



PRA APP USER GUIDE
Apple & Android Phone & IPAD & Tablet

Conducting Plant Risk Assessments
Conducting Pre Start Checks on Equipment
Conducting Corrective Actions
PRA Project Planning and your Plant
Building Your Own (BYO) Plant Risk Assessment Template.
Plant Safety General Information – WHS Plant & WHS ACT
List of Standards AS & ISO for Earth Moving Equipment
PRA Plant Type Index

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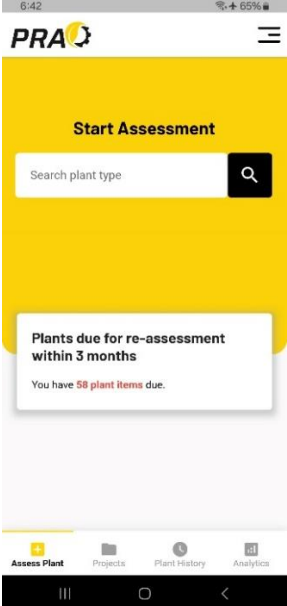
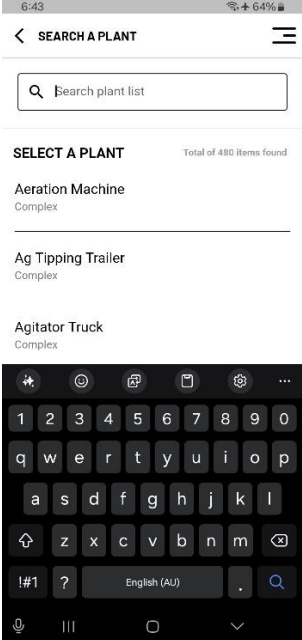
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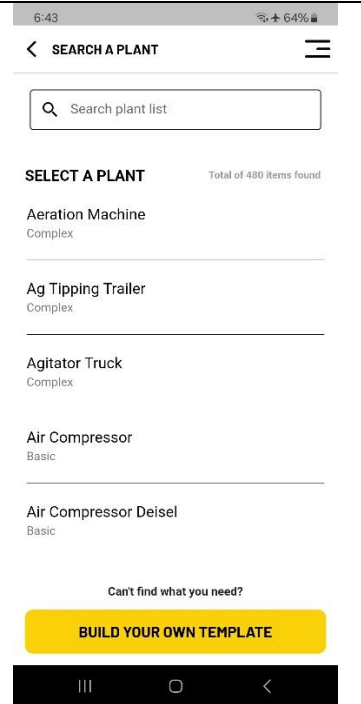
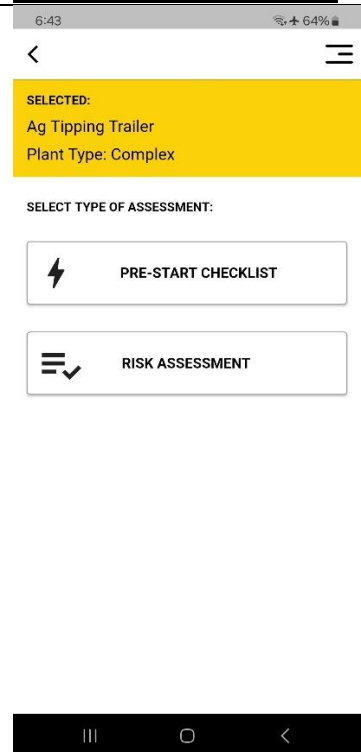
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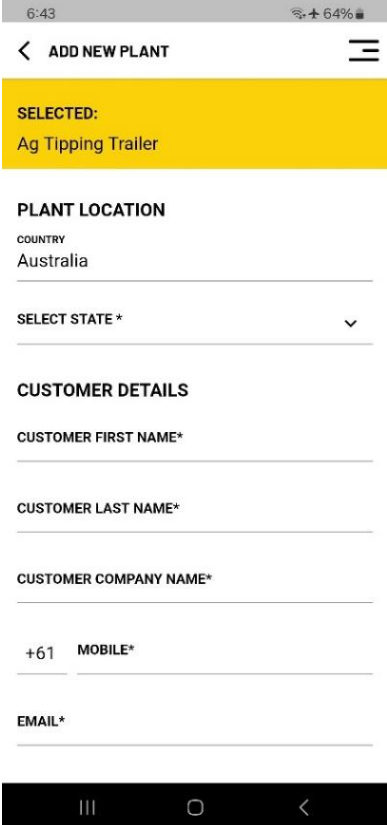
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SafeWork Australia Ph: (02) 93871248	2
New South Wales (NSW) Ph: 131050	2
Western Australia (WA) Ph: 1300307877	2
Victoria (VIC) Ph: 132360	2
Northern Territory (NT) Ph: 1800019115	2
South Australia (SA) Ph: 1300365255	2
Australian Capital Territory (ACT) (02) 93871248	2
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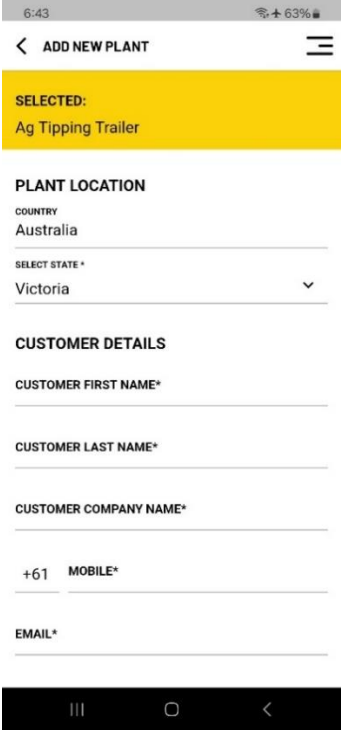
PRA USER GUIDE

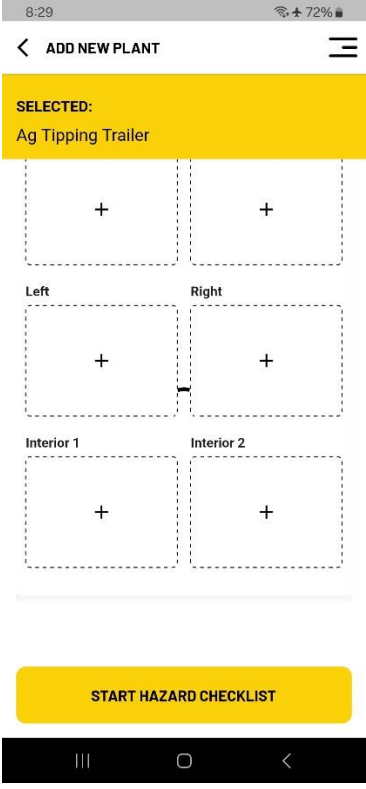
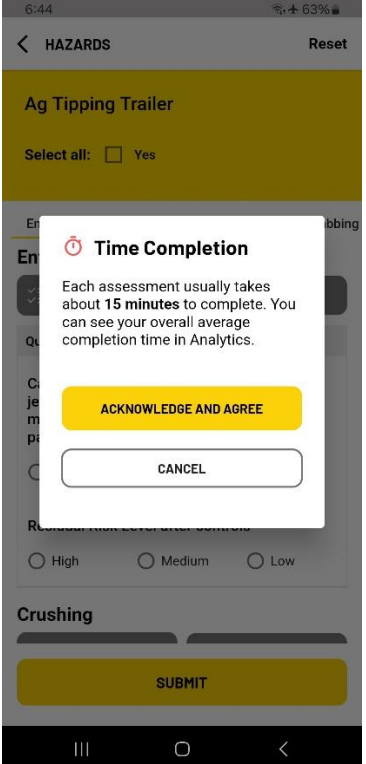
After you have downloaded the App and Registered and paid for credits you can commence its use.

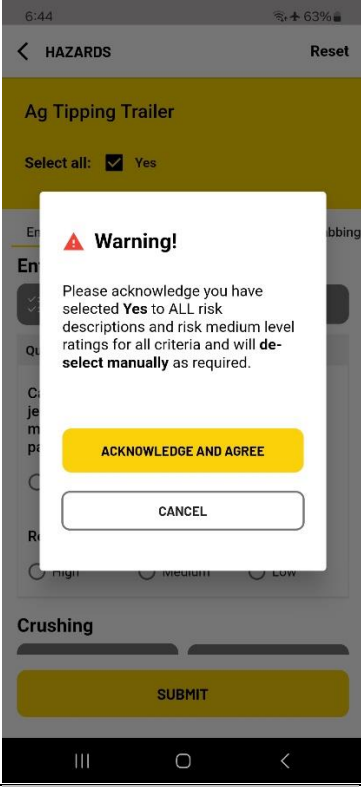
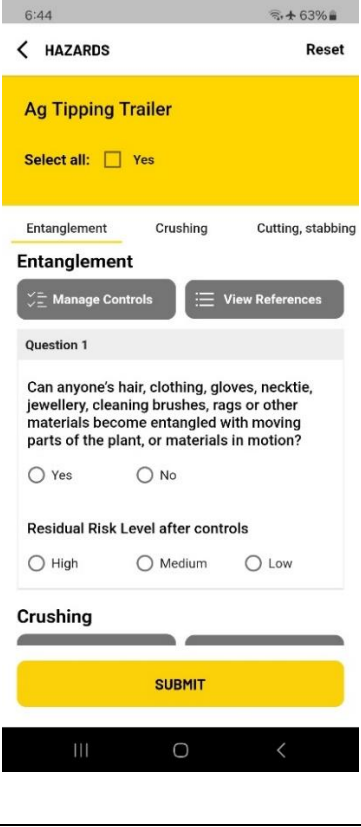
How To Conduct a Plant Risk Assessment	
Screen Shot From APP	Description of Activity
	• Search for the plant type that you are looking for. For example type in crane. The type of models of equipment are not indexed in this typical fashion and you are required to search under generic terms (as there are 100s of models) • In this example of Cranes, you will find categories such as Crane Trucks, 4 by 4 All Terrain Cranes, Slewing Cranes, Non Slewing Cranes, Tower Cranes, Overhead gantry Cranes. Extra. Search under known generic names of equipment. • We have all types of equipment if you are unable to find what you are looking for refer to the back of this User Guide for the list of plant.
	• Type in the search function the type of equipment you are looking for. • If you can not find it then try thinking of other common terms the equipment is referred to and search that way. By Searching under various generic known equipment terms will assist in locating plant. If PRA does not have your plant item then you can use the BUILD YOUR OWN TEMPLATE, to build a new risk assessment template for your equipment. Select a similar piece of equipment to your equipment and complete the building of the new template. This process is explained below. • Select the Plant Item and move to next screen

