OPERATIONAL INSPECTION FORM – OVERHEAD CRANES/HOISTS (Continued)

DESCRIPTION	CONDITION	COMMENTS
Below-the-Hook Lift Fixtures: Includes: LET, Concrete cask lift fixture, grapples, ACGLF. • Inspect for structural deformation, cracks, or unacceptable wear on any part, as determined by the inspector. • Inspect for loose or missing guards, fasteners, covers, stops, or nameplates. • Inspect all operating mechanisms and automatic hold-and- release mechanisms for maladjustments interfering with operation. • Inspection date is current.	☐SAT ☐UNSAT ☐N/A	
Slings: Visually inspect ALL slings and end attachments for: • abrasive wear, knots, cuts, tears, broken stitching, acid or caustic burns, melting or charring, or weld spatter. • missing or illegible identification • broken wires • abrasion or scraping • kinking, crushing, birdcaging, or any other damage • heat damage, weld spatter, or arc strikes • cracks, breaks, corrosion, or pitting • stretched, bent, twisted, or deformed chain links • snags, punctures, tears, cuts, or knots • discoloration, brittle, or stiff areas • inspection date is current	☐SAT ☐UNSAT ☐N/A	
Rigging Hooks: • Inspect the hook for cracks, nicks, gouges, deformation, wear, damage from chemicals, or evidence of heat damage. • Inspect hook latch for damage, malfunction, and engagement. • Inspect hook attachments and securing means for damage. • Inspection date is current.	☐SAT ☐UNSAT ☐N/A	
Rigging Hardware: Includes: Shackles, Eyebolts, Eye Nuts, Turnbuckles, Links, Rings, Swivels, and Swivel Hoist Rings: Visually inspect all rigging hardware for: • missing or illegible identification/information • heat damage, weld spatter or arc strikes • cracks, nicks, gouges, breaks, corrosion, or pitting stretched, bent, twisted, distorted, elongated, broken, or deformed load-bearing components incomplete pin engagement unacceptable thread damage or wear, as determined by the inspector • evidence of unauthorized repairs • lack of ability for swivels to rotate or pivot freely • loose or missing nuts, bolts, cotter pins, snap rings, or • other fasteners or retaining devices • inspection date is current	☐SAT ☐UNSAT ☐N/A	

CP3-SM-0051-F03 – HOISTING AND RIGGING EQUIPMENT PRE-OPERATIONAL INSPECTION FORM – OVERHEAD CRANES/HOISTS (Continued)

DESCRIPTION	CONDITION	COMMENTS
Miscellaneous Lifting Devices: Includes: Portable A frames (portable Gantries), truck mounted cranes with a capacity of 1-ton or less, and selfcontained shop cranes. • Inspect all control mechanisms for maladjustment interfering with proper operation. • Inspect hook and latch for deformation, cracks, and wear. • Inspect hydraulic systems operation or for other signs of unacceptable damage as determined by the inspector. • Inspect wire rope for kinking, crushing, birdcaging, and corrosion. • Inspect chain for bent links, stretched links, cracks, scores, abrasions, or heat damage. • Inspect all safety devices for malfunction. • Visually inspect lifting device for bent, broken, damaged, corroded, cracked, or missing parts. • Verify the hoist and all components on portable A frames do not exceed the rated capacity of the unit. • Verify required markings are installed and legible. • Perform a functional check of the trolley and hoist installed on portable A frames to ensure proper operation.	☐SAT ☐UNSAT ☐N/A	

Remarks: _____

_____

_____

_____

_____

_____

Remove equipment or devices with deficiencies from service, and notify the MM.

Performed by: _____
Crane Operator

Approved by: _____
Lift Supervisor

CP3-SM-0051-F05 – TOWING AND RECOVERY CHECK SHEET

Chg A

A. Loaded weight of vehicle/equipment (LW) = _____

If Vehicle/equipment is: (choose only one below)

Stuck to depth of sidewalls on tires = 1 · LW = _____

Stuck to depth of Hubs = 2 · LW = _____

Stuck to depth of the frame = 3 · LW = _____

B. Grade (slope) resistance is figured as follows: (choose only one below)

Recovery on a grade of 15 degrees = .25 · LW = _____

Recovery on a grade of 30 degrees = .50 · LW = _____

Recovery on a grade of 45 degrees = .75 · LW = _____

Recovery on level ground = 0 · LW = _____

If Pulling Uphill Add A and B Total Effective Weight_____lbs.

If Pulling Downhill Subtract B from A Total Effective Weight_____lbs.

