



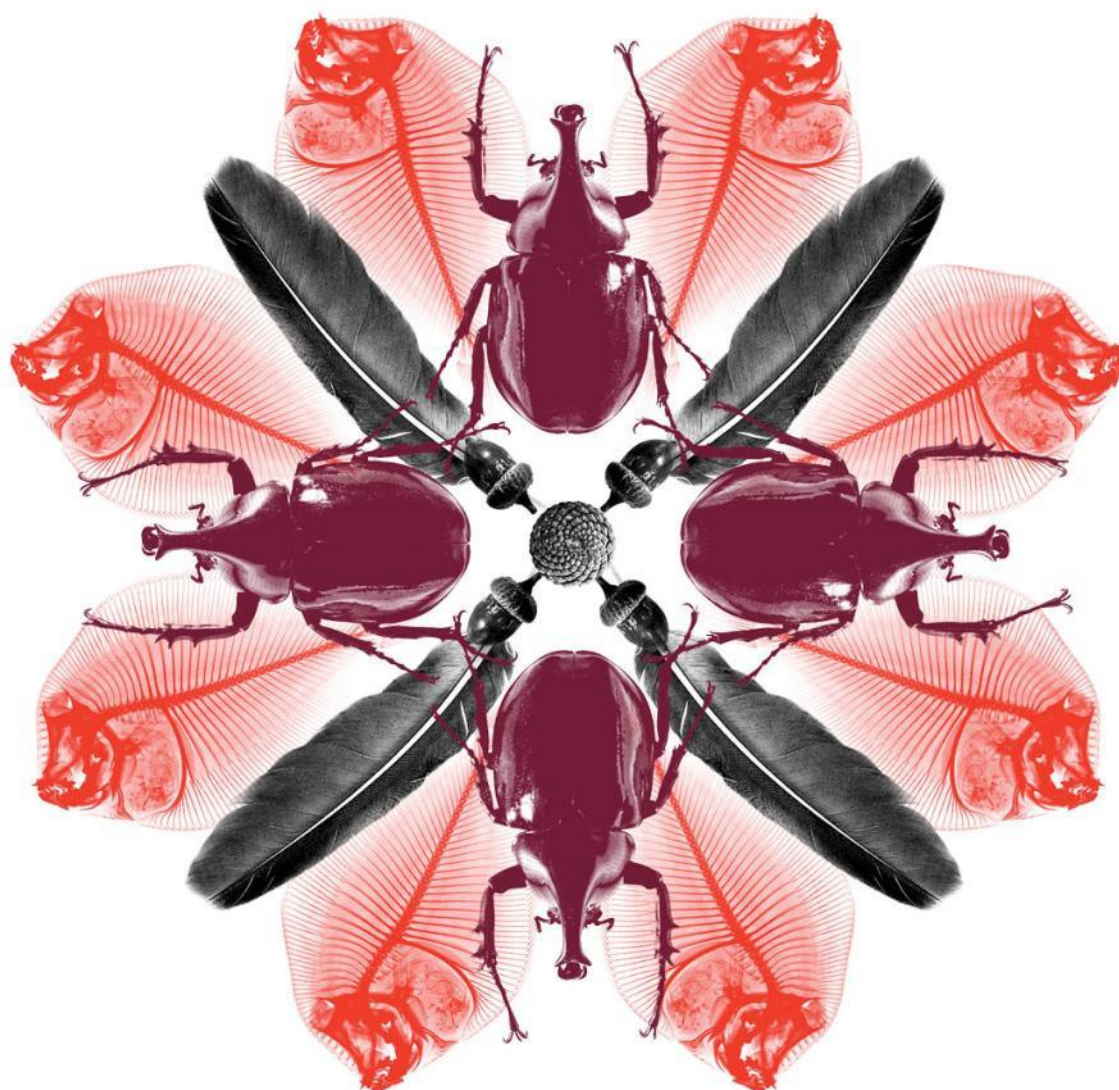
Australian Government  
Department of Agriculture  
and Water Resources

# Machinery Cleaning Guide – Excavators

**Biosecurity**

Publication series

April 2016



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Inquiries regarding this document should be directed to:

Department of Agriculture and Water Resources  
Machinery Team  
PO Box 222  
Hamilton QLD 4007

Within Australia Phone: 1800 900 090  
Outside Australia Phone: +61 7 3246 8706  
Email: [machinery@agriculture.gov.au](mailto:machinery@agriculture.gov.au)