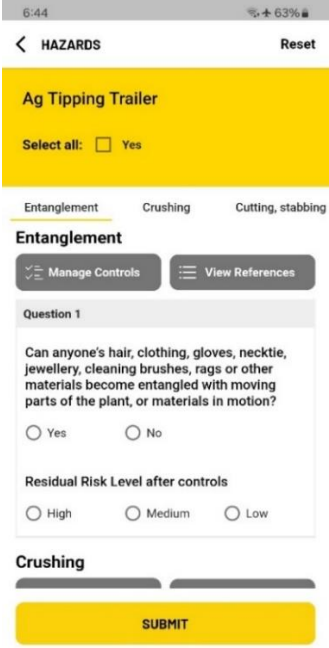
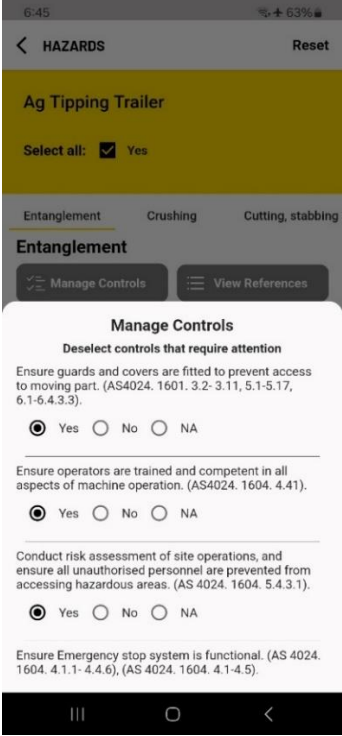
Screen Shot From APP	Description of Activity
	• In this example I am going to select the AG Tipping Trailer. This is an Agriculture Farming Tipping Trailer. • You can see below at the bottom of the screen the Heading “Build Your Own Template”. • This Process of building a new Template is explained in detail further up in the User Guide and ignore it for now. • Select the plant Item you want and you will move to the next screen seen below.
	• We have now moved onto the next screen. • On this screen you can choose to do a pre start risk assessment or a plant risk assessment on the AG Tipping Trailer. • You can see in the yellow the selected Equipment “AG Tipping Trailer” is indicated. • Mobile Plant is considered complex from a pricing point of view (\$140.00 plus gst plus Apples Cost or Goggles charges) if you purchase a private Licence for Larger Volumes from our office you avoid these charges by Apple or Goggle which are in excess of 20%) • Pre Start Assessments are free. • NOW -- > Select <u>Risk Assessment</u> for AG Tipping Trailer

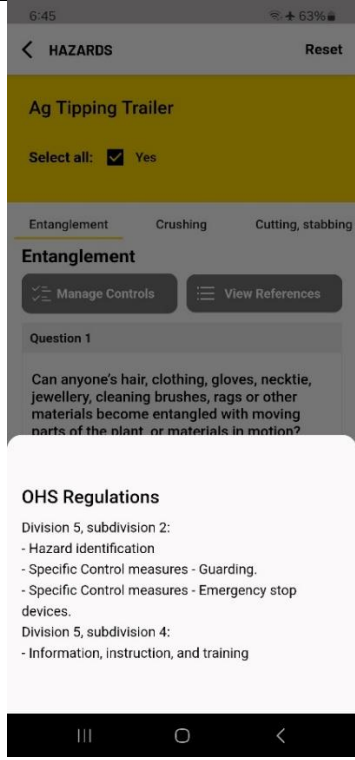
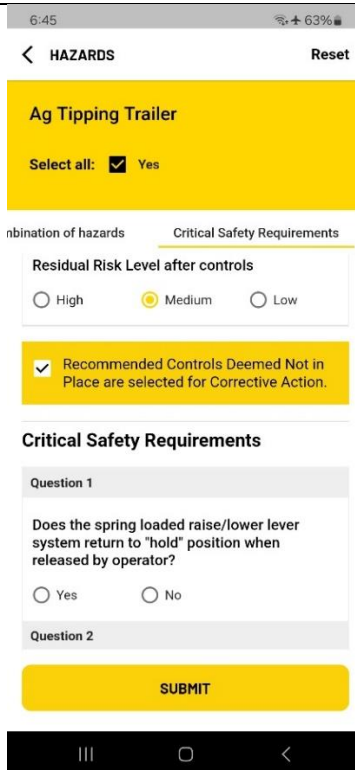
Screen Shot From APP	Description of Activity
	• We are now in the data entry field. You only need to enter data once on a machine as PRA stores the equipment details you enter. If you have 100s of machines you can have the data automatically populate the fields by our App Developer creating a backend link from your server to the PRA App. • Select Australia and then the state you are assessing in, for example Victoria.
	• Complete customer details, name, company, mobile number, email.... • Everything that is Asterix must be completed, or you can not proceed to the next screen. • NOTE: PEOPLE OFTEN ASKED IF THEY ARE QUALIFIED TO ASSESS THEIR PLANT. MY ANSWER IS THE REGULATIONS STATE YOU MUST BE "COMPETENT". • THE MOST IMPORTANT THING IS THAT YOU UNDERSTAND THE OPERATION OF THE EQUIPMENT THOROUGHLY AND IF THE EQUIPMENT IS NOT OPERATING CORRECTLY OR SAFELY AS IT SHOULD. DO NOT RISK ASSESS EQUIPMENT YOU ARE NOT FAMILIAR WITH.

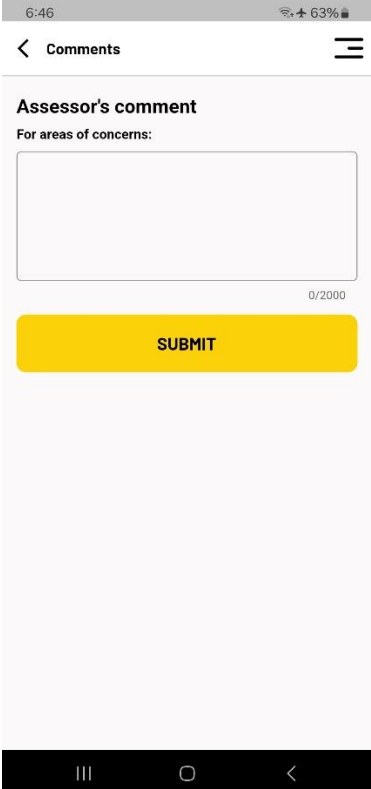
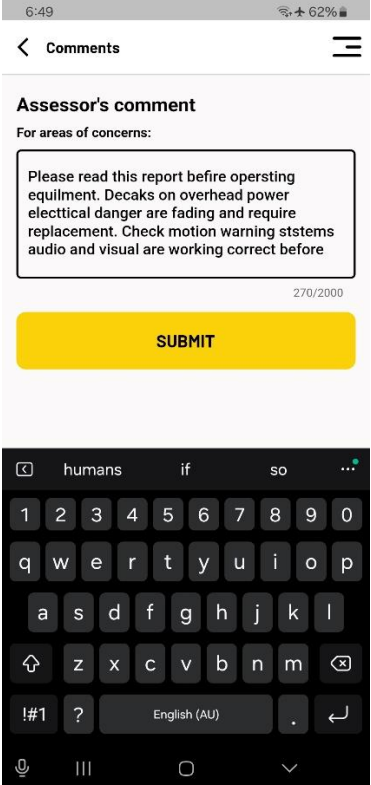
Screen Shot From APP	Description of Activity
	- THE PRA APP HAS THE CONTROLS LISTED AGAINST THE CODE OF PRACTICE FOR PLANT AND PLANT REGULATIONS SO JUST ENSURE YOU ANSWER THE QUESTIONS CORRECTLY. <u>IF YOU ARE UNSURE AS TO WHETHER THE SAFETY CONTROL RECOMMENDED IN THE APP ASSESSMENT GUIDE IS EFFECTIVE OR IN PLACE, FAIL THE ITEM AND CALL THE MANUFACTURER OR WORKSAFE AUSTRALIA.</u> FOR A LIST OF PHONE NUMBERS OF STATE WORKSAFE AUTHORITIES OR REFER TO THE BACK OF THIS USER GUIDE FOR HELP PHONE NUMBERS. THE AUTHORITIES ARE VERY HELPFUL AND THE APP IS EASY TO USE AND THOROUGH IN WHAT IS COVERED. - At the rear of this User Guide is useful Plant Safety General information but it by no means covers all situations in how plant can be safely used and if unsure speak to the WorkSafe Authority or the Equipment Manufacturer.
	You can upload your company logo and photos of the equipment are taken from Front, Back, Right and Left Side and two Interior Photos are all included in the report. Please note that you can WHITE LABEL THE REPORT in your company Logos You can arrange to have a Drop Box with your Model Equipment displayed that only your company can access.

