Plant Hazard Analysis & Risk Assessment

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Model: Boxer 600HD

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Person conducting assessment:

This Hazard Identification and Risk Assessment document is Model specific. It is based on the knowledge that all new machines of this model were/are produced to the same specification and design. It assumes all examples of this exact model currently in service to be as per the original specification, and to have been and continue to be operated and maintained in accordance with the Manufacturers requirements, and with all applicable statutory and regulatory requirements of an original example of the Model for which it was prepared. This Assessment must be reviewed by all stakeholders as required:

- Having regard to the manufacturers approved options
- Having regard to the general arrangement of miscellaneous equipment or facilities that may be provided on the plant according to the end users requirements or specification
- According to the particular circumstances under which the plant is used and maintained
- As new Hazards are identified and/or as risks are reassessed
- As existing risk control measures are revised or new risk control measures are introduced and implemented
- As and when work procedures are altered or revised
- Having regard to any unauthorised alterations or modifications made to the design or operation of the equipment

Monitor have made every attempt to identify all reasonably foreseeable operating circumstances in preparing this Assessment, however no guarantee as to the completeness of this Assessment is provided or implied.
It is the responsibility of Owners, Employers and Operators to identify all hazards associated with the use of this equipment specifically applicable to the task to be carried out and to where the equipment is to be used or located. They must assess the risk potential for each of the identified hazards and ensure that all reasonably practicable steps are taken to ensure those risks are effectively controlled.

- All operators must be trained and competent in the safe use of this particular piece of equipment, and hold appropriate qualifications as required by applicable regulatory requirements
- Operators of the equipment to which this Plant Risk Assessment refers must read and understand the Instructions for Use and Warnings contained within the Operators Manual prior to use
- All Daily Pre-Start Checks, Routine and Periodic Inspections, Maintenance and Repairs to this equipment must be carried out in accordance with the requirements of AS2550.10-2006

ID	Description of Hazard Potential		Activity	Risk control measures already implemented	Risk	Supplementary risk control measures	Risk score
	Origin	Consequence					
1	Operator Competency						
1.1	Untrained operator, not following proper operating procedures. Distracted operator. Following a poor system of work. Operator working alone.	Entanglement (amputation/death) Laceration / cuts / bruises / fractures Serious injury or death	Set up Operation Maintenance	Operation instructions explained in operator's manual	C4 Extreme	Train operators on safe use of the plant. Operator training should include at least the following: • pre-operation inspections • safe operation of plant • regular maintenance tasks • understanding of plant operation • capabilities and limitations • emergency procedures Do not operate the plant unless proper training has been received. Ensure operator's manual is kept with the plant for reference. Do not operate the plant when distracted, ill, excessively fatigued, or under the influence of drugs or alcohol. Implement appropriate system of work based on manufacturer's recommendations (e.g. operating instructions shown in operator's manual).	B1 Low
1.2	Misuse Unauthorised use of plant	Entanglement (amputation/death) Laceration / cuts / bruises / fractures Serious injury or death	Operation	Operator's manual warns about not using the plant for other than its intended purpose.	C4 Extreme	Do not use the plant for any other purpose than its intended use as explained in the operator's manual. Do not operate the plant unless proper training has been received.	C4 Extreme

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						Keys are not to remain in an unattended machine.	
2	Plant Limitations						
2.1	Slope operation	Roll over	Driving Operation	Operator's manual recommends • Do not travel up or across a slope steeper than 15° • Make sure that the tracks are extended to their widest position, providing the broadest stance for the machine • Keep attachments as low as possible when traveling on slopes or rough terrain • Keep the heavy end of the machine towards the uphill direction when traveling up or down a slope.	C3 High	Avoid any conditions that can lead to tipping the machine. Avoid driving on ground too soft to support the machine's weight. Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes. If the machine has to be stopped on an incline, make sure that the machine is pointing either up or down the slope. Also chock both tracks at the downhill end.	B2 Low
3	Operation						
3.1	Moving operator controls	Pinching	Operation	The design and layout of the operator controls eliminate the risk of pinching by providing large gaps between moving controls. Operate the levers and joysticks gradually and smoothly. Excessive speed and quick control movements without regard for working conditions could cause an unsafe situation.	C2 Medium	Regularly inspect machine controls. Make sure to maintain your grip on the hand grip area around the joysticks, any time the machine is in motion.	A1 Rare