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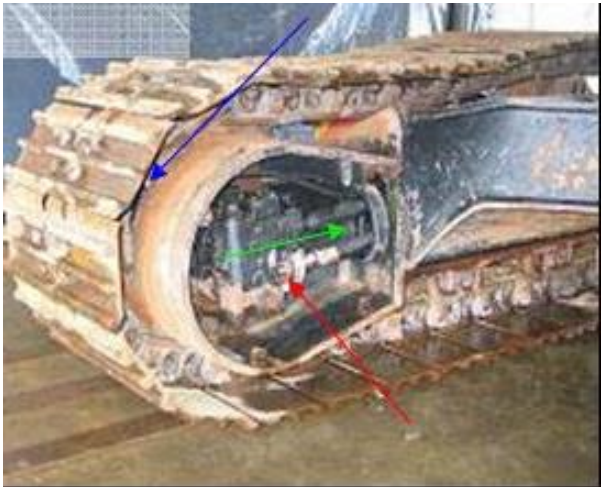
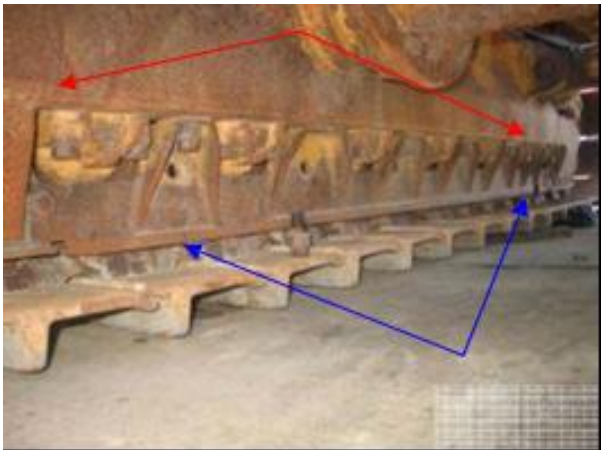
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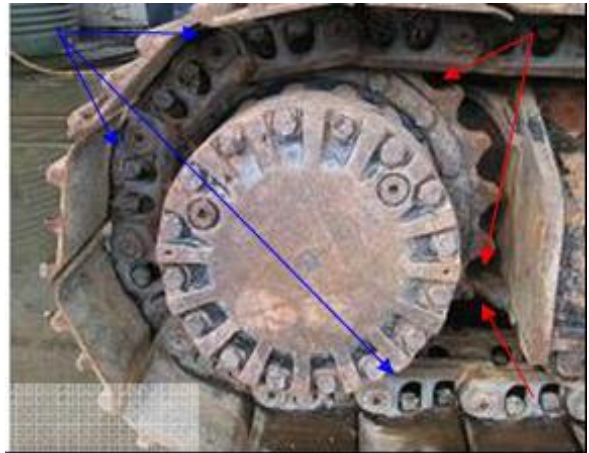
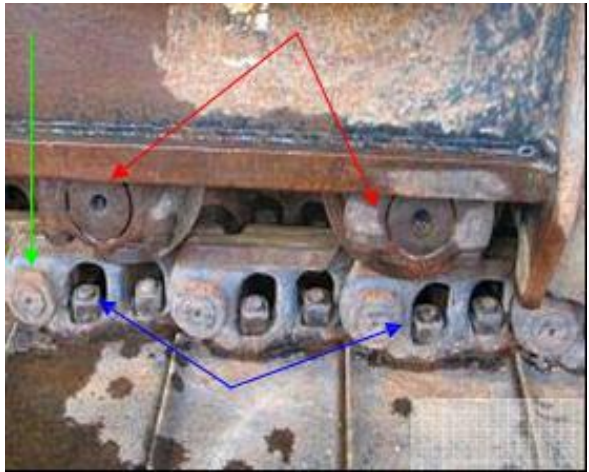




