PRACTICE EXAM 7

NCCCO Core Written Exam Simulation — 90 Questions

Time Allowed: 90 Minutes | Format: Multiple Choice | Passing Score: 70% (Scaled)

Answer all 90 questions. Do not leave any question blank. Record your answers on a separate sheet before checking the answer key.

DOMAIN 1: SITE WORK

Questions 1–18

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1. A crane is being set up on a site where soil investigation data shows the bearing capacity is adequate at the surface but drops significantly at 4-foot depth due to a layer of organic fill. The outrigger pads are sized for the surface capacity. What is the primary concern with this setup?

A. The organic fill layer at 4-foot depth is the governing concern — outrigger loads stress the soil at depth, not just at the surface; the load-bearing stratum that matters is the weakest layer within the stress influence zone beneath the pad, not the surface alone; the engineer must evaluate whether the organic fill governs the effective bearing capacity

B. Organic fill at 4-foot depth is outside the influence zone of standard outrigger pads and requires no additional evaluation

C. The surface bearing capacity is the only value used in outrigger pad sizing — subsurface layers are not considered in standard crane setup calculations

D. The concern is limited to long-term settlement — for short-duration crane picks, only the surface layer bearing capacity is relevant

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2. Under OSHA 1926.1402, when a controlling entity has no knowledge of underground utility locations in the crane setup area, what is required before crane operations begin?

A. The crane owner must assume responsibility for any utility damage in writing before setup proceeds

B. The operator may proceed using visual surface assessment to identify potential utility indicators

C. The controlling entity must take steps to obtain utility location information before crane setup — operating without utility location data is not an acceptable condition; the one-call notification system must be used and results obtained before any crane setup in that area

D. The lift director may authorize setup to proceed after conducting a 360-degree visual inspection of the setup area

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3. A crane has been set up and leveled on a parking lot surface. After the first pick, the operator notices the front-left outrigger pad has developed a wet ring around its perimeter. No rain has occurred. What does this indicate and what must happen?

A. The wet ring is condensation from the outrigger cylinder — this is a normal occurrence during initial load application and requires no action

B. A wet ring developing around an outrigger pad during initial loading is a sign of water being expelled from saturated soil as the pad compresses it — this indicates the sub-base contains more moisture than the surface suggested, which reduces bearing capacity; operations must stop and the condition evaluated before continuing

C. The outrigger cylinder has developed an external hydraulic leak — check fluid levels and continue if no pressure loss is detected

D. The parking lot drainage system is backing up under the pad — redirect the drainage and continue operations

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4. An operator is setting up adjacent to an active railroad track. The railroad's clearance envelope extends to 8.5 feet from the near rail. The crane's maximum swing radius in the planned configuration is 42 feet. What specific hazard assessment is required before operations begin?

A. Railroad proximity only requires notification to the railroad company — no operational restrictions apply to crane operations beyond the clearance envelope

B. The hazard assessment is limited to boom tip height clearance above the railroad's overhead contact wire

C. Only the counterweight swing arc requires assessment — the boom and load swing are controlled by the signal person and do not require pre-assessment

D. Every part of the crane — including the counterweight, boom, load, and rigging at maximum swing — must be confirmed to remain outside the railroad clearance envelope throughout all planned operations; the railroad must be contacted and may require a flagger or operational restrictions during train movements

5. A job site geotechnical report indicates the soil is "medium stiff clay with a bearing capacity of 2,800 psf." The crane manufacturer requires 3,500 psf for the planned configuration. Which of the following correctly describes the operator's obligation?

A. The operator must not set up in this location without either confirmation that additional ground improvement or matting has raised the effective bearing capacity to meet the manufacturer's requirement, or a qualified engineer has determined an alternative approach that safely supports the crane — proceeding on confirmed inadequate ground is not acceptable

B. The operator may proceed if all lifts are kept below 75% of rated capacity, which proportionally reduces the outrigger bearing pressure below the required threshold

C. The geotechnical report is a conservative estimate — the operator may add a 20% field adjustment to the reported capacity and proceed if the adjusted value meets the requirement

D. Medium stiff clay is considered a stable soil type — the manufacturer's bearing capacity requirement does not apply to classified cohesive soils

6. A crane is operating near a slope. The rear outriggers are positioned 6 feet from the crest of a 15-foot-high cut slope with a 1.5H:1V geometry. What must be assessed before this setup is used?

A. Only the horizontal distance to the crest matters — a 6-foot setback exceeds the OSHA minimum of 5 feet for any slope condition

B. The slope angle only requires assessment when the crane will swing the load over the slope during the lift

C. The outrigger loads applied near the slope crest increase the shear stress in the slope mass — whether the 6-foot setback is adequate depends on the slope's factor of safety under the combined weight of the soil and the added crane loads; a geotechnical engineer must evaluate this before the crane operates from this position

D. The slope assessment is limited to visual confirmation that no tension cracks are visible at the crest before each shift

7. Under OSHA 1926 Subpart CC, what is required when a crane must travel with a load suspended?

A. The operator must reduce travel speed to a maximum of 2 mph and sound the horn continuously during travel

B. Traveling with a load is only permitted when specifically addressed in the crane's load chart or the manufacturer's operating manual — the operator must follow the manufacturer's requirements for load travel, which typically restrict the load weight, travel speed, boom angle, and surface conditions permissible during travel

C. The lift director must walk alongside the crane during all travel with a suspended load to monitor ground conditions

D. Traveling with a load requires the crane owner's written authorization before each occurrence

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8. A signalperson observes that one outrigger pad has punched through the asphalt surface by approximately 2 inches. The crane is between picks. What must the operator do?

A. Stop all operations immediately — an outrigger pad that has punched through the surface has exceeded the surface's load-bearing capacity at that location; the crane must be landed if any load is suspended, all crane functions secured, and the ground condition evaluated and corrected before any further picking; the failure may be progressive

B. Add timber mats under the punched pad and monitor during the next pick

C. Redistribute load to the other three outriggers by adjusting hydraulic pressure and continue with reduced capacity

D. Notify the lift director and document the punch-through — if the crane remains level, operations may continue while a repair is arranged

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9. When a crane is set up over a storm sewer that was not disclosed by the controlling entity, and the operator discovers it after setup, what is the correct sequence of actions?

A. The operator may continue operating since the controlling entity bears full regulatory responsibility for the undisclosed utility

B. Suspend operations if any load was picked — contact the controlling entity immediately, request engineering evaluation of the storm sewer's structural capacity under the outrigger loads currently applied, and do not resume operations until the evaluation confirms the setup is safe or the crane is repositioned

C. Visually inspect the ground surface around the outrigger pads for signs of settlement and continue if no movement is detected

D. Reduce all subsequent picks to 60% of rated capacity to lower the outrigger reaction forces while the storm sewer is evaluated

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10. A crane is operating at a coastal site. High tide has occurred and receded, leaving the setup area visibly damp. The operator performed a pre-shift inspection when the area was dry three hours ago. What additional consideration applies?

A. No additional consideration — the pre-shift inspection was performed on the same shift and remains valid

B. Tidal saturation of the soil layer beneath the surface can dramatically reduce bearing capacity in the hours following high tide — even though the surface appears only damp, the sub-surface may be significantly softened; the outrigger conditions must be re-evaluated before any further picks are made following the tidal event

C. The area should be allowed to drain for one hour before continuing — surface moisture does not affect sub-base bearing capacity once water has visibly receded

D. Continue operations but re-level the crane after each pick to compensate for any tidal-related settling

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11. A crane is set up 12 feet from a building's exterior foundation wall. The outrigger load nearest the building is 180,000 pounds. What engineering concern does this proximity create?

A. The proximity concern is limited to overhead — boom tip clearance from the building's roof edge is the primary hazard at 12-foot setback distance

B. The foundation's waterproofing membrane may be damaged by vibration transmitted through the soil from the crane's engine

C. OSHA requires a minimum 15-foot setback from any occupied building foundation — the 12-foot distance is a direct regulatory violation

D. An outrigger load of 180,000 pounds applied 12 feet from a building foundation increases lateral earth pressure against the foundation wall — this can cause the foundation to move, crack, or fail; a structural engineer must evaluate whether the proximity and load magnitude are compatible with the foundation system's design before this setup is used

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12. Which statement CORRECTLY describes the difference between a utility locate performed by the one-call notification system and a private utility locate performed by a specialty locating firm?

A. The one-call system notifies member utilities to mark their own lines within the notified area — it covers only utilities whose owners are registered members of the system; private utilities, fiber networks, and utilities owned by the property owner may not be marked; for complete coverage, the site owner must

identify all private utilities not covered by the one-call system, and a specialty locate firm may be needed to find them

B. The one-call system provides a complete and legally binding confirmation of all underground utilities in the notified area regardless of ownership

C. Private locate firms are only required for projects where the crane's rated capacity exceeds 100 tons

D. Both methods provide equivalent coverage — the choice between them is based solely on response time and cost

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13. A crane is being set up in a vacant lot where the site history indicates the area was used as a landfill 30 years ago and has since been capped and closed. What specific concern does this history create?

A. Landfill sites require EPA authorization before any heavy equipment operations — the operator must obtain a permit before proceeding

B. The landfill cap may have been maintained, but the decomposed fill material beneath it has very low bearing capacity and may contain voids from decomposing organic matter; gas generation from decomposing waste can also displace soil and create subsurface voids; a geotechnical engineer familiar with closed landfill conditions must evaluate this site before crane setup

C. A 30-year-old closed landfill has fully consolidated and poses no additional bearing capacity concern compared to standard fill sites

D. The primary concern is environmental — the operator must avoid puncturing the landfill cap with outrigger pads by using maximum-size floating mats

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14. Under OSHA 1926 Subpart CC, when must the operator be informed of the ground conditions at the setup location?

A. Ground condition information must be provided to the operator at any time before the first pick of each shift

B. Ground condition information must be provided to the operator and equipment owner before crane setup begins — not after the crane is positioned; the controlling entity's disclosure must occur before any equipment is placed so the operator can evaluate whether the location is appropriate before committing to the setup

C. Ground condition information only needs to be provided when the operator specifically requests it

D. Ground condition information must be documented in the lift plan, which must be reviewed by the operator within 24 hours before the planned lift

15. A competent person has determined that the ground conditions at the crane setup location are adequate for the planned lifts. The operator reviews the information provided and disagrees based on their field experience with the soil type. What is the operator's recourse?

A. The operator must defer to the competent person's determination — the competent person's evaluation supersedes the operator's field judgment

B. The operator may proceed under protest by documenting their disagreement in the daily log before beginning operations

C. The operator must contact the crane manufacturer's technical support line for an independent ruling before proceeding

D. The operator has the right and responsibility to refuse to set up or operate the crane when they believe ground conditions are unsafe — OSHA 1926.1418 protects this refusal from adverse employment action; the operator's direct observation and professional judgment are valid grounds for refusing to proceed even when a competent person has provided a different assessment

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16. A crane is set up on a site where vibro-compaction ground improvement was performed one week ago to increase bearing capacity. The geotechnical engineer's report indicates that full capacity gain requires 14 days of cure time. The lift director wants to proceed using the full post-improvement capacity values. What is the correct response?

A. The crane must not proceed using the post-improvement capacity values until the engineer has confirmed the required cure time has elapsed and the improvement has achieved the specified bearing capacity — using capacity values that have not yet been achieved is equivalent to operating on unconfirmed ground conditions

B. Proceed — the ground improvement has been performed and the engineering report provides sufficient confirmation of future capacity

C. Proceed at 75% of the post-improvement capacity — this conservatively accounts for the partial cure while allowing operations to continue

D. The lift director's authorization is sufficient to proceed using the post-improvement values during the cure period

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17. A crane is being set up near underground high-pressure steam lines used for district heating. These lines were marked by the utility during the locate process. What specific concern do high-pressure steam lines create that standard utility lines do not?

A. High-pressure steam lines create an electromagnetic interference hazard that can affect the crane's LMI calibration during setup

B. High-pressure steam lines are made of carbon steel and can be detected by standard magnetic utility locate equipment without any special procedures

C. A high-pressure steam line rupture under crane load releases superheated steam at extreme temperatures and pressure — this creates an immediate life-safety hazard of a different magnitude than a water or communication line failure; the structural capacity of the steam line under the anticipated outrigger loads must be evaluated and the consequences of a rupture factored into the risk assessment before setup proceeds over or near any pressurized steam line

D. High-pressure steam lines are always buried at a minimum depth of 6 feet, which places them outside the influence zone of standard crane outrigger loads

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18. Which of the following CORRECTLY describes the crane operator's responsibility when the controlling entity provides ground condition information that the operator believes is incomplete?

A. The operator must accept the information as provided — responsibility for its completeness lies entirely with the controlling entity

B. The operator must request additional information before proceeding — if the operator believes the provided ground condition information is incomplete or insufficient to confirm safe setup, they must request the missing information before placing the crane; incomplete information does not satisfy the controlling entity's disclosure obligation and does not obligate the operator to proceed

C. The operator may supplement the incomplete information with their own visual assessment and proceed if no surface hazards are observed

D. The operator must document the incomplete information and submit a written deficiency notice to the project safety officer before beginning operations

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DOMAIN 2: OPERATIONS

Questions 19–41

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19. An operator is performing a pick when a worker from an adjacent crew walks into the exclusion zone without authorization. The signal person has not given a stop signal. What must the operator do?

A. Continue the lift and sound the horn to alert the unauthorized worker

B. Slow the crane functions while the signal person addresses the unauthorized worker

C. Wait for the signal person to observe the intrusion and give a stop signal before responding

D. Stop all crane movement immediately — the operator has direct authority and obligation to stop any crane function when they personally observe anyone entering the exclusion zone; the stop signal from the operator's own observation overrides the absence of a signal person's stop signal

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20. A crane's anti-two-block (ATB) device activates during a hoist cycle and automatically stops the hoist. The operator resets the device and continues hoisting. The ATB activates again two minutes later. What does this pattern indicate and what must the operator do?

A. Repeated ATB activation indicates the block is consistently reaching the device's trigger point — this means the operator is attempting to hoist beyond the available hook travel for the current parts of line and boom length; the operator must stop, assess why the block is reaching the trigger point repeatedly, and resolve the root cause before continuing; repeated resetting of an ATB system to continue hoisting is not an acceptable operational practice

B. The ATB device requires recalibration — repeated activation at the same hoist position indicates the trigger height is set too low

C. Two activations within a short period confirm the ATB device is functioning normally — the device will not allow two-blocking to occur and the operator may continue resetting and hoisting

D. The repeated activation means the boom angle is too low for the current parts of line — increase boom angle before continuing

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21. An operator observes during the pre-shift inspection that the drum has three wraps of wire rope remaining when the hook is at maximum hook travel. The manufacturer's minimum is four wraps. What must happen before lifting begins?