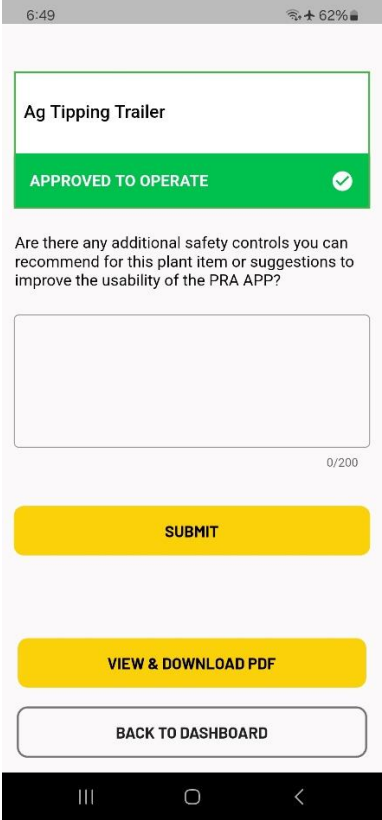
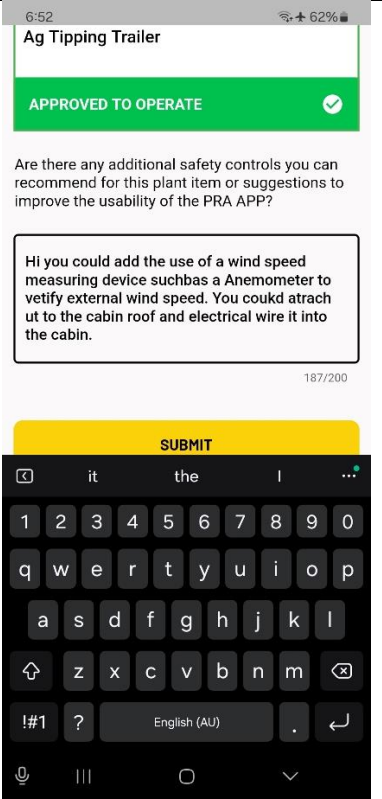
Screen Shot From APP	Description of Activity
	• Once you complete the uploading of photographs you can hit the Start Hazard Checklist Which is the Plant Risk Assessment for the Equipment. • If you do not proceed please check you have completed all areas and inputted data correctly. • Please note, once you move to the risk assessment phase you can not add further details you may have omitted such as equipment working hours that is not Astrex Compulsory to input. • The Plant Risk Assessment Reports Last for 12 Months, before reassessment is required • Please note that if your equipment usage is high or the environment the equipment is exposed to is harsh you may need more frequent Plant Risk Assessments.
	• As you enter the Risk Assessment Area, PRA will record the average time assesses spend assessing their equipment. It is suggested that around 15 min as an approximate average time to complete an assessment. This varies based on the age and condition of the equipment and the skill of the operator. • Just hit the Acknowledge button and get ready to commence your assessment.

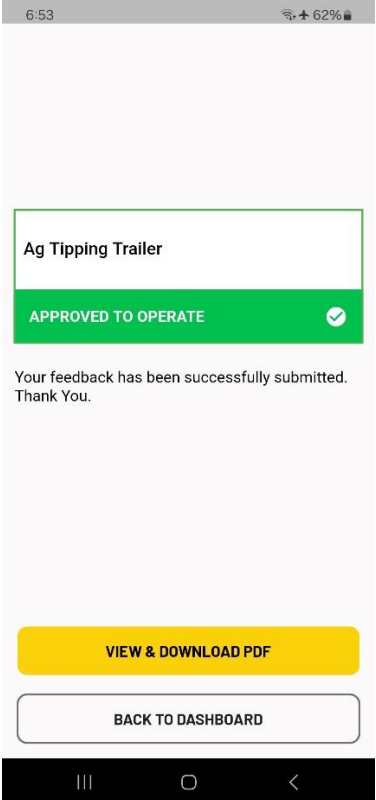
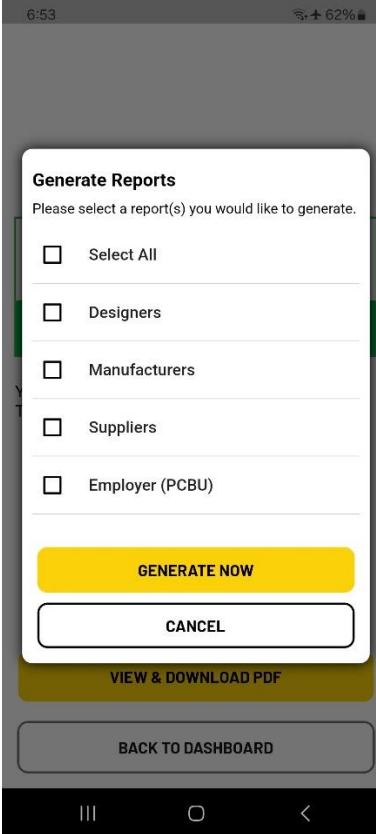
Screen Shot From APP	Description of Activity
	• At the top of the screen it is recommended that you tick the box Select All as a quick preference. • This will select everything as a hazard and as medium risk level and you are then required to deselect what is not a hazard & decrease or increase your risk ratings for each hazard. • Acknowledge and agree if selecting everything as a hazard and proceed with your Plant Hazard Assessment. • It is much safer and more conservative to select everything as a Hazard.
	• The National Plant Code of Practice is embedded in the Questions of the PRA App, ie Entanglement Questions “Can Anyone’s Hair, Clothing...”, then move to Crushing Hazards and the listed Questions there. • In every category (Entanglement, Crushing, Striking extra..) there is a safety control viewing box called MANAGE CONTROLS that suggests safety controls to manage hazards on your equipment. The controls are extensive and you can choose Yes The Safety Control is in Place, No the Safety Control is Not In Place or the Safety Control IS NA NOT RELEVANT or APPLICABLE TO THIS MODEL.

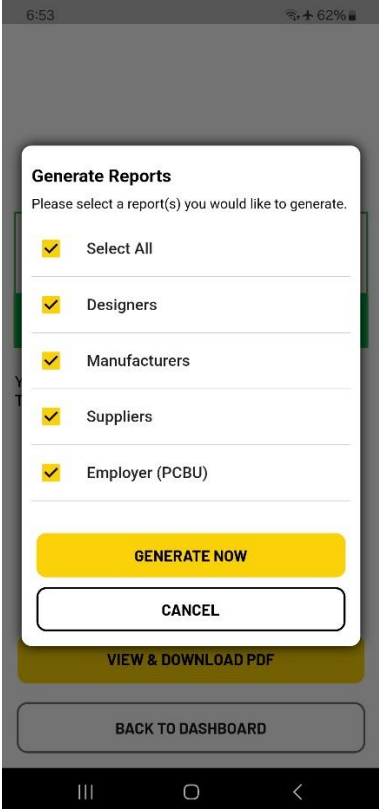
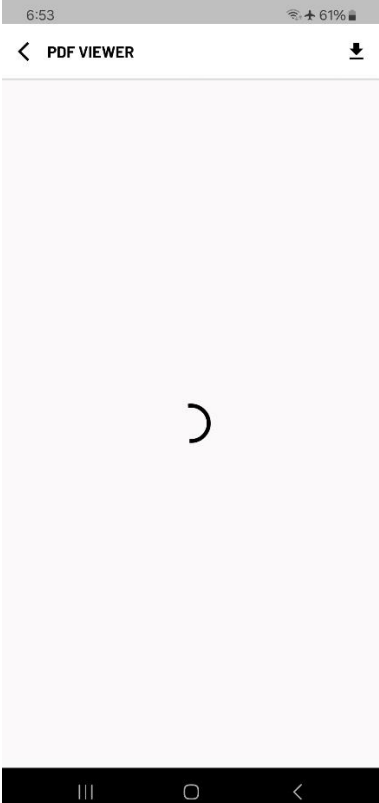
Screen Shot From APP	Description of Activity
	- In a planned enhancement Update of the PRA App occurring in the next couple of Months & should be available by July/August 2025, the Assessor will be able <u>to ADD NEW CONTROLS THAT YOU FEEL IS APPLICABLE AND REMOVE ANY CONTROLS FROM THE REPORT.</u> THESE CHANGES ARE RECORDED IN THE REPORT AS ADDED OR REMOVED SAFETY CONTROLS. NORMALLY THIS FUNCTION IS ONLY AVAILABLE TO USERS USING BUILD YOUR OWN TEMPLATE BUT IS BEING ADDED TO THE RISK ASSESSMENT PROCESS. - Currently you must use assessors comments to add new controls or requirements.
	- There are many references to AS & ISO for Equipment in our Safety Controls. The references are just that, meaning that they are not copied or identical safety controls. The Cross Referencing of Safety Controls allows the Assessor to look further into these areas if they desire to do further research. - The PRA Database has over 200,000 safety controls and is being Updated with an additional 12,000 new safety controls covering all equipment and up to 200 Safety Global Standards Crossed Referenced and new or updated Legislation for example the Heavy Vehicle Regulations and the Crystalline Silica Dust Legislation. All people that purchase PRA from May 1st, 2025, onward can gain free credits to update their reports with the new safety database. Please Note that the Current Safety Control Framework in PRA Has address these areas of hazard. Our Safety Advice is very Thorough and clients should not be concerned that controls are not in place to manage all known risks. We annually review and update safety controls.

