



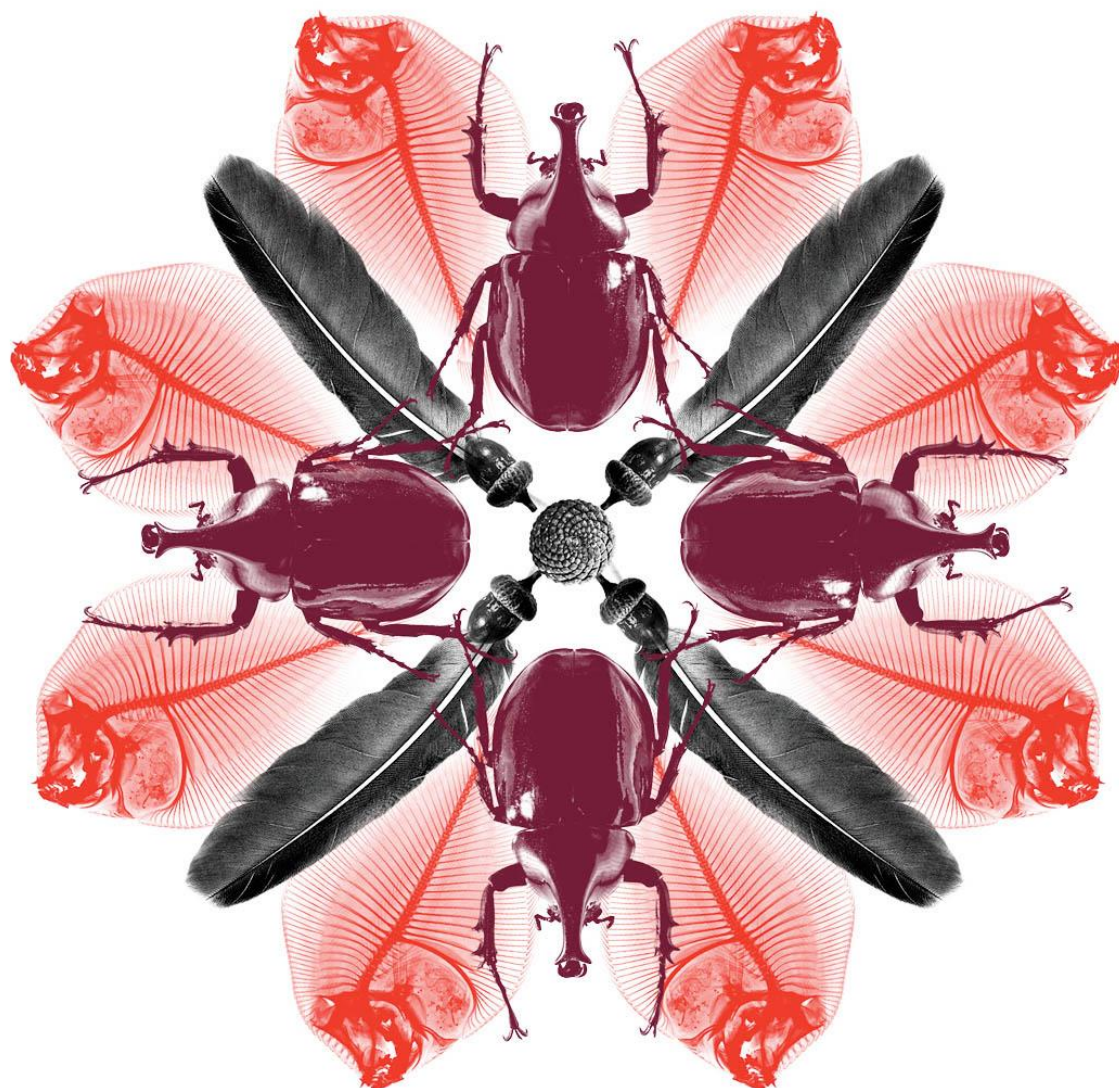
Australian Government
Department of Agriculture
and Water Resources

Machinery Cleaning Guide - Motor Grader

Biosecurity

Publication series

April 2016



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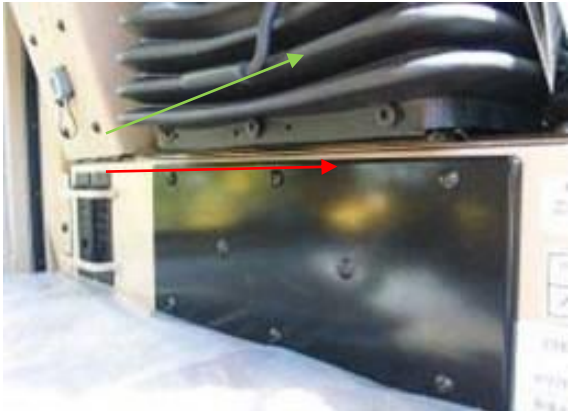


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Cleaning guidelines

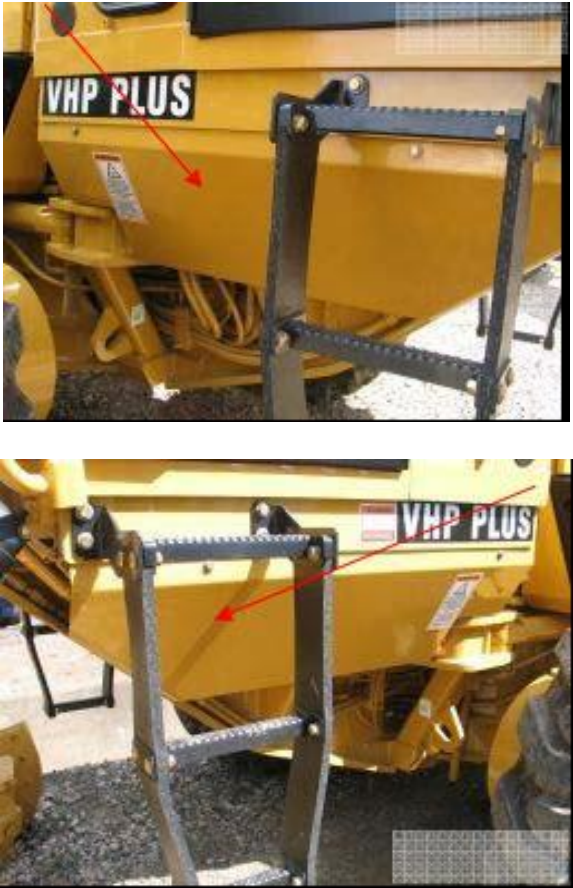

Cabin and pivot point

Description	Images
<p>A typical view of a grader cabin from the side. Cabin door rubbers can be contaminated and are therefore an area of concern. The yellow arrow highlights the hollow cabin framework, which requires flushing.</p>	
<p>Remove all rubber floor matting (red arrow) and clean underneath. If there are non-affixed floor pans (blue arrow) underneath the matting, remove and clean underneath.</p>	