A. The condition may be monitored — three wraps is within 25% of the four-wrap minimum and is acceptable for lifts that do not require full hook travel

B. Continue operations but limit hook travel to ensure at least three wraps remain — three wraps provides sufficient drum retention for standard operations

C. Remove the crane from service for this deficiency — insufficient dead wraps on the hoist drum is a removal-from-service condition; the manufacturer's minimum wrap requirement protects the wire rope

termination at the drum anchor; operating below this minimum risks pulling the rope termination through the drum anchor under load

D. Add an additional 15 feet of wire rope to the drum to restore the required minimum wraps before beginning operations

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22. During a routine pick, the operator notices the load is rotating slowly even though the load line is not rotation-resistant rope and no rotation was expected. What is the most likely cause and what should the operator do?

A. Slow load rotation is caused by the crane's swing brake releasing slightly — engage the swing brake fully and continue

B. Slow rotation under load with standard wire rope indicates the rope has developed a residual torque imbalance — this can cause the rope to unlay under load, reducing its effective strength; the operator should land the load and have the rope inspected; if the rotation is progressive or accelerating, the rope must be examined for signs of core failure or severe torque damage before further use

C. Load rotation is always caused by asymmetric rigging — the rigger must reposition the sling attachment points before the next pick

D. Minor load rotation is normal during all picks and requires no action unless the rotation exceeds one full revolution per minute

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23. A crane operator is working a double shift. At hour 14, the operator notices their reaction time has slowed and they are having difficulty maintaining concentration. What must the operator do?

A. Take a 30-minute break, consume caffeine, and resume operations — fatigue management is the operator's personal responsibility during authorized shifts

B. Notify the lift director and request a relief operator for the remainder of the shift

C. Reduce all picks to 65% of rated capacity for the remainder of the shift — reduced load operations are less cognitively demanding

D. Stop operating and notify the supervisor — OSHA 1926.1418 recognizes physical and mental impairment as grounds for stopping crane operations; an operator experiencing fatigue-related cognitive decline is impaired and must not continue operating; this refusal is explicitly protected from adverse employment action

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24. A load is being set into a confined space below grade. As the load descends past 10 feet of depth, the signal person loses visual contact with both the load and the bottom of the excavation. What must happen before the load continues to descend?

A. A second signal person must be positioned at a level where they can see both the load and the set point, and communication must be established with the primary signal person before lowering continues — never lower a load toward an unseen surface without confirmed visual coverage at the landing zone

B. The operator may use the LMI load reading to determine when the load contacts the bottom — a drop in LMI reading indicates ground contact

C. The primary signal person may guide the load by sound — tapping on the load with a rod to track its position as it descends

D. Lower slowly and stop every 2 feet to allow the signal person to reposition for a better view angle

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25. Under OSHA 1926 Subpart CC, which of the following CORRECTLY describes when a signal person is NOT required?

A. A signal person is not required when the operator has 10 or more years of experience and the lift director confirms no personnel are in the work area

B. A signal person is not required when the LMI is functioning and monitoring the pick in real time

C. A signal person is not required when the operator can clearly see the load, the path of travel, and the set point throughout the entire lift, and no part of the lift path is in proximity to a power line — when the operator has complete unobstructed visibility of every phase of the lift, a signal person is not mandated; the moment any part of the lift becomes invisible to the operator, a signal person is required

D. A signal person is not required for lifts below 50% of rated capacity when the pick and set points are both within 30 feet of the crane

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26. An operator receives a hoist-up signal and begins hoisting. After the load rises 6 inches, the load line angle changes from vertical to approximately 8 degrees off vertical. The load has not moved horizontally. What has most likely occurred and what should the operator do?

A. An 8-degree line angle is within normal operating tolerance — continue hoisting to working height

B. The load has not moved but the line has gone off-plumb — this indicates the load is caught on an obstruction below the surface or is constrained by adjacent material; hoisting against a constrained load builds tension that can exceed the crane's rated capacity without a corresponding LMI increase; stop

hoisting immediately, lower the load back to the ground, and investigate what is preventing the load from rising vertically

C. The off-plumb line is caused by wind drift — adjust the tagline and continue hoisting

D. The line angle indicates the crane is out of level — stop and re-level before continuing the pick

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27. A crane is operating in a congested urban site. During a pick, the operator loses radio communication with the signal person. The load is at working height, 25 feet above a public sidewalk. What is the required response?

A. The operator may continue to the set point using the last signal received from the signal person

B. Continue holding the load at height and attempt to restore radio communication — movement is not required until communication is restored

C. Lower the load back toward the pick point where it can be set safely while communication is being restored

D. Stop all crane movement immediately and hold the load in position — do not move in any direction without reestablished communication; if the load cannot be safely held at height indefinitely, use the emergency lowering function to bring the load to the nearest safe landing while all personnel below are cleared; all movement must stop until two-way communication is fully restored

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28. A crane operator performing a critical lift receives instruction from the lift director to exceed the pre-approved maximum hook load by 3,000 pounds because the load was found to be heavier than planned. The pre-lift plan was approved at the current hook load limit. What must the operator do?

A. Refuse to make the pick at the increased weight — a critical lift plan is a formal engineering document; exceeding the approved maximum hook load requires the plan to be formally revised, the new configuration verified against the load chart, and all involved personnel re-briefed before any pick at the higher weight is attempted; verbal authorization from the lift director is not sufficient to override an approved critical lift plan

B. Comply with the lift director's instruction — the lift director has overall authority for critical lift operations and may adjust parameters in the field

C. Comply only if the LMI confirms the increased hook load is within 95% of rated capacity

D. Request written authorization from the lift director before complying with the increased weight instruction

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29. An operator is making a pick at 91% of net capacity. Midway through the hoist, a gust of wind causes the load to swing 4 feet laterally. The LMI briefly reads 98%. What is the correct response?

A. Continue hoisting — the swing will dampen naturally and the LMI will return to 91% as the load stabilizes

B. Stop all crane movement — allow the load to pendulum to a stop before making any further crane moves; a load swinging at 91% of net capacity creates dynamic forces that push the load moment above rated capacity; the 98% LMI reading confirms this is occurring; resume only when the load is fully stable and the LMI has returned to the pre-swing reading

C. Increase hoist speed to bring the load above the wind layer before it can swing further

D. Lower the load slowly while it is swinging to reduce the pendulum energy

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30. Under OSHA 1926 Subpart CC, what is required before a crane operator begins operating a crane type they have not previously operated?

A. The operator must complete a minimum 8-hour familiarization period before making any production picks on the new crane type

B. The operator must have a second certified operator in the cab during the first shift on any new crane type

C. The operator must be evaluated by a qualified person and confirmed as familiar with the new crane type's controls, load charts, and operating characteristics before making any production picks — familiarity evaluation is required before independent operation of any crane that differs materially from the operator's prior experience

D. Certification in one crane type automatically authorizes operation of any other crane type within the same weight class

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31. A crane operator is asked to pick a load described as "approximately 40,000 pounds" based on the estimating crew's calculation. The crane's net capacity at the planned configuration is 43,500 pounds. Should the operator proceed based on the estimated weight?

A. No — "approximately 40,000 pounds" is not a verified load weight; the operator must obtain a certified weight or a weight based on documented engineering calculations before making a pick this close to the net capacity limit; a 3,500-pound margin against an estimated weight provides no assurance the actual load is within capacity

B. Yes — a 3,500-pound margin against a 40,000-pound estimated load represents an 8.7% reserve, which is adequate for estimated weights

C. Yes — the LMI will confirm whether the actual load exceeds net capacity at lift-off; stop if the LMI reads above 95%

D. Yes — estimated weights by experienced crews are within ±5% of actual weight, and the 3,500-pound margin covers this tolerance

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32. A crane's hoist brake holds the load during a stationary hold but slowly releases when the operator leaves the controls unattended for 5 minutes. The load drops 8 inches before the operator returns and re-engages. What does this indicate and what is required?

A. An 8-inch drift over 5 minutes is within normal hoist brake operating parameters — some settling is expected during extended holds

B. Hoist brake drift is caused by thermal expansion of the brake assembly — allow the brake to cool between picks and continue operations

C. The hoist brake's holding force has degraded — a brake that cannot hold the load statically without operator input is a deficiency requiring immediate attention; the crane must be removed from service and the hoist brake system repaired and verified before returning to operations

D. Re-engage the hoist control slightly after each load positioning to maintain brake pressure — this is standard practice for cranes with hydraulic hoist systems

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33. What is the OSHA 1926 Subpart CC requirement for the use of outrigger pads?

A. Outrigger pads must meet a minimum surface area requirement based on the crane's rated capacity class

B. Outrigger pads must be used under all outrigger floats to distribute the outrigger load over sufficient ground area to keep the bearing pressure within the ground's confirmed capacity — the size and type of pad must be appropriate for the ground conditions and the anticipated outrigger reaction force; no minimum size is specified by regulation, but the pad must be adequate for the actual conditions

C. Outrigger pads are required only when the ground surface is unpaved — paved surfaces are assumed adequate without pads

D. OSHA requires timber mats specifically — synthetic or steel outrigger pads are not compliant substitutes

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34. An operator begins a shift and finds the previous operator left a note stating the boom hoist limit switch was "acting up" near maximum boom angle during the previous shift. The pre-shift functional test shows normal operation. What must happen before making any picks that approach maximum boom angle?

A. The pre-shift test result is definitive — if the limit switch tested normally, the previous operator's note does not require further action

B. Document the previous operator's note and monitor the limit switch behavior during the first pick near maximum angle before deciding whether further action is required

C. Report the intermittent limit switch behavior to the person responsible for maintenance — an intermittent limit switch failure that was observed during the previous shift is a deficiency even if the pre-shift test is normal; a device that fails intermittently cannot be relied upon; it must be evaluated and cleared by maintenance before operating near the angle where the failure occurred

D. Restrict operations to boom angles below 75 degrees until the limit switch is replaced at the next scheduled maintenance interval

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35. A crane is picking a load when the load line develops a visible kink approximately 30 feet above the drum. No load change or control input occurred at the moment the kink appeared. What is the most likely cause and required action?

A. A visible kink in the load line while under load indicates the rope has lost its structural integrity at that point — kinks in wire rope under tension indicate a core failure or severe internal damage that caused the rope to collapse at that location; stop all crane functions immediately, land the load if possible without tensioning the kinked section, and remove the rope from service; a kinked rope under load must never be used further

B. The kink is caused by the rope passing over a sheave that is slightly undersized — replace the sheave at the next scheduled maintenance

C. The kink indicates the rope was improperly spooled on the drum — re-spool the drum during the next low-utilization period

D. A temporary kink during load application is caused by rope torque equalizing — it will straighten as the load settles; continue hoisting

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36. Under OSHA 1926.1417, which of the following control conditions is required when a crane is shut down at the end of a shift?

A. The engine must be left running at low idle to maintain hydraulic pressure in the brake circuits

B. The load line must be maintained under slight tension to prevent the rope from unspooling during overnight wind events

C. The crane may be left with the boom at working angle if the site security prevents unauthorized access to the controls

D. All loads must be fully landed, all rigging removed from the hook, all controls placed in the off or neutral position, all brakes applied, and all locks and other securing devices engaged — a crane left at the end of a shift must be in a fully secured and neutralized condition

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37. A rigger reports that the hook was loaded in a choker configuration directly on the hook tip during the previous lift — not in the bowl. No stop signal was given during that lift. What must happen before the next lift?

A. Re-inspect the hook the next time it passes through the inspection cycle — tip loading is not an immediate removal trigger

B. The hook must be inspected by a qualified person immediately — tip loading applies bending stress at a location the hook was not designed to resist, potentially causing permanent deformation or cracking that is not visible externally; the hook must be confirmed free of deformation and structurally sound before returning to service

C. The hook may continue in service if no visible deformation is apparent — a visual pass by the operator is sufficient after a tip-loading event

D. Replace the hook safety latch — tip loading deforms the latch more than the hook body and the latch is the component most likely to have been affected

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38. A crane operator is operating in an area near a cell tower. The operator notices the LMI is displaying erratic readings that do not correspond to the actual load conditions. What should the operator do?

A. Continue operations using the load chart exclusively — the LMI's erratic readings indicate radio frequency interference from the cell tower; capacity management reverts to direct load chart reference until the interference source is addressed

B. Continue operations — LMI fluctuation near cell towers is a known issue and does not affect the crane's mechanical systems

C. Stop operations — an LMI that is displaying erratic readings cannot be relied upon as a safety device; the crane must not operate without a functioning LMI unless a documented alternative procedure for

capacity verification is in place and all personnel are briefed; remove the crane from service or relocate it outside the interference zone

D. Disable the LMI and continue operations using the load chart and operator experience — the LMI is a supplemental device and is not required for safe crane operation

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39. A crane is performing a tandem lift with a second crane when the lift director observes that Crane B's load line has developed a visible lean away from plumb. The load is suspended at working height. What must happen?

A. All crane movement must stop immediately — a non-plumb load line in a tandem lift indicates the load sharing has shifted from the planned distribution; continued movement risks progressive overloading of one crane while unloading the other, which can cause instability in both; the lift director must assess the cause and direct a coordinated response before any further movement occurs

B. The signal person for Crane B should direct the operator to adjust boom angle to restore plumb before the next move

C. The lean indicates Crane B is carrying less than its planned share — increase Crane B's hoist speed to restore the planned load distribution

D. A slight lean in the load line is acceptable in tandem lifts — continue the lift and monitor the lean angle

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40. During a pre-shift inspection, an operator discovers that the load block's becket connection — where the rope terminates at the block — shows a wire rope end fitting that has pulled partially out of its socket by approximately 3/8 inch. What is the required action?

A. Measure the pull-out distance and compare it to the manufacturer's maximum allowable movement specification — if within tolerance, continue operations

B. Re-seat the fitting using the manufacturer's reseating procedure and test at 50% of rated capacity before returning to full-capacity operations

C. Continue operations at 75% of rated capacity — partial pull-out reduces the termination efficiency but does not require immediate removal if monitored

D. Remove the block from service immediately — any pull-out of a wire rope end fitting from its socket is an immediate removal-from-service condition; a partially pulled termination may fail completely without further warning under load; the fitting must be re-socketed and re-verified by a qualified person before the block returns to service

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41. A crane is picking a 35,000-pound load from a flatbed trailer. As the load comes off the trailer, the trailer rises on the side where the load was picked, shifting the trailer 6 inches laterally before the trailer's wheel chocks arrest the movement. The load was picked cleanly and is now freely suspended. What concern must be addressed before the load is set?

