



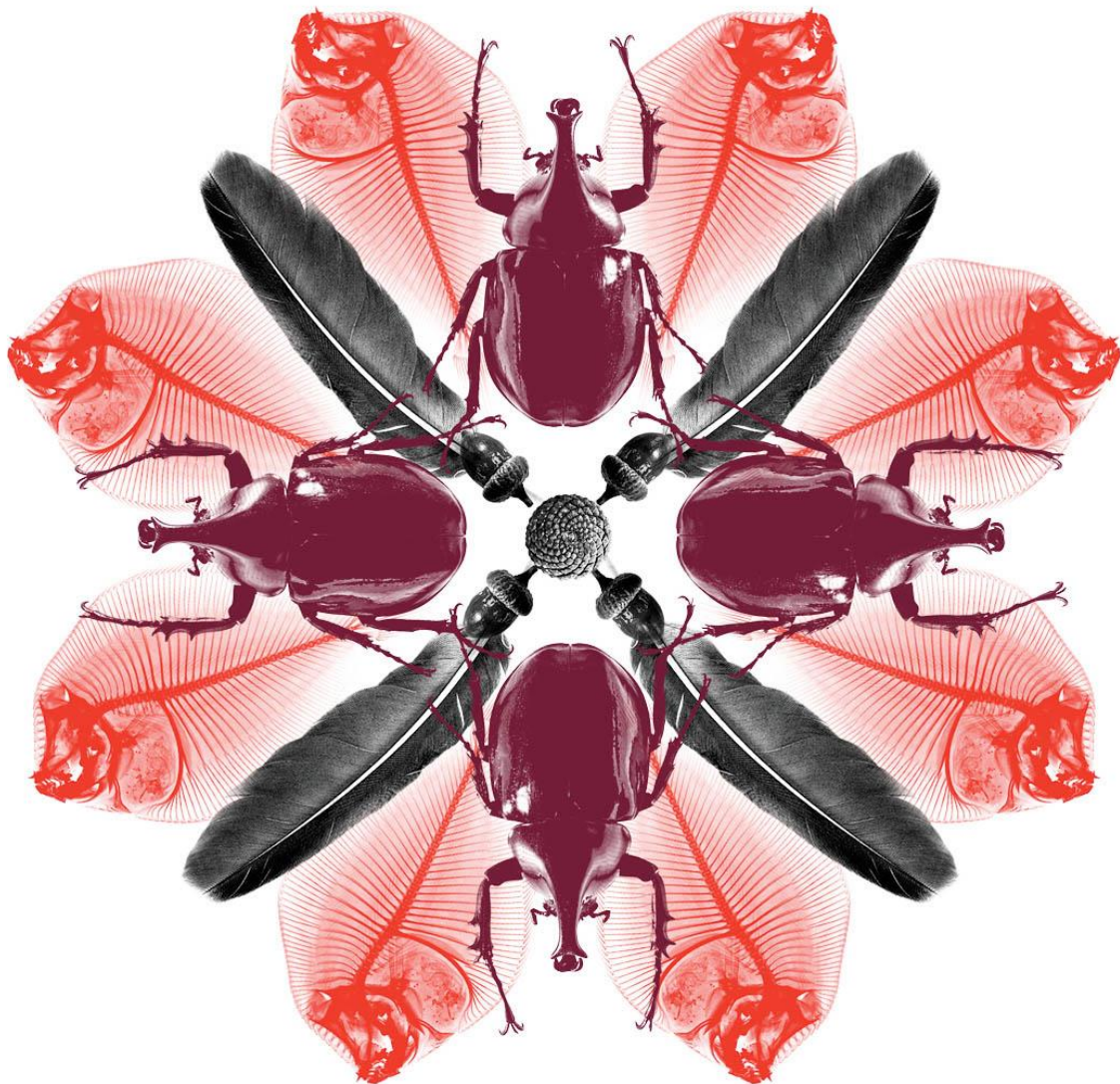
Australian Government
Department of Agriculture
and Water Resources

Machinery Cleaning Guide - Wheel Loader

Biosecurity

Publication series

April 2016



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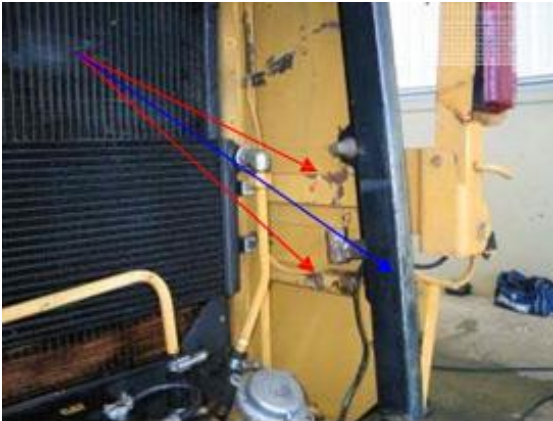
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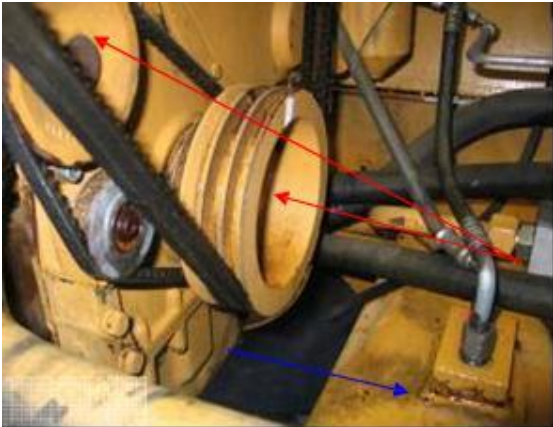

