This form has three sections used to document the lift plan required for all *critical, planned engineered and pre-engineered production lifts*. Deviations from the approved plan must be reviewed by the original approvers. A copy of the plan must be uploaded in to Teamcenter.

If the lift is covered by an existing procedure, attach it to the form and fill out only the first page.

Approved plans may be reused for similar lifts of like material with the same lifting equipment. The date of the lift and workers may be different. Plans must be signed only once: by preparers and approvers when being written and approved, and by workers after reading the plan. Plans must be revised and reapproved if conditions change.

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| **Section 1: Plan Details Work Order/ Project Number/ Permit Number:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **1** | **Plan Preparer:**  | James Kilmer | **Location of Lift: Minos surface and underground** |
| **2** | **Description of Object to be Lifted:** | 282 Minos detector planes at ~8000 pounds each |
| **3** | **Type of Lift:***Check all that apply**See FESHM 10200 for definitions of each lift* | **[ ]  Critical****[ ]  Planned Engineered****X[ ]  Pre-Engineered Production** |
| **4** | **Hoisting Equipment Manufacturer & Type:** | Model Number: Minos shaft andCavern cranesType: Bridge | Rated Capacity:15 tons each craneInspection Date \_\_\_/\_\_\_\_/\_\_\_\_\_\_ |
| ***Sections 5, 6, 7, 8, 9 and 10 are to be filled out when a mobile crane is used. Not Applicable*** |
| **5** | **A. Expected Radius:** | (Maximum Radius pick, swing, set)  | (Planned Radius) |
| **B. Load Rating at Radius:** | (Maximum Radius)  | (Planned Radius) |
|  | **C. Swing Direction and Degrees of Swing** | Swing Direction:  | Degrees of Swing:  |
|  | **D. Lift Elevation and Boom Angle** | Lift Elevation: | Boom Angle:  |
| **6** | **A. Weight of Rigging:** | A. B.  |
| **B. Weight of Load:** |
| **7** | **A: Total Load Weight:** |  |
| **B: Percent of Rating (for mobile crane):** | . |  |
| **8** | **Jib or Boom Extension Used (Yes or No)** | Length/Erected:  | Weight |
| **9** | **Clearances:** | **Load to Boom:** |  |
| **To Existing Facilities:** |  |
| **To Power Lines:** |  |
| **Fall Zone:** |  |
| **10** | **Ground Stability:** | **Surface Type:** | **[ ]  Bare Ground [ ]  Asphalt [ ]  Concrete [ ]  Other**  |
| **Ground Stable/Support Needed:** | **[ ]  No [ ]  Yes –** Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **11** | **Anticipated Hazards: (wind, weather, visibility, power lines)** | **[ ]** Wind is < than 25 MPH or lower as specified in JHA.**[ ]** Power Lines > 20 Feet from Maximum Working Radius of Crane (see OSHA 1926.1408)**[ ]** Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Attachments Included:** | **[ ]** Operator Qualifications (Required)**[ ]** Crane Operator Medical Card (Required for mobile cranes)**[ ]** Crane Operator Evaluation Form (Mobile cranes only)**[ ]** Rigger Qualifications (If riggers are used) | **[ ]** Site Plan **[ ]** Utility locating documentation (e.g. JULIE)**[ ]** Rigging Configuration (Required)**[ ]** Hazard Analysis |
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| **Define Rigging Gear Requirements**  |
| 1. List each piece of rigging gear shown on the rigging sketch or photo in the table below (such as: load hook, shackles, slings, eye bolts). If a component weighs more than 10 pounds, include the weight in the weight column.
2. Label the sketch or photo using the corresponding number for the gear.
3. Draw sling angles and the resulting load reduction factors for slings and eyebolts.
4. Calculate the force on each piece of rigging gear. Show that angles are accounted for in determining forces.
5. Determine the required rigging gear capacity and size. Indicate if this is an exact specification or a minimum.
 |
| **Item** | **Name of Rigging Equip:** (Sling, Eyebolt, etc.) | **Weight** | **Force on gear** | **Capacity / rating / working load limit** | **Size specifications** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 8 |  |  |  |  |  |

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| **Section 2: Rigging Plan and Sketch** **Plan the Rigging** *(define specific controls)* |
| On a sketch or photo (see sketch grid on next page), show how the item will be rigged and the type of gear to be used:1. Show location of shackles, hoist rings, spreader beams, slings, etc.
2. Show attachment points (how rigging gear will be attached to load)
3. Show where padding of sharp edges is necessary
4. Provide the weight of heavy equipment such as a lifter or spreader beam
5. Show proper orientation of eyebolts
6. Indicate the center of gravity (horizontal and vertical)
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| **Rigging Sketch or Photo of Rigged Item** *(Include all information required to determine that the load is properly rigged, and that appropriate rigging gear is selected. Include, as applicable, sling angles, eye bolt orientation, padding points, center of gravity, type of sling hitch, and any other pertinent information.) May attach drawings.*  |

 |

See attached drawings. The positioning fixture and the two strongbacks have engineering notes approved and were all load tested to ASME B30.20 standards (in effect in 2000-2003). This equipment was used to install the 282 detector planes in 2003-2004 using the reverse of the attached procedure.