Screen Shot From APP	Description of Activity
	- On the Right side of Manage Controls is View References that lists relevant Plant Regulations Ref for types of hazard. - Its just a reference guide, like the Australian Standards listed near safety controls if you wish to conduct further research in that the area of hazards being addressed by our safety controls that are designed to Meet these Regulatory Requirements. - Go through all the Categories and evaluate under Manage Controls if the Safety Controls are in place or not or if they are not applicable. Shortly you will be also able to add new controls for each category. - Note That under the CURRENT SYSTEM YOU CAN ADD NEW CONTROLS UNDER ASSESSORS COMMENTS AT THE END OF THE SUBMISSION QUESTIONS WHICH APPEARS AT THE TOP OF THE REPORT.
	- Just Before Answering Critical Safety questions, you must Tick the Box Acknowledging that you have REVIEWED THE SAFETY CONTROLS FOR EACH HAZARD CATEGORY & ANSWERED QUESTIONS CORRECTLY IF THEY ARE IN PLACE & EFFECTIVE OR NOT OR NOT APPLICABLE. You can not proceed without ticking this box. <u>CRITICAL SAFETY QUESTIONS</u> MUST BE ANSWERED. THEY ARE QUESTIONS ASKED TWICE DUE TO THEIR HIGH SAFETY IMPORTANCE - Once you have answered all the questions hit submit.

Screen Shot From APP	Description of Activity
	• Note If you answered any question throughout the report as No the Safety Control is not in place your assessment will fail the equipment and you will need to complete the relevant corrective action to pass the Equipment. • You can still generate a Failed Equipment Risk Assessment Report. • Below here in the user guide we show you how to complete the corrective action for failed equipment , which is very easy to do. • The Report will record any Failed Items and corrective actions implemented or completed as signed off and the equipment is safe to use.
	• As mentioned earlier under Assessor Comments any new additional safety controls can be added here. There is space for 2000 characters, so there is no shortage of space for additional safety requirements you may want to suggest. These comments appear at the Top of the Report under Assessor Comments, so they are very easy to identify and should always be read by the user of the equipment. • The Pre Start Checklist in PRA Requires Users of Plant to Read the Plant Safety Risk Assessment before using the Plant.

Screen Shot From APP	Description of Activity
	• In this example the AG Tipping Trailer has been “Approved to Operate” • We later below show you how to conduct corrective actions for a Failed Equipment. • Note: Below Approved to Operate is a blank box where you can make additional recommendations of safety controls you would like to see added to the Template for the Equipment. • We are Grateful for All Recommendations and Update Safety Controls from various sources during our research. • We review recommendations regarding their appropriateness and either approve or disapprove the recommendation by our Plant Safety Experts.
	• Here you can see the recommendation in the text box. • We will review this and approve or disapprove its entry into the safety database. • Note recommendations made here will not appear in your report, they are general safety control recommendations made by assessors for PRA to consider to be included in the already 200,000 plus safety Controls. • If you have entered a suggestion then hit the submit button. • You do not need to make suggestions and can leave it blank and hit the button displayed below called View and Download PDF Report

Screen Shot From APP	Description of Activity
	• Hit the View and Download Button. • If you do not want to view the report immediately you can just hit the Back to Dashboard Button. • The completed Report is Stored in your History Tab permanently. • All Completed PRA Reports and Pre Start Reports are Stored in History.
	• The next screen after you select View & Download PDF is the Legal Reference Criteria which you need to select one or all the to appear in the preamble of the report. It has no effect of the controls you have approved. It's just a summary in the preamble of the report. • I generally recommend generating all criteria, as you never know who may view your report, and it does no harm to the report by having the Plant Safety Regulations in the Report that relates to Designers, Manufacturers, Suppliers and End Users in the preamble of the report.

Screen Shot From APP	Description of Activity
	Once you select the criteria then hit the button Generate Report.
	- The report can take up to 45 seconds to generate. These are comprehensive reports with an average of between 200 to 300 Safety Controls. - Ensure you have a good internet signal.

Screen Shot From APP	Description of Activity
	• See the generated First Page of 30 odd page Report. • You can email the report from here to any person. • It is stored “indefinitely” in your history file, and can be sent or emailed from there at any time. • The App will warn you 3 months prior to when 12 Month Reassessment is due, to avoid being locked out from potential clients that require 12 monthly assessments which is standard in industry. Frequency is based on risk of damage to equipment in how it is being used. • The PRA App can be used on phone or iPad or Android Phone or Tablet.
	•

When Plant has Failed During your Risk Assessment & Requires Corrective Action Process

10:02 68%

Ag Tipping Trailer

FAILED TO OPERATE

Are there any additional safety controls you can recommend for this plant item or suggestions to improve the usability of the PRA APP?

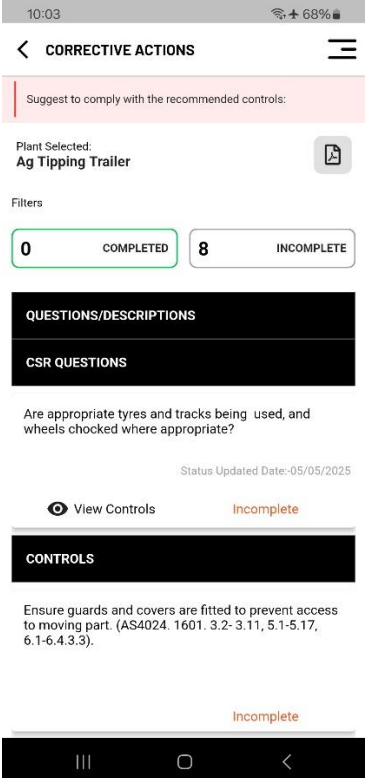
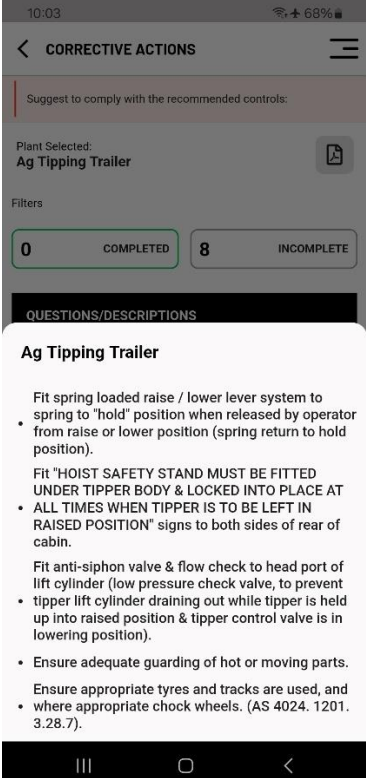
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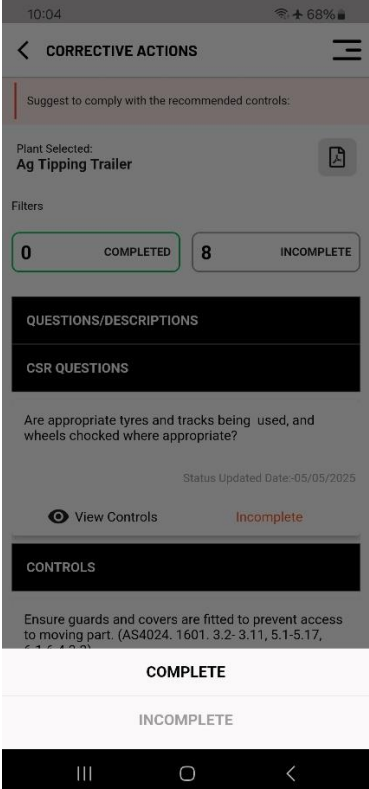
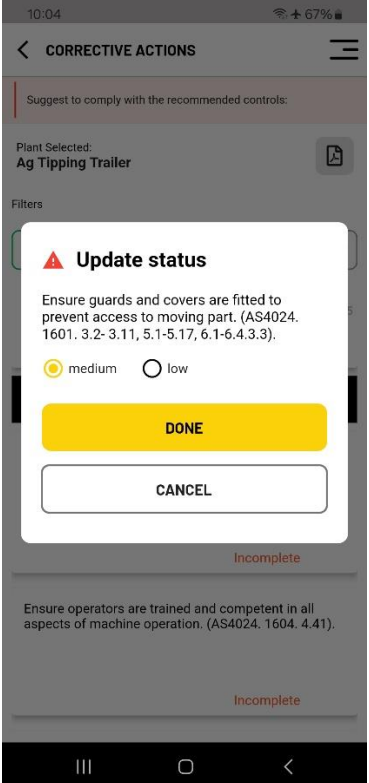
SUBMIT