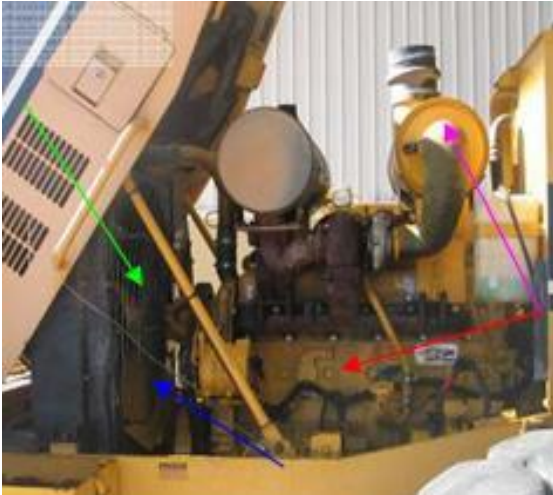
Cleaning guidelines



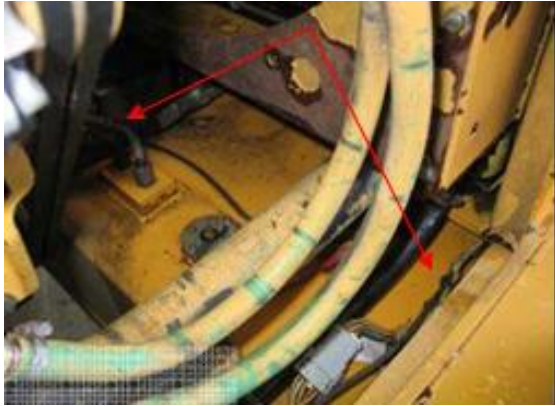
Engine bay, radiator and housing



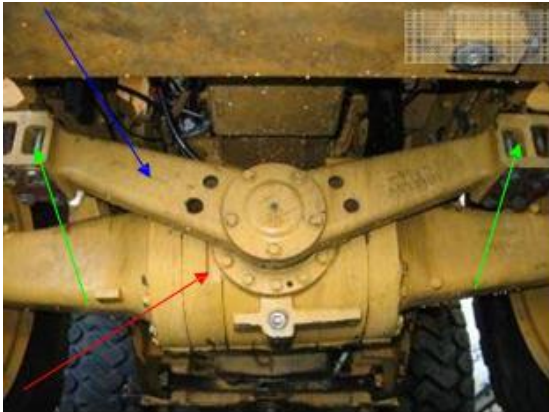
Description	Images
<p>A wheel loader where the engine cover pivots rearwards. Areas of significance that will be highlighted for cleaning and inspection purposes are the engine cover (red arrow), battery box (blue arrow), engine block (green arrow), radiator (aqua arrow) and the air-filter (purple arrow).</p>	
<p>This picture illustrates the side of the engine block and the air-filter housing, which has had the outer filter removed (purple arrow). On this particular model the engine cover is accessed, by opening hinged doors (red arrow).</p>	
<p>Illustrates the rear of the wheel loader and the radiator grill open, exposing the oil cooler and radiator fins (red arrows), which need to be flushed in the presence of the inspecting officer in order to verify cleanliness. Check all internal surfaces of the light covers (blue arrows).</p>	

Description	Images
<p>On this model the batteries are located behind the radiator. Each battery (red arrows) must be loosened from the tie-down points and the underside and housing inspected.</p>	
<p>This picture illustrates the left hand side of the engine cover near the radiator. Check for any hollow channels as indicated by the red arrows. If hollow and open-ended, they will require flushing to verify cleanliness.</p>	
<p>This picture illustrates the right hand side of the engine cover near the 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>	