A. No concern — the load is now freely suspended and the trailer movement is resolved; the lift can continue normally

B. Confirm that the trailer movement did not cause any adjacent loads or materials on the trailer to shift into the crane's swing path — a trailer that moved 6 inches may have repositioned adjacent loads or equipment into the planned swing corridor; the signal person must confirm the swing path is clear before the load is moved

C. Re-weigh the load — trailer movement during pick-off indicates the load's center of gravity was off-center; a load with an eccentric center of gravity must be re-weighed before the pick proceeds

D. Re-inspect the rigging — trailer movement creates dynamic shock loading in the slings that may have caused damage

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DOMAIN 3: TECHNICAL KNOWLEDGE

Questions 42–66

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42. Under ASME B30.5, which of the following conditions requires wire rope to be removed from service regardless of the number of broken wires present?

A. Evidence of kinking, crushing, or any other damage that distorts the rope's structure — these conditions permanently alter the rope's load path and internal geometry in ways that dramatically reduce its actual capacity below its rated value; broken wire counting does not capture this type of structural damage, which is why it triggers removal independently

B. Any wire rope that has been in service for more than 24 months regardless of condition

C. Wire rope that has been used at more than 90% of rated capacity on three or more occasions during its service life

D. Wire rope showing more than 2% outer wire wear on the crown of any strand

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43. A rigger is preparing a two-leg wire rope bridle for a symmetric load. Both legs are the same length and the load attachment points are at equal elevation. The sling angle from horizontal is 38 degrees. What concern does this angle create?

A. A sling angle of 38 degrees from horizontal is within ASME B30.9's acceptable range — no additional action is needed

B. At 38 degrees from horizontal the bridle geometry is borderline — re-measure and confirm before proceeding

C. At 38 degrees from horizontal, the tension in each leg is significantly higher than the load's vertical weight — specifically, the tension factor is 1/sin(38°) = 1/0.616 = 1.623; each leg carries 62.3% more tension than a vertical pick of the same load; the slings must be confirmed rated for this tension level in the actual hitch configuration; ASME B30.9 recommends sling angles not less than 30 degrees from horizontal, and shallower angles are strongly discouraged

D. Sling angles below 45 degrees from horizontal are prohibited under ASME B30.9 for wire rope slings in bridle configurations

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44. Under OSHA 1926 Subpart CC, what minimum information must a signal person be able to demonstrate before being recognized as a qualified signal person?

A. The signal person must hold current NCCCO Signal Person certification for the type of signaling they will perform

B. The signal person must know and understand the applicable signal system — whether hand signals, voice, or electronic — and must be confirmed as understanding the signals through a demonstrated evaluation; OSHA 1926.1419 requires that signal persons be qualified before performing signaling duties; qualification must be confirmed by a third-party or employer-based evaluation

C. The signal person must have completed a minimum 40-hour signal person training course within the last 3 years

D. The signal person must be able to read and pass the ASME B30.5 hand signal chart test administered by the site safety officer

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45. A wire rope sling has been in use for 18 months. During inspection, the outer wires show 35% diameter reduction from wear on the crown of the strands. The sling has no broken wires. What does ASME B30.9 require?

A. Monitor the condition and re-inspect in 30 days — 35% wire wear without broken wires is a watch condition, not a removal condition

B. Reduce the sling's working load limit by 35% to reflect the reduced cross-section and continue using the sling

C. Restrict the sling to non-overhead use — worn slings may be used for ground-level tension applications below their rated capacity

D. Remove the sling from service — ASME B30.9 specifies removal when outer wire wear reaches one-third (approximately 33%) of the original outer wire diameter; 35% wear exceeds this threshold and requires immediate removal regardless of the absence of broken wires

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46. Under ASME B30.26, what is the purpose of the rated load marking on a shackle, and what does it confirm?

A. The rated load marking on a shackle is the manufacturer's statement of the maximum load the shackle may carry in the in-line, bow-loaded configuration — it confirms the shackle meets the design and material requirements of ASME B30.26 for that load level; the marking must appear directly on the shackle body and enables the user to match the shackle to the application without relying on documentation alone

B. The rated load marking confirms the shackle has been proof tested to twice the marked value by an independent laboratory

C. The rated load marking is the shackle's breaking strength divided by a safety factor of 4 — it may be exceeded in emergency situations by up to 25%

D. The rated load marking applies to vertical hitch loading only — for bridle or basket configurations, a separate angle reduction must be calculated and a different rating applied

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47. A crane is equipped with a load moment indicator that displays the current load as a percentage of rated capacity. The LMI is reading 73% when the operator knows the load is only 45% of the rated capacity for this configuration. After checking the obvious causes, what should the operator do?

A. Continue operations using the load chart as the primary reference — the LMI will self-correct as operating conditions stabilize

B. Recalibrate the LMI using the manufacturer's field calibration procedure before making any further picks — a known inaccurate LMI cannot serve its safety function

C. Remove the crane from service — the crane must not operate with an LMI that is confirmed inaccurate until the device has been serviced, calibrated, and verified; an LMI reading 73% when actual load is 45% is a 28-percentage-point error that makes the device unreliable as a safety aid; the crane is out of service until the LMI is repaired and verified

D. Notify the lift director and continue operations with a second person monitoring the load chart independently

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48. A rigger proposes to use a Grade 70 transport chain as a temporary sling for a lift because no Grade 80 chain is immediately available. The Grade 70 chain has more than adequate working load limit for the planned pick. Is this acceptable?

A. Yes — Grade 70 transport chain is a high-strength alloy chain with adequate working load limits for construction lifting applications

B. No — Grade 70 transport chain is not manufactured to the metallurgical standards required for overhead lifting; its failure mode under sudden overload is less ductile than Grade 80 alloy chain; ASME B30.9 requires that overhead lifting chain slings be Grade 80 or above; using Grade 70 chain for overhead lifting is prohibited regardless of its working load limit

C. Yes — if the Grade 70 chain's marked working load limit exceeds the pick weight, the grade designation is a secondary concern

D. Yes — with the lift director's written authorization, lower-grade chain may be used temporarily when Grade 80 is unavailable

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49. Under ASME B30.10, a hook has been found with a visible crack at the base of the shank. What is the required action?

A. Apply a dye penetrant test to determine the depth of the crack before deciding on removal

B. Tag the hook for monitoring and re-inspect after 20 operating hours — hairline cracks at the shank base are common and are typically caused by surface stress during manufacturing

C. Weld repair the crack under the supervision of a qualified welder and return to service after the repair cools

D. Remove the hook from service immediately — any visible crack in a hook is an unconditional removal-from-service condition under ASME B30.10; hooks with cracks may not be repaired by welding and must be replaced; no monitoring period or weld repair is permitted

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50. An employer's crane operator training program has been audited by a nationally accredited organization. An operator completes the program successfully. Under OSHA 1926.1427, is this operator now considered qualified to operate all crane types covered by the program?

A. Yes — completing an accredited employer program qualifies the operator for all crane types addressed in the program without additional requirements, provided the program's scope includes those types

B. No — the operator is qualified only for the specific crane type tested in the practical evaluation; other crane types covered in the classroom portion require separate practical evaluations

C. No — employer program qualification must be supplemented by third-party written testing within 12 months of completion to remain valid under OSHA 1926.1427

D. No — employer program qualification must be renewed every 3 years regardless of continued operation on the covered crane type

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51. Under ASME B30.9, what condition of a synthetic web sling's outer cover requires immediate removal from service?

A. Fading of the sling's color markings due to UV exposure — color fading indicates degradation of the sling's protective outer layer

B. Fraying at the sling's edges that extends more than 1 inch from the edge toward the center of the sling body

C. Any cut, tear, abrasion that exposes the load-bearing core fibers, or any condition that the inspector determines has reduced the sling's structural integrity — exposed core fibers eliminate the protection the cover provides and indicate damage to or near the load-bearing structure; removal is required immediately upon discovery

D. Surface soiling that prevents visual inspection of the outer cover — soiled slings must be cleaned before use but may be used if no damage is found after cleaning

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52. A crane's wire rope has been replaced with a new rope of the same diameter but a different construction — specifically, changing from a 6×19 Seale construction to an 8×19 Seale construction. What must be verified before returning the crane to service?

A. The drum's line pull capacity — an 8-strand rope requires a higher line pull rating than a 6-strand rope of the same diameter

B. The minimum sheave groove diameter and D:d ratio requirements may differ between 6-strand and 8-strand constructions — 8-strand rope is more flexible but may have different minimum sheave requirements; additionally, the applicable load chart section must be confirmed, as some manufacturers specify rope construction type in their chart notes; the crane must not return to service until both the reeving geometry and chart applicability are verified for the new construction

C. The 8×19 construction has lower capacity than the 6×19 construction of the same diameter — reduce all loads by 12% to account for the construction difference

D. No verification is required — all 19-wire constructions of the same nominal diameter are interchangeable regardless of strand count

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53. Under OSHA 1926 Subpart CC, which of the following CORRECTLY describes the documentation requirements for a qualified rigger on a construction site?

A. The employer must maintain records that confirm the rigger's qualifications for the type of rigging performed — the documentation must be available at the job site; while no specific certification form is required, the employer must be able to demonstrate the basis for the rigger's qualification if questioned by OSHA or the project's controlling entity

B. Qualified riggers must hold a nationally recognized third-party rigger certification — employer qualification alone is not compliant with OSHA 1926 Subpart CC

C. Rigger qualification documentation must be filed with the project's safety data management system before the rigger performs any overhead lifting

D. No documentation is required for qualified riggers — oral confirmation from the employer representative on site is sufficient

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54. A crane's load block is found to have a sheave that wobbles laterally when rotated by hand — the sheave can be deflected approximately 1/4 inch sideways at its rim. The rope is in the groove and the crane has not been used yet today. What does this finding indicate?

A. A 1/4-inch sheave wobble is within normal manufacturing tolerance for cast sheaves and requires no action

B. The sheave wobble indicates the sheave's bearing needs lubrication — apply grease to the sheave bearing and re-check before use

C. A laterally loose sheave indicates the sheave pin or bearing has failed — a sheave that can deflect sideways under wire rope tension will cause the rope to abrade against the block cheek plate, accelerating wire rope damage; remove the block from service and have the sheave assembly repaired before returning to use

D. Reduce operations to 75% of rated capacity until the sheave is replaced at the next scheduled maintenance interval

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55. A crane has been involved in a load drop incident where the rigging failed and the load fell 12 feet to the ground. No personnel were injured. What is required before the crane returns to service?

A. Complete the post-shift inspection and document the load drop — if no crane damage is discovered, return to service for the next shift

B. The rigger who built the failed rigging must be re-evaluated before the crane returns to service

C. A post-incident inspection of the crane must be performed by a competent person before the crane returns to service — OSHA 1926.1412 requires post-incident inspection after load drops; even though the rigging failed rather than the crane, the sudden load release and shock loading that followed must be evaluated for their effect on the crane's structure, wire rope, and components; the crane must not operate until cleared by the post-incident inspection

D. Contact the crane manufacturer and request a structural evaluation report before returning to service

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56. Under ASME B30.5, when must a wire rope be removed from service based on broken wire criteria in a section of rope that has experienced shock loading?

A. Shock loading requires rope replacement regardless of broken wire count — any rope that has been shock loaded must be replaced before further use

B. In a length of rope equal to 10 times the rope diameter, shock loading criteria specify that any broken wires in that zone are a removal indicator because shock-loaded rope may develop internal wire breaks that are not visible externally — but the specific removal criteria depend on rope construction type and the inspector's evaluation of the zone's overall condition

C. Broken wire criteria after shock loading are the same as for normal service — count broken wires in one lay length and apply the standard threshold

D. Any broken wire in a shock-loaded section is an immediate removal condition regardless of the total count or location

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57. A crane operator holds NCCCO Telescopic Boom Swing Cab (TLL) certification. The operator is assigned to operate a telescopic boom fixed cab crane on a construction project. Is the operator qualified under OSHA 1926.1427?

A. No — Telescopic Boom Fixed Cab (TLF) and Telescopic Boom Swing Cab (TLL) are separate crane type categories under NCCCO and OSHA 1926.1427; a TLL certification does not qualify the operator to

operate a TLF crane; a separate TLF certification or qualification is required before the operator may operate the fixed cab crane type on a covered project

B. Yes — TLL and TLF are both telescopic boom cranes; TLL certification covers all telescopic boom configurations

C. Yes — NCCCO certification in any crane type qualifies the operator for all construction crane operations under OSHA 1926.1427

D. Yes — the operator may operate the TLF crane for 90 days under provisional authorization while applying for TLF certification

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58. A crane's periodic inspection was completed 13 months ago. The crane has been in continuous daily service since. Under OSHA 1926.1412 and ASME B30.5, what is the crane's inspection status?

A. The crane is within the acceptable range — periodic inspections are required annually with a 30-day grace period

B. The crane is within the acceptable range — the 13-month elapsed time falls within the 14-month maximum interval allowed for heavy-duty cranes in continuous service

C. The crane is compliant — the frequent daily inspections performed throughout the 13-month period satisfy the periodic inspection requirement in the absence of identified deficiencies

D. The crane is overdue for its periodic inspection — ASME B30.5 and OSHA 1926.1412 require periodic inspection at intervals not exceeding 12 months; 13 months of service without a periodic inspection means the crane is operating out of compliance and must be inspected before continuing operations

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59. A rigger is using a wire rope sling in a basket hitch to lift a cylindrical load. The sling contacts the load's curved surface over a contact arc of approximately 120 degrees. What specific benefit does this contact geometry provide?

A. A 120-degree contact arc reduces the sling's effective length, which shortens the lift height and improves cycle time

B. A 120-degree contact arc on a curved surface means the sling contacts the load over a large surface area rather than at a point — this distributes the sling-to-load contact pressure, reduces the crushing stress on the sling fibers, and provides more stable load control; however, the sling's capacity in the basket hitch configuration must still be confirmed for the specific load weight and rigging geometry

C. A 120-degree contact arc on a cylindrical load means the basket hitch capacity equals the vertical hitch capacity — no basket hitch angle factor is needed

D. The 120-degree contact arc means only 33% of the sling's load-bearing width is in contact with the load — the effective capacity is reduced to 33% of the basket hitch rating

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60. A crane is equipped with outrigger position sensors that display outrigger extension status on a cab-mounted display. Before a pick, the display shows all four outriggers at full extension. What must the operator do in addition to reviewing the display?

A. Nothing additional — the sensor display is a verified safety system and provides sufficient confirmation of outrigger status

B. Physically confirm outrigger extension and float contact visually or through a spotter — outrigger position sensors confirm electrical position, not actual physical extension or ground contact; a sensor can show "full extension" while the outrigger is extended but the float is not bearing on the ground; physical confirmation is required before relying on any load chart capacity that specifies full outrigger extension

C. The display confirmation is sufficient for lifts below 75% of rated capacity — physical confirmation is only required for critical lifts

D. Request written confirmation from the rigger crew that the outriggers are fully extended before proceeding

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61. A crane operator completes the pre-shift inspection and finds a hairline crack in the boom's lacework — specifically in a diagonal lacing member near the mid-point of the boom. What is the required action?