# Cleaning guidelines

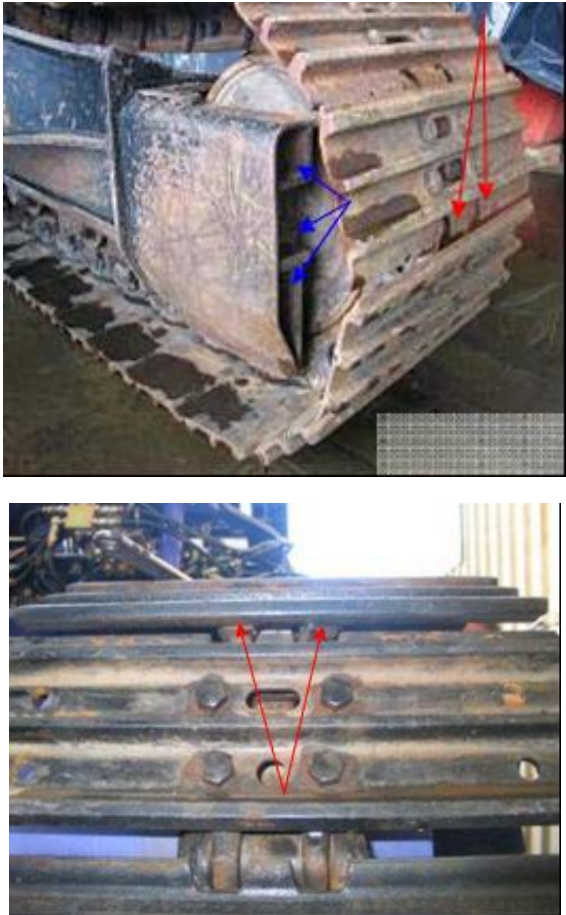
## Tracks

Description	Images
<p>All non-affixed panels, rock guards and motor covers must be dismantled. The yellow arrow indicates a small rock guard, which may not require dismantling. The red arrow indicates the rollers and the blue arrows the hollow channels on the idler wheel frame.</p>	
<p>Red arrow indicates that the motor cover has been removed, allowing access to the drive motor. The green arrow indicates the hollow channel, which extends up through the frame into the turret or slew ring. These hollow areas on each side need to be thoroughly flushed to ensure cleanliness. The blue arrow indicates the area at the rear of the motor cover, which can be easily overlooked.</p>	
<p>Illustration of rock guards (red arrows) on a track frame. The frame to which these rock guards is attached (blue arrows), is hollow and must be verified clean. To verify this hollow area and around each roller, the rock guards must be dismantled.</p>	




Description	Images
<p>This picture indicates the hollow sections that can be found supporting the idler wheel (red and blue arrows). All these hollow areas require thorough flushing to remove all contaminants. These hollow sections can also be found on the inside of the idler wheel (green arrow).</p>	
<p>This picture indicates the outside of the drive motor. The red arrows highlights the rear of the motor cover and the blue arrows highlight each track nut.</p>	
<p>The blue arrows highlights the small gaps either side of each nut where biosecurity risk material (BRM) is commonly found. The red and green arrows highlight small hollow areas where BRM can become compacted.</p>	


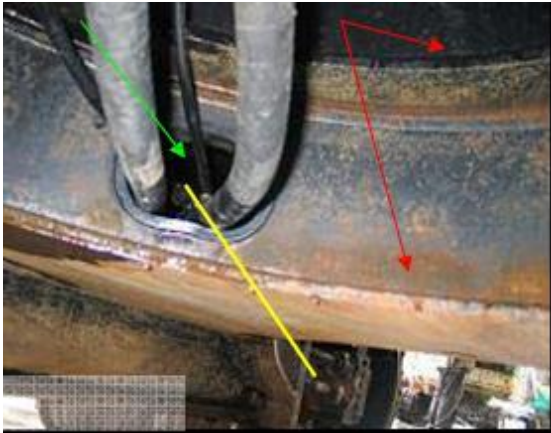
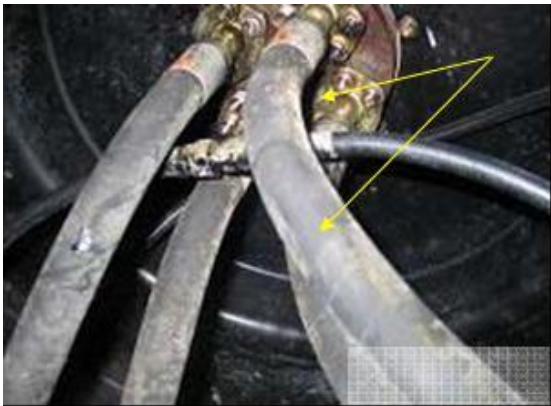
Description	Images
<p>This picture highlights the roller inside the track frame. Note the horizontal ledge inside the frame highlighted by the green arrows. The red arrows highlight the small gap either side of the roller while the aqua arrow shows a drainage hole, sometimes found on the turret of some excavators. The orange arrows highlight the area behind each nut.</p>	
<p>Indicates the top roller above the track frame. The red arrow highlights the small gap at the rear, which must be flushed while the blue highlights the small gap at the rear of the roller.</p>	