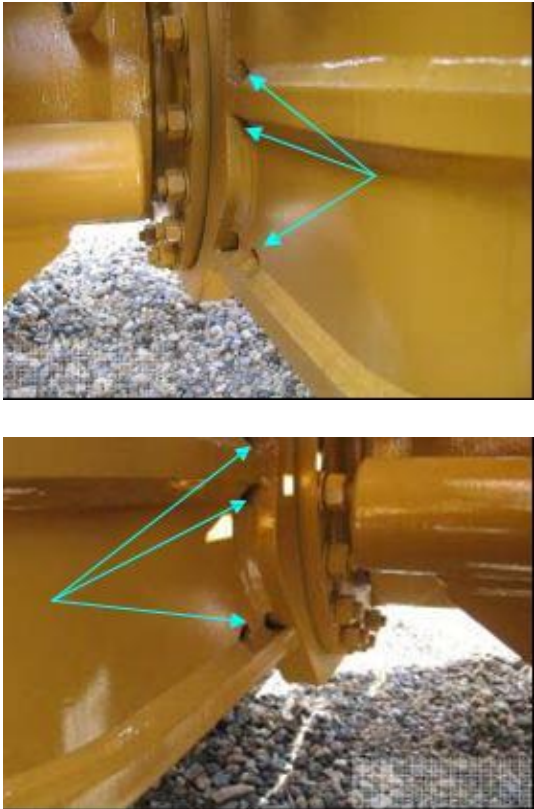

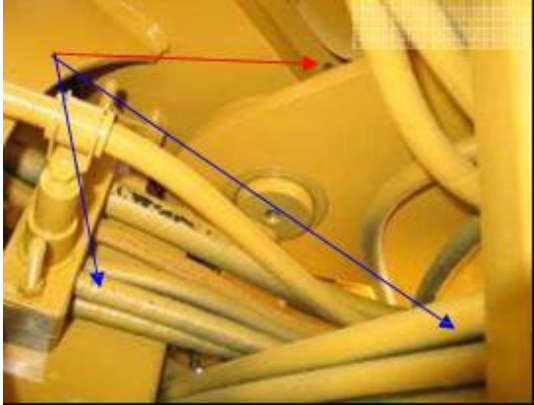
Description	Images
<p>Check below the seat on all models for box sections such as the one highlighted (red arrow). These will need to be checked internally for cleanliness and be accessible at the time of inspection. The rubber shroud under the seat (green arrow) must be externally and internally cleaned and inspected.</p>	
<p>All joystick control panels will need to be cleaned internally and be accessible at the time of inspection.</p>	
<p>The steering column (red arrow) will need to be internally cleaned and inspected, likewise the air-conditioning vents (blue arrow) can harbour internal biosecurity risk material.</p>	

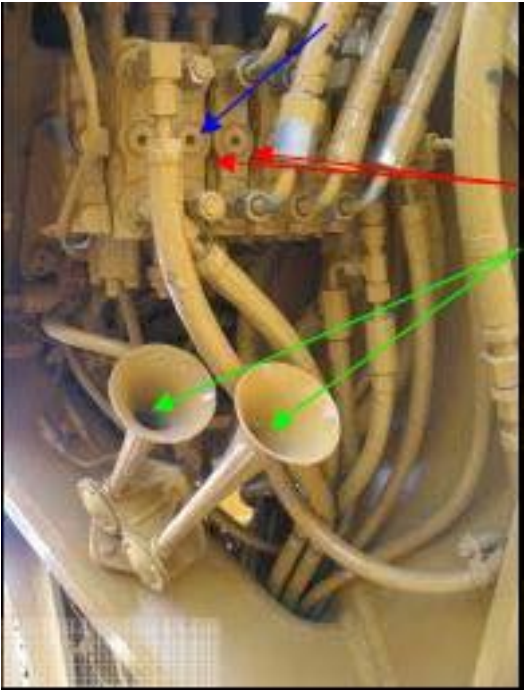
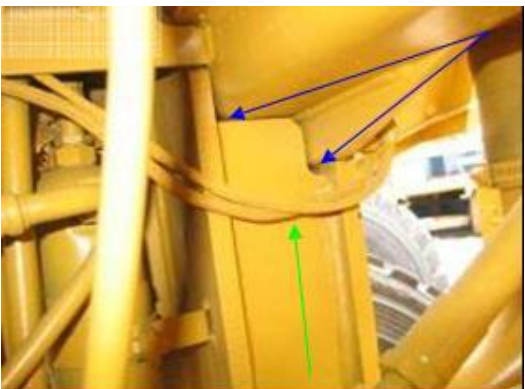
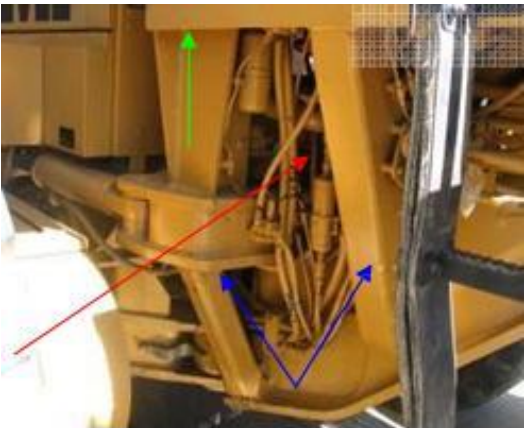
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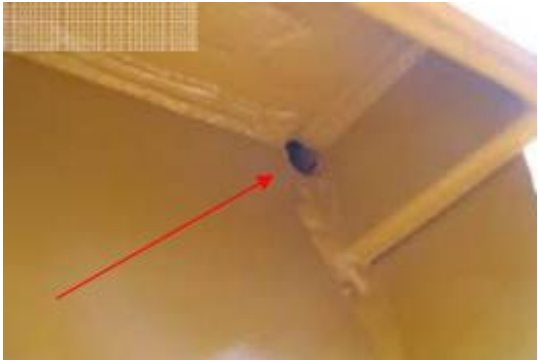
Description	Images
<p>The internal wall lining behind the seat (red arrows) must be removed, allowing access for cleaning and inspection. Access will be required to verify the internal cleanliness of the joystick control panel (blue arrow).</p>	 A photograph of the interior of a motor grader cab. A large, light-colored seat is in the center. Behind the seat, the internal wall lining is visible. Two red arrows point to the wall lining on either side of the seat. A blue arrow points to the joystick control panel located below the seat.
<p>Check overhead storage compartments (red arrows) are free of biosecurity risk material.</p>	 A photograph of the overhead storage compartments in the cab. Two red arrows point to the compartments, which are located above the seat and control panel.
<p>Check the external cabin framework for hollow channels as illustrated. If open-ended (red arrow), then these will require flushing to verify cleanliness.</p>	 A close-up photograph of the external cabin framework. A red arrow points to a hollow channel in the metal structure, which is open-ended.