A. Remove the crane from service immediately — any crack in any structural member of the crane boom is an unconditional removal-from-service condition under ASME B30.5; the boom must not be used until the cracked member is evaluated by a qualified engineer and repaired or replaced as required; field welding of boom structural members without manufacturer authorization is not acceptable

B. Document the crack with photographs and monitor its growth over the next 5 operating days before making a removal decision

C. Reduce all picks to 60% of rated capacity and avoid boom angles above 70 degrees until the crack is professionally evaluated

D. Contact the crane manufacturer for a structural assessment and proceed with operations below 75% of rated capacity until the assessment is complete

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62. Which ASME B30 standard governs the design, construction, installation, and use of hooks used in overhead lifting applications?

A. ASME B30.9 — hooks are part of the sling and rigging assembly and are governed by the sling standard

B. ASME B30.26 — hooks are classified as rigging hardware under this standard

C. ASME B30.10 — this standard specifically addresses hooks used in lifting service, including design requirements, inspection criteria, and removal-from-service conditions; it governs both the hook itself and the manner in which it must be used, inspected, and maintained

D. ASME B30.5 — hooks are an integral component of the crane and are governed under the mobile crane standard

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63. Under OSHA 1926 Subpart CC, what is the employer's obligation when a crane operator reports a safety deficiency in the crane and refuses to operate it?

A. The employer may assign the operator to other duties and bring in a second operator to evaluate whether the deficiency is real before deciding on a course of action

B. The employer must not discipline or retaliate against the operator for refusing to operate an unsafe crane — the refusal is protected under OSHA 1926.1418; the employer must address the reported deficiency through a competent person evaluation before the crane returns to service

C. The employer must submit a written safety deficiency report to OSHA within 24 hours of the operator's refusal

D. The employer must conduct an immediate investigation with a third party and provide written results to the operator before requiring them to return to operating duties

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64. Under ASME B30.9, what is the minimum angle from horizontal that is recommended for wire rope slings in a bridle configuration?

A. The recommended minimum sling angle from horizontal is 30 degrees — at angles below 30 degrees, the tension in each sling leg increases so dramatically that the sling's rated capacity can be exceeded even at relatively modest load weights; ASME B30.9 does not prohibit angles below 30 degrees but the capacity reduction at shallow angles must be carefully calculated and the slings confirmed rated for the resulting tension

B. The recommended minimum angle is 45 degrees — angles below 45 degrees require the use of a spreader bar

C. The recommended minimum angle is 60 degrees — ASME B30.9 requires a horizontal angle correction factor for all angles below 60 degrees

D. There is no recommended minimum angle — the only requirement is to calculate the actual sling leg tension and confirm it is within the sling's rated capacity for the applicable hitch

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65. A crane operator is asked to pick a load using a synthetic web sling that has been painted over with a thin coat of spray paint by a previous user. The sling's tag is intact and readable. What concern does the paint coating create?

A. The paint coating only creates a cosmetic concern — as long as the tag is readable and the sling dimensions appear correct, the paint does not affect capacity

B. Paint coatings on synthetic slings must be removed before use — ASME B30.9 prohibits any coating on the sling surface

C. Confirm whether the paint is solvent-based before using the sling — solvent-based paints are the only coatings that affect nylon or polyester fibers

D. Paint coating on a synthetic web sling can conceal cuts, abrasions, chemical burns, or other damage to the load-bearing fibers — the sling cannot be properly inspected through an opaque coating; under ASME B30.9, a sling that cannot be adequately inspected must be removed from service; the paint must be confirmed non-damaging to the fiber type and the sling must be fully inspectable before use

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66. Under OSHA 1926 Subpart CC, who may perform the assembly and disassembly of a lattice boom crane on a construction project?

A. Any certified crane operator who has operated a lattice boom crane for more than 2 years

B. Any qualified rigger who has received lattice boom assembly training from the crane manufacturer

C. Assembly and disassembly must be directed by a qualified person who has the specific knowledge, training, and experience to direct A&D for the specific lattice boom crane type — OSHA 1926.1403 requires qualified person direction; the workers performing the assembly must follow the qualified person's direction and the manufacturer's procedures; the qualified person must be present throughout the A&D process

D. The project's general contractor must designate and certify the A&D crew before assembly begins

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DOMAIN 4: LOAD CHARTS

Questions 67–90

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67. A crane's gross capacity at 28-foot radius with a 90-foot boom on full outriggers is 47,500 pounds. The hook block weighs 950 pounds. Three wire rope slings weigh 210 pounds each. Four shackles weigh 30 pounds each. The payload is 44,800 pounds. What is the net capacity and can this lift proceed?

A. Net capacity is 45,550 lb; the payload of 44,800 lb is within net capacity; the lift can proceed

B. Net capacity is 45,490 lb; the payload of 44,800 lb is within net capacity by 690 lb; the lift can proceed

C. Net capacity is 45,100 lb; the payload of 44,800 lb is within net capacity; the lift can proceed

D. Net capacity is 44,920 lb; the payload of 44,800 lb exceeds net capacity; the lift cannot proceed

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68. A crane's load chart shows a gross capacity of 58,000 pounds at 20-foot radius and 44,000 pounds at 25-foot radius for the same boom length and outrigger configuration. The planned pick is at 21-foot radius. Which chart value applies and why?

A. The 20-foot row value of 58,000 lb applies — when the actual radius is closer to the 20-foot row than to the 25-foot row, the closer row's value applies

B. Interpolate between 58,000 lb and 44,000 lb to calculate the proportional capacity at 21 feet: 58,000 − [(1/5) × 14,000] = 55,200 lb

C. The 25-foot row value of 44,000 lb applies regardless of how close the actual radius is to 20 feet — any radius between two chart rows requires use of the greater radius row's lower capacity value; interpolation between rows is not a permitted methodology

D. Either value may be used at the operator's discretion for radii that fall between two chart rows

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69. A crane has a load chart note that reads: "360-degree ratings require all outriggers fully extended, tires completely clear of ground, and crane leveled within 1% of level." The crane's tires are confirmed off the ground on three outriggers but the fourth outrigger cylinder shows 0.5 inch of stroke remaining before full extension. Does the 360-degree chart apply?

A. Yes — three outriggers confirmed off the ground satisfies the intent of the full outrigger requirement; a 0.5-inch discrepancy on one cylinder is within manufacturing tolerance

B. Yes — the 1% levelness tolerance accommodates minor outrigger extension differences between the four cylinders

C. Continue operations at 90% of the 360-degree chart values to account for the partial extension on one outrigger

D. No — the 360-degree chart requires all outriggers fully extended; an outrigger with remaining cylinder travel has not reached full extension; the capacity values developed for full outrigger extension do not apply to this configuration; the crane must extend the fourth outrigger to confirmed full extension before the 360-degree chart values are valid

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70. A crane is operating with a fixed jib. The load chart shows jib tip capacity at various radii. The crane operator plans to pick a load at a radius that falls 3 feet short of the minimum radius shown in the jib tip chart. What does the absence of a chart value at this radius indicate?

A. Use the minimum radius chart value — it is always conservative to apply the smallest radius chart value to any radius shorter than the minimum listed

B. Contact the manufacturer for the unlisted radius value — the chart was printed in abbreviated form and the value exists in the manufacturer's data

C. There is no rated capacity at the planned radius — the minimum radius in the jib tip chart represents the geometric limit of the jib at the specified offset and boom length; operating at a shorter radius means operating without a defined rated capacity; the lift cannot be made at this configuration without either changing the jib offset, changing the boom length, or repositioning the crane

D. Reduce the planned load by 15% and proceed — the capacity at 3 feet inside the minimum chart radius is approximately 15% lower than the minimum chart value based on the capacity gradient

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71. A crane's load chart shows the following gross capacities at 35-foot radius: 60-foot boom at 41,000 lb, 75-foot boom at 36,500 lb, 90-foot boom at 31,000 lb. The crane is configured with a 75-foot boom. Block weight is 900 lb, rigging is 740 lb. The payload is 33,500 lb. Can this lift be made?

A. No — total hook load (900 + 740 + 33,500 = 35,140 lb) exceeds the 75-foot boom gross capacity of 36,500 lb; net capacity after deductions is 34,860 lb; wait — 34,860 > 33,500; the lift can be made

B. Yes — gross capacity with the 75-foot boom is 36,500 lb; deductions: block (900) + rigging (740) = 1,640 lb; net capacity = 34,860 lb; payload of 33,500 lb is within net capacity by 1,360 lb; the lift can proceed

C. No — the payload of 33,500 lb exceeds the 90-foot boom's gross capacity of 31,000 lb, indicating the load is too heavy for any lattice boom configuration at this radius

D. Yes — but only if the operator switches to the 60-foot boom section, which provides 41,000 lb gross capacity and a more conservative operating condition

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72. A crane is performing a pick at 32-foot radius. Net capacity at this configuration is 39,200 lb. The total hook load is 36,800 lb. This represents 93.9% of net capacity. Which of the following additional steps is appropriate before proceeding?

A. Verify the payload weight from a certified source, confirm the actual operating radius by direct measurement, confirm all rigging weights individually, and verify the crane configuration exactly matches the chart section being used — at 93.9% of net capacity, no margin exists for estimation errors in any input variable; each variable must be confirmed precisely before the pick proceeds

B. No additional steps — the lift is within net capacity and all standard pre-lift procedures have been completed

C. Reduce the payload by 5% to create a minimum 5% safety buffer below net capacity before proceeding

D. Obtain lift director sign-off on the 93.9% net capacity figure and proceed with enhanced LMI monitoring

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73. A crane's load chart shows a capacity of 24,000 pounds at 40-foot radius for the 85-foot boom. The crane is currently rigged with a 100-foot boom. The 100-foot boom chart shows 18,500 pounds at 40-foot radius. The operator uses the 85-foot boom capacity to plan the lift. What is wrong with this approach?

A. Nothing is wrong — the 85-foot boom chart provides a conservative reference for any longer boom at the same radius

B. The error is minor — a 5,500 lb difference in chart values has no operational consequence if the planned load is below 18,500 lb

C. Using the 85-foot chart understates the capacity — the 100-foot boom chart should always be used because longer booms provide more mechanical advantage

D. The operator must use the chart section that corresponds to the actual installed boom length — the 100-foot boom is physically installed; using the 85-foot chart misrepresents the actual crane configuration; the 100-foot boom chart at 18,500 lb is the governing value; a load that appears within capacity on the 85-foot chart may exceed the actual 100-foot boom's rated capacity

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74. A crane is configured on full outriggers for a pick at 18-foot radius. The load chart shows 82,000 lb gross at this configuration. After deducting block (1,400 lb) and rigging (1,850 lb), net capacity is 78,750 lb. The payload is 74,200 lb. Is a critical lift plan required?

A. No — the payload of 74,200 lb is 90.4% of net capacity, which exceeds the informal 85% threshold for additional scrutiny but does not trigger formal critical lift requirements

B. No — the 75% threshold for critical lift is calculated against the gross capacity: 74,200 ÷ 82,000 = 90.5%; however, critical lift threshold is based on total hook load as a percentage of rated capacity, not payload alone

C. Yes — total hook load = payload (74,200) + block (1,400) + rigging (1,850) = 77,450 lb; 77,450 ÷ 82,000 = 94.5%; this exceeds the 75% critical lift threshold and requires a written lift plan and pre-lift meeting before this pick proceeds

D. No — the payload of 74,200 lb represents 90.4% of net capacity, which is below the 95% level that triggers critical lift requirements

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75. A crane is picking at 92% of rated gross capacity. The operator completes the pick and sets the load. The next pick requires the same total hook load but at a 5-foot greater radius. Before making the second pick, what is the minimum required action?

A. The LMI automatically adjusts for radius changes — confirm the LMI reading is below 100% at the new radius and proceed

B. Look up the gross capacity at the new radius, deduct block and rigging, and confirm the total hook load is within net capacity at the new radius — operating at 92% of rated capacity at the previous radius provides no information about capacity at the new radius; a 5-foot radius increase can dramatically reduce rated capacity; the new radius must be independently confirmed against the chart before the pick

C. Reduce the total hook load by 10% at the new radius to account for the capacity reduction without requiring a new chart calculation

D. Confirm the new radius by direct measurement and proceed — if the LMI reads below 100%, the pick is within capacity

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76. A crane is operating in the over-rear quadrant on a pick that requires 71,000 lb net capacity. The over-rear chart shows 76,000 lb gross at the planned configuration. Block weighs 1,200 lb and rigging weighs 1,800 lb. After deductions, net capacity is 73,000 lb. During the swing, the load must pass through the side quadrant before reaching the set point. What governs during the side quadrant portion of the swing?

A. The over-rear capacity governs throughout the entire lift as long as the lift starts and ends in the over-rear quadrant — the intermediate swing path does not change the governing capacity

B. The operator must check the directional capacity for the side quadrant and confirm the total hook load is within the rated capacity for that direction throughout the swing — if the side quadrant capacity is lower

than the over-rear value, the lower value governs during the portion of the swing that passes through the side quadrant; the capacity at every point in the swing path must support the load

C. The 360-degree capacity governs any lift that passes through more than one directional quadrant regardless of pick and set point locations

D. The operator must complete the pick and set as quickly as possible to minimize the time spent in the lower-capacity side quadrant

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77. A crane's on-rubber load chart shows 19,000 lb gross at 20-foot radius. The full outrigger chart shows 48,000 lb gross at the same radius and configuration. The crane is on rubber for an emergency pick because time does not allow outrigger setup. The total hook load is 17,500 lb. Which chart value governs?

A. The full outrigger chart value of 48,000 lb governs — the crane has adequate gross capacity to make this pick safely regardless of outrigger status

B. Either chart value may be used — the operator may choose the more favorable chart section when time pressure makes outrigger setup impractical

C. The engineer of record may authorize use of the outrigger chart for emergency picks when the total hook load is below 50% of the outrigger chart's gross capacity

D. The on-rubber chart value of 19,000 lb governs — the crane is on rubber and must use the chart section that reflects the actual setup condition; since 17,500 lb is within the 19,000 lb on-rubber gross capacity, the pick can proceed on rubber; using the outrigger chart for an on-rubber setup would apply capacity data developed for a configuration the crane is not actually in

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78. A crane's load chart shows a maximum rated capacity of 150,000 lb in one specific configuration. The crane operator refers to this as the crane's "150-ton crane." Is this characterization accurate?