Description	Images
<p>Blue arrows again show the hollow framework that requires thorough cleaning and the red highlights where the track pads connect to the chain. All tracked machines undergo one full revolution to ensure cleanliness. The picture highlights the track pads opening slightly, this area is to be cleaned.</p>	

## Turret/slew ring



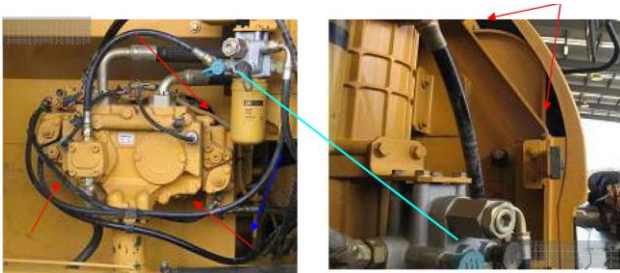

Description	Images
<p>The red arrows highlight the turret or slew ring, a hollow structure that can be accessed once the belly plate is removed (if present). The green arrow highlights the nuts/bolts that fix the body to the turret. All contaminated grease must be removed from each nut/bolt.</p>	











Description	Images
<p>A closer view of each nut/bolt that attaches the body to the turret (red arrows). The blue arrow highlights just one of the plates which has been removed, allowing access to the underside of the engine.</p>	
<p>The red arrows highlight the various ledges that can be found inside the turret/slew ring, each ledge requires thorough cleaning. The green arrow points to the hollow channel where the hydraulic hoses run down through the turret housing to the drive motors (yellow line demonstrates the path of the hydraulic hoses). This area must be flushed in the presence of the inspecting officer to verify cleanliness.</p>	
<p>The hydraulic hoses inside the turret/slew ring (yellow arrows). Each hose must be individually cleaned.</p>	



## Engine bay

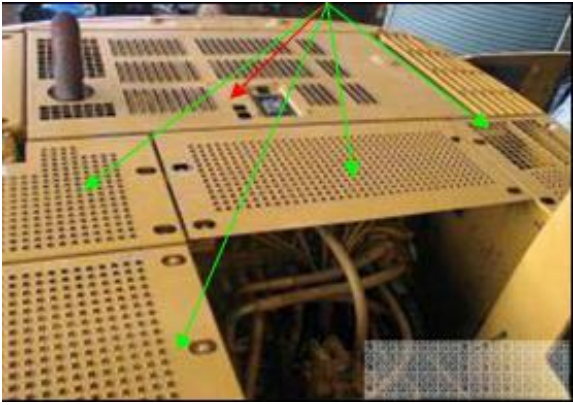


Description	Images
<p>The right hand side of the engine bay. On some models the horizontal blue line highlighted in this picture indicates a hollow channel while the red arrow on the left indicates the entrance to this area. On other models this area is completely sealed. If this channel is open ended, it will require flushing in the presence of the inspecting officer.</p>	
<p>Check all engine doors for hollow support channels. Check for drainage holes or if only spot-welded – will require flushing if not completely sealed. Check all foam insulation and hydraulic hoses (red arrows).</p>	
<p>Check all surfaces and hydraulic hoses for cleanliness as indicated by the red arrows. The blue arrow indicates an accumulation of hydraulic hoses, bound together by zip-ties. These hydraulic hoses need to be separated to allow cleaning and inspection.</p>	
<p>The battery box located just in front of the fuel cell on the RH side of the excavator. Ensure the hollow, open-ended sections in the battery-box cover are flushed. Check handrail for openings at either end – flush if open-ended (red arrow).</p>	