Description	Images
<p>The protective shrouds just below the cabin need to be removed to facilitate the cleaning and inspection process.</p>	
<p>Removing the non-affixed panels from below the cabin will facilitate the cleaning and inspection process (blue arrow). Check all ladder steps (red arrows) are clean.</p>	


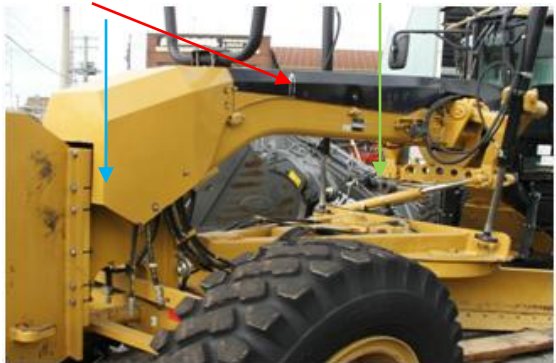
Description	Images
<p>All lights (red arrow) must be checked and as previously stated, the door rubbers maybe contaminated (yellow arrows).</p>	
<p>Below the cabin and behind the pivot point is a number of channels and hydraulic hoses (blue arrows), all requiring thorough cleaning and inspection. The red arrows highlight channels that may have drainage holes on the base (green arrows). The aqua arrows allude to drainage holes at the rear that will be illustrated next.</p>	





Description	Images
<p>Illustrates the drainage holes located behind a number of hydraulic hoses and pivot area, directly below the cabin.</p>	
<p>The bottom pivot plate must be cleaned and free of all biosecurity risk material.</p>	
<p>The top pivot point below the cabin floor. This area must be thoroughly cleaned, including all hydraulic hoses (blue arrows) and ledges (red arrow).</p>	

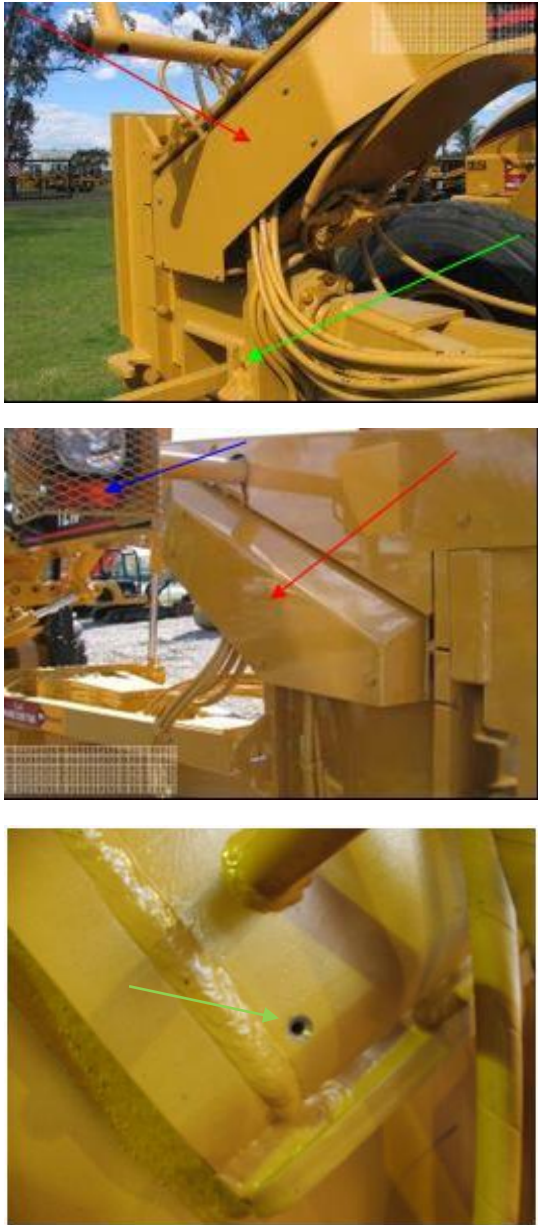

Description	Images
<p>A closer view of the hydraulic hoses under the cabin. Each hose must be thoroughly cleaned and inspected. Ensure in between each coupling (red arrow) and countersunk hole (blue arrow) is clean and free of biosecurity risk material. Wasp nests have been found inside horns (green arrow), internal verification is required.</p>	
<p>The green arrow highlights one of the vertical support channels under the cabin. As this channel is not sealed (blue arrows), in this instance it will require flushing to verify cleanliness.</p>	
<p>Check under all cabin support rails for drainage holes or openings. As the green arrow highlights and the next illustration illustrates, not all holes are on the bottom of the channels. Check all surfaces of other support channels (blue arrows) for openings that will require flushing, if present. The myriad of hydraulic hoses in this area requires thorough cleaning and inspection.</p>	



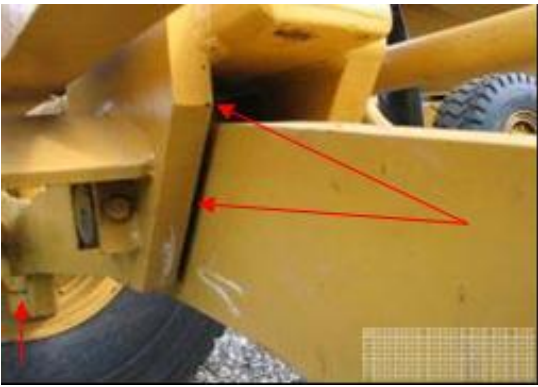
Description	Images
<p>The opening at the top of the channel (red arrow) as highlighted by the green arrow in the last illustration. These areas must be flushed to verify cleanliness.</p>	

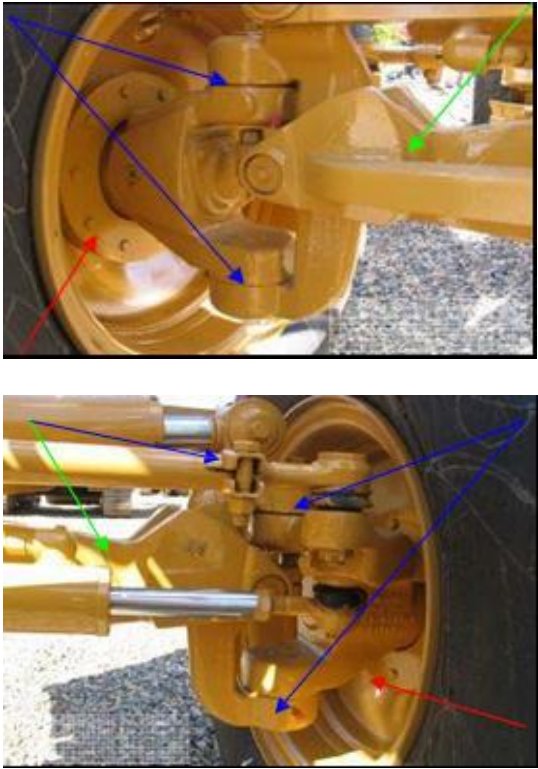
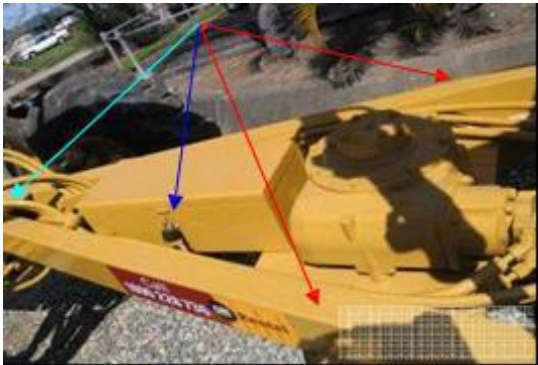
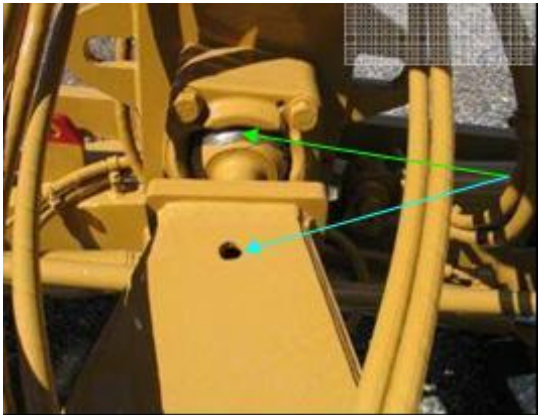
The gooseneck and front end