Size the rigging configuration to have a breaking strength of at least 200% of the Effective Weight of the stuck vehicle/equipment. Inspect rigging equipment prior to use. Never use damaged rigging.
Inspect and verify the attachment points used to attach rigging to equipment are visible free of damage. Use softeners if rigging will contact any sharp corners or edges.
Clear the pull path of any obstruction. (Keep non essential personnel away from the pulling activity.)
Prior to starting the activity, conduct a briefing with all employees participating in the recovery activity.
Verify parking brake is released on equipment/vehicle being pulled.

Slings_____ Shackles_____

Capacity of rigging configuration_____

Equipment Operator_____ Rigger_____

Driver_____ Spotter_____

Supervisor_____ H&R manager/Designee_____

Date_____

Chg A

CP3-SM-0051-F06 – LIFT CLASSIFICATION WORKSHEET

Work Package or Work Request #:_____

Ordinary Lift – Any lift not designated as a personal lift, special lift, critical lift or as a pre-engineered production lift.

Personnel Lift – This involves the lifting of personnel with a crane or forklift on a personnel lift platform. Personnel lifts are prohibited on site unless the Industrial Safety Department determines that it is less safe or not possible to access the work area using conventional methods.

Critical Lift Determination

1. A designated person shall classify each lift into one of the lift categories (ordinary, personnel, special, critical, or pre-engineered production) prior to planning the lift.
2. A lift shall be classified critical if any of the following conditions are met:
   - A. If loss of control of the item being lifted would likely result in the declaration of an emergency as defined by the facility's emergency plan or construction site emergency plan.
   - B. The load item is unique and, if damaged, would be irreplaceable or not repairable and is vital to a system, facility or project operation.
   - C. The cost to replace or repair the load item, or the delay in operations of having the load item damaged would have a negative impact on facility, organizational, or DOE budgets to the extent that it would affect the program commitments.
   - D. If mishandling or dropping of the load would cause any of the above noted consequences to nearby installations or facilities.
   - E. If the load being lifted is 80% or more of a mobile crane's load chart rating in the set-up configuration. If two or more mobile cranes are used to make a lift, other than a tail crane.
   - F. For steel erection, a lift shall be designated as a critical lift if:
     1. The lift exceeds 75 percent of the rated capacity of the crane or derrick.

        OR
     2. The lift requires the use of more than one crane or derrick (refer to 29 CFR 1926.751)

Pre-Engineered Production Lift Determination

1. A designated person shall classify each lift into one of the lift categories (ordinary, personnel, critical, or pre-engineered production) prior to planning the lift.
2. A pre-engineered production lift is defined as a repetitive lift that is performed by production line personnel in the assembly or disassembly of components or systems where detailed lift planning, equipment selection, and lift-specific training may substitute for the qualifications prescribed in Section 5 of this standard. In order for a lift to be designated a pre-engineered production lift, the following criteria shall apply:
   - A. The group of items to be lifted is identical in terms of dimensions, weight, center of gravity, load path, method of attachment to the lifting equipment, and selection of lifting equipment.
   - B. All items can be lifted in adherence to a specific step-by-step procedure that eliminates rigging decisions or calculations by lift personnel. The lifting procedure shall address details of the specific operation including the attachment and detachment of all lifting equipment fixtures and accessories.

CP3-SM-0051-F06 – LIFT CLASSIFICATION WORKSHEET (Continued)

Work Package or Work Request #:_____

NOTE

Forklifts performing routine forklift material handling activities within their rated lift capacity are not covered under the H&R program.

LIFT CLASSIFICATION

☐ **Personnel Lift** – Contact Safety Department for direction

☐ **Ordinary Lift**

☐ **Pre-Engineered Production Lift**

☐ **Critical Lift**

Completed by:_____ _____ _____

Print Name Signature Date

Chg A

CP3-SM-0051-F07 – PGDP Hoisting and Rigging Checklist (Ordinary Lifts Only)

Work Package /WO#			Date of Lifting Machine Annual Inspection		
Description of Load			Lifting Machine Model		
Weight of Load			Boom Length		
Deductions			Jib Length		
Total Erection Load			Maximum Radius of Lift		
Percent Lifting Machine Capacity at Maximum Lift Radius			Lifting Machine Capacity at Maximum Radius of Lift Radius		

RIGGING GEAR REQUIRED – SIZE AND CAPACITY

Shackles		Spreader		
Slings		Tailing Hook-Up		

LOAD AND LIFTING LUG

1. Has the weight of the load been documented or accurately calculated?		2. Are all items that will be lifted with the equipment included in the weight?	
3. Have the lifting lugs that will be used to lift the load been designed for that purpose?		4. Will the lifting lugs be used with the correct shackle?	
5. Will the lifting lugs be loaded only in the strong directions(s) of the lug?		**6. Are the lifting lugs visibly free of defects or damage?	
**7. Have the sling angles been considered when checking the capacity of the slings and shackles?		8. For a one-lifting machine lift will the lifting machine hook be over the center of gravity at the initial pick?	