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3.2	Instability of machine when operating on steep and undulating ground.	Rollover Crushing Serious injury Death	Operation	Follow Operator's manual recommendations (as listed above).	C4 Extreme	Carry out job site risk assessment to determine suitability of the site before commencing any work. Avoid driving on steep ground; find alternative routes whenever possible. Be aware of performance features of the equipment in operation and the effects on machine stability.	B2 Low
3.3	Instability caused by overloading the attachment.	Rollover Crushing Machine damage	Operation	Never exceed the rated capacity of the machine. When using attachments, know their capacity ratings and unit limitations. Unit specifications can be found in the Operator's Manual. Never attempt to operate any attachment without first understanding proper installation and operating procedures. The centre of gravity, stability, and operating characteristics of the entire machine will change with the use of different attachments.	D3 High	Ensure only operators are within work area - ensure the exclusion zone is in place and operational. NEVER stand or allow anyone else to be directly in front of machine.	B2 Low
3.4	Prestart inspection	Laceration / cuts / bruises / fractures	Operation	Prestart inspection as per manufacturers recommendation.		Ensure any fitted safety devices or equipment are in good condition and functional during Pre-start check.	A1 Low
3.5	Uncontrolled movement of plant components	Entanglement (amputation/death) Laceration / cuts / bruises / fractures	Set up Operation Maintenance Cleaning	Prestart inspection as per manufacturers recommendation.	C3 High	Isolate power to machine and remove the main switch key when performing maintenance and cleaning tasks.	B2 Low

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		Serious injury or death Muscular stress / Musculoskeletal Disorder	Troubleshoot	Joysticks and levers should return to the neutral position when they are released.		Implement 'tag out' procedure to isolate faulty/out of order plants. Maintenance to be carried out by a competent person. Pay attention to hazard decals to machine.	
3.6	Operator safety	Entanglement (amputation/death) Laceration / cuts / bruises / fractures Serious injury or death	Set up Operation Maintenance Cleaning Troubleshoot	Ensure operator: - Has no loose clothing or jewellery, hair tied back - Has snug fitting PPE with no cuffs or strings - Has clothing tucked in where applicable. - Is provided with correct rated hearing protection. - Safety footwear	D4 Extreme		B2 Low
3.7	Pivot points between loader arm and hydraulic rams.	Crushing body parts	Operation Maintenance	Hydraulic cylinder lock fitted for use when performing maintenance with raised loader arms. Operator's manual provides SOP for safely installing cylinder lock. Danger and warning safety decals are fitted to the machine which identifies the crushing / pinching hazards.	D4 Extreme	The operator and maintenance person must ensure that maintenance is only carried out with the cylinder lock fitted when loader arm is fully raised.	B3 Medium
3.8	Loader arm collapses due to hydraulic failure.	Serious injury Crushing Death	Maintenance	Loader is fitted with a cylinder lock and fitting instructions for	D4 Extreme	Persons are not to work under raised arm until cylinder lock is installed.	B2 Low