Description	Images
<p>The gooseneck (red arrows), circle arms (green arrow) and front end (aqua arrow) of the grader.</p>	<p>H Model</p>  <p>M Model</p> 


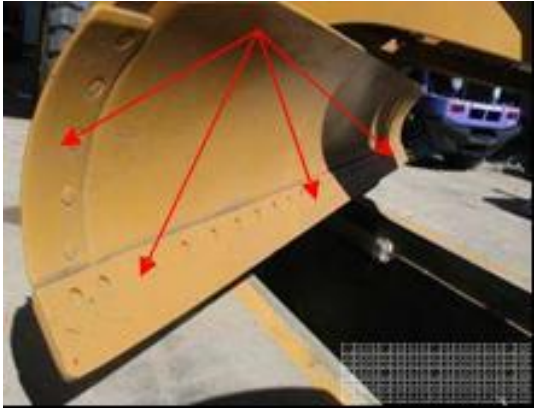
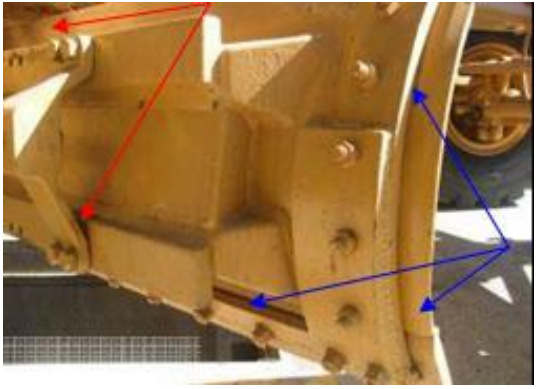
Description	Images
<p>All non-affixed panelling (red arrow) must be removed from along the gooseneck to facilitate cleaning and inspection.</p>	
<p>The rear of the gooseneck, just in front of the cabin. All non-affixed panelling has been removed to allow cleaning of all hydraulic hoses and inspection. The hollow area highlighted by the direction of the green arrows is to be flushed to verify cleanliness.</p>	 <p>H Model</p>  <p>M Model</p> 

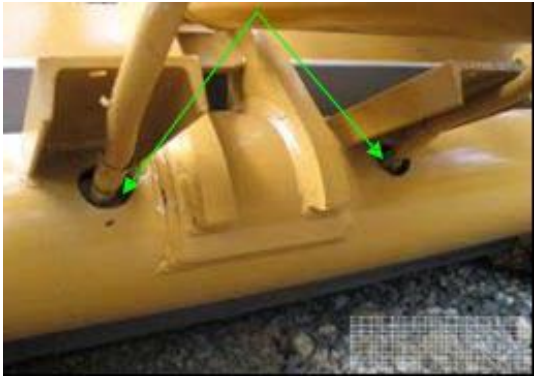


Description	Images
<p>On the front end or nose, a variety of non-affixed panelling can be found (red arrows). All must be removed to facilitate the cleaning and inspection process. The green arrow highlights the gooseneck drainage hole, which will be highlighted later. Check the internal of all light fittings (blue arrow) for cleanliness. The bottom image highlights further access at front of gooseneck provided by importer to confirm freedom of biosecurity risk material.</p>	
<p>The front counterweight (red arrow). Check all surfaces for cleanliness and for drainage holes on the underside (green arrow). Flush if drainage holes are present.</p>	

Description	Images
<p>The drainage hole (green arrow) at the front of the gooseneck as mentioned earlier.</p>	
<p>A drainage hole (red arrow) at the bottom of the counterweight. This will require flushing to verify cleanliness.</p>	
<p>This illustration highlights the pivot point between the two front axels. It may be necessary to flush this area (red arrows) to verify cleanliness. All contaminated grease must be removed.</p>	


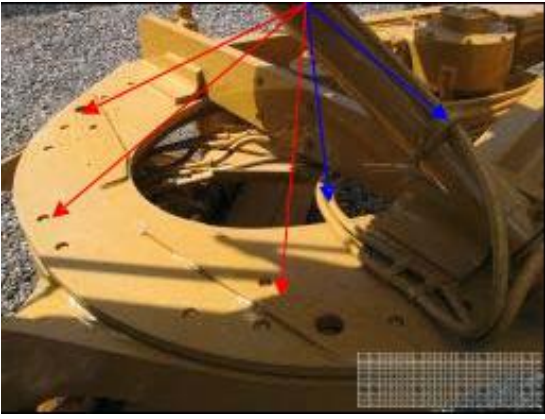
Description	Images
<p>The front rims (red arrows), axels (green arrows) and hydraulic rams and pivot points (blue arrows). All contaminated grease must be removed from these areas.</p>	
<p>The circle support arms (red arrows) under the gooseneck. Check these arms for cracks, splits and evidence of repair or drainage holes (aqua arrow) as illustrated next. Remove all contents of the toolbox (blue arrow) and clean internal surfaces.</p>	
<p>The drainage hole (aqua arrow) at the point where the two arms meet at the front end. There may be further drainage holes on the underside. If these arms have openings as illustrated, they must be flushed to verify cleanliness.</p>	