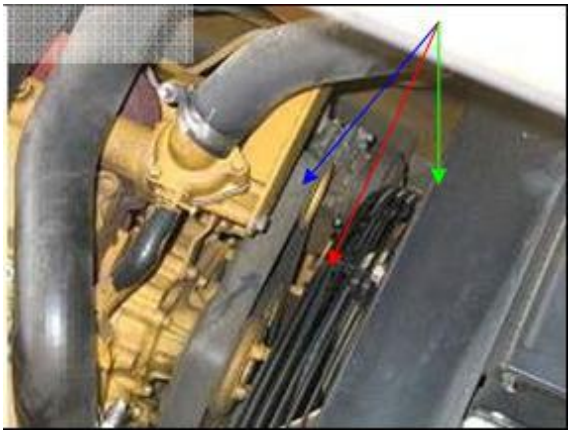
Description	Images
<p>The batteries have been removed (red arrows) allowing for easy cleaning and inspection. The blue arrows again highlight the open-ended channels on the inside of the battery box cover.</p>	 <p>A photograph showing the interior of a yellow battery box cover. Two blue arrows point to horizontal channels on the top surface. A red arrow points to a rectangular opening where batteries were located.</p>
<p>A view of the LH side of the engine bay. Check all insulation foam (red arrow). The blue line again indicates that this section may be a hollow channel while the green arrow highlights the opening to this hollow section. This hollow section is not applicable on all models.</p>	 <p>A photograph of the left-hand side of an engine bay. A red arrow points to a section of insulation foam. A blue line is drawn along a horizontal surface. A green arrow points to a small opening in the structure.</p>
<p>The red arrow highlights the air-filter, which needs to be removed and checked for cleanliness. An air hose is the best way to verify cleanliness. The blue arrow highlights the fuse-box. This area is generally well sealed, however an internal cleanliness check is required. The green arrows highlight the oil coolers. Each must be flushed to ensure cleanliness.</p>	 <p>A photograph of engine components. A red arrow points to a black circular air filter. A blue arrow points to a fuse box. Two green arrows point to oil coolers.</p>
<p>Another view of the LH side of the engine bay. The blue arrow again indicates the fuse-box (access is required), while the green arrow shows an accumulation of hoses that are held together by zip-ties. Each hose must be cleaned and inspected.</p>	 <p>A photograph showing another view of the left-hand side of the engine bay. A blue arrow points to the fuse box. A green arrow points to a bundle of hoses secured with zip-ties.</p>

Description	Images
	
<p>Another view of the oil-coolers (red arrow) and radiator core (blue arrow). All require flushing to verify cleanliness. To allow access to the radiator at the rear, the oil cooling fins may have to be dismantled to allow thorough flushing.</p>	
<p>An accumulation of hydraulic hoses bound together with zip-ties (red arrow).</p>	
<p>The zip-tie removed, allowing the hoses to be moved and highlighting BRM between the hoses (green arrow).</p>	

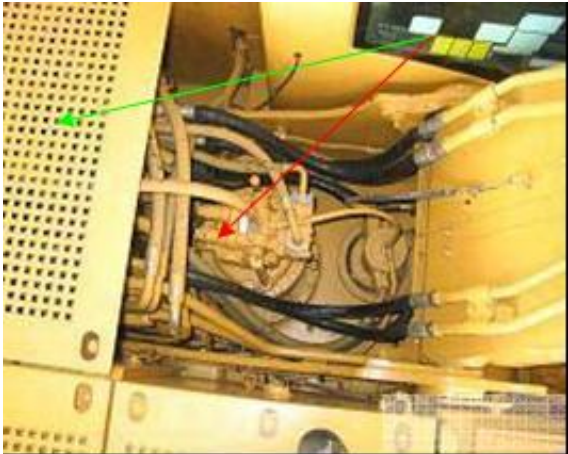



Description	Images
<p>All non-affixed panels on the underside of the car body have been removed allowing access for cleaning and inspection (red arrow).</p>	
<p>When the non-affixed panels on the underside of the car body are dismantled, this allows access to cleaning and inspection staff. Areas like the one highlighted (green arrow) require careful attention and a mirror may assist the inspection process.</p>	
<p>The bottom of the sump (green arrow) is visible with the non-affixed panels removed. All contaminated grease and oil residues must be removed during cleaning. The blue arrow shows the bottom of the radiator, while the red arrows show where the counterweight attaches on some models.</p>	