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| **Section 2: Rigging Plan and Sketch, continued**

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| **Rigging Sketch or Photo of Rigged Item** *(Include all information required to determine that the load is properly rigged, and that appropriate rigging gear is selected. Include, as applicable, sling angles, eye bolt orientation, padding points, center of gravity, type of sling hitch, and any other pertinent information.)* |

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| **Lift Director** |
| Printed Name: James Kilmer | Signature: | Date: |
| **Technical Approver (Crane Office SME), or designee** |
| Printed Name: Marcel Borcean | Signature: | Date: |
| **Contractor Supervisor (if applicable)** |
| Printed Name: | Signature: | Date: |
| **Qualified Crane/Forklift Operator** |
| Printed Name: Thomas Olszanowski | Signature: | Date: |
| **ES&H Representative**  |
| Printed Name: Angela Aparicio | Signature: | Date: |
| **D/S/P Head (or designee)** |
| Printed Name: | Signature: | Date: |

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| **Person-in-Charge** (If the Lift Director cannot be present, they may designate a person-in-charge (PIC), who must be someone other than the operator.) |
| Printed Name: Thomas Wicks | Signature: | Date: |
| **Authorized Workers** *(The Lift Director / person-in-charge must ensure that all personnel fully understand the requirements of the lift plan and their role in the operation. Workers signatures below attest to this.)* |
| Name | Signature | Date |
| Name | Signature | Date |
| Name | Signature | Date |
| Name | Signature | Date |
| Name | Signature | Date |
| Name | Signature | Date |
| Name | Signature | Date |
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Lift Plan for Removal of Minos Planes

April 28, 2020

Jim Kilmer

 This plan is a step by step procedure for how to move the Minos planes out from the underground. Two lifting fixtures are used to move the planes. The positioning fixture takes the planes of the detector rails and attaches to the cart to move them under the shaft crane. At the shaft the crane lowers a Minos strongback down to the cart where the planes are transferred from the positioning fixture (which stays attached to the cart) to the strongback for lifting to the surface. Both fixtures were load tested and used to install the 282 steel planes in the Minos detector in 2003 and 2004. Engineering notes for both fixtures are available. These drawings are attached for the fixtures and the cart:

9213.300-ME-397226 Positioning Fixture

9213.300-ME-384185 Near Detector Strongback

9210.300-ME-397515 Cart, Positioning fixture, plate, and strongback

9213.300-ME-397430 Transport Cart, Front elevation

9213.300-ME-397468 Cart side view

1. Lower the positioning fixture down the shaft.
2. At the bottom of the shaft bolt the positioning fixture to the cart using 8 bolts from the tabs on the cart to the tabs on the fixture. Disconnect the shaft crane. See drawing 397430.
3. Move the cart to the Minos cavern.
4. Connect the cavern crane. Unbolt the 8 bolts holding the fixture to the cart.
5. Lift the fixture from the cart and move to the front of the Minos Detector.
6. Engage the bottom hooks on the front plate. Move the top of the fixture until the fixture is parallel to the plate.
7. Engage the upper clamps (parts 15 and 16 on drawing 397226) on the plate ears. Torque these bolts to 150 ft-lb.
8. With the plate secure on the positioning fixture, remove the four axial bolts, and the magnet collar.
9. Lift the plane off the rails and move to the cart.
10. Attach the fixture and plane to the cart using 8 bolts.
11. Move the cart back to the shaft.
12. Using the shaft crane lower a strongback down to the cart.
13. Engage the plane attached to the positioning fixture with the strongback hooks at the bottom of the plane.
14. Move the shaft crane to the west to mate the strongback parallel with the plane.
15. Make up the clamps at the ears on the strongback. Torque the bolts to 100 ft-lb.
16. When the strongback is securely attached to the plane loosen ear clamps on the positioning fixture.
17. Raise the strongback slightly to disengage the lower hooks and the ear clamps on the positioning fixture.
18. As soon as the positioning fixture is loose move the crane to the east and lift the plane up the shaft.
19. When the strongback reaches the surface, have a person who is tied off wearing fall protection open the gate on the safety railing around the shaft.
20. Move the crane south so the strongback moves through the gate in the railing. Close and lock the gate as soon as the strongback is through the gate.
21. The strongback has Hilman rollers on the base to assist with laying it on the floor. Attach a tag line to the base rail of the strongback. The strongback is designed such that when it is in the air with a plane on it the strongback is NOT plumb. The strongback is designed so that with the plane held the strongback/plane combination has a small angle (~ 1 degree) so that the steel plane is resting on the strongback even when “vertical”. Landing the Hilmans should just allow the strongback to be lowered to the floor with the bottom rolling out from under the hook. If there is any hesitation the spotters should pull on the rope in the direction the bottom is supposed to move.