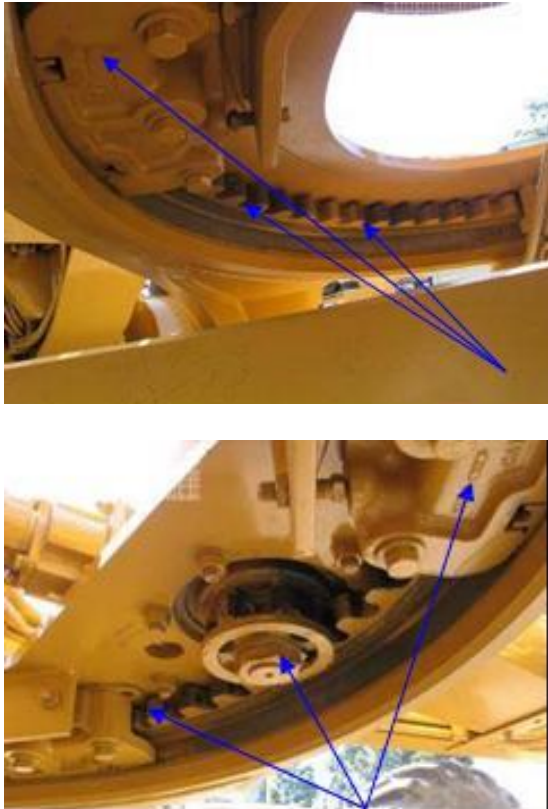

Blade and cutting teeth

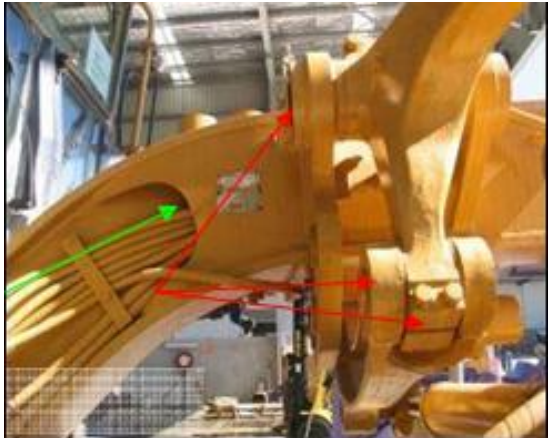
Description	Images
<p>A grader blade (red arrow) and circle above (blue arrow).</p>	 <p>A photograph of a yellow motor grader blade. A red arrow points to the blade itself, and a blue arrow points to a circular component above it. The blade is positioned over a gravel surface.</p>
<p>All cutting teeth along the blade must be loosened off and flushed to verify cleanliness.</p>	 <p>A close-up photograph of a yellow grader blade. Red arrows point to several cutting teeth along the edge of the blade, indicating they need to be loosened and flushed.</p>
<p>All rear surfaces of the blade are to be cleaned and all cutting teeth loosened off and flushed.</p>	 <p>A close-up photograph of the rear surface of a yellow grader blade. Red arrows point to the rear surfaces, and blue arrows point to the cutting teeth, indicating they need to be cleaned and loosened.</p>

Description	Images
<p>On some models there may be openings (green arrows) where the hydraulic lines enter the rear of the blade. These areas must be flushed in the presence of the inspecting officer to verify cleanliness.</p>	
<p>As blades can be adjusted along a slide, flush through the small recesses (green arrow) to verify cleanliness.</p>	
<p>Clean and inspect all countersunk recesses (red arrows) on the nuts.</p>	

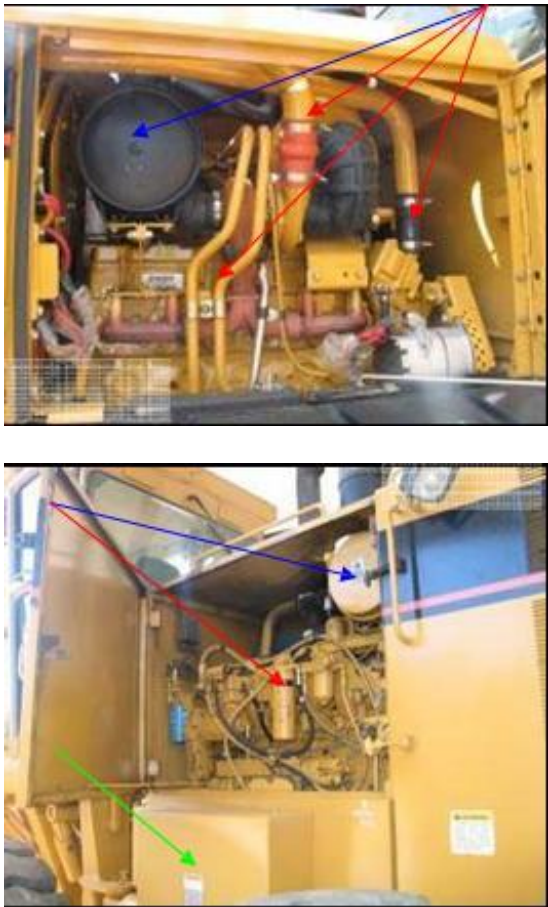
Blade pitch adjuster and circle


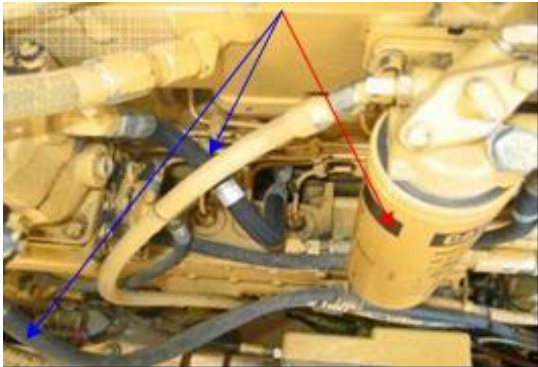
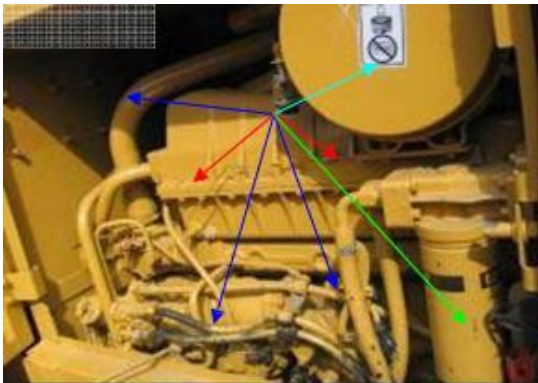
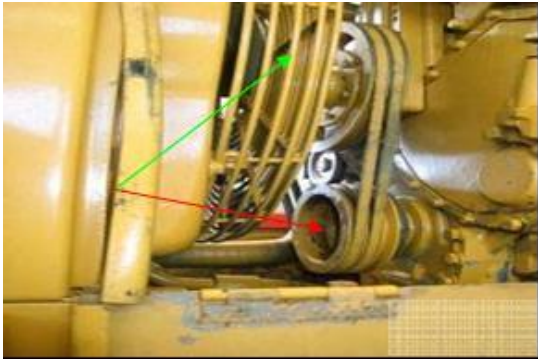
Description	Images
<p>Above the circle is the blade pitch adjuster. This configuration comprises of hydraulic rams, pivot points. Red arrow highlights hollow area that requires flushing.</p>	
<p>All surfaces on the topside, including countersunk holes (red arrows) must be free of all biosecurity risk material. All hydraulic hoses (blue arrows) must be free of biosecurity risk material.</p>	