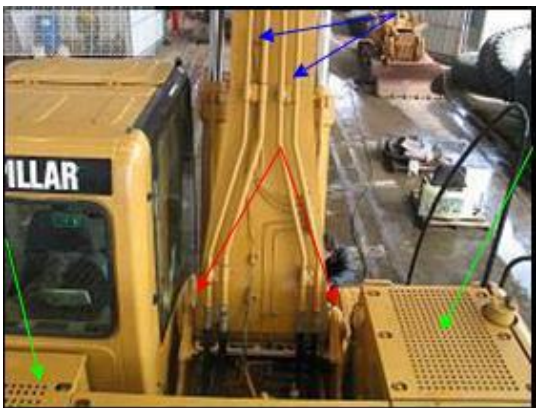
Description	Images
<p>The topside of the engine bay. The red arrow highlights the engine cover that opens, allowing access to the topside of the block. The green arrows highlight the remaining engine covers that are non-affixed and can be dismantled to allow for cleaning and inspection.</p>	
<p>The engine cover open, allowing access to the topside of the engine block (red arrow) and radiator (blue arrow).</p>	
<p>The red arrow highlights a small gap between each tappet cover, which requires thorough cleaning and inspection. Flushing may also be required.</p>	




Description	Images
<p>The green arrow highlights the radiator shroud wire grill. This needs to be dismantled to allow access to the inside of the shroud and remove all BRM. The red arrow highlights the small gap between the radiator core and the oil-cooler cores. Check the cores by thorough flushing.</p>	
<p>On some models, a mesh grill protects the radiator core. These mesh grills (red arrow) need to be removed as the gauge is small and prevents BRM caught in the radiator fins from being successfully removed.</p>	
<p>Check the sides of the block, including the harmonic balancers (blue arrow) as BRM can become caught in front of these open ended flywheels. The red arrow indicates the radiator grill, which if still present, prevents access to the bottom of the radiator shroud (green arrow).</p>	


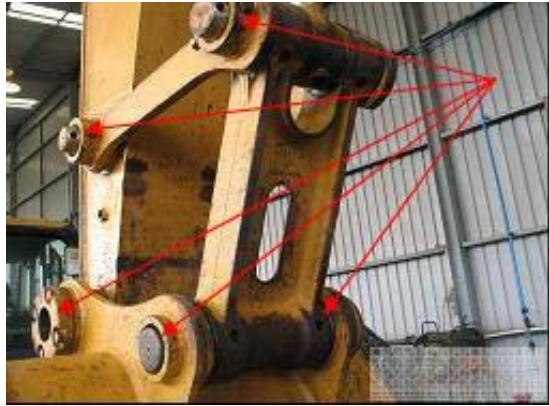
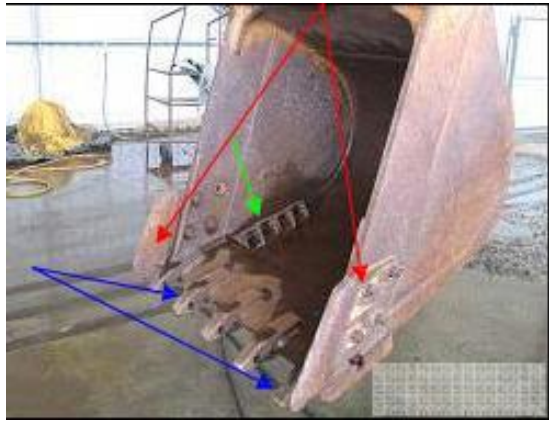


Description	Images
<p>The accumulation of hydraulic hoses (red arrow) situated just behind the boom stick. Sometimes this area may be covered by a non-affixed panel, which will need to be dismantled to allow access. Other non-affixed panels (green arrow) can also be dismantled to facilitate the cleaning and inspection process.</p>	
<p>Ensure that the small gap between the cabin wall and the base of the boom stick (red arrows) is cleaned and inspected. BRM can often accumulate inside the small gaps where the hydraulic hoses connect, indicated here by the blue arrow.</p>	