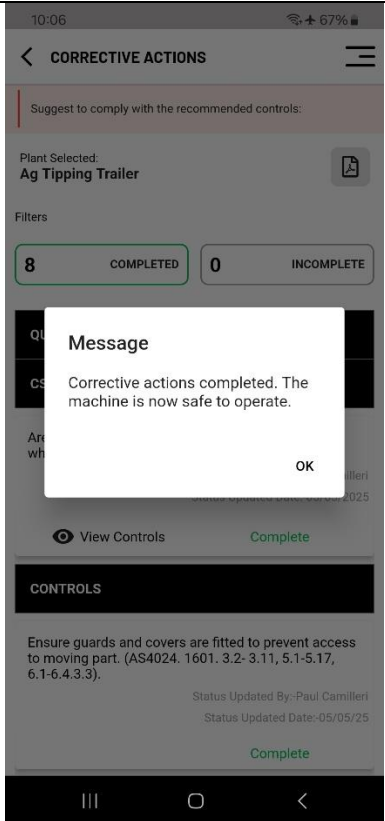
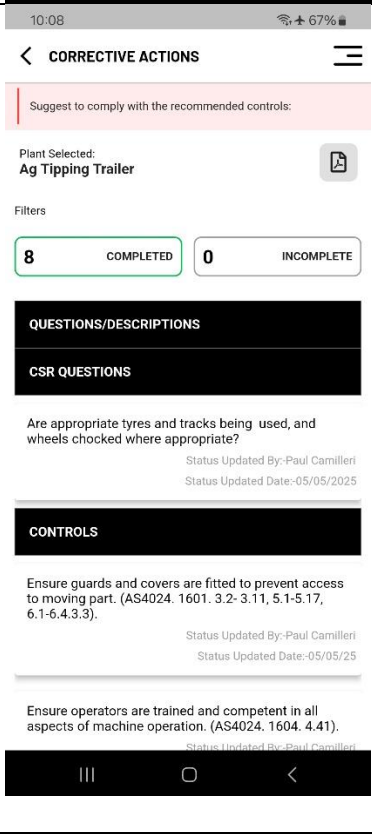
SEE CORRECTIVE ACTIONS NOW

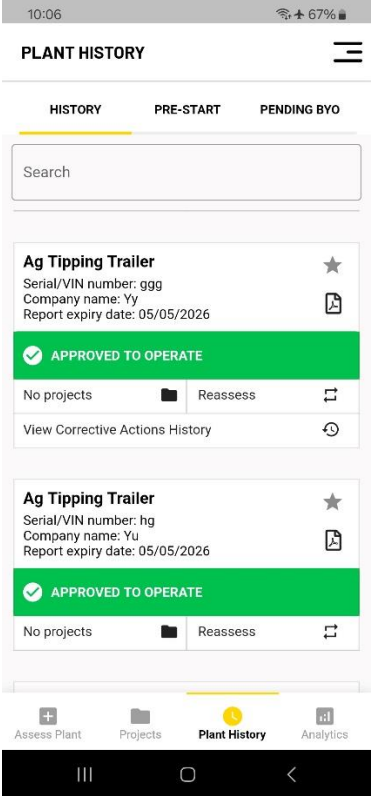
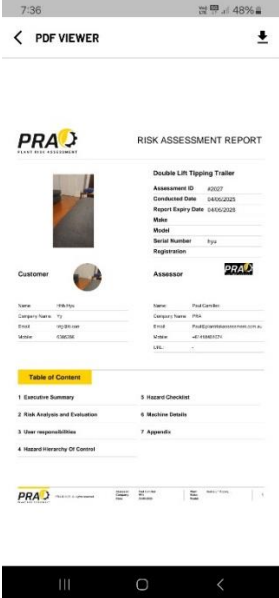
BACK TO DASHBOARD

- If the plant failed due to ticking No that a safety Control is Not In Place, you have the option to see corrective actions now and correct the defect or you can submit the report and download and view from history.
- If you choose to correct the defects, once defects are rectified you will end up back at the storage History Area where you can generate the passed report at any stage and email it.
- The report will document/record all failed and corrected defects and controls implemented.

Screen Shot From APP	Description of Activity
	• This screen shot displays the corrective action task area. • It list the number of complete and incomplete corrective actions. • You can view controls to see what needs to be completed. • When the corrective action has been satisfactorily completed and the equipment is safe to use, hit the Incomplete button and change the selection to COMPLETE. • You will need to do this for every outstanding corrective action.
	• Example of Displayed Controls Recommended During the Risk Assessment that the Assessor Deemed Not In Place and Failed which requires corrective actions as the machine does not meet these requirements and is Failed Not Safe To Operate.

Screen Shot From APP	Description of Activity
	- You can see at the bottom of the screen shot the words Complete being Highlighted as Corrective Action is Done and below that the previous category the title Incomplete. - You Must change the display from Incomplete to Complete once the corrective action has been completed to Pass the Equipment Safe to Use.
	After you have completed the CORECTIVE ACTION you will be given an opportunity to re rank the risk after the control has been put in place to a lower level of risk or leave the ranking as it is.

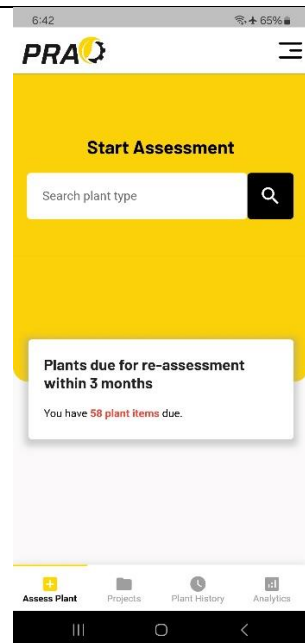
Screen Shot From APP	Description of Activity
	When you complete all the Corrective Actions a Message Will Pop Up, saying that the Corrective Actions are Now Completed and the Equipment is Safe To Use.
	- The last screen here displays all 8 Corrective actions are complete and no Incomplete Corrective are Outstanding. - There is a PDF icon at the top right corner allowing you to generate the Plant Risk Assessment Report with the Corrective Actions in the report. All defects and corrective actions are listed in the Safe To Use Plant Risk Assessment Report you generate after the corrective actions are completed. - Remember the Completed Corrective Action Report is stored in your History area and the Corrective Actions are indefinitely recorded in the report.

Screen Shot From APP	Description of Activity
	• This screen shot displays the Completed History of All Completed Plant Risk Assessments • There is a search functions that allows you to search for a plant item via its serial number when you have a lot of plant alternatively just scroll through the list if you have a low number of plant items being stored. • This area of the App Stores Pre Starts and Pending BYO (Build Your Own Templates) that are waiting for our technical staff to approve the templates for use. • You can hit the top tab bar on each heading to see the displayed list • You can regenerate the report at anytime by just hitting the PDF Icon below the star. • You can hit the reassess button anytime you wish to reassess the plant or hit the Projects button to verify what projects the Plant has been allocated to. I will demonstrate the Projects Software later in the guide. • The analytics button displays summary data of failed Plant Items for export and better analysis into excel
	• See displayed generated report

Screen Shot From APP	Description of Activity												
10:09 < PDF VIEWER <table><tr><td>YES</td><td>Are appropriate tyres and tracks being used, and wheels checked where appropriate?</td><td>Have you ensured all hazard warning decals are clear and legible? For example, crushing risks near hot parts, height risks with fail hazards</td></tr><tr><td>YES</td><td>Are all motion warning systems, audible and visual are in good working order? These may include horns, reverse beepers, flashing beacons.</td><td>YES Is periodic servicing conducted on machine/eq as necessary, in accordance with manufacture</td></tr><tr><td>YES</td><td>Is the machine only operated on slopes less than 20 degrees? And when slopes exceed 10 degrees are Risk assessments conducted prior to operation of the equipment?</td><td>YES Is Anti-burst protection in place?</td></tr><tr><td>YES</td><td>Are hydraulic valves or hoses free from damage?</td><td>YES On the High Pressure Hoses that a barrier/windscreen protection bo</td></tr></table> CONTROLS - Fit spring loaded raise / lower lever system to spring to "hold" position when released by operator h (spring return to hold position). - Fit "HOIST SAFETY STAND MUST BE FITTED UNDER TIPPER BODY & LOCKED INTO PLACE. TIPPER IS TO BE LEFT IN RAISED POSITION" signs to both sides of rear of cabin. - Fit anti-siphon valve & flow check to head port of lift cylinder (low pressure check valve, to prevent out while tipper is held up into raised position & tipper control valve is in lowering position) - Ensure adequate guarding of hot or moving parts. - Ensure appropriate tyres and tracks are used, and where appropriate chock wheels. (AS 4024. 120) - Install barrier protection in front of high-pressure hoses to protect the operator from potential hose r - Ensure hydraulic valves or hoses free from damage - Anti-burst protection is in place - The machine is only operated on slopes less than 20 degrees. And when slopes exceed 10 degrees conducted prior to operation of the equipment. - Any Service work not carried out is to be carried out before operating equipment especially if there is a potent injury. Any necessary repairs are to be carried out in accordance with manufacturer's specifications - Install motion warning systems, audible and visual and ensure they are in good working order. These may incl reverse beepers, flashing beacons. - Install hazard warning decals and ensure they are in correct location and visible. For example, crushing risks r parts, burn risks near hot parts, height risks with fail hazards RECOMMENDED CSR IMPLEMENTED - Are appropriate tyres and tracks being used, and wheels checked where appropriate? RECOMMENDED CONTROLS IMPLEMENTED - Ensure guards and covers are fitted to prevent access to moving part. (AS4024. 1601. 3.2- 3.1.1, 5.1-5.17. 6.1 - Ensure operators are trained and competent in all aspects of machine operation. (AS4024. 1604. 4.41). - Conduct risk assessment of site operations, and ensure al unauthorised personnel are prevented from access areas. (AS 4024. 1604. 5.4.3.1). - Ensure Emergency stop system is functional. (AS 4024. 1604. 4.1.1-4.4.6), (AS 4024. 1604. 4.1-4.5). - Ensure warning decals are clear and legible (crushing, entanglement, pinching, heights, hot parts, electrical, e chemical, hazardous fumes, vibration, noise). (AS 4024. 1201. 6.4.3- 6.4.4), (AS4024-1507-1506). - When working at heights, ensure equipment is setup correctly, including height limiters, PPE harness and lany (including certified anchor points) is operational. Consider the use of spotters. - Ensure staff are trained in rescue plan in the event of mobile equipment breakdown. PRA 012025 (all rights reserved) Assessor: Paul Camilleri Company: PRA Date: 05-06-2023 Plant: Ag Tipping Trailer Risk: Modet III	YES	Are appropriate tyres and tracks being used, and wheels checked where appropriate?	Have you ensured all hazard warning decals are clear and legible? For example, crushing risks near hot parts, height risks with fail hazards	YES	Are all motion warning systems, audible and visual are in good working order? These may include horns, reverse beepers, flashing beacons.	YES Is periodic servicing conducted on machine/eq as necessary, in accordance with manufacture	YES	Is the machine only operated on slopes less than 20 degrees? And when slopes exceed 10 degrees are Risk assessments conducted prior to operation of the equipment?	YES Is Anti-burst protection in place?	YES	Are hydraulic valves or hoses free from damage?	YES On the High Pressure Hoses that a barrier/windscreen protection bo	- See just below the first page the headings of Recommended Critical Safety Controls (CSR) Implemented and Recommended Controls Implemented which relate to the safety controls within the body of the assessment listed under Manage Controls that the assessor marked as Not in place when conducting the assessment and later corrected under corrective actions. - Critical Safety Controls are listed at the bottom of the Hazard Assessment after the Tick Box Acknowledgement of Safety Controls. These Safety Controls that the Assessor Failed will also appear in the report as Recommended CSR Implemented
YES	Are appropriate tyres and tracks being used, and wheels checked where appropriate?	Have you ensured all hazard warning decals are clear and legible? For example, crushing risks near hot parts, height risks with fail hazards											
YES	Are all motion warning systems, audible and visual are in good working order? These may include horns, reverse beepers, flashing beacons.	YES Is periodic servicing conducted on machine/eq as necessary, in accordance with manufacture											
YES	Is the machine only operated on slopes less than 20 degrees? And when slopes exceed 10 degrees are Risk assessments conducted prior to operation of the equipment?	YES Is Anti-burst protection in place?											
YES	Are hydraulic valves or hoses free from damage?	YES On the High Pressure Hoses that a barrier/windscreen protection bo											