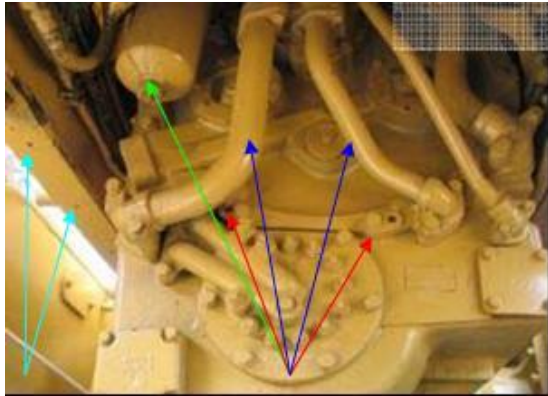
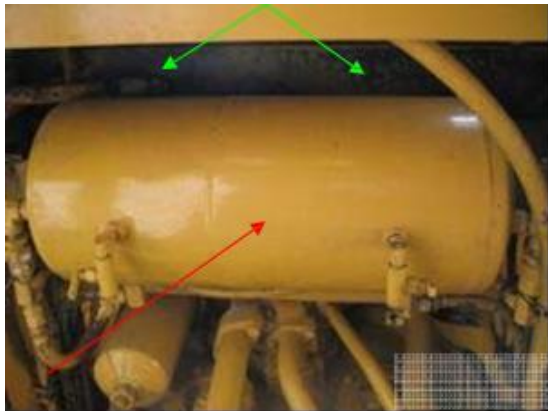
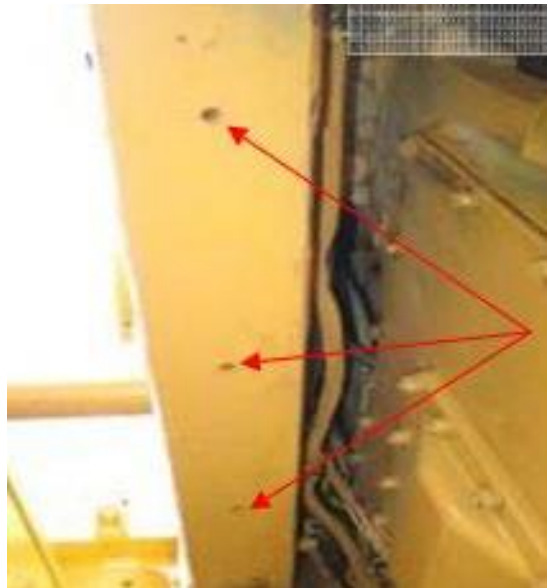
Description	Images
<p>The underside of the circle. All biosecurity risk material, including dirty grease must be removed from all surfaces, including the cogs.</p>	 <p>The first photograph shows the underside of a yellow motor grader's circle, with blue arrows pointing to various components and cogs. The second photograph shows a close-up of the same area, with blue arrows pointing to specific components and cogs.</p>
<p>A close up of the blade pitch adjuster. This area must be free of all contaminated grease.</p>	 <p>The photograph shows a close-up of the blade pitch adjuster, with red arrows pointing to specific components.</p>


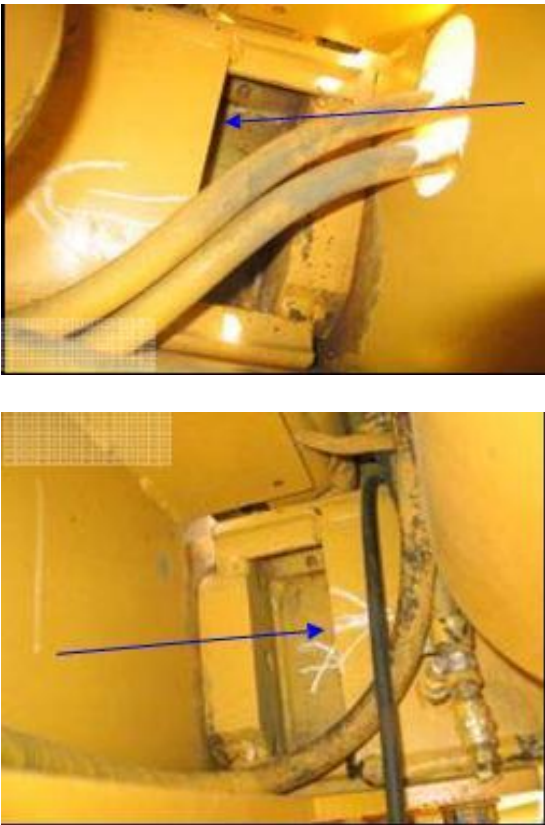
Description	Images
<p>Side view of the blade pitch adjuster. Green arrow highlights the hollow cavity in the gooseneck, which requires flushing to verify cleanliness. The red arrows highlight the pivot points where contaminated grease must be removed.</p>	 <p>A photograph showing a side view of a yellow blade pitch adjuster. A green arrow points to a hollow cavity in the gooseneck. Several red arrows point to pivot points where contaminated grease must be removed.</p>

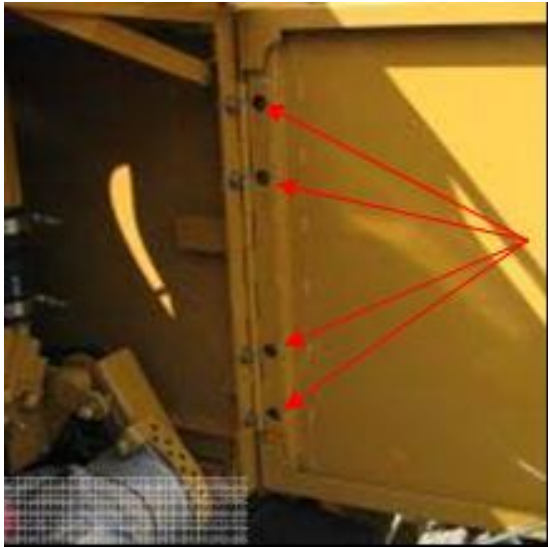
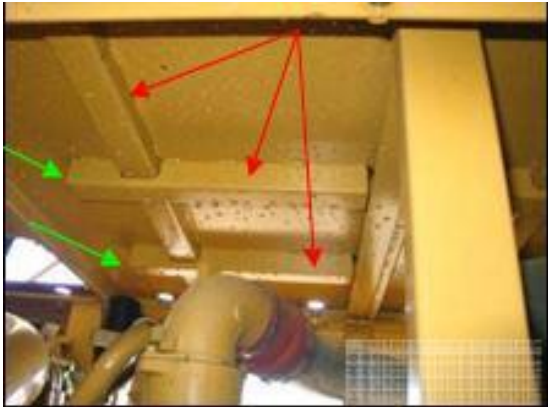
Engine block, chassis and housing

Description	Images
<p>The sides of the grader engine bay. All surfaces of the block, around all oil filters and hoses (red arrows) must be thoroughly cleaned and inspected. The air-filters (blue arrows) must be removed and verified clean. On some models, the battery box is mounted on the side (green arrow).</p>	 <p>Two photographs showing the engine bay of a grader. The top photo shows the engine block with red arrows pointing to hoses and blue arrows pointing to air filters. The bottom photo shows the engine bay with red arrows pointing to hoses, blue arrows pointing to air filters, and a green arrow pointing to the battery box mounted on the side.</p>