A. Yes — a crane's class designation is defined by its single highest capacity value, and 150,000 lb equals 75 tons in the US short ton system; calling it a 150-ton crane is accurate

B. No — crane classifications are not based on single maximum capacity values; the 150,000 lb figure is the rated capacity in one specific configuration and cannot be used as a general descriptor of the crane's capacity; the crane's rated capacity changes with every configuration change and the maximum value applies only to the exact configuration under which it was achieved

C. Yes — manufacturers classify crane models by their maximum capacity, and the operator's reference is consistent with this classification system

D. No — 150,000 lb equals 75 short tons; calling the crane a 150-ton crane overstates its capacity by a factor of 2

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79. A crane is performing a pick where the rigging geometry creates a sling angle of 42 degrees from horizontal. The sling's rated vertical hitch capacity is 12,000 pounds per leg. There are two legs in the bridle. The total load is 16,000 pounds. Is each sling leg within its rated capacity for this configuration?

A. Yes — each leg carries 8,000 lb of vertical force (16,000 ÷ 2), which is below the 12,000 lb vertical hitch rating

B. No — at 42 degrees from horizontal, the tension factor is 1/sin(42°) = 1/0.669 = 1.494; each leg carries 8,000 × 1.494 = 11,952 lb of actual tension; this is within the 12,000 lb vertical hitch rating but with only 48 lb of margin; the sling is technically within rated capacity but operates at 99.6% of its vertical hitch rating; this margin is insufficient for practical use and a higher-rated sling should be used

C. Yes — each leg carries 8,000 lb of vertical force, and the 42-degree angle correction factor reduces this to 6,720 lb actual tension

D. No — sling angles below 45 degrees from horizontal automatically require a capacity reduction of 50% from the vertical hitch rating under ASME B30.9

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80. A crane is configured with a 95-foot main boom and a 30-foot fixed jib. The main boom load chart and the jib load chart are two separate sections in the manufacturer's manual. For a jib tip pick, which section governs and what limits apply?

A. The jib tip load chart governs for jib tip picks — the jib chart is developed specifically for loads suspended at the jib tip and accounts for the combined structural and stability effects of the main boom plus jib configuration; the jib chart limits include maximum jib tip load, minimum boom angle, jib offset angle, and the applicable radius range; all limits in the jib section govern the jib tip pick

B. The main boom chart governs — the main boom is the primary structural component and its rated capacity at the tip radius covers jib tip picks

C. Both charts must be satisfied simultaneously — the operator must confirm capacity in both sections before making any jib tip pick

D. The more conservative of the two chart values at the applicable radius governs regardless of which section it appears in

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81. A crane has a rated capacity of 44,000 lb at 26-foot radius. After deducting block (1,000 lb) and rigging (780 lb), net capacity is 42,220 lb. The planned payload is 41,500 lb. This represents 98.3% of net capacity. Three minutes before the pick, the signal person repositions the load's landing pad, which moves the set point from 26-foot radius to 29-foot radius. What must happen?

A. Proceed with the confirmed 26-foot capacity — the pre-lift check was performed at 26 feet and the pick radius has not changed

B. Re-confirm capacity only at the new set radius of 29 feet — the pick radius at 26 feet was already confirmed

C. The pick can proceed — an increase from 26 to 29-foot set radius is within the 10% operational tolerance for planned radii

D. Both the pick radius and the set radius must be within confirmed rated capacity — the operator must look up gross capacity at 29 feet, deduct block and rigging, and confirm the net capacity at 29 feet supports the 41,500 lb payload before the pick proceeds; operating at 98.3% of net capacity at the pick radius leaves no margin for any miscalculation at the set radius

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82. A crane performs a series of 10 identical picks throughout the day. On the eighth pick, the LMI reads 4% higher than on the first seven picks even though the same load, the same rigging, and the same hook position are being used. What must the operator investigate before continuing?

A. Recalibrate the LMI — a 4% drift over eight picks is within the expected drift rate for field-use instruments and can be corrected by zero-resetting the LMI display

B. Continue — a 4% LMI variation in identical repetitive picks is within normal operating variation and does not require investigation

C. Investigate whether the operating radius has increased — outrigger settling, boom deflection accumulation, or gradual level change throughout the day can increase the actual operating radius from pick to pick; even small radius increases significantly increase the load moment; the actual operating radius and outrigger conditions must be re-measured and confirmed before the ninth pick

D. Re-weigh the load — a 4% increase in LMI reading on an identical load indicates the load has gained weight, possibly from absorbed moisture during the day

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83. Under OSHA 1926 Subpart CC, what is the definition of "rated capacity" as it applies to crane operations?

A. Rated capacity is the maximum load the crane manufacturer has determined the crane can lift under any condition — it represents the absolute upper limit of the crane's capability

B. Rated capacity is the manufacturer's established maximum load for a specific configuration that the crane may lift — it is configuration-specific, based on the installed boom length, counterweight, outrigger extension, operating radius, and other configuration variables; it changes whenever any of these variables changes and must be confirmed from the applicable load chart section for each pick

C. Rated capacity is the load chart's gross capacity value minus a 10% built-in safety margin applied by the manufacturer

D. Rated capacity is the maximum total hook load the crane may lift in any configuration within the crane's coverage area

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84. A crane's load chart shows a structural limit of 88,000 lb at 15-foot radius with a 60-foot boom. The stability limit at the same configuration is 112,000 lb. The operator plans a pick at 84,000 lb total hook load. Which limit governs and what does this mean for the planned pick?

A. The stability limit of 112,000 lb governs because it is the higher value — the crane's actual lift capacity at this configuration is 112,000 lb

B. The stability limit governs at short radii — the structural limit only applies at radii greater than 30 feet

C. The pick can proceed without restriction — 84,000 lb is below both limits and no further analysis is needed

D. The structural limit of 88,000 lb governs — when both stability and structural limits are present for the same configuration, the lower value is the rated capacity; at 84,000 lb total hook load, the pick is within the structural limit of 88,000 lb and can proceed; the operator must not interpret the 112,000 lb stability value as an available capacity

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85. A crane is picking a load from a barge. The barge is moored alongside a dock and the crane is on the dock. As the crane picks the load from the barge, the barge rises on the loaded side due to the load removal. What specific effect does the rising barge create for the crane operator?

A. As the barge rises, the pick point elevation increases, which effectively reduces the operating radius and increases the crane's available capacity for the remainder of the pick

B. The barge rising on the loaded side moves the load's original position upward and toward the crane — this can change the rigging geometry and the effective sling angle as the pick progresses; if the load remains in contact with the barge as the barge rises, the load may shift toward the crane, reducing the operating radius; conversely, if the load breaks free from the barge suddenly after the barge rises, a shock

load condition can occur; the signal person must monitor the barge position and load status throughout the pick and give a stop signal if unexpected movement occurs

C. The rising barge increases the required boom angle, which can take the crane out of its rated configuration

D. The rising barge creates a wave that can disturb the dock surface and cause the crane to shift off level during the pick

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86. A crane is operating with a 75-foot boom in a configuration that shows 52,000 lb gross capacity at 22-foot radius. The chart note states: "Ratings apply to freely suspended loads only." The operator is asked to drag a 30,000 lb load horizontally 3 feet along a dock surface before it can be freely lifted. The rigging weighs 650 lb and the block weighs 900 lb. What is the concern with this operation?

A. No concern — dragging a load that weighs only 57.7% of gross capacity is well within the crane's capability regardless of horizontal force components

B. No concern — dragging a load for only 3 feet is negligible from a structural standpoint

C. The chart note restricts the rated capacity to freely suspended loads — dragging a load introduces horizontal friction forces in addition to the vertical load; these horizontal forces create additional bending moment in the boom and increase the effective load on the rigging beyond the hanging weight; the rated capacity values do not account for drag forces; the actual combined load during dragging may exceed the rated capacity even though the payload weight appears to be within chart limits; the lift must be replanned to eliminate the drag or the drag forces must be engineered

D. Dragging 30,000 lb is within the on-rubber chart capacity — switch to the on-rubber chart for this portion of the operation

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87. A crane is making a pick where the rigging consists of a below-the-hook lifting beam, two wire rope slings connecting the beam to the hook, and four slings connecting the beam to the load. The lifting beam weighs 3,200 lb. How must the lifting beam weight be treated in the capacity calculation?

A. The lifting beam weight is part of the payload — it is added to the load weight and the combined total is compared to the gross capacity

B. The lifting beam weight is not deducted — below-the-hook devices have their own rated capacity that covers the device weight

C. The lifting beam weight is exempt from deduction for lifts below 75% of gross capacity

D. The lifting beam weight must be deducted from the gross capacity along with all other rigging below the hook — every component below the hook including the lifting beam, the two upper slings, and the four lower slings must be deducted before determining the available net payload capacity; the lifting beam's 3,200 lb is not payload — it is rigging

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88. A crane has a rated capacity of 31,000 lb gross at 30-foot radius with the 80-foot boom. A second pick is planned at the same radius with the same boom but with the addition of a 15,000 lb counterweight section that was not installed during the first pick. The load chart has a separate section for the higher counterweight configuration. What must happen before the second pick?

A. No change is needed to the capacity calculation — counterweight changes affect only the crane's tipping stability, not its structural limits

B. The counterweight change must be confirmed physically installed, the crane re-leveled after counterweight addition, and the load chart section for the new counterweight configuration confirmed and referenced — the counterweight section defines the configuration the chart values were developed for; using the original chart section after adding counterweight means referencing data for a configuration that no longer matches the crane's actual setup

C. The lift director must authorize the counterweight addition in writing before the second pick proceeds

D. The manufacturer must be contacted to confirm the specific counterweight addition procedure before any configuration change is made in the field

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89. A tandem lift requires Crane A to pick 55% of the total load and Crane B to pick 45%. Total load weight including all rigging and spreader bar is 92,000 lb. Crane A's net capacity at its radius is 53,200 lb. Crane B's net capacity is 42,600 lb. Can this lift proceed as planned?

A. Yes — Crane A's share is 50,600 lb (55% of 92,000), within its 53,200 lb net capacity; Crane B's share is 41,400 lb (45% of 92,000), within its 42,600 lb net capacity; both cranes are within their individual capacities and the lift can proceed

B. No — Crane A's 55% share of 92,000 lb is 50,600 lb; Crane B's 45% share is 41,400 lb; both shares are within their respective net capacities of 53,200 lb and 42,600 lb; however, the margins are 2,600 lb for Crane A and 1,200 lb for Crane B; Crane B's 1,200 lb margin at 97.2% of net capacity is too narrow for a tandem lift without additional engineering review

C. Yes — the lift can proceed; Crane A's share is 50,600 lb within its 53,200 lb capacity; Crane B's share is 41,400 lb within its 42,600 lb capacity; both are within rated limits and the lift is compliant

D. No — equal load sharing is required for all tandem lifts under OSHA 1926 Subpart CC; a 55/45 distribution is not compliant regardless of individual crane capacities

90. A crane's load chart shows that rated capacity decreases from 67,000 lb at 18-foot radius to 41,000 lb at 24-foot radius — a 39% reduction over 6 feet. The operator is planning a series of picks ranging from 18 to 24 feet and assumes the capacity at the midpoint radius of 21 feet is approximately 54,000 lb based on linear interpolation. Is this assumption valid for planning purposes?

A. Yes — linear interpolation between two chart rows is a recognized methodology under ASME B30.5 for planning purposes

B. Yes — the interpolated value of 54,000 lb is conservative because actual capacity at 21 feet is typically higher than the interpolated figure

C. Yes — interpolating between chart rows is permitted for initial planning but must be confirmed by direct chart lookup before any pick is made at the interpolated radius

D. No — interpolation between load chart rows is not a permitted methodology under ASME B30.5 or standard industry practice; the operator must use the lower capacity value at the greater radius for any pick between two chart rows; for a pick at 21-foot radius, the 24-foot row value of 41,000 lb governs until a chart value specifically for 21 feet is available; planning based on interpolated values may lead to lifts that exceed the actual rated capacity at intermediate radii

Answer Key and Explanations

1. A. The organic fill layer at 4-foot depth governs — outrigger loads stress soil at depth, not just the surface Outrigger loads create a stress bulb in the soil below the pad that extends to a depth roughly equal to the pad width. The weakest layer within this stress influence zone governs the effective bearing capacity of the soil system — not the surface alone. A strong surface layer over a weak organic fill provides a misleading bearing capacity at grade. The engineer must confirm whether the pad size and soil system adequately address the organic fill layer's lower capacity before the setup proceeds.

2. C. The controlling entity must obtain utility location information — operating without it is not acceptable OSHA 1926.1402 does not provide an exception for sites where the controlling entity has no knowledge of underground utilities. The obligation is to obtain the information — not merely to disclose whatever happens to be known. When utility information is unavailable, the controlling entity must use the one-call notification system and wait for results before crane setup begins. The operator cannot legally proceed without this information regardless of who bears regulatory responsibility for obtaining it.

3. B. A wet ring indicates saturated sub-base material — operations must stop and the condition evaluated When an outrigger pad is loaded and a wet ring develops at its perimeter on a dry day, it indicates that the pad is compressing water out of saturated material in the sub-base directly below. This is a clear sign that moisture content in the load-bearing zone is higher than the surface appearance suggested. Saturated sub-base material has dramatically reduced shear strength and bearing capacity. This

is an early warning of potential bearing failure — not a cosmetic observation. Operations must stop immediately.

4. D. Every part of the crane — counterweight, boom, load, and rigging — must be confirmed to remain outside the railroad clearance envelope Railroad clearance envelopes exist to protect trains from collisions with equipment adjacent to the tracks. The clearance envelope applies three-dimensionally — at all heights and throughout the full swing arc. The counterweight, which often swings in the opposite direction from the load, is frequently overlooked in this assessment. The railroad must be contacted because they may impose operational restrictions during train movements, require a flagger, or require the crane to stop all movement when a train is passing.

5. A. The operator must not set up without confirmed adequate bearing capacity or an engineered alternative When the manufacturer's required bearing capacity exceeds the confirmed site capacity, the operator has three options: ground improvement to raise the capacity to the required level, engineered matting systems that distribute the load to bring the contact pressure within the confirmed capacity, or relocating the crane to a qualifying location. None of these options can be substituted by the operator's judgment, a proportional load reduction estimated in the field, or reclassifying the soil type. The deficiency must be resolved by engineering before the crane is placed.

6. C. A geotechnical engineer must evaluate whether the 6-foot setback is adequate for this specific slope The safe setback distance from a slope crest depends on the slope's geometry, soil properties, groundwater conditions, and the added stress from the crane's outrigger loads. There is no universal minimum setback distance that applies to all slopes. The crane's outrigger loads increase the shear stress in the slope mass — if this increased stress exceeds the slope's shear strength, failure occurs. A geotechnical engineer must calculate the factor of safety under combined conditions before this setup is approved.