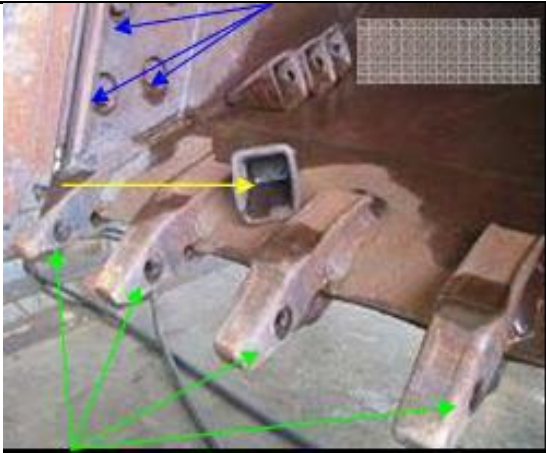
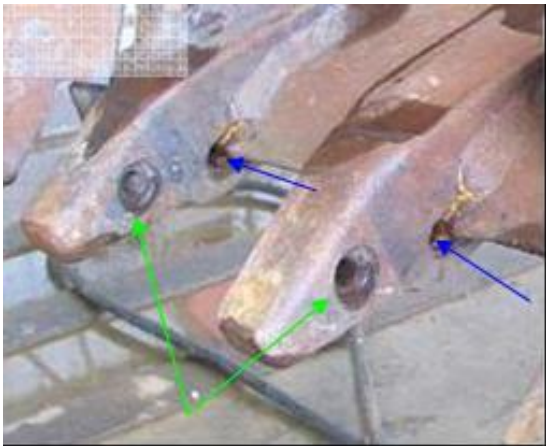

## Boom stick and bucket


Description	Images
<p>The base of the boom stick and checker-plate above the engine. Ensure all contaminated grease is removed from the pivot-points (red arrows). Flush under all the check-plates as indicated by the green arrows. Check all hydraulic lines and mounting points (blue arrows). The boom can be extended and lowered to address work health and safety concerns (otherwise use scaffolding or cherry picker).</p>	

Description	Images
<p>Check along the length of the boom, ensuring all BRM including contaminated grease is removed (red arrow). All hydraulic lines need to be cleaned and inspected (blue arrow).</p>	
<p>Check along all surfaces, hydraulic rams (green arrows) and for the presence of any drainage holes or openings in the boom stick (blue lines).</p>	
<p>Ensure all rams and pivot points are clean and free of contaminated grease (red arrows).</p>	



Description	Images
	
<p>Check all pivot points above the bucket and ensure all contaminated grease is removed (red arrows).</p>	
<p>The wear plates (red arrows) either side of the bucket must be either dismantled or at the very least loosened off and flushed behind. All cutting teeth (blue arrows) must be removed and the teeth can be seen here in the bucket (green arrow).</p>	
<p>The cutting teeth have been removed, exposing the hole through the centre (green arrows), which cannot be verified while the teeth are still in place. Ensure the countersunk holes (blue arrows) where the wear plates attach are free of all BRM. The yellow arrow shows the inside of the cutting teeth – quick and easy to verify if presented in this manner.</p>	




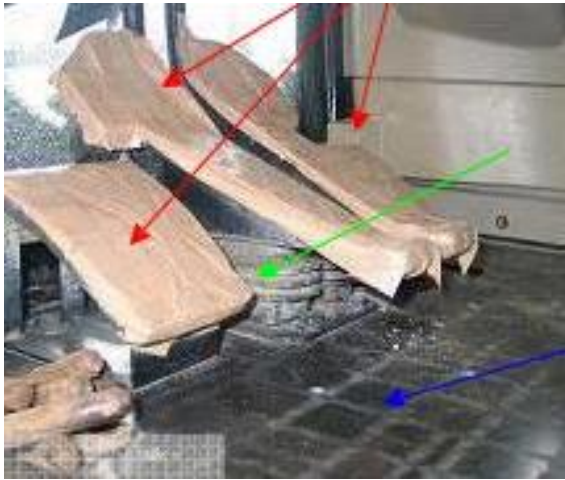

Description	Images
	 <p>A close-up photograph of the cutting teeth and side wear plates of an excavator bucket. The image shows several metal teeth and plates. Blue arrows point to a narrow opening between the teeth. Green arrows point to the pinholes on the side wear plates. A yellow arrow points to a side wear plate. A small inset image in the top right corner shows a close-up of a pinhole.</p>
<p>A close up of the boots and where the cutting teeth are mounted. Ensure around each pinhole is clean (green arrows). The blue arrows highlight a narrow opening that tends to become compacted with BRM and can be overlooked if the cutting teeth are still attached.</p>	 <p>A close-up photograph of the cutting teeth and side wear plates of an excavator bucket. The image shows several metal teeth and plates. Blue arrows point to a narrow opening between the teeth. Green arrows point to the pinholes on the side wear plates. A yellow arrow points to a side wear plate. A small inset image in the top left corner shows a close-up of a pinhole.</p>
<p>Evidence of a crack/split (blue arrow) in the wear plate on the underside of the bucket. Side wear plates (yellow arrow) need to be either removed or loosened and flushed. Cutting teeth (aqua arrows) must be removed at the time of inspection.</p>	 <p>A photograph of an excavator bucket being inspected. The bucket is orange and has several inspection points marked with arrows. A blue arrow points to a crack/split in the wear plate on the underside of the bucket. A yellow arrow points to a side wear plate. Aqua arrows point to the cutting teeth. A small inset image in the top right corner shows a close-up of a crack/split in the wear plate.</p>