Description	Images
<p>All biosecurity risk material, including dirty grease must be removed from the engine block, including in between the tappet covers (red arrow).</p>	
<p>The side of the block can have of a number of filters (red arrow) and hoses (blue arrows), all requiring thorough cleaning and inspection.</p>	
<p>Another example of the side of the engine block of a grader. All ledges (red arrows), hoses (blue arrows), filters (green arrow) and air-filters (aqua arrow) must be thoroughly cleaned and inspected.</p>	
<p>The harmonic balancer or flywheel (red arrow) at the front of the block. This area is concave and must be cleaned thoroughly. The inside radiator grill (green arrow) must be removed to allow cleaning and inspection access to the bottom of the radiator shroud.</p>	


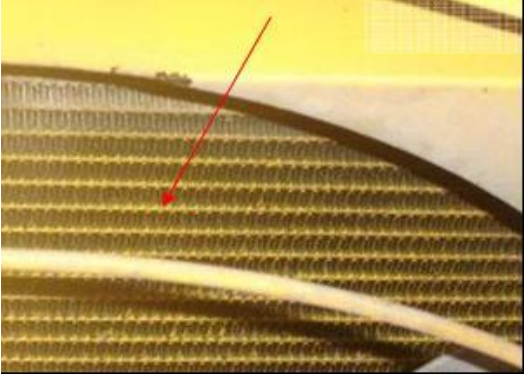

Description	Images
<p>The underside of the block, visible once the belly plates have been removed. All countersunk holes (red arrows), hoses (blue arrows) and filters (green arrow) must be thoroughly cleaned and inspected. The aqua arrows highlight the hollow chassis rails that will be illustrated later.</p>	
<p>An air tank (red arrow) can sometimes be found at the rear of the grader. Thorough cleaning, particularly the topside (green arrows) is essential.</p>	
<p>Once the belly plates have been removed, the empty bolt holes (red arrows) allow flushing access to the chassis rails either side of the engine block. These rails must be flushed in the presence of the inspecting officer to verify cleanliness.</p>	

Description	Images
<p>The underside front of the block. All countersunk holes and recesses (red arrows) must be clean and free of biosecurity risk material.</p>	
<p>Besides the belly plate bolt holes providing access to the hollow chassis rails, on some models, these may have open-ended channels as illustrated. To verify cleanliness, these channels must be flushed.</p>	


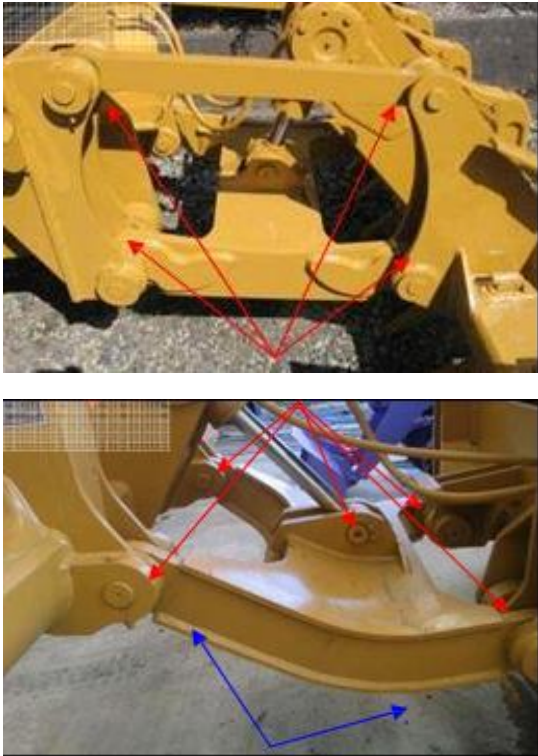
Description	Images
<p>Check all engine doors for hollow or open support channels (red arrows) that will require flushing to verify cleanliness.</p>	
<p>Check all engine housing for hollow or open-ended support channels that will require flushing to verify cleanliness.</p>	

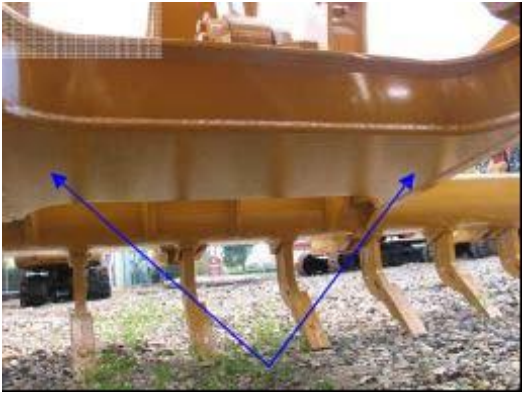

Radiator

Description	Images
<p>The rear radiator grill on the back of the grader. This grill must be removed to allow cleaning and inspection access to the radiator core. All light fittings (blue arrows) must be verified internally clean.</p>	


Description	Images
<p>The radiator grill removed, allowing cleaning and inspection access to the inside of the radiator shroud.</p>	
<p>The radiator core (fins) that require flushing to remove all contaminants and to verify cleanliness.</p>	
<p>This picture illustrates the right hand side of the engine cover near that radiator. The two red arrows highlight open-ended channels that will require flushing to verify cleanliness. Check the outside framework (blue arrow) for open ends or drainage holes. If present, flush to verify clean.</p>	


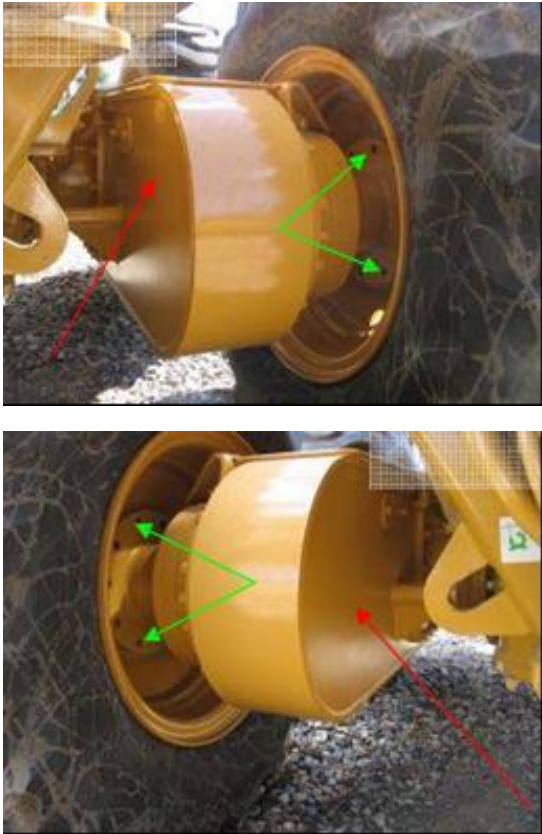

The ripper cradle

Description	Images
<p>The ripper cradle (red arrows) and tynes. All cutting teeth (green arrows) must be removed for internal cleaning and inspection.</p>	
<p>All cutting teeth (green arrows) must be removed for cleaning and internal inspection. Flush through the tyne pockets (red arrows) to verify cleanliness. Check all surfaces of the cradle bar (blue arrow) for cracks, splits, evidence of repair or for drainage holes on the underside. Flush if drainage holes are present.</p>	
<p>Two examples of ripper cradles. All contaminated grease must be removed from all pivot points (red arrows) and check the ripper cradle surfaces for drainage holes (blue arrows), cracks, splits or any evidence of repair. If breached, it will have to be investigated and verified clean.</p>	