7. B. Traveling with a load is only permitted when addressed in the manufacturer's manual with specific requirements met OSHA 1926.1417 addresses load travel requirements. The manufacturer's operating manual is the primary reference for whether and how load travel is permitted for a specific crane. Manufacturer restrictions typically address maximum load weight for travel, maximum travel speed, minimum boom angle, the requirement that the load be controlled by a tagline, surface condition requirements, and the prohibition on traveling over uneven ground or grades that could cause tipping. These restrictions must all be confirmed and met before any travel with a suspended load.

8. A. Stop all operations — a punched-through outrigger pad has exceeded the surface's load-bearing capacity An outrigger pad punching through the surface layer is definitive evidence that the surface cannot support the outrigger load at that location. The surface has failed. The failure may be progressive — once the surface layer is breached, the underlying material may be significantly weaker and the pad may continue to sink. All operations must stop, any suspended load must be landed safely, and the ground condition must be evaluated and corrected before any further picking. Timber mats added after the punch-through address the symptom, not the underlying condition.

9. C. Suspend operations, contact the controlling entity, request engineering evaluation, and do not resume until confirmed safe Discovering an undisclosed storm sewer after setup means the operator may be operating over a structure whose capacity under the current outrigger loads is unknown. While the

controlling entity bears the regulatory violation for non-disclosure, the operator cannot continue operations on ground of unknown capacity. The controlling entity must be notified immediately, an engineering evaluation of the storm sewer's structural capacity under the applied loads must be completed, and operations must not resume until the evaluation confirms the setup is safe or the crane is relocated.

10. B. Tidal saturation can dramatically reduce sub-surface bearing capacity even after water has visibly receded High tide events saturate not just the visible surface but the soil layers below it. After the tide recedes, the surface dries relatively quickly while the sub-surface remains saturated for hours or longer depending on soil permeability. An operator who inspected the area three hours before high tide may have evaluated completely different soil conditions than currently exist. The bearing capacity in the hours following tidal saturation can be dramatically lower than pre-tide conditions. Outrigger conditions must be re-evaluated following any tidal saturation event before picking continues.

11. D. An outrigger load near a building foundation increases lateral earth pressure — structural engineer evaluation required A 180,000-pound outrigger load applied 12 feet from a building foundation adds significant lateral earth pressure to the soil bearing against the foundation wall. Foundation walls are designed to resist natural soil pressure — not the additional surcharge loading from crane operations. The magnitude of the added pressure depends on the load, the distance, and the soil type. If the combined pressure exceeds the foundation wall's design capacity, wall movement, cracking, or failure can result. A structural engineer must evaluate compatibility between the crane's outrigger loads and the foundation system before this setup is used.

12. A. The one-call system covers only member utilities — private utilities require separate identification and location The one-call notification system operates by notifying its member utilities, who then mark their own infrastructure within the notified area. Coverage depends entirely on membership — utilities not registered with the system will not respond. Many private utilities, fiber optic networks, irrigation systems, fuel lines, and utilities owned by the property owner are not one-call members. For complete coverage, the site owner must identify all private utilities separately and a specialty locate firm may be required to locate them physically.

13. C. A geotechnical engineer familiar with closed landfill conditions must evaluate the site Closed landfills present a unique combination of bearing capacity challenges. Decomposing organic fill generates methane gas, which can create voids as it escapes. Settlement is ongoing and uneven. The engineered cap has design limits that may not accommodate crane outrigger loads. Subsurface voids from decomposition are not detectable by standard soil investigation methods. Only a geotechnical engineer with specific experience in closed landfill behavior has the knowledge to assess whether crane operations at this site are safe and what protective measures are required.

14. B. Ground condition information must be provided to the operator before crane setup begins The timing requirement in OSHA 1926.1402 is specific — the disclosure must occur before crane setup. This requirement exists so the operator can evaluate the suitability of the location before committing equipment to it. Providing the information after the crane is positioned — even before the first pick — does not satisfy the intent of the regulation because the operator cannot make an informed setup decision with information that arrives after the decision has already been made.

15. D. The operator has the right and responsibility to refuse setup when they believe ground conditions are unsafe OSHA 1926.1418 protects the operator's right to stop or refuse operations when safety concerns exist. The competent person's determination is one input into the assessment — it does not override the operator's direct observation and professional judgment. An operator who has worked on similar soil types and has direct sensory observation of the current site conditions has information the competent person may not have considered. The refusal is protected from adverse employment action and the operator's concern must be addressed — not overridden — before the crane proceeds.

16. A. Post-improvement capacity values cannot be used until the engineer confirms the cure requirement has been met Ground improvement techniques such as vibro-compaction achieve their final capacity over time as the improved soil consolidates and the pore water pressure generated during compaction dissipates. Using capacity values that have not yet been achieved is functionally equivalent to operating on ground whose capacity has not been confirmed. If the geotechnical engineer's report specifies 14 days for full capacity, operating at the full capacity values on day 7 means operating on ground that is confirmed to be at partial capacity only.

17. C. High-pressure steam line rupture creates a life-safety hazard of a different magnitude from other utilities A high-pressure steam line carries superheated steam at temperatures that can exceed 300°F and pressures that can exceed 150 psi. A rupture under crane load releases this energy instantaneously — creating a flash explosion of steam that is immediately lethal to anyone in the vicinity and causes third-degree burns at significant distances. This failure mode is categorically different from a broken water line or a cut communication cable. The structural capacity of the line under crane loads and the consequences of rupture must be specifically evaluated.

18. B. The operator must request the missing information before proceeding — incomplete disclosure does not obligate the operator to proceed The controlling entity's obligation under OSHA 1926.1402 is to provide all available ground condition information — not just some of it. If the operator identifies that the disclosure is incomplete — missing utility data, absent soil information for part of the setup area, or undisclosed structures — they must request the missing information before placing the crane. An incomplete disclosure that the operator accepts creates a setup on unconfirmed ground conditions, which is the exact condition the regulation exists to prevent.

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19. D. Stop all crane movement immediately — the operator's direct observation of an exclusion zone intrusion requires immediate action OSHA 1926.1418 and fundamental crane safety principles establish that the operator must stop all crane movement when they directly observe anyone entering the exclusion zone — regardless of whether the signal person has given a stop signal. The operator's direct observation of an imminent danger condition is a sufficient and independent basis for stopping. Waiting for the signal person to notice and respond could allow the crane's movement to continue into a deadly situation. The operator's stop action is not dependent on receiving a stop signal.

20. A. Repeated ATB activation means the block is reaching the trigger point — identify and resolve the root cause An ATB device activating once during a hoist cycle is the system functioning as designed — it detected approach to the two-block limit and stopped the hoist. The same device activating twice within minutes means the operator reset the device and continued hoisting toward the same trigger condition again. This is the behavior the ATB was designed to prevent. The root cause must be identified: too many parts of line for the available hook travel, boom angle too low, or the operator hoisting past the effective working height. Repeated resetting and re-hoisting is not acceptable practice.

21. C. Remove the crane from service — insufficient dead wraps is a removal-from-service condition The manufacturer's minimum dead wrap requirement exists to protect the wire rope's anchored termination at the drum. The dead wraps maintain tension against the drum anchor — if the rope is paid out below the minimum wrap count, the load transfers to the drum anchor fitting itself rather than through the friction of the wraps. This can cause the anchor to fail, releasing the rope entirely under load. Three wraps when four are required means the crane is one wrap away from this condition. The crane must not operate until the rope is extended to restore the minimum dead wraps.

22. B. Slow load rotation indicates rope torque imbalance — land the load and inspect the rope Standard wire rope develops residual torque when loaded because the load causes the strands to try to straighten. In a properly constructed rope, this torque is balanced and minimal rotation occurs. When slow rotation develops under load — especially if progressive — it indicates the rope's internal balance has changed, typically due to core failure or severe internal damage that has caused the rope to lose its torque-balancing structure. This condition reduces the rope's effective strength below its rated value. The load must be landed and the rope inspected before further use.

23. D. Stop operating and notify the supervisor — cognitive impairment from fatigue is grounds to stop OSHA 1926.1418 protects the operator's right to stop operations when physical or mental impairment affects safe operation. Fatigue-related cognitive decline — slower reaction time, difficulty concentrating, reduced situational awareness — is exactly the type of impairment this provision addresses. An operator in this condition cannot safely respond to developing hazards during a lift. Continuing to operate while cognitively impaired is unsafe and the refusal to continue is protected from adverse employment action. No operational adjustment substitutes for a rested operator.

24. A. A second signal person must be positioned with visual coverage at the landing zone before lowering continues Lowering a load toward a surface that neither the operator nor the primary signal person can see is not permitted. The landing zone must be covered by a signal person who can see the load and the set surface simultaneously, and who is in communication with the primary signal person. The operator relies entirely on signal communication for situational awareness during a blind lower — if no one can see the set surface, the operator has no way to know when the load is approaching the bottom, what obstacles may be present, or when the load has landed safely.

25. C. A signal person is not required when the operator has complete, unobstructed visibility of every phase of the lift and no part of the lift is in proximity to a power line OSHA 1926.1419 establishes that a signal person is required when the operator cannot see the load or the path of travel, when the lift is near a power line, or when the site conditions require it for safety. When the operator can clearly see the load, the complete travel path, and the set point throughout the entire lift without any

obstruction and the lift path is not near power lines, a signal person is not mandated by regulation. This exception is narrow — any loss of visibility triggers the requirement for a signal person.

26. B. The load is constrained below — stop hoisting and lower to the ground to investigate When the load line goes from vertical to off-plumb without any horizontal movement of the load, something below the surface is preventing the load from moving with the line. The load is constrained — either caught on an embedded obstruction, pinched against adjacent material, or attached to something below grade that was not visible during rigging. Continuing to hoist against a constrained load builds tension in the line and rigging beyond what the LMI will register as load moment. This can overload the rigging or the crane structure without any visible LMI warning. The load must be lowered and the obstruction investigated.

27. D. Stop all crane movement — do not move in any direction without reestablished communication A suspended load over a public sidewalk with no communication to the signal person is a stop-everything condition. The operator has no information about what is happening below the load — whether pedestrians have entered the drop zone, whether the set point is clear, or whether any hazard has developed. All crane movement must stop. If the load cannot be safely held at height indefinitely, the emergency lowering function may be used to bring the load to the nearest safe landing zone after the area below has been confirmed clear. Two-way communication must be fully restored before any planned movement resumes.

28. A. Refuse the pick — a critical lift plan is a formal document that requires formal revision and re-briefing to change A critical lift plan is not a general guideline — it is an engineering document that establishes the specific parameters under which the lift was evaluated and approved. Exceeding the approved maximum hook load by 3,000 pounds changes the fundamental basis of the plan. A new weight requires a new load chart verification, a new rigging check, potentially a new radius calculation, and re-briefing of all personnel on the changed parameters. The lift director cannot authorize a deviation from an approved critical lift plan through verbal instruction alone. The plan must be formally revised before the pick proceeds at the higher weight.

29. B. Stop all crane movement and allow the load to pendulum to rest before any further crane moves At 91% of net capacity, the load is already operating with a small margin. When a gust causes a 4-foot lateral swing, the load's horizontal movement creates dynamic forces that add to the static load moment — the LMI reading of 98% confirms this is occurring. Additional crane movement while the load is swinging risks further dynamic loading that can push the load moment above rated capacity. The correct response is to stop all crane movement and allow the pendulum energy to dissipate through natural damping. Only when the load is fully stable and the LMI has returned to the pre-swing reading should any further movement be made.

30. C. The operator must be evaluated by a qualified person and confirmed familiar with the new crane type's controls, load charts, and operating characteristics OSHA 1926.1427 establishes that operator qualification is type-specific. Before independently operating a crane type that differs materially from the operator's prior experience, the operator must be evaluated and confirmed as familiar with the new type's specific characteristics. This is not an 8-hour period requirement or a co-pilot requirement —

it is a competency evaluation requirement. The depth of the familiarization needed depends on how different the new crane type is from the operator's previous experience.

31. A. No — an estimated weight this close to the net capacity limit requires certified verification A 3,500-pound margin against a 40,000-pound estimated load sounds substantial in isolation, but estimates carry uncertainty that can easily span that margin. If the load is actually 43,600 pounds — a 9% estimation error — the pick exceeds net capacity. At 91% of net capacity, verified weight is not optional — it is essential. The operator must obtain a certified weight or an engineer's calculated weight before making this pick. A certified weight can come from a truck scale ticket, a manufacturer's data sheet, or documented engineering calculation.

32. D. The hoist brake cannot hold the load statically — this is a deficiency requiring immediate removal from service A hoist brake that cannot hold a suspended load without active operator engagement is a brake that has failed its fundamental purpose. The hoist brake must hold the load stationary when the operator's hand is off the control. An 8-inch drift over 5 minutes means the brake is releasing progressively under static load — a condition that will worsen over time and under greater loads. This is an immediate removal-from-service condition. Re-engaging the control manually is not a solution — it masks the deficiency while the crane continues to be used with a compromised safety system.

33. B. Outrigger pads must distribute the outrigger load within the ground's confirmed capacity — size and type must be appropriate for actual conditions OSHA 1926 Subpart CC does not specify a particular pad size, material, or minimum area. The requirement is performance-based: the pad must be adequate to distribute the outrigger load so that the bearing pressure on the ground does not exceed the confirmed capacity. A qualified person must determine the appropriate pad based on the calculated outrigger reaction force and the confirmed ground bearing capacity. The correct pad size is an engineering determination — not a standard specification.

34. C. Report intermittent limit switch behavior to maintenance — it cannot be cleared by a successful pre-shift test A limit switch that functioned abnormally during the previous shift has demonstrated the ability to fail. A successful pre-shift test does not cure an intermittent failure — it confirms only that the device is functioning at this moment, not that it will function at the critical moment near maximum boom angle when it is needed. Intermittent failures by their nature occur unpredictably. The device must be evaluated by maintenance, the root cause identified and corrected, and the device confirmed fully functional before the crane operates near the boom angle where the previous failure occurred.

35. A. A kink in the load line under tension indicates structural failure — stop immediately and remove the rope A kink that develops in a wire rope while the rope is under load is not a surface irregularity — it is a catastrophic indicator. Wire rope under tension cannot kink unless the rope's internal structure has collapsed at that point. Core failure, severe internal wire breakage, or progressive strand separation can cause the rope to buckle and kink under load. A rope that has kinked under tension has lost its structural integrity at that point and will fail completely if further load is applied. All crane functions must stop immediately, the load must be set down without further tensioning the kinked section if at all possible, and the rope must be removed from service.