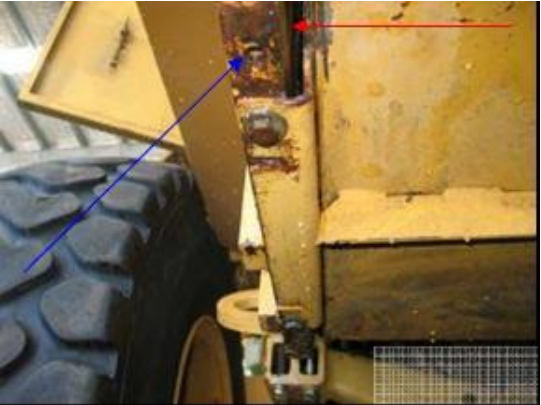

Biosecurity




Description	Images
<p>At the rear of the engine block are the harmonic balancers or flywheels (red arrows). These are generally concave and can harbour a significant amount of biosecurity risk material. While inspecting these, check the topside of the fuel cell (blue arrow).</p>	 A close-up photograph of the rear of an engine block. Two red arrows point to the concave harmonic balancers (flywheels). A blue arrow points to the topside of the fuel cell.
<p>The radiator grill has been removed, allowing inspection access into the bottom of the shroud.</p>	 A close-up photograph of the engine shroud. A red arrow points to the internal radiator grill, which has been removed to allow inspection access.
<p>A typical wheel loader engine block and radiator. The blue arrow highlights the internal radiator grill, which is preventing inspection access to the inside and bottom of the shroud. The green arrow highlights where the harmonic balancers (flywheels) can be found. The purple arrow highlights the air-filter and the red arrow highlights the side of the engine block.</p>	 A wide-angle photograph of the engine block and radiator. A blue arrow points to the internal radiator grill. A green arrow points to the harmonic balancers (flywheels). A purple arrow points to the air-filter. A red arrow points to the side of the engine block.




Description	Images
<p>On most models the batteries are located in boxes (red arrows) on either side of the chassis. The batteries need to be loosened from the tie-down points and checked underneath. Battery box entrance holes into the hollow chassis rail (blue arrow). These chassis rails, on the larger models are hollow and can be accessed via small holes in the side of the battery box (where the battery cables go) or once the belly plates have been dropped, flush the open holes where the bolts have been removed.</p>	
<p>This illustration shows the small hole that can sometimes be found in the battery box – the cables go through this hole, into the hollow chassis rail.</p>	
<p>The topside of the fuel cell, under the radiator. Generally there are small gaps either side of the fuel cell (red arrows), inside the chassis rail. This small recess will be further highlighted in the next series of pictures.</p>	

Description	Images
<p>The underside of the fuel cell (red arrow) from the rear. The rear belly plate has been removed, allowing access to the small recess (green arrow) between the fuel cell and the left hand side of the wheel loader.</p>	
<p>The engine block (sump) from below. The red arrow highlights the harmonic balancer, the blue arrow highlights the engine mounts and the green arrow highlights the lip around the topside of the sump and the purple arrow highlighting the oil filters.</p>	
<p>The left hand side of the engine block. Check all the engine cover panels for open-ended or spot welded hollow supports (red arrows), which will require flushing. Check each hydraulic hose, wiring harness and engine mounts (blue arrow).</p>	
<p>Rear view of the diff (red arrow) and sway bar (blue arrow). Note the holes in the sway bar, indicating a hollow structure that will require flushing. Ensure that all recesses where sway bar attaches to the chassis (green arrows) are clean.</p>	

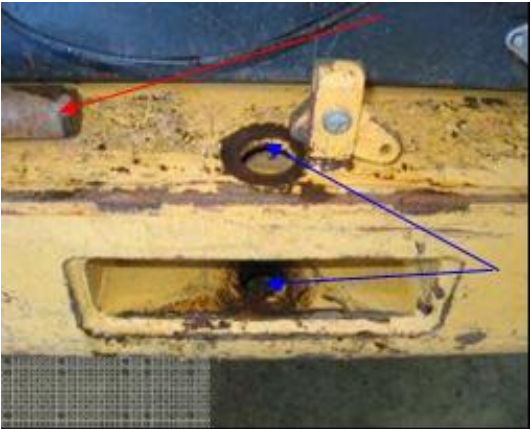
Biosecurity

Description	Images
<p>Another example of a sway bar, not hollow like the last example, but does have horizontal ledges (red arrows), both back and front that can harbour biosecurity risk material.</p>	 A close-up photograph of a yellow metal sway bar assembly. Two red arrows point to horizontal ledges on the bar, one pointing to a ledge on the back side and one pointing to a ledge on the front side. The assembly is connected to a larger yellow component.
<p>The small recess between the fuel cell and chassis rail (red arrow). This illustration also highlights the countersunk belly plate bolt holes (blue arrow) – flushing points for hollow chassis rails.</p>	 A close-up photograph of a yellow chassis rail. A red arrow points to a small recess between the rail and another component. A blue arrow points to a countersunk bolt hole on the belly plate of the rail. A blue 'X' is marked on the rail surface.
<p>Another example of the belly plate bolt holes (red arrows), allowing this hollow chassis rail to be flushed to verify cleanliness.</p>	 A close-up photograph of a rusty, yellow-painted chassis rail. Two red arrows point to bolt holes on the belly plate. A blue 'X' is marked on the rail surface, and a blue circle highlights one of the bolt holes.