Description	Images
<p>The underside of the ripper cradle. On this model there are no drainage holes, however all surfaces and welding seams must be checked for breaches.</p>	
<p>All cutting teeth (green arrows) must be removed for cleaning and internal inspection. Flush through the tyne pockets (red arrows) to verify cleanliness.</p>	

Tyres, rims and final drive

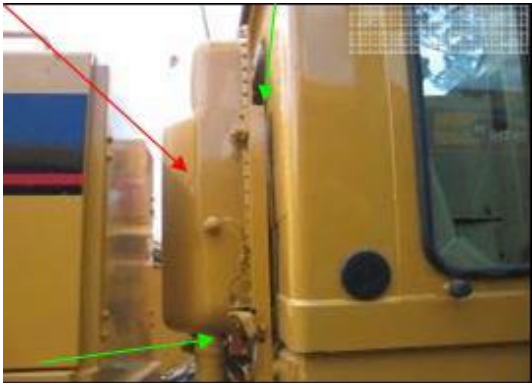

Description	Images
<p>Tyres in this condition can be easily cleaned and inspected.</p>	

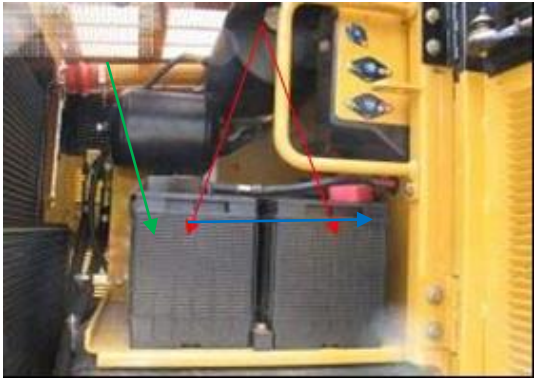

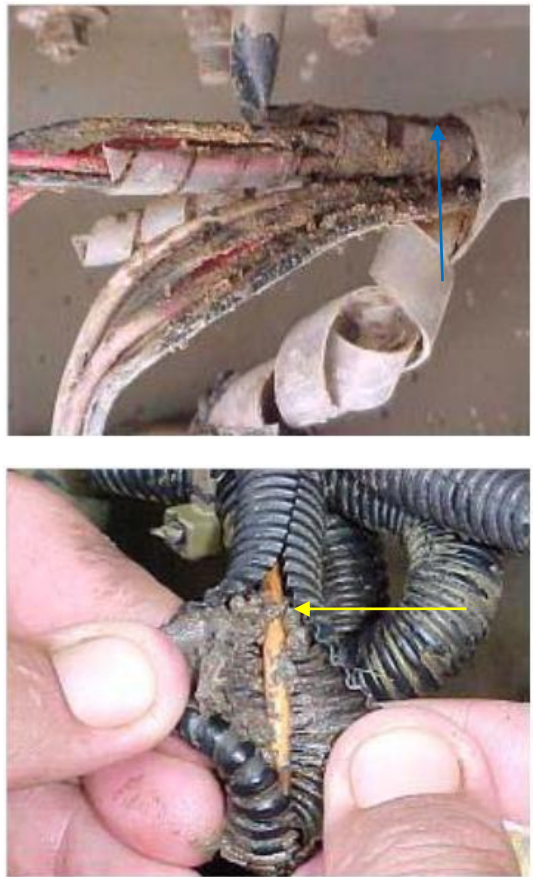
Description	Images
<p>All cracks and splits in tyres must be verified that all are free of biosecurity risk material.</p>	
<p>The final drive motors are sealed inside these illustrated sections (red arrows) and filled with oil. All countersunk holes (green arrows) inside the rims must be clean and free of all biosecurity risk material.</p>	
<p>Check under each footstep (red arrow) on the final drive motors is clean and free of biosecurity risk material.</p>	




Biosecurity

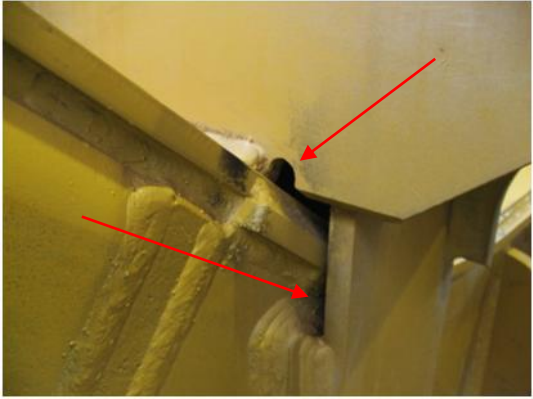
Description	Images
All outside rims must be cleaned and free of biosecurity risk material.	

General

Description	Images
The oil tanks (red arrow) on graders are commonly located behind the cabin. All surfaces, particularly the backside and bottom (green arrows) are the hardest to access. The tank can be loosened off to allow access.	
The top of the air-filter pre-cleaner must be removed for cleaning and inspection access.	

Description	Images
<p>All batteries (red arrows) must be loosened from tie-down points for cleaning and inspection. All hollow framework (blue arrow) is to be flushed to verify cleanliness. The green arrow (H models only) highlights the hollow cavity under the battery ledge and behind the fuel tank.</p>	
<p>The windscreen wiper housing (red arrow) will have to be removed to verify internal cleanliness.</p>	
<p>Ensure that all looming (blue line) is free of contamination (see first image). Flushing these areas with the looming still in place rarely removes all contamination. All wiring (see second image yellow area) must be thoroughly inspected for internal contamination.</p>	

Description	Images
<p>This image highlights the fuel tank which has now been moved to under the cabin green arrow on M models. With the fuel tanks now under the cab on certain M models this has changed the whole set up of the cab supports, hydraulic hoses and cables. If the fuel tank is located under the cab, both fuel tanks must be loosened and may need to be removed on a case by case basis for access for cleaning of the cab supports (see below three images) and the cleaning of the internal side and underside of the fuel tanks.</p>	 
<p>This image shows the cabin and fuel tanks removed (common for containerized graders) giving access to the cabin supports (purple arrows). Note that there are no electrical cables or hydraulic hoses in this area.</p>	

Description	Images
<p>Front cabin support highlights two flush areas (red arrows) which must be free from all biosecurity risk material.</p>	
<p>These images highlight the rear cabin support and access to the hollow cavity. Access is at the rear and from underneath as shown by blue arrows. Flushing is required to remove all biosecurity risk material. Further access may be required if unable to successfully flush.</p>	