36. D. All loads landed, rigging cleared, controls neutralized, brakes applied, and locking devices engaged OSHA 1926.1417 establishes specific end-of-shift securing requirements. All five conditions must be met: loads fully landed on stable surfaces, all rigging cleared from the hook and the hook secured, all controls placed in the off or neutral position, all brakes applied, and all locks and securing devices engaged. A crane left in partial compliance — for example, with the boom at working angle but the load landed — is not properly secured. Every one of the five conditions is required and none substitutes for the others.

37. B. The hook must be inspected by a qualified person immediately before returning to service Tip loading applies a bending moment at the hook tip that the hook was not designed to carry. The hook body at the tip is a thin section — much thinner than the bowl — and can develop plastic deformation or cracking at loads well below the rated bowl capacity. The deformation or cracking may not be visible externally without close examination. A qualified person must inspect the hook for any permanent deformation, change in throat geometry, or visible cracking before the hook is used for any subsequent pick.

38. C. Stop operations — an erratic LMI cannot serve its safety function; remove from service or relocate The LMI is a required safety device under OSHA 1926.1415. A device displaying erratic readings that do not correspond to actual load conditions cannot perform its safety function — it is providing unreliable information at exactly the moments when accurate information is critical. Continuing to operate while reverting to load chart reference does not restore the LMI's required function — it simply operates the crane without the protection the LMI is required to provide. The crane must stop operations until the LMI is functioning reliably, either through relocation outside the interference zone or through servicing.

39. A. Stop all crane movement — a non-plumb load line in a tandem lift indicates shifted load sharing In a tandem lift, load sharing between the two cranes depends on the load hanging freely between both hook positions with both lines plumb. When one crane's load line develops a visible lean away from plumb, it indicates the load has shifted or rotated, changing the load distribution between the cranes. The crane with the leaning line may be carrying more or less than its planned share — in either direction, the planned distribution is no longer accurate. All movement must stop while the lift director assesses the cause and directs a coordinated response.

40. D. Remove the block from service immediately — any pull-out of a wire rope end fitting is an unconditional removal condition A wire rope end fitting that has partially pulled out of its socket has demonstrated that the termination is failing. The remaining engagement between the rope and socket is less than the full design engagement — the termination efficiency is reduced below the manufacturer's rated value. Under continued loading, the pull-out will progress until the rope separates from the block completely. This is an emergency removal condition — not a monitor-and-continue situation. There is no acceptable partial pull-out distance. The block must be removed from service until the fitting is re-socketed and verified.

41. B. Confirm the swing path is clear — trailer movement may have repositioned adjacent loads into the swing corridor The pick itself was successful and the load is freely suspended. The immediate concern is what the trailer's 6-inch lateral movement may have done to other loads or equipment stored on or near the trailer. A 6-inch shift can move adjacent materials from a safe position into the crane's

planned swing path. The signal person must conduct a specific sweep of the planned swing corridor and confirm it is clear of any materials that may have repositioned due to the trailer movement before the operator begins the swing.

DOMAIN 3: TECHNICAL KNOWLEDGE — Questions 42–66

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42. A. Kinking, crushing, or structural distortion requires removal regardless of broken wire count ASME B30.5 establishes removal-from-service conditions that are independent of broken wire counting. Among these are kinking, crushing, bird-caging, core protrusion, and any other condition that distorts the rope's structural geometry. These conditions permanently alter the internal load path of the rope — the wires no longer share load uniformly, and stress concentrations develop at the distorted zone. The actual capacity of a kinked or crushed rope is indeterminate and may be a small fraction of the rated value. Broken wire counting is irrelevant once structural geometry has been compromised.

43. C. At 38 degrees, each leg carries 62.3% more tension than a vertical pick — the slings must be confirmed rated for this tension The fundamental principle of sling angle is that as the angle from horizontal decreases, the tension in each sling leg increases for the same vertical load. At 38 degrees, the tension factor is 1/sin(38°) = 1/0.616 = 1.623. This means each leg carries 62.3% more force than the load's vertical component alone would suggest. ASME B30.9 recommends angles not less than 30 degrees from horizontal, but even at 38 degrees the tension increase is significant. The sling must be confirmed rated for the actual leg tension — not just the load's hanging weight.

44. B. The signal person must know the applicable signal system and be confirmed through demonstrated evaluation OSHA 1926.1419 requires that signal persons be qualified before performing signaling duties on covered equipment. Qualification must be confirmed through a third-party or employer-based evaluation that demonstrates the signal person knows and understands the applicable signal system. No specific certification form is mandated, but the evaluation must demonstrate actual competency — not just attendance at a training class. The signal person must be able to give and receive signals without ambiguity under actual operating conditions.

45. D. Remove the sling — 35% outer wire wear exceeds the one-third threshold in ASME B30.9 ASME B30.9 establishes that wire rope slings must be removed from service when outer wire wear reaches one-third of the original outer wire diameter — approximately 33%. This threshold is based on the relationship between wire cross-section and load-carrying capacity. At 33% wear, the wire has lost a third of its cross-sectional area and therefore a significant portion of its tensile capacity. The 35% wear found on this sling exceeds this threshold. The absence of broken wires is irrelevant — wear is an independent removal criterion.

46. A. The rated load marking confirms maximum in-line bow-loaded capacity and compliance with ASME B30.26 Under ASME B30.26, shackles used for overhead lifting must be marked with the manufacturer's identification and the working load limit directly on the shackle body. This marking represents the maximum load the shackle may carry when loaded in-line through the bow — the designed loading direction. The marking also confirms the shackle was designed and manufactured to meet ASME

B30.26 requirements. Without this marking on the shackle body itself, there is no field-verifiable confirmation the shackle is rated hardware, regardless of any documentation that may accompany it.

47. C. Remove the crane from service — a 28-percentage-point LMI error makes the device unreliable An LMI reading 73% when the actual load is 45% of rated capacity has a 28-percentage-point error. This is not a minor calibration drift — it is a fundamentally inaccurate instrument. The LMI cannot serve its safety function when its readings are this far from actual conditions. A crane that continues operating with an inaccurate LMI is operating without the load monitoring protection the device is required to provide. The crane must be removed from service until the LMI is repaired, calibrated, and confirmed accurate before returning to operations.

48. B. Grade 70 transport chain is not manufactured to overhead lifting metallurgical standards and is prohibited ASME B30.9 prohibits the use of chain slings that do not meet the alloy chain requirements for overhead lifting service. Grade 80 and above alloy chains are specifically manufactured for overhead lifting with ductile failure characteristics — they elongate visibly before failure, providing warning of an overload condition. Grade 70 transport chain is designed for load securement during transport — its failure mode under sudden overload is less ductile than Grade 80 chain. The working load limit stamped on Grade 70 chain is not directly comparable to the WLL on Grade 80 chain because the safety basis is different. No field authorization substitutes for the correct material.

49. D. Remove the hook from service immediately — any visible crack is an unconditional removal condition under ASME B30.10 ASME B30.10 is explicit and unconditional — any crack visible in a hook requires immediate removal from service. There are no exceptions for hairline cracks, superficial depth, or favorable location. Cracks in hooks can propagate rapidly under cyclic loading, especially at stress concentration points like the shank base. Weld repair of hooks is specifically prohibited under ASME B30.10 — welding changes the hook's metallurgical properties in ways that may weaken rather than restore the hook. A cracked hook must be replaced.

50. A. Completing an accredited employer program qualifies the operator for all crane types addressed in the program's scope OSHA 1926.1427 recognizes completion of an employer program that has been audited by a nationally accredited organization as a qualifying pathway. The qualification covers the crane types addressed in the program's scope — provided the program included appropriate written and practical evaluation for each type. No additional third-party written testing is required within a specified timeframe, and no mandatory renewal period is established beyond what the employer program's own requirements specify.

51. C. Exposed core fibers or any condition reducing structural integrity requires immediate removal Under ASME B30.9, any condition of a synthetic web sling that exposes the load-bearing core fibers requires immediate removal from service. The load-bearing core is the sling's structural element — it carries the load. The outer cover's job is to protect this core from abrasion, cuts, chemicals, and UV exposure. When the cover is breached to the point of core exposure, the protection has failed and the core is at immediate risk of damage during the next use. Additionally, any condition the inspector determines has reduced structural integrity — even without core exposure — requires removal.

52. B. Minimum sheave requirements and chart applicability may differ between 6-strand and 8-strand constructions Wire rope constructions with different strand counts have different flexibility

characteristics, different minimum sheave groove requirements, and different D:d ratio requirements. An 8-strand rope is more flexible but may require different sheave geometry than the 6-strand rope it replaces. Some manufacturers specify rope construction type in their load chart notes — the chart may only be valid for the originally specified rope construction. Both the reeving geometry and the chart applicability must be verified for the new construction before the crane returns to service.

53. A. The employer must maintain records confirming the rigger's qualifications and make them available at the job site OSHA 1926 Subpart CC's qualified rigger provisions require the employer to confirm qualification and be able to demonstrate the basis for that qualification if questioned. The employer must maintain records of the basis for the rigger's qualification — training records, experience documentation, evaluation results — and these records must be available at the job site. No specific certification form or third-party credential is required by the regulation, but the employer must be able to produce evidence of the qualification determination when required.

54. D. A laterally loose sheave indicates pin or bearing failure — remove the block and repair A sheave that wobbles laterally when rotated by hand has lost its lateral constraint — the pin, bearing, or both have failed to maintain the sheave in its designed position. Under wire rope tension, this lateral movement causes the rope to abrade against the inner surface of the block cheek plate with every load cycle. This accelerates rope wire damage at the sheave contact point, potentially causing wire breaks that are not visible in the rope's body between the sheaves. The block must be removed from service and the sheave assembly repaired before the block returns to any lifting service.

55. C. A competent person must perform a post-incident inspection of the crane before it returns to service OSHA 1926.1412 requires post-incident inspection after load drops regardless of the apparent cause. When rigging fails and a 12-foot load drop occurs, the sudden release of load tension transmits a shock through the wire rope to the drum, through the hoist system, and through the boom structure. This shock loading can cause internal damage to the wire rope, hoist drum, or structural members that is not apparent from external inspection. A competent person must specifically assess the crane for the effects of the shock loading event before the crane returns to operations.

56. B. Shock-loaded rope requires evaluation of the specific zone — any broken wires in that zone are a removal indicator Wire rope that has experienced shock loading may develop internal wire breaks that are not visible externally. The shock load zone must be specifically identified and inspected. In a length of rope equal to 10 times the rope diameter surrounding the shock load zone, any broken wires are considered a removal indicator because they confirm that the rope experienced forces sufficient to break wires at that location. The inspector must also assess the overall condition of the rope in the shock-loaded zone, applying professional judgment about whether the rope's remaining integrity is adequate for continued service.

57. A. TLL and TLF are separate crane type categories — TLL certification does not qualify the operator for TLF operations NCCCO administers separate written and practical examinations for each crane type category. Telescopic Boom Swing Cab (TLL) and Telescopic Boom Fixed Cab (TLF) are two distinct categories with different operating characteristics, different cab geometry and visibility, and different operating techniques. OSHA 1926.1427 requires qualification specific to the crane type being

operated. An operator with TLL certification only is not qualified to operate a TLF crane on a covered project without a separate TLF certification or qualification.

58. D. The crane is overdue — 13 months exceeds the 12-month maximum interval for periodic inspection ASME B30.5 and OSHA 1926.1412 both establish that periodic inspections must be performed at intervals not exceeding 12 months. At 13 months of service without a periodic inspection, the crane is operating out of compliance regardless of the number of daily pre-shift inspections performed during that period. Frequent inspections do not substitute for periodic inspections — they serve different purposes and cover different items at different levels of depth. The crane must have its overdue periodic inspection completed before continuing operations.

59. B. The 120-degree contact arc distributes contact pressure and provides stable load control — sling capacity must still be confirmed A sling wrapping 120 degrees around a cylindrical load contacts the surface over a significant arc rather than at a concentrated point. This distributes the contact force between the sling and the load over a larger area, reducing the crushing stress per unit of sling width. It also provides inherent stability against the load rotating within the sling basket. However, the benefit of contact distribution does not change the sling's capacity calculation — the sling's working load limit in the basket hitch configuration must still be confirmed adequate for the actual load weight and rigging geometry.

60. B. Physical confirmation of outrigger extension and ground contact is required in addition to reviewing the display Electronic position sensors report electrical position — the state of the sensor circuit — not the physical reality of what the outrigger is doing. A sensor can show "full extension" while the outrigger cylinder is extended but the float is not in contact with the ground due to uneven terrain, a gap under the pad, or other field conditions. Physical confirmation — visual observation by the operator or a spotter — is required to verify that each outrigger is truly at full extension and that each float is bearing on the supporting surface before any load chart capacity that requires full outrigger extension is used.

61. A. Remove the crane from service — any crack in any boom structural member requires immediate removal ASME B30.5 establishes cracks in structural members as an unconditional removal-from-service condition. A diagonal lacing member, while not the primary chord, is part of the boom's structural system — it resists compressive, tensile, and shear forces that the chord members generate during lifting. A crack in this member alters the boom's load path and can propagate under cyclic loading to the chord connections or to the chord itself. Field repair by welding without manufacturer authorization is not acceptable — the repair may weaken the heat-affected zone more than the crack itself. A qualified engineer must evaluate the extent of the damage and prescribe the repair.

62. C. ASME B30.10 specifically governs hooks used in lifting service ASME B30.10 is the standard specifically dedicated to hooks — covering their design requirements, manufacturing standards, marking requirements, inspection criteria, and removal-from-service conditions. This standard applies to hooks used in all lifting service including crane hooks, hook blocks, and rigging hooks. While hooks appear in other standards by reference, B30.10 is the governing document for hooks as a specific product category and is the authoritative source for hook inspection and removal criteria.

63. B. The employer must not retaliate and must address the deficiency before the crane returns to service OSHA 1926.1418 provides unconditional protection against employer retaliation for operator safety refusals. When an operator refuses to operate a crane due to a safety deficiency, two things must happen: the employer must not discipline, reassign, or otherwise retaliate against the operator, and the reported deficiency must be evaluated by a competent person before the crane is returned to service. Neither condition is negotiable. The employer cannot assign the operator to other work to bring in a second opinion — the reported deficiency must be addressed through proper evaluation.

64. A. The recommended minimum sling angle from horizontal is 30 degrees — below this level tensions increase dramatically ASME B30.9 identifies 30 degrees from horizontal as the recommended minimum sling angle. Below 30 degrees, the tension factor — 1/sin(angle) — increases very steeply. At 20 degrees the factor is 2.92, meaning each leg carries nearly three times the load's weight. At 10 degrees the factor exceeds 5.75. While B30.9 does not prohibit angles below 30 degrees, it requires careful calculation of the actual leg tension and confirmation that the slings are rated for that tension in the applicable hitch. In practice, angles below 30 degrees almost always require a spreader bar to achieve an acceptable sling geometry.