RIGGING GEAR

9. Have the capacities of the slings and shackles been checked for the load?		**10. Have the slings and shackles been visually inspected for defects or damage?	
11. Have the sling angles been considered when checking the capacity of the slings and shackles?		12. Has the center of gravity been considered when checking the capacities of the sling and shackles?	

MOBILE CRANE

13. Is the load less than 80% of the mobile crane chart capacity?		14. Lift classification: sheet completed and attached.	
**15. Has the crane received a daily inspection and operational check by the operator?		16. Is the mobile crane set up according to the manufacturer's specifications?	
**17. Is the mobile crane supported by approved mobile crane mats?			
19. Has the soil been inspected and determined to be adequate?		18. If the lift involves more than one mobile crane, can it be made without any possibility of one of the mobile cranes being overlooked?	

LIFT

**20. Has the radius of the lift been checked by a tape measure?		**21. Is the lift area free of operating process equipment, piping, or live electrical lines?	
**22. Has the area under the lift been barricaded or everyone warned to stay away?		**23. Is the wind less than 20 miles per hour?	
24. If there is a possibility for boom or equipment interference, has a rigging layout or clearance study been made?		**25. Has Pre-lift meeting been conducted?	
**26. Will slings come in contact with edges, corners, protrusions, or abrasive surfaces?		**27. Has the correct sling protection been selected and put in place?	

Notes: All questions should be answered yes, no, or N/A (not applicable). The Rigging/DL SME or Designee must approve any checklist items answered "no" by initialing and dating on that line.

All asterisked (**) items must be filled out at the lift site at the time of the lift.

Operator	Date Qualification Expires	Rigging/DL SME or designee
Rigging/DL Supervisor	Date Qualification Expires	
Qualified Signal person	Date Qualification Expires	Date

Chg A

CP3-SM-0051-F08 – PGDP Mobile Crane Pre-Operational Check List

Equipment:	Capacity:		
Equipment number:	Owner/Lessor:		
Date:	Shift:	Day	Night
Operator:			

No	Item	Pass	Fail	Comments
	Pre-Operation Inspection			
1	Perform 360 degree walk around. Check that all operational, instructional and warning decals are legible and that the load chart is posted in an area easily accessible to the operator.			
2	Check engine oil			
3	Check coolant reservoir for proper level			
4	Check hydraulic system for leaks			
5	Check hydraulic oil reservoir for adequate level			
6	Check fuel level for adequate level			
7	Check boom and hoist lines for wear			
8	Grease sheaves as needed			
9	Check tire for proper pressure			
10	Drain water from air tanks			
11	Check LMI set-up and functionality			
12	Check doors and controls for suitable condition and operability. Check cab for cleanliness. Ensure all glass is clean and intact.			
13	Check Hydraulic hoses for wear/damage			
	Power Plant			
1	Start engine and warm up			
2	Check all instruments to ensure that they are working			

CP3-SM-0051-F08 – PGDP Mobile Crane Pre-Operational Check List (Continued)

	Hoisting Mechanism	Pass	Fail	Comments
1	Check for overhead obstructions			
2	Check ground conditions for suitability			
3	Check ball and/or block, hooks, and safety latches for defects			
4	Set outriggers (Use mats as required)			
5	Verify anti two-block device is operational			
6	Check boom operations; up, down, left, right			
7	Fully extend telescoping boom and retract (check wire rope spooling)			
8	Verify rope reeving per crane specifications			
	Travel Mechanisms			
1	Test brakes			
	Back up alarms			
	Turn signals, lights, horn			
	Equipment			
1	Fire extinguisher			
2	Seat belt (mandatory use when operating)			
3	Check stowed jib attachment hardware			
	Records			
1	Load chart posted in machine			
2	Annual inspection report in machine			
3	Crane Manual in machine			
4	Keep this report in the machine and turn in to supervisor at the end of every shift.			

Inspector signature_____Date_____

Supervisor signature_____Date_____