Description	Images
<p>The bell housing as seen from either side of the universal joint. This bell housing has many nooks, ledges, countersunk holes and hydraulic hoses, all of which require careful cleaning and inspection.</p>	
<p>All universal joints must be free of contaminated grease (red arrows).</p>	
<p>The front of the engine block, situated below the cabin floor. This area has many nooks, ledges, countersunk holes and hydraulic hoses, all of which require careful cleaning and inspection.</p>	

Description	Images
<p>The topside of the engine block, just below the cabin floor. On some models, this area can be one of the hardest areas to clean and inspect. This area also has many nooks, ledges, countersunk holes and hydraulic hoses, all of which require careful cleaning and inspection.</p>	
<p>To enable thorough cleaning and inspection, all non-affixed side panels need to be removed. The hollow, open-ended gussets (green arrows) under the rails need checking.</p>	
<p>Note that the counterweights have been removed from the rear drawbar (red arrows). The area highlighted by the blue line is hollow and access will be shown next.</p>	

Biosecurity




Description	Images
<p>Once the pin is removed from the drawbar (red arrow), on some models this area is hollow and requires flushing to verify cleanliness (blue arrows). Other hollow rear drawbars may have access points elsewhere (drainage holes underside).</p>	 A close-up photograph of a yellow metal drawbar. A red arrow points to a pin being removed from a hole. Two blue arrows point to hollow areas on the surface, indicating where flushing is required for cleaning.

Cabin


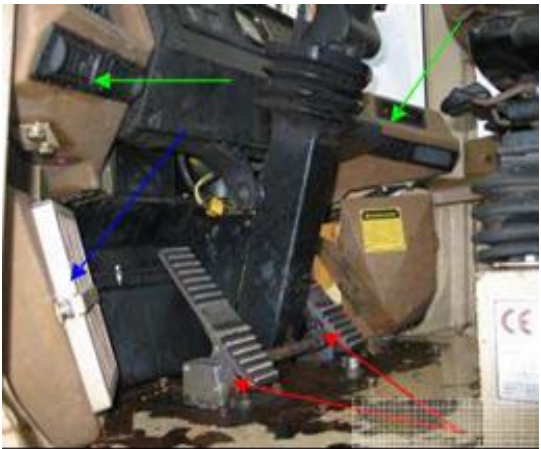

Description	Images
<p>The side view of the wheel loader cabin. Note that all non-affixed panels have been removed allowing cleaning and inspection access (red arrow). All door rubbers have been removed for cleaning (blue arrows).</p>	 A side-view photograph of a yellow wheel loader cabin. A red arrow points to a removed panel on the side. Blue arrows point to the removed door rubbers on the door.
<p>The internal door panelling (red arrow) and door rubbers (blue arrows) have been removed for cleaning and inspection.</p>	 A close-up photograph of the internal door panelling. A red arrow points to the removed panelling. Blue arrows point to the removed door rubbers.





Description	Images
<p>All non-affixed panelling from outside the cabin has been removed, allowing access for cleaning and inspection (blue arrows).</p>	
<p>Located just below the cabin are protective shrouds (red arrows). These must be removed to allow access for cleaning and inspection staff. Note the air-filter cover (green arrow), just under the cabin entrance.</p>	

Biosecurity


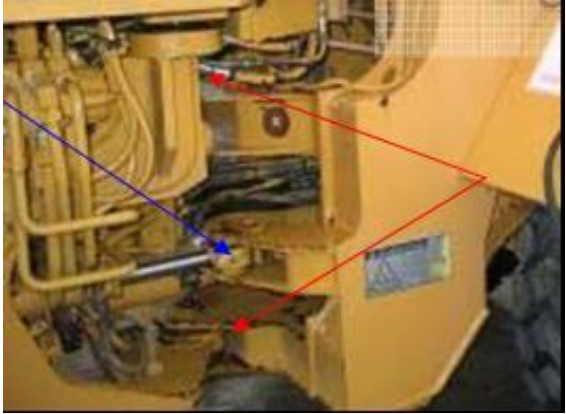

Description	Images
<p>The rubber floor matting has been removed (red arrow). The seat may have to be removed to allow access to the air-conditioning box underneath (blue arrow), or at least to clean under the seat and inside of the rubber shroud (green arrow).</p>	 A photograph showing the interior of a wheel loader cab. A large, light-colored seat is in the center. To the left, a red arrow points to the floor area where a rubber mat has been removed. To the right, a green arrow points to the underside of the seat. A blue arrow points to a rectangular box, likely the air conditioning unit, located below the seat. The floor is covered with a light-colored, fibrous material.
<p>Access will be required to verify that the inside surfaces of the joystick control panels are clean (red arrows).</p>	 A close-up photograph of the joystick control panels in the cab. Two red arrows point to the internal surfaces of the joystick housings. Another red arrow points to a panel on the right side of the control area. The panels are grey and have various buttons and switches.
<p>Not all internal surfaces of the joystick controls are contaminated, but this was found after one joystick control panel was removed (red arrow).</p>	 A close-up photograph of a removed joystick control panel. A red arrow points to a surface that appears to be contaminated with a light-colored, fibrous material. The panel is resting on a metal surface.