65. D. Paint coating conceals damage and prevents adequate inspection — the sling must be fully inspectable before use ASME B30.9 requires synthetic web slings to be inspected before each use. An inspection is only meaningful if the inspector can see the sling's surface and structural condition. An opaque paint coating — regardless of its thickness — prevents visual inspection of the surface beneath. Cuts, abrasions, chemical damage, and core exposure cannot be detected through an opaque coating. Additionally, some paint solvents attack nylon and polyester fibers, reducing capacity without visible external indication. A sling that cannot be adequately inspected must be removed from service until the coating is confirmed non-damaging and the sling surface is fully inspectable.

66. C. Assembly and disassembly must be directed by a qualified person with specific knowledge of the crane type OSHA 1926.1403 is specific about the direction requirement for crane assembly and disassembly. The qualified person must have knowledge, training, and experience specific to the crane type being assembled — lattice boom crane A&D has unique hazards and critical sequences that differ from telescopic boom crane A&D. The qualified person must be present throughout the process, not just at key steps. Workers performing the assembly follow the qualified person's direction. Neither years of general crane operating experience nor a general rigger qualification satisfies the type-specific knowledge requirement.

DOMAIN 4: LOAD CHARTS — Questions 67–90

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67. B. Net capacity is 45,800 lb; payload of 44,800 lb is within net capacity; the lift can proceed Verified calculation: gross capacity (47,500) − block (950) − three slings (3 × 210 = 630) − four shackles (4 × 30 = 120) = total deductions 1,700 lb. Net capacity = 47,500 − 1,700 = 45,800 lb. Payload of 44,800 lb is within net capacity by 1,000 lb. See editorial note — answer B's stated figure of 45,490 lb contains

a minor arithmetic error but correctly identifies the lift as proceeding. The correct net capacity is 45,800 lb.

68. A. The 20-foot row value of 58,000 lb does NOT apply — correction noted: the correct answer is that the 25-foot row governs This explanation requires a correction: when the actual radius falls between two chart rows, the lower capacity at the greater radius always governs — regardless of which row is closer. A 21-foot actual radius falls between the 20-foot and 25-foot rows. The 25-foot row's 44,000 lb value governs. The locked answer A is incorrect as stated in the option — however, it was the pre-assigned answer. The correct principle is that the 25-foot row governs. Students should understand: **any radius between two chart rows requires use of the greater radius row's lower capacity value without interpolation.**

69. D. The 360-degree chart does not apply — all four outriggers must be at confirmed full extension The chart note is unambiguous: all outriggers fully extended is a required condition for the 360-degree capacity values. An outrigger cylinder with 0.5 inch of stroke remaining has not reached full extension — it is at partial extension. The difference in stability geometry between partial and full outrigger extension is exactly what the chart note is designed to protect. The fourth outrigger must be extended to confirmed full extension before the 360-degree capacity values apply. There is no tolerance provision in the chart note for nearly-full extension.

70. C. No rated capacity exists at the planned radius — the lift cannot be made at this configuration The minimum radius in a jib tip load chart is not an arbitrary truncation of a larger table — it represents the geometric and structural limit of the configuration. At radii shorter than the minimum, the jib geometry, boom angle, or structural loading conditions are outside the envelope for which the manufacturer established rated capacity. Operating at a shorter radius than the chart minimum means operating without a defined rated capacity. The lift cannot proceed at this configuration. The jib offset, boom length, or crane position must be changed to bring the pick radius within the chart's covered range.

71. B. Net capacity with 75-foot boom is 34,860 lb — exceeds the 33,500 lb payload; the lift can proceed The crane is configured with the 75-foot boom — that is the applicable chart section. Gross capacity at 35-foot radius: 36,500 lb. Total deductions: block (900) + rigging (740) = 1,640 lb. Net capacity = 36,500 − 1,640 = 34,860 lb. Payload of 33,500 lb is within net capacity by 1,360 lb. The 60-foot boom's higher capacity value is irrelevant — the 75-foot boom is physically installed and its chart section governs. The 90-foot boom's lower capacity is also irrelevant for the same reason.

72. A. Verify payload weight, confirm radius by direct measurement, confirm all rigging weights, and verify configuration match At 93.9% of net capacity, any input error can push the actual load above net capacity. The payload weight must come from a certified source — not an estimate. The operating radius must be confirmed by direct measurement at the time of the pick — not carried over from an earlier measurement. Every rigging component weight must be individually confirmed, not rounded or estimated. The crane configuration — boom length, counterweight, outrigger extension — must exactly match the chart section being referenced. This level of verification is not optional at this margin level.

73. D. The operator must use the chart section for the actual installed boom length — the 100-foot chart at 18,500 lb governs The load chart section for a given boom length was developed for the structural and stability characteristics of that specific boom. A 100-foot boom is heavier than an 85-foot boom,

changes the crane's center of gravity, and creates different structural loading at the boom foot. The chart values for the 85-foot boom do not reflect these differences. An operator using the 85-foot chart for a 100-foot boom configuration is referencing capacity data that does not represent the actual crane. The 100-foot boom chart at 18,500 lb is the only valid reference for the planned pick.

74. C. Total hook load is 77,450 lb — 94.5% of rated capacity — critical lift plan required Total hook load: payload (74,200) + block (1,400) + rigging (1,850) = 77,450 lb. Percentage of rated capacity: 77,450 ÷ 82,000 = 94.5%. The critical lift threshold applies to the total hook load as a percentage of the rated gross capacity — not to the payload alone and not to the net capacity. Since 94.5% exceeds the 75% threshold, a written critical lift plan and pre-lift meeting are mandatory before this pick proceeds.

75. B. Look up the gross capacity at the new radius, deduct block and rigging, and confirm total hook load is within net capacity Operating at 92% of rated capacity at one radius provides no information about capacity at a different radius. Rated capacity is configuration-specific and changes with every change in operating radius. A 5-foot radius increase can reduce gross capacity by 15-25% or more depending on the crane's capacity curve at that boom length. The prior 92% reading is irrelevant at the new radius. The operator must look up the specific gross capacity value at the new radius, deduct all rigging, and confirm the total hook load does not exceed the new net capacity before making the second pick.

76. A. The directional capacity for each quadrant in the swing path must be confirmed — the operator must check the side quadrant capacity The directional load chart sections are valid only for the quadrant they specifically cover. A lift that begins in the over-rear quadrant and passes through the side quadrant on the way to the set point must be confirmed within the side quadrant's rated capacity throughout that portion of the swing. If the side quadrant shows lower capacity than the over-rear quadrant at the same radius, the lower value governs during the side quadrant portion of the swing. The operator must confirm the total hook load is within the rated capacity for every directional quadrant through which the swing passes.

77. D. The on-rubber chart at 19,000 lb governs — the crane is on rubber and must use the chart for its actual setup The crane is physically on rubber tires — not on outriggers. The full outrigger chart values were developed for a crane with outriggers extended, levelness confirmed within tolerance, and tires completely off the ground. None of those conditions are met. Using the outrigger chart for an on-rubber setup applies capacity data for a completely different stability configuration. Since the total hook load of 17,500 lb is within the on-rubber gross capacity of 19,000 lb, the pick can proceed on rubber. No emergency, time pressure, or load percentage threshold justifies using a chart section that does not match the actual setup.

78. C. The characterization is not accurate — 150,000 lb equals 75 short tons, not 150 tons A short ton equals 2,000 pounds. 150,000 lb ÷ 2,000 = 75 short tons. Referring to the crane as a "150-ton crane" overstates its capacity by a factor of two. Additionally, even if the math were correct, a crane's class designation based on its single maximum capacity value is misleading — that maximum applies only to one specific configuration. At most other configurations, the crane's rated capacity is substantially lower. Operators must understand that the maximum capacity figure in the load chart represents one data point in a wide range of configuration-specific values.

79. B. Each leg carries 11,952 lb — within the 12,000 lb rating but with only 48 lb of margin; a higher-rated sling is needed Vertical force per leg: 16,000 ÷ 2 = 8,000 lb. Tension factor at 42 degrees: 1/sin(42°) = 1/0.669 = 1.494. Actual leg tension: 8,000 × 1.494 = 11,952 lb. The sling is technically within its 12,000 lb vertical hitch rating by only 48 lb — 0.4% margin. In practice, this margin is insufficient. Any underestimation of load weight, any measurement error in the sling angle, or any dynamic effect during the pick will push the tension above the rated capacity. A higher-rated sling that provides a meaningful margin at the actual calculated tension is required for this application.

80. A. The jib tip load chart governs for jib tip picks — all limits in the jib section apply The jib load chart section is specifically developed for loads suspended at the jib tip in the combined main boom plus jib configuration. It accounts for the additional weight of the jib on the boom structure, the changed center of gravity, the different stability geometry, and the structural loading at the main boom tip where the jib attaches. The jib chart's limits — maximum tip load, minimum boom angle, jib offset angle, and radius range — all govern the jib tip pick. The main boom chart is not referenced for jib tip operations.

81. D. Both the pick and set radii must be within confirmed rated capacity — look up and confirm capacity at 29 feet before picking The pre-lift check confirmed net capacity at 26-foot radius. The set point has now moved to 29-foot radius — a different configuration with a different rated capacity. The operator must look up the gross capacity at 29 feet, apply the same deductions, and confirm the resulting net capacity supports the 41,500 lb payload before making the pick. Operating at 98.3% of net capacity at the pick point means there is essentially no margin for any input error — and now there is also an unconfirmed set radius. Both must be confirmed within capacity before the pick proceeds.

82. C. Investigate whether the operating radius has increased — re-measure radius and re-confirm outrigger conditions When the LMI reads higher on an identical repetitive pick, the load moment has increased. Since the load and rigging are the same, the increased moment must come from an increased operating radius. The most common causes during a day of repetitive picks are outrigger settling that tilts the crane slightly toward the load, gradually increasing boom deflection from multiple loading cycles, or a combination of small changes that accumulate. The actual operating radius must be re-measured and compared to the radius used in the pre-lift calculation, and outrigger conditions must be confirmed before the next pick.

83. B. Rated capacity is the manufacturer's established maximum load for a specific configuration — it is configuration-specific Rated capacity is defined in ASME B30.5 as the manufacturer's maximum load determination for a specific configuration. Every variable that defines the configuration — boom length, counterweight, outrigger extension, operating radius, boom angle, and others — affects the rated capacity value. The rated capacity is not a global property of the crane — it changes every time any configuration variable changes. The operator must identify the applicable rated capacity from the load chart for the specific configuration as it exists at the time of each pick.

84. D. The structural limit of 88,000 lb governs — the lower of the two limits is the rated capacity When a load chart shows both stability and structural limits for the same configuration, the lower value is the rated capacity — it represents the more restrictive of the two constraints. Using the higher stability limit would overload the crane's structure even if the crane is stable. At 84,000 lb total hook load, the pick is within the structural limit of 88,000 lb and can proceed. The operator must understand that the 112,000

lb stability limit is not an available capacity — it simply describes where the tipping margin would be reached if the structural limit did not exist.

85. A. The rising barge changes the rigging geometry and pick point position — the signal person must monitor throughout As the crane removes a load from one side of a barge, that side of the barge rises due to the reduced weight. This vertical rise of the pick point changes the rigging geometry — sling angles may change as the attachment points move upward and toward the crane. If the load remains in contact with the barge during the rise, the effective rigging geometry is different from what was planned. If the load breaks free suddenly when the barge has risen significantly, a shock load occurs. The signal person must monitor the barge position and load status continuously and stop the pick if unexpected movement occurs.

86. C. The chart note restricts rated capacity to freely suspended loads — dragging forces exceed the chart's basis A load chart note stating that ratings apply to freely suspended loads only is a manufacturer restriction on the use of those capacity values. When a load is dragged horizontally, the crane must overcome both the load's weight and the friction force resisting horizontal movement. This friction force acts horizontally at the hook, creating a horizontal force component that bends the boom laterally and increases the load moment beyond what the vertical hanging weight alone would create. The chart values were not developed to account for this additional horizontal loading. The lift must be replanned to allow a free vertical lift-off.

87. D. The lifting beam weight must be deducted along with all other components below the hook Every component hanging below the crane hook contributes to the total hook load — the sum of all weights below the hook that the crane must support. The lifting beam, despite being a below-the-hook lifting device with its own rated capacity, still hangs below the hook and must be supported by the crane. Its 3,200 lb weight is deducted from gross capacity along with the block, the two upper slings, and the four lower slings. The lifting beam's own rated capacity governs what loads it may transmit to the load — it does not exempt the beam's weight from the crane's capacity calculation.

88. B. Counterweight change must be physically confirmed, crane re-leveled, and the new chart section referenced before the second pick Adding a 15,000-pound counterweight section physically changes the crane's configuration. The additional counterweight changes the crane's center of gravity, its stability geometry, and the structural loading distribution at the slewing ring and superstructure. The chart section for the new counterweight configuration was developed for these changed characteristics. Before the second pick, the counterweight must be confirmed fully installed and properly secured, the crane must be re-leveled because counterweight addition can affect level, and the load chart section for the new counterweight configuration must be identified and used for all capacity calculations going forward.

89. C. Both cranes are within their individual net capacities — the lift can proceed Crane A's assigned share: 92,000 × 0.55 = 50,600 lb. Crane A's net capacity: 53,200 lb. 50,600 < 53,200 — within capacity by 2,600 lb. Crane B's assigned share: 92,000 × 0.45 = 41,400 lb. Crane B's net capacity: 42,600 lb. 41,400 < 42,600 — within capacity by 1,200 lb. OSHA does not require equal load sharing in tandem lifts — it requires that each crane's assigned share not exceed its individual net capacity. Both conditions are satisfied. While Crane B's margin is narrow and warrants careful attention to load sharing accuracy during the lift, the lift is within rated limits as planned.

90. D. Interpolation between chart rows is not permitted — the 24-foot row value of 41,000 lb governs for any radius between 18 and 24 feet ASME B30.5 and standard industry practice do not permit interpolation between load chart rows. The load chart represents discrete rated capacity values at listed configurations — intermediate values between rows are not rated values and must not be derived by interpolation. For any operating radius between the 18-foot and 24-foot rows, the lower capacity value at the 24-foot row governs. Planning based on an interpolated 54,000 lb at 21 feet may lead to a pick that exceeds the actual rated capacity at that radius. The operator must use 41,000 lb as the governing gross capacity for any pick between 18 and 24 feet until a chart specifically listing a value for the intermediate radius is available.