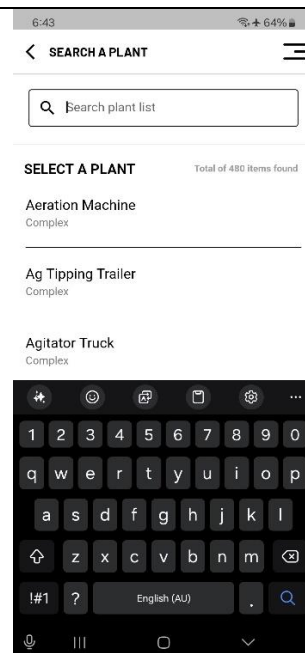
How To Conduct a Pre-Start Assessment on Plant

Screen Shot From APP

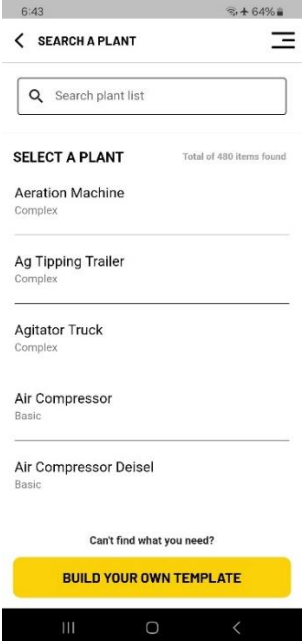
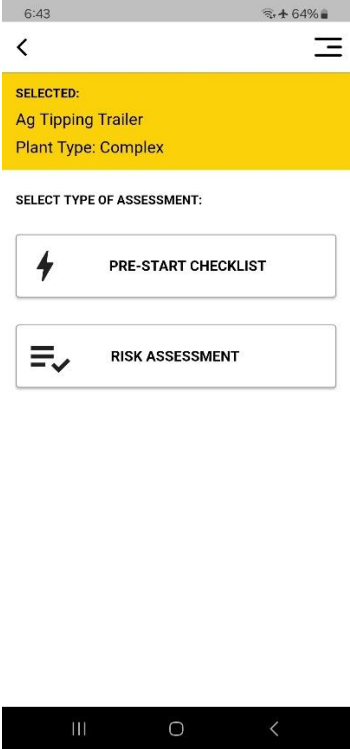


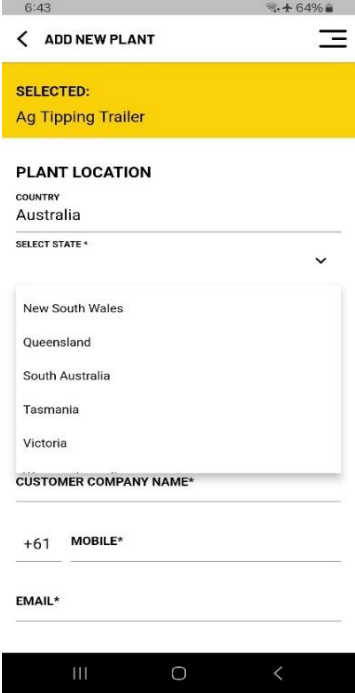
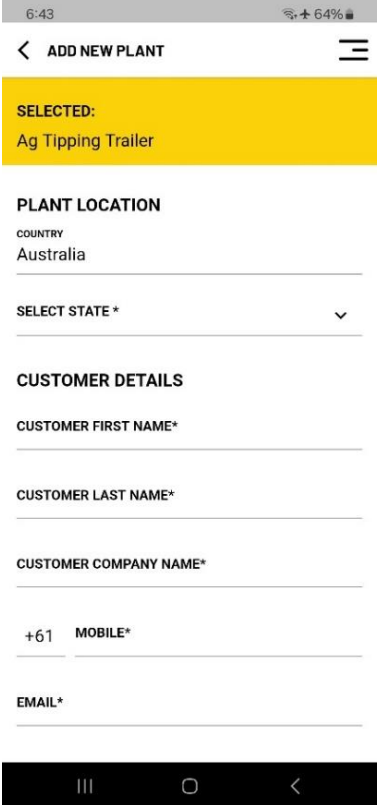
Description of Activity

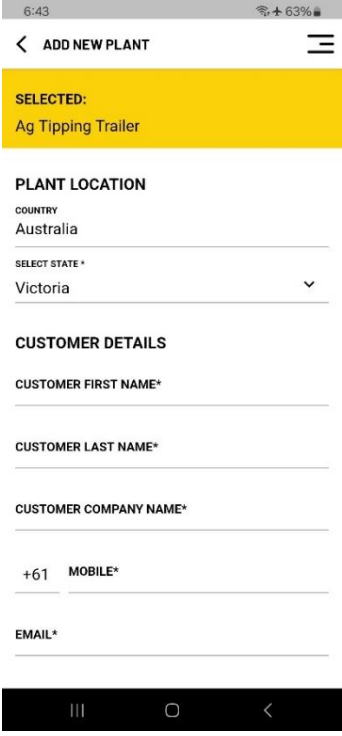
- Search for the plant type that you are looking for. For example type in crane. The type of models of equipment are not indexed in this typical fashion and you are required to search under generic terms (as there are 100s of models)
- In this example of Cranes, you will find categories such as Crane Trucks, 4 by 4 All Terrain Cranes, Slewing Cranes, Non Slewing Cranes, Tower Cranes, Overhead gantry Cranes. Extra. Search under known generic names of equipment.
- We have all types of equipment if you are unable to find what you are looking for refer to the back of this User Guide for the list of plant.

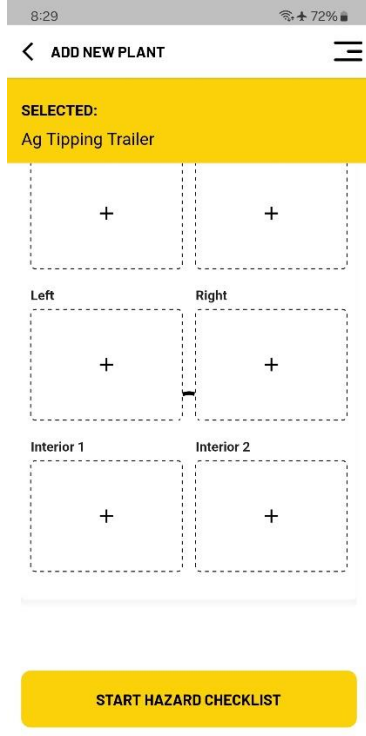
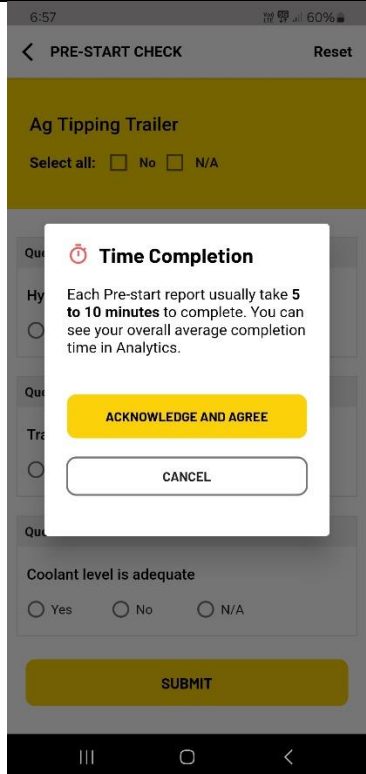