Biosecurity


Description	Images
<p>Ensure that the fuse box cover is removed for inspection (red arrow). There is not a lot of biosecurity risk material in this illustration, however all must be free of biosecurity risk material. Also check rubber seals (blue arrows).</p>	
<p>The rubber pedal covers (red arrows) have been removed and cleaned. The internal filter (blue arrow) must be verified, as well as the air-conditioning vents (green arrow).</p>	
<p>A close up of the air-conditioning vents (red arrows), which must be internally cleaned and accessible for inspection.</p>	

Description	Images
<p>The air-conditioning vents behind the seat (red arrows). These areas must be cleaned and accessible for inspection.</p>	
<p>On some models a handbrake set-up such as this may be found. The air-conditioning grill (red arrow) is directly underneath and access for cleaning and inspection will be required.</p>	
<p>On some models, this non-affixed panel over the windscreen wiper motor must be removed for inspection (red arrow).</p>	
<p>On some models, under the cabin there may be box channels such as the one highlighted in this picture (blue arrow). Note the small drainage holes on the bottom (green arrows). This area must be flushed to verify cleanliness.</p>	

Articulated pivot points


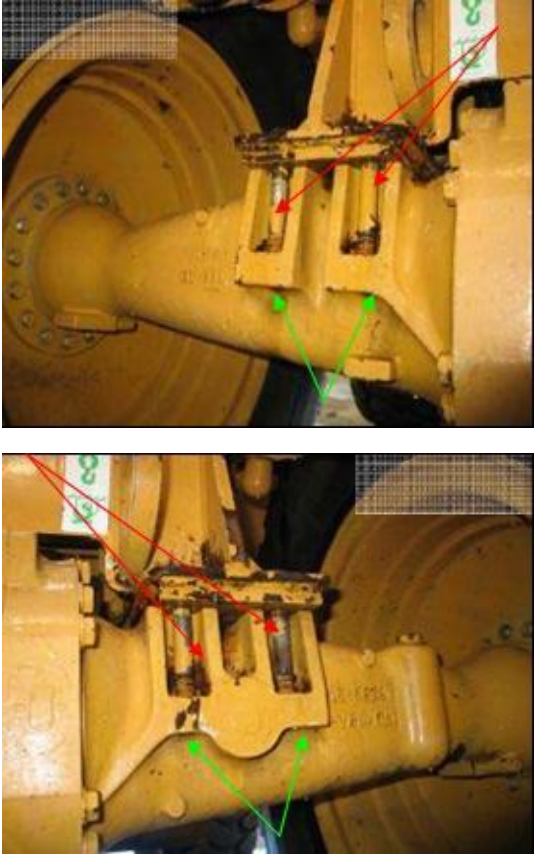
Description	Images
<p>The bottom pivot-point (red arrow) as generally seen on wheel loaders. This area is signified by several pivot points (above), universal joints (blue arrow) and a myriad of hydraulic hoses (green arrows), all requiring thorough cleaning and inspection.</p>	
<p>The pivot-points (red arrows) and hydraulic rams (blue arrow). All non-affixed panels and shrouds have been removed, allowing access for cleaning and inspection.</p>	
<p>The bottom pivot-point from a slightly elevated angle. Check all hollow framework (green arrow) for entrance holes (blue arrow) or drainage holes underside. This area can harbour a significant amount of biosecurity risk material and must be verified clean.</p>	

Biosecurity

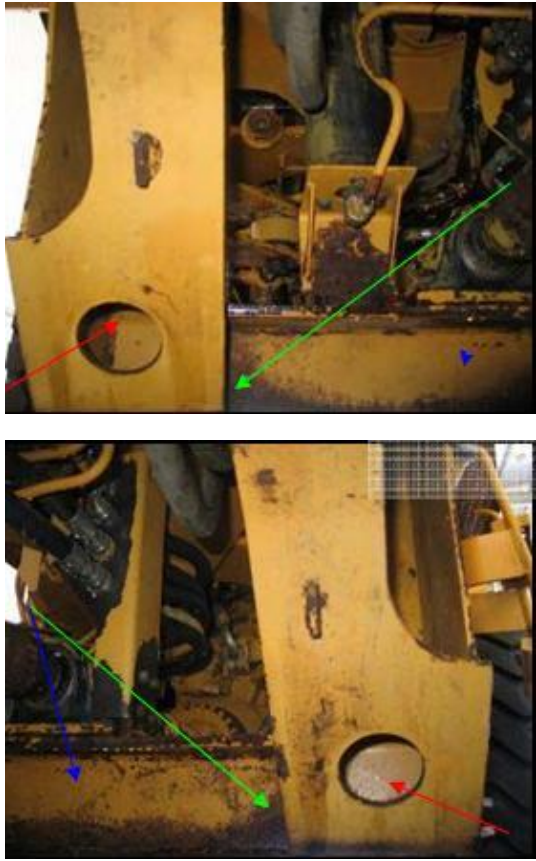
Description	Images
<p>On the underside of the cabin, the protective shrouds and all non-affixed panels have been removed, allowing for cleaning and inspection. Note the open-ended support channels (red arrows) under the side step.</p>	 <p>The top photograph shows the underside of the yellow wheel loader cabin. Three red arrows point to open-ended support channels located under the side step. The bottom photograph is a close-up view of the engine compartment, showing various hydraulic lines and components.</p>