Description	Images
<p>If wear plates are only spot-welded as seen in the examples above, ensure that these are verified. For example; by witnessing high-pressure water being flushed through (blue arrow).</p>	

## Cabin

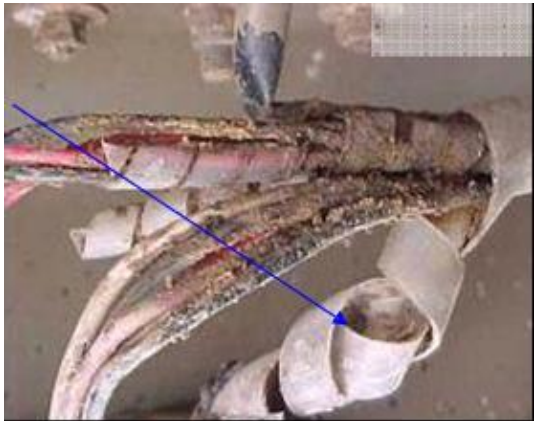

Description	Images
<p>Landscape shot of the inside of a typical cabin. Access is required to verify the cleanliness of the internal workings or the joystick controls (red arrows). The seat shroud (green arrow) must be internally and externally cleaned and inspected. Floor mats must be removed (blue arrow).</p>	 <p>A wide-angle photograph of the interior of an excavator cabin. The view shows the operator's seat, the joystick control panel, and the floor area. Several colored arrows are overlaid on the image: a red arrow points to the joystick control panel, a green arrow points to the seat shroud, and a blue arrow points to the floor mat area.</p>
<p>Access will be required to check the internal workings of the joystick control panels (red arrow).</p>	 <p>A close-up photograph of the joystick control panel. A red arrow points to the internal wiring and components of the joystick, indicating the area that requires inspection.</p>
<p>The box section below the seat needs to be thoroughly cleaned (yellow arrow). Proper access can only be achieved once the four bolts are removed and the seat moved. Access into the joystick control panels (red arrow) is required. Inside the seat shroud (green arrow) must be cleaned and inspected.</p>	 <p>A close-up photograph of the box section below the seat. The image shows the seat shroud, the joystick control panel, and the box section. Colored arrows are overlaid: a green arrow points to the seat shroud, a red arrow points to the joystick control panel, and a yellow arrow points to the box section below the seat.</p>



Description	Images
<p>BRM has previously been found in some air-conditioning vents (red arrows) and to a storage compartment (blue arrow) and are therefore areas of interest to the department.</p>	 <p>This image shows the operator's seat area of an excavator. Two red arrows point to the air-conditioning vents on the dashboard, and a blue arrow points to a storage compartment below the dashboard.</p>
<p>If rubber or plastic foot pedal covers (red arrows) are in place, remove and clean. Rubber shrouds below pedals (green arrow) must also be verified clean inside. Under the floor mat must be clean (blue arrow).</p>	 <p>This image shows the foot pedals of the excavator. Two red arrows point to the rubber or plastic foot pedal covers. A green arrow points to the rubber shroud below the pedals. A blue arrow points to the floor mat area.</p>
<p>Located behind the seat in some models is the air-conditioning filter (green arrow). The filter must be removed, the filter and surrounding area cleaned and verified.</p>	 <p>This image shows the air-conditioning filter located behind the seat. A green arrow points to the filter.</p>

Description	Images
<p>The filter has been removed (green arrow), revealing BRM inside which must be removed.</p>	

## General

Description	Images
<p>Ensure that all looming (blue arrow) around hydraulic hoses and lines is free of all BRM. Flushing these areas with the looming still in place rarely removes all BRM as can be seen in this illustration.</p>	
<p>All wiring harnesses (yellow arrows) must be thoroughly inspected for internal BRM as seen in this image.</p>	

Description	Images
BRM inside the fuse box must be removed.	