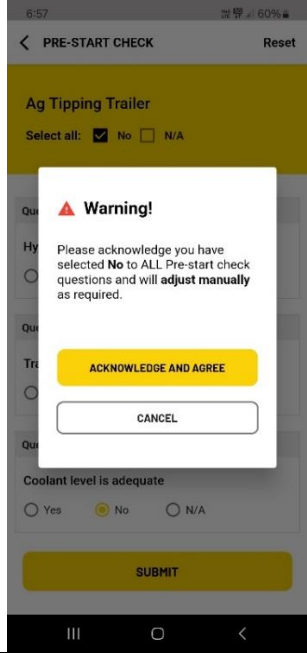
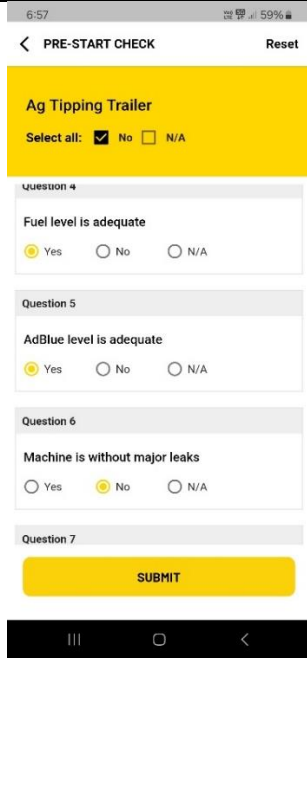
- Type in the search function, the type of equipment you are looking for.
- If you cannot find it then try thinking of other common terms the equipment is referred to and search that way. Search under various known terms the equipment is referred to and you should find your equipment.
- If not refer to the Plant Name Index at the rear of this User Guide.

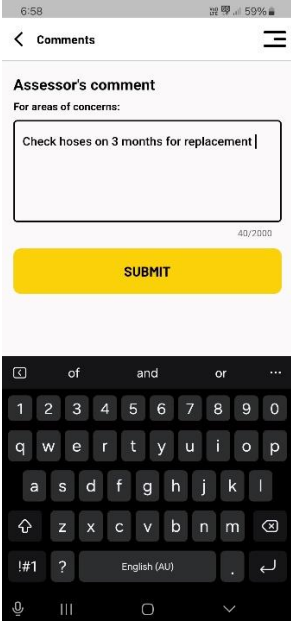
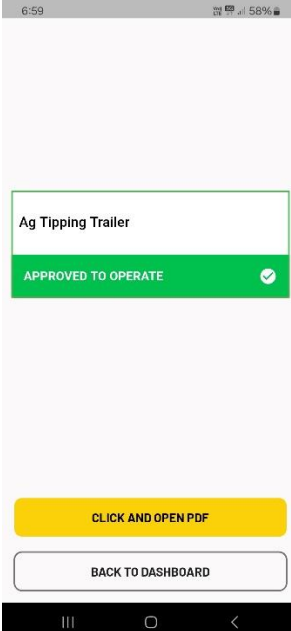
Screen Shot From APP	Description of Activity
 6:43 64% < SEARCH A PLANT Search plant list SELECT A PLANT Total of 480 Items found Aeration Machine Complex Ag Tipping Trailer Complex Agitator Truck Complex Air Compressor Basic Air Compressor Deisel Basic Can't find what you need? BUILD YOUR OWN TEMPLATE	In this example I am going to select the AG Tipping Trailer. This is an Agriculture Farming Tipping Trailer.
 6:43 64% < SELECTED: Ag Tipping Trailer Plant Type: Complex SELECT TYPE OF ASSESSMENT: PRE-START CHECKLIST RISK ASSESSMENT	- We have now moved onto the next screen. - On this screen you can choose to do a <i>pre start risk assessment</i> or a <i>plant risk assessment</i> on the AG Tipping Trailer. - You can see in the yellow the selected Equipment is “AG Tipping Trailer” - Mobile Plant is considered complex with a cost of (\$140.00 plus gst plus Apples charges or Goggles charges when purchasing on the APP. If you purchase a Private Licence through our office based on high volumes you avoid these charges by Apple or Goggle. <u>Pre Start Assessments are free.</u> NOW: Select PRE START ASSESSMENT

Screen Shot From APP	Description of Activity
	• We are now in the data entry field. You only need to enter data once on a machine as the system stores the data. If you have 100s of machines you can have the data automatically populate the fields by our App Developer creating the backend connection between your server and PRA • Select Australia and then the state you are assessing in, ie Victoria. • You always must enter equipment details when doing a pre-start, even if you did one the previous day or a risk assessment with the data entered. This is because Pre Starts by their definition are done daily and require equipment verification before doing them.
	• Complete customer details, name, company, mobile number, email.... • Everything that is Asterix must be completed. • NOTE: PEOPLE OFTEN ASKED IF THEY ARE QUALIFIED TO ASSESS THEIR PLANT. MY ANSWER IS THE REGULATIONS STATE YOU MUST BE "COMPETENT". • THE MOST IMPORTANT THING IS THAT YOU UNDERSTAND THE OPERATION OF THE EQUIPMENT THOROUGHLY AND IF THE EQUIPMENT IS NOT OPERATING CORRECTLY. <u>THIS APPLIES TO CONDUCTING A PRE START</u> AS WELL AS A RISK ASSESSMENT. IF UNSURE FAIL AN ITEM AND CONTACT THE MANUFACTURER IF UNSURE TO VERIFY CORRECT SAFE STATE.

Screen Shot From APP	Description of Activity
	- THE PRA APP HAS AN EXTENSIVE LIST OF PARTS OF EQUIPMENT THAT MUST BE CHECKED FOR SAFE OPERATION. <u>IF YOU ARE UNSURE AS TO WHETHER THE SAFETY CONTROL AND OR CORRECT FUNCTION OF A PART REQUESTED IN THE PRE START IS EFFECTIVE OR IN PLACE, FAIL THE ITEM AND CALL THE MANUFACTURER OR WORKSAFE AUSTRALIA.</u> FOR A LIST OF PHONE NUMBERS OF STATE WORKSAFE AUTHORITIES OR REFER TO THE BACK OF THIS USER GUIDE FOR HELP PHONE NUMBERS. THE AUTHORITIES ARE VERY HELPFUL. - There maybe items not relevant that you can tick as N/A. This because the Pre Start covers many types of equipment.
	- You can upload your company logo and photos of the equipment are taken from Front, Back, Right and Left Side and two Interior Photos are all included in the report. - Please note that you can WHITE LABEL THE REPORT in your company Logos - You can arrange to have a Drop Box with your Model Equipment displayed that only your company can access.

Screen Shot From APP	Description of Activity
	- Once you complete the uploading of photographs you can hit the Start the Hazard Checklist and commence the Pre Start Assessment on the Equipment. Note This is a Free and does not require credits or funds. - If you do not proceed, please check you have completed all areas and inputted data correctly.
	- As you enter the Pre Start Area, the PRA App will record the average time assesses spend assessing the equipment. It is suggested that around 5 to 10min as an approximate average time to complete a pre start assessment. This varies based on the age and condition of the equipment and the skill of the operator.

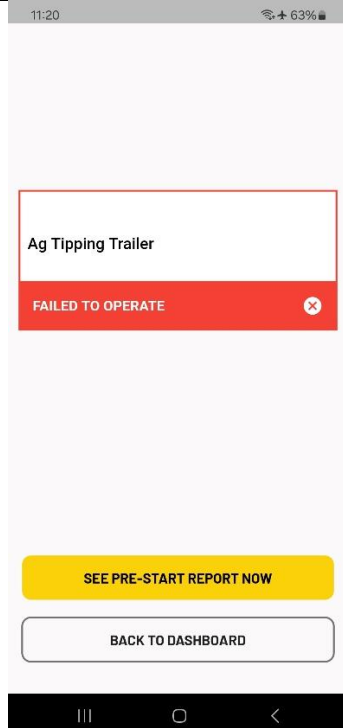
Screen Shot From APP	Description of Activity
	Just hit the Acknowledge button and get ready to commence the pre start assessment.
	- At the top of the screen it is recommended that you tick the box Select All as a quick preference. - This will select everything is not functioning requiring you to verify that it is. - This is a good safety feature, for if you miss an item by human error then you will be failed until the item is reviewed and rectified. - THE PRA APP HAS AN EXTENSIVE LIST OF PARTS OF EQUIPMENT THAT MUST BE CHECKED FOR SAFE OPERATION. <u>IF YOU ARE UNSURE AS TO WHETHER THE SAFETY CONTROL AND OR CORRECT FUNCTION OF A PART REQUESTED IN THE PRE START IS EFFECTIVE OR IN PLACE, FAIL THE ITEM AND CALL THE MANUFACTURER OR WORKSAFE AUSTRALIA.</u> FOR A LIST OF PHONE NUMBERS OF STATE WORKSAFE AUTHORITIES OR REFER TO THE BACK OF THIS USER GUIDE FOR HELP PHONE NUMBERS. THE AUTHORITIES ARE VERY HELPFUL. - There maybe items not relevant that you can tick as N/A. This because the Pre Start covers many types of equipment.

Screen Shot From APP	Description of Activity
	• The assessors' comments can be utilised for any additional items not listed that need attention or rectification. • Once Submitted you can generate the report in PDF and send it via email to any person. • All Pre Starts similar to Completed Risk Assessments are stored in History.
	• The AG Tipping Trailer is Approved to Operate, and you can hit the yellow button "Click & Open PDF:" • You can select the Back to Dashboard button and go to History and generate the Pre Start located in the History Folder, listed on the top bar next to BYO (Build Your Own). • Just hit the PDF icon in the stored Pre Start History listing the plant AG Tipping Trailer to generate the report and if required you can email the report.