Front end

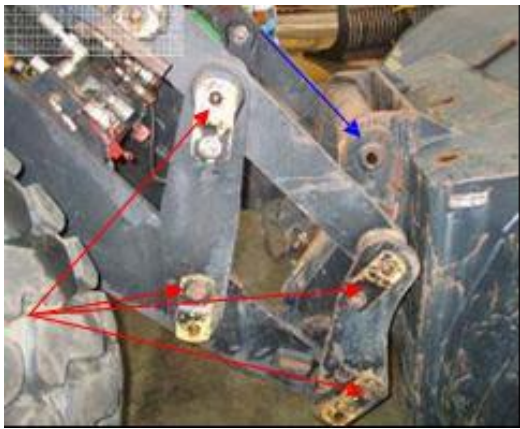
Description	Images
<p>The front views of a typical wheel loader showing the non-affixed panel (red arrow) that needs to be removed to facilitate the cleaning and inspection process. The pivot-points on the bucket arms (blue arrows) must be thoroughly cleaned, removing all contaminated grease.</p>	
<p>The front differential (red arrow) as seen from the underside. Check all surfaces, especially topside (red arrows). Also check that all countersunk holes (blue arrow) are clean inside.</p>	

Description	Images
<p>All universal joints must be free of contaminated grease.</p>	
<p>Each axle on either side of the differential has supports (red arrows) for the housing above. Each of these areas requires thorough cleaning and inspection. Check if bolts are countersunk below (green arrows).</p>	



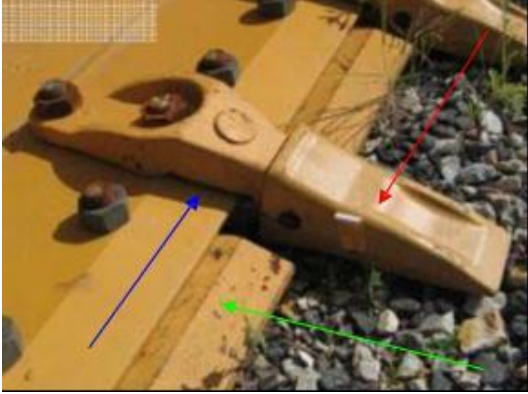
Biosecurity

Description	Images
<p>From the front end, looking back towards the articulated pivot-point, open channels (red arrows) like those illustrated above maybe found on either side of the wheel loader. On some models the horizontal structure highlighted below these channels (blue arrows) is hollow and may have drainage points (green arrows).</p>	

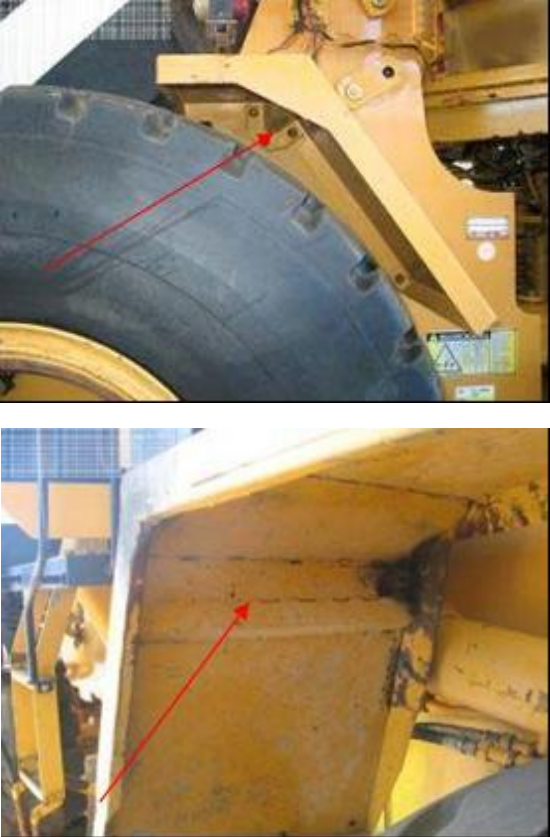

Bucket and arms

Description	Images
<p>Each pivot-point (red arrows) on the bucket arms is to be free of all contaminated grease. Check for any hollow areas (blue arrow).</p>	