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				installation in operator's manual.			
3.9	Engaging / disengaging an attachment from the loader.	Crushing Impact Serious injury	Operation	The operator's manual provides safe operating instructions for engaging / disengaging both manual and hydraulic attachments.	D3 High	Operators must be trained in the operation of the loader. Operator must relieve hydraulic oil pressure before uncoupling hydraulic hoses.	A2 Low
3.10	Faulty/out of order, or poorly maintained plant	Entanglement (amputation/death) Laceration / cuts / bruises / fractures Serious injury or death Muscular stress / Musculoskeletal Disorder	Operation Emergency Maintenance	Operator's manual outlines plant maintenance schedule. Current maintenance inspections up to date as per manufacturers recommendation.	B4 High	Always perform pre-operation inspection before operating the plant. Implement 'tag out' procedure to isolate faulty/out of order plants. Do not use an 'out of order' plant. Record all faults in logbook. Perform plant maintenance as per manufacturer's maintenance schedule. Keep maintenance records / plant logbook up to date.	B1 Low
3.11	Refuelling	Explosion Fire			B4 High	When refuelling: • Keep away from ignition sources; • Do not smoke; • Avoid spilling fuel over hot engine.	A2 Low
3.12	Engine exhaust pipe	Burn	Operation	Exhaust pipe guarded by exhaust shield. "Hot surface" decal in place.	C2 Medium	Do not touch exhaust pipe when hot.	A1 Low
3.13	Plant modifications after completion of risk assessment.	Crushing Overturning	Operation Set up		C5 Extreme	Ensure modifications made to the plant are inspected, assessed, and approved by a competent person. Review hazard analysis and risk	B1 Low

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						assessment after plant modifications.	
3.14	Damage to tracks	Overturning Crushing Impact	Operation	Prestart inspection as per manufacturers recommendation.	C3 High	Avoid driving on the following terrains or work sites • Environments with crushed stone, iron bars, scrap metal or similar recycling material • Daily/continuous driving on asphalt or concrete • Work sites with sharp objects, such as broken stones or concrete waste Work sites with corrosive substances (fuels, oil, salt or fertilisers)	B2 Low
4	Transport / Handling						
4.1	Loading and unloading – driving on/off	Roll over Crushing	Transport	Make sure that the entire width of the tracks will be on the ramps before driving on the ramps. Use low speed / low engine RPM on slopes / ramps.	C4 Extreme	Follow appropriate loading procedures including using weight rated ramps, have ramps at a low inclination, all person clear from the loading zone and placing the heavy end towards the front of the tray or tow hitch on a trailer.	B2 Low
4.2	Loading and unloading – lifting on/off	Crushing Collision	Transport	Operators' manual provides safe working procedures for safely lifting the machine onto transport.	C4 Extreme	Lifting equipment is in safe working order and rated to the load being lifted.	B2 Low
4.3	Failure of chains used for tying down / tie down straps	Roll over Crushing	Transport	Plant is fitted with designated tie down points.	C5 Extreme	Use tie-down points provided on the plant to secure it for transportation.	B2 Low
4.4	Transporting machine	Overturning Impact	Transport		C3 High	Ensure machine is in transportation (locked) mode before departing.	A2 Low

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						Clear machine of loose woodchip material before departing.	
5	Plant Failure						
5.1	Power Failure Burst hydraulic hose	Crushing Overturning Burn Skin irritation	Set up Operation Maintenance	Hydraulic hoses are protected by an outer covering reducing the likelihood of wear and failure. Hydraulic hoses are routed so they will not be in the way during operation.	A3 Medium	Check hydraulic hose condition during periodic maintenance. Report and "tag out of service" if identified.	A2 Low
5.2	Excessive hydraulic oil pressure.	Impact Crushing	Set up Operation		C3 High	Check pressure settings during preventative maintenance.	A1 Low
5.3	Inadequate maintenance procedures	Crushing Impact	Maintenance	Maintenance procedures included in Operator's Manual.	C3 High	Allow only qualified service personnel to perform maintenance tasks.	A2 Low
5.4	Control systems stick creating run-away situation.	Impact Machine damage	Start -up Operation	Operator's manual provides SOP for warming up hydraulic oil prior to use.	C3 High		A2 Low
5.5	Track tension (Continual 'cogging' will cause the track drive sprocket to seat into the rubber track incorrectly, and cause damage to the track.	Overturning Track damage	Operation	Due to the spring tension system built into the track drive as a safety mechanism, the machine can be put into an extreme situation during which the drive sprocket will bypass the rubber track guide holes causing a popping noise, called "cogging". This situation is part of the track drive systems safety design and indicates that this portion of the safety system is functioning properly.	C2 Medium	If cogging occurs, stop travel function and check for and remove any debris or foreign matter in the drive system, check track for proper tension as shown in Section 4 of the operator's manual and resume operation.	A2 Low