- As you can see the report has been passed with all items green and the checked items listed as reviewed and working correctly and safely, which is a requirement of checking these items in the pre start.

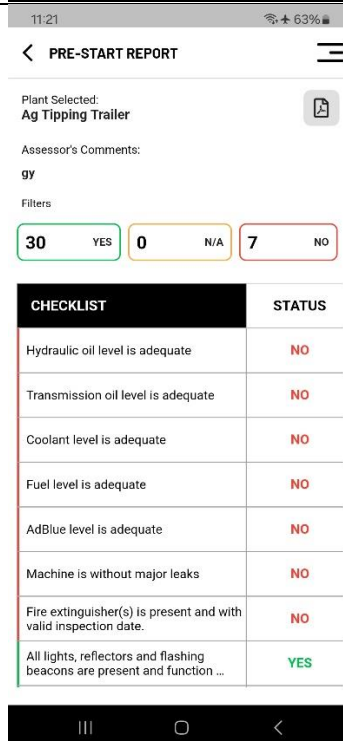
Correcting A Failed Plant After Completing a Pre Start Assessment - Process

Screen Shot From APP

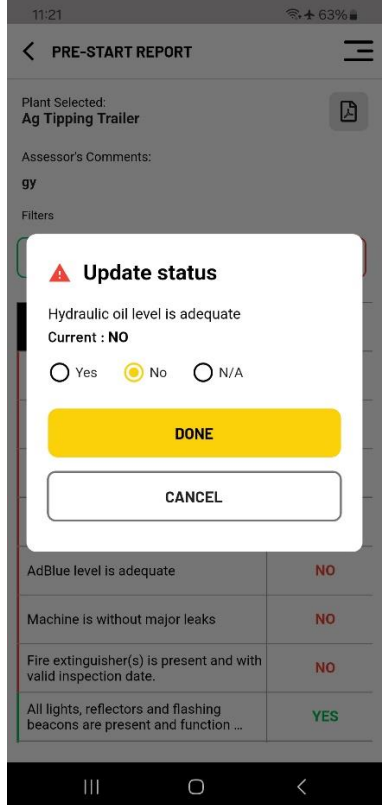
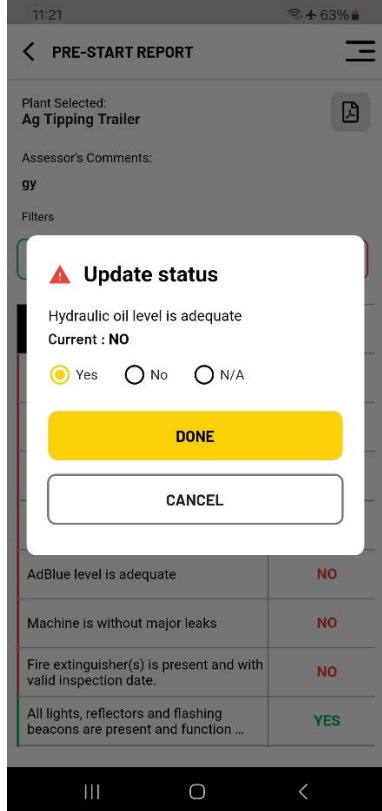


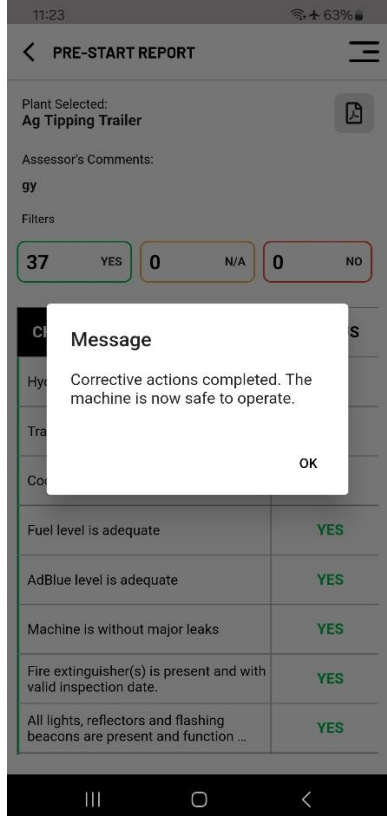
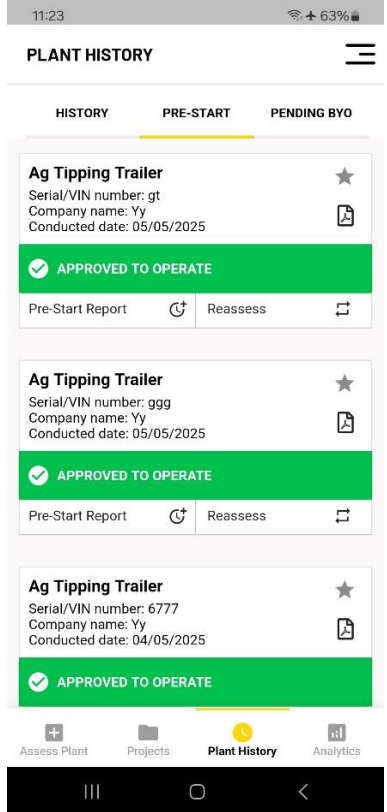
Description of Activity

- In this example the Pre Start has failed items and the Plant is not safe to use.

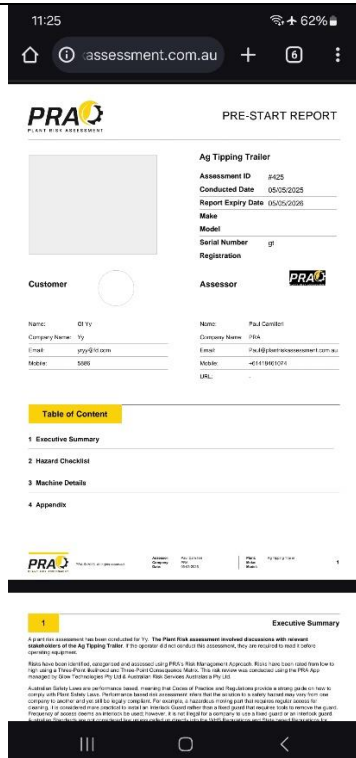


- You will come to this screen where you have the choice of generating the pre start in its failed state with equipment not safe to use by hitting the PDF icon in the right corner.
- You can also elect to correct the defects identified during the pre-start and then generate the passed equipment report, meaning the Equipment is Safe To Use based on the Honesty of the Assessor.

Screen Shot From APP	Description of Activity
	When correcting defects you will get this message when you place your cursor on the No(inferring this this item is not in working order when you conducted the assessment). When the defect is rectified and the part or item operates Safely according to Manufacturer and Worksafe Requirements then you can switch the No to Yes or NA, and then push the Done Button.
	When correcting defects you will get this message when you place your cursor on the No(inferring this this item is not in working order when you conducted the assessment). When the defect is rectified and the part or item operates Safely according to Manufacturer and Worksafe Requirements then you can switch the No to Yes or NA, and then push the Done Button.

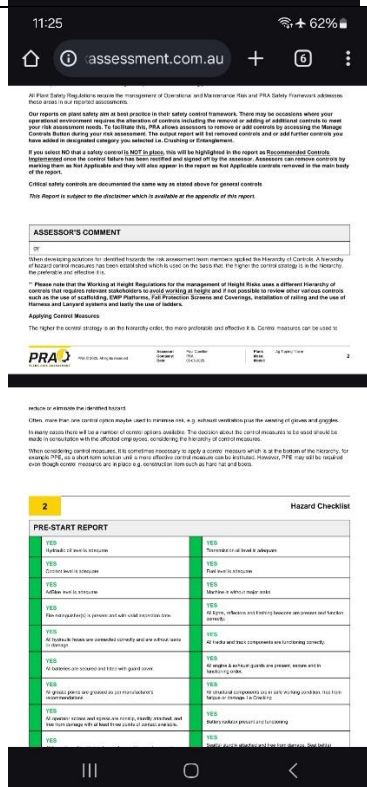
Screen Shot From APP	Description of Activity
	When all corrective actions are all completed the assessed equipment is deemed Safe to Use and you can generate a report with these corrective actions completed by hitting the PDF Button and you can also email the report.
	- Under Plant History you can view as seen here all completed pre start reports. - You can generate the PDF from here as well and email it if you desire.

Screen Shot From APP



Description of Activity

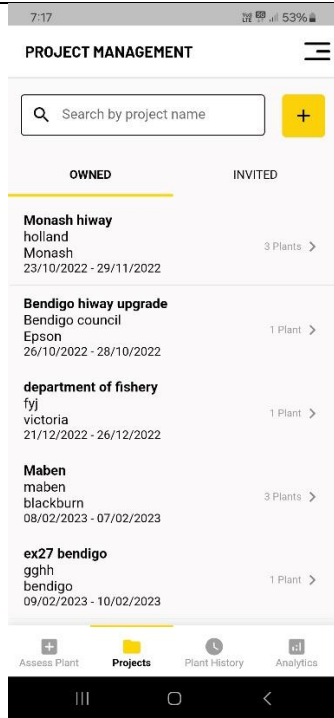
- **This is an example of a completed pre-start report with no photo. All prestart can have photos and it is recommended that you insert them for verification of equipment being assessed when completing data entry details.**



- **The Same Report of the completed Pre Start lists items inspected and passed.**