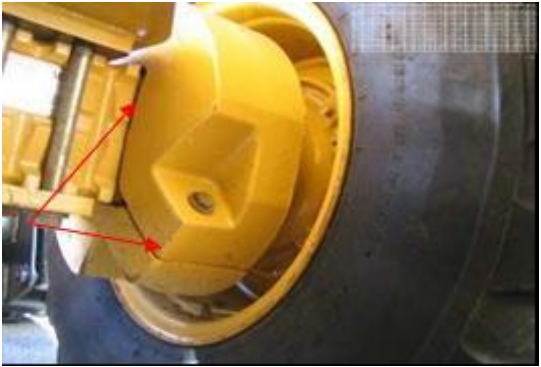


Biosecurity

Description	Images
<p>Another view of the bucket arm pivot-points. Ensure all are free of biosecurity risk material.</p>	 A close-up photograph of the bucket arm pivot points on a wheel loader. The image shows the metal components, including the bucket arm, the pivot pin, and the hydraulic cylinder. A large, treaded tire is visible in the background.
<p>Check all internal and external surfaces of the bucket for any cracks, splits or evidence of repair. All wear plates are to be loosened for flushing, while cutting teeth are to be removed for inspection.</p>	 A photograph of a bucket from a wheel loader, showing its internal and external surfaces. The bucket is positioned in a workshop or maintenance area. The bucket is dark-colored and appears to be made of heavy-duty metal.
<p>An example of the variety of cutting teeth on buckets. The cutting teeth (red arrow) are to be removed for inspection, while the cutting blade (green arrow) must be loosened off and flushed to verify cleanliness. Check for small recesses (blue arrow), like the one highlighted.</p>	 A close-up photograph of the cutting teeth and blade on a bucket. The image shows three different types of cutting teeth: a red arrow points to a sharp, pointed tooth; a green arrow points to a flat, rectangular blade; and a blue arrow points to a small recessed area on the blade. The bucket is resting on a gravel surface.

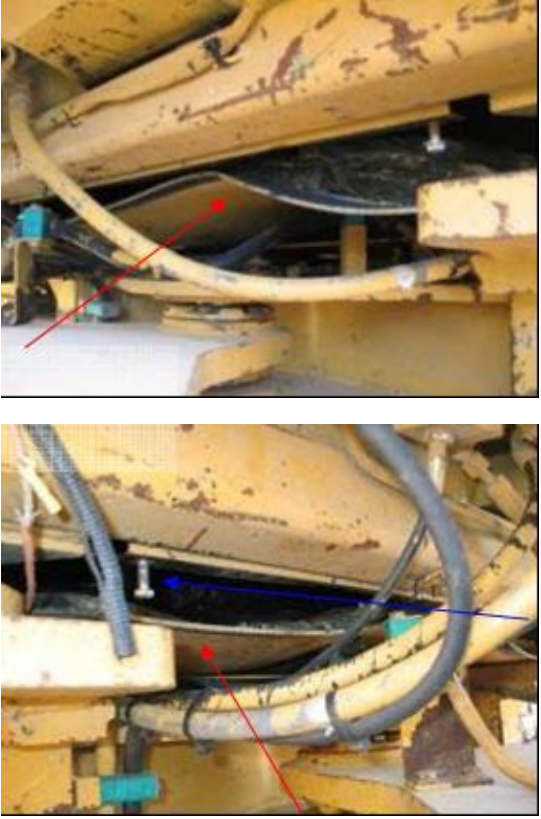
Wheel arches, tyres and rims

Description	Images
<p>The front wheel arch on the wheel loader. The support structures (red arrow) may be hollow, open ended or only spot-welded. Flush and verify if required.</p>	
<p>On some models the inside rims are covered by non-affixed plates (red arrows). Remove all non-affixed plates for cleaning and inspection.</p>	


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Description	Images
<p>Another example of the inside rim on a wheel loader. Ensure that all small recesses (red arrows) are flushed to verify cleanliness.</p>	 A close-up photograph of the inner rim of a yellow wheel loader. Two red arrows point to small, dark recesses or grooves on the rim's surface, indicating areas that need to be flushed for cleanliness.
<p>All cracks and splits in tyres must be verified to ensure that all are free of biosecurity risk material.</p>	 A close-up photograph of a blue tyre tread. The image shows several deep, irregular cracks and splits in the rubber, highlighting areas that must be inspected for biosecurity risk material.
<p>Flush along the wheel arch seam (red arrows) to verify cleanliness.</p>	 A photograph of a yellow wheel loader's wheel arch. A white warning sign with red text is attached to the arch. Two red arrows point to the seam between the arch and the wheel hub, indicating where to flush for cleanliness. The sign reads: "VERBODEN zich hier tussen te bevinden bij draaiende motor" (Prohibited from being in this area when the motor is running).