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6	Maintenance						
	Battery charging	Burn Fire Explosion	Maintenance		C5 Extreme	Charge in an area with good ventilation, away from ignition sources.	A3 Medium
	Battery handling	Burn Fire Explosion	Maintenance		C5 Extreme	When handling the battery, wear protective clothing and eyewear. Avoid contact with clothes or skin; if electrolyte gets on your skin or clothes, flush it with a large quantity of water. In case of contact with eyes, flush with a lot of water for at least 15 minutes and seek medical assistance immediately. Do not touch the battery terminals or cables with tools that may cause spark emissions. In order to avoid spark emissions, always disconnect the (-) cable first and connect it last.	3B Low

RISK MATRIX							ACTION	HEIRACHY OF CONTROLS
		CONSEQUENCE					**EXTREME –** Do not proceed, until further control measures are implemented to lower the risk. Senior management attention required. **HIGH –** Review and introduce additional controls to lower level of risk. Needs senior management attention. **MEDIUM –** Monitor and maintain supervision and controls. Specify management responsibility. **LOW –** Monitor and manage by routine procedures and monitoring.	1. Elimination – controlling the hazard at the source 2. Substitution – e.g. replacing one substance or activity with a less hazardous one 3. Isolation – e.g. use of barriers to shield or isolate the hazard, enclosures for noisy machinery, installing guards on machinery 4. Engineering – e.g. design and install equipment to counteract the hazard 5. Administration – policies and procedures for safe work practices 6. Personal Protective Equipment – e.g. respirators, ear plugs, face masks, safety glasses, safety shoes
		1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic		
LIKELIHOOD	**E. Almost Certain** Is expected to occur immediately or within a short timeframe	HIGH	HIGH	EXTREME	EXTREME	EXTREME		
	D. Likely Will probably occur in most circumstances	MEDIUM	HIGH	HIGH	EXTREME	EXTREME		
	C. Possible Could happen and has occurred here or elsewhere	LOW	MEDIUM	HIGH	EXTREME	EXTREME		
	B. Unlikely Unlikely to occur	LOW	LOW	MEDIUM	HIGH	EXTREME		
	A. Rare Not expected to occur	LOW	LOW	MEDIUM	HIGH	HIGH		

CONSEQUENCE DESCRIPTORS			
SEVERITY	**SAFETY**	**ENVIRONMENT**	**BUSINESS**
5. Catastrophic	Potential for incident resulting in serious damage and/or fatality	The aspect is legally or contract regulated and has the potential for a disastrous long term impact resulting in prosecution.	Loss > $1M
4. Major	Potential for incident resulting in serious damage and/or permanent disabling illness or injury	The aspect is legally or contract regulated and has the potential for a serious long term impact resulting in prosecution.	Loss of service provision
3. Moderate	Potential for incident resulting in significant damage and/or temporary disabling illness or injury	Significant environmental aspect with short term impact resulting in improvement notice.	Loss $100K - $1M
2. Minor	Potential for incident resulting in moderate damage and/or requiring medical treatment.	The aspect is legally or contract regulated and has the potential for a moderate reversible short term impact resulting in an improvement notice.	Prolonged reduction in service provision or productivity
1. Insignificant	Potential for incident resulting in minor damage and/or injury requiring first aid treatment	The aspect is not legally or contract regulated and has the potential for a minor negligible impact.	Loss $10K - $100K