False floors under cabins

Description	Images
<p>On some models of wheel loaders, under the cabin may be a false floor (red arrows). These are reasonably common and worth illustrating as this area can harbour a significant amount of biosecurity risk material. The false floors can be made from hard rubber or compressed fibreboard and can be unbolted to allow access for cleaning and inspection.</p>	

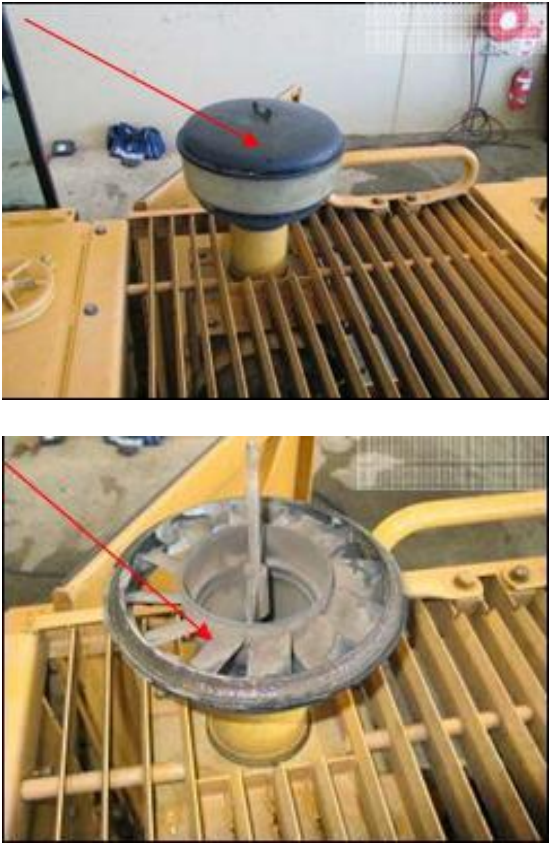
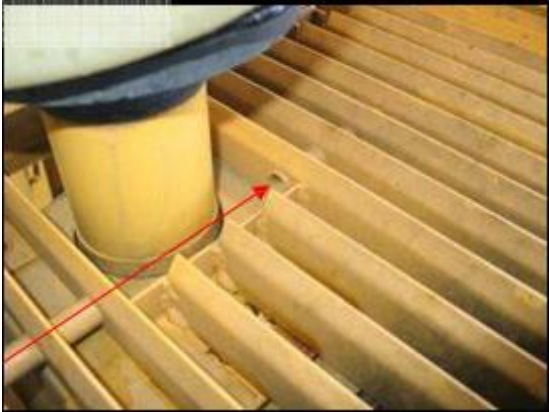
General

Description	Images
<p>Check all wiring harnesses for internal cleanliness.</p>	

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Description	Images
Check all looming around hydraulic hoses for internal cleanliness.	 A close-up photograph of a hydraulic hose. A section of the hose has been cut away, revealing the internal structure. The interior is heavily contaminated with dark, fibrous material, likely mold or debris, which is a biosecurity concern. A white tape is wrapped around the cut end of the hose.
Check all footsteps for cleanliness (including underside).	 A close-up photograph of a yellow machine footprint. Two red arrows point to the underside of the footprint, highlighting areas that need to be checked for cleanliness. The footprint has a perforated surface.
The ladder to the cabin may have open-ended tubing (red arrows) that requires flushing to verify cleanliness.	 A photograph of a yellow ladder leading up to a machine cabin. Two red arrows point to the bottom of the ladder, where there is open-ended tubing. This tubing is a biosecurity concern because it can collect contaminants and requires flushing to verify cleanliness.


Biosecurity

Description	Images
<p>The pre-cleaner or dust collector. The lid must be removed for cleaning and inspection.</p>	 <p>The top photograph shows a yellow pre-cleaner or dust collector with a blue lid. A red arrow points to the lid. The bottom photograph shows the same unit with the lid removed, revealing the internal components. A red arrow points to the inner structure.</p>
<p>Flush any open-ended piping to verify cleanliness (red arrow).</p>	 <p>The photograph shows a close-up of the pre-cleaner or dust collector. A red arrow points to an open-ended piping.</p>

Biosecurity

Description	Images
<p>The oil tank located behind the cabin (red arrow). All external surfaces must be cleaned and thoroughly inspected.</p>	
<p>The fuel tank located just below the cabin (red arrow). All external surfaces must be cleaned and thoroughly inspected – particularly the backside and top.</p>	
<p>Remove all light covers and check the internal surfaces (red arrow).</p>	

Biosecurity

Description	Images
<p>Some light mounts are open-ended and hollow (red arrow) and require checking.</p>	
<p>On some models an open-ended channel (red arrow) can be found above the radiator.</p>	
<p>On some models the internal door latch may look like this (red arrow). Access for cleaning and inspection will be required.</p>	

Biosecurity

Description	Images
The internal radiator grill removed (red arrow), allowing access inside the shroud.	 A photograph of a yellow, semi-circular radiator grill lying on a dark, wet concrete floor. A red arrow points to a small, rectangular component on the top surface of the grill.
Examples of dismantling required on wheel loaders.	 A photograph showing a pile of dismantled yellow metal components, likely parts of a wheel loader's shroud or radiator area, scattered on a concrete floor. The parts include various plates, brackets, and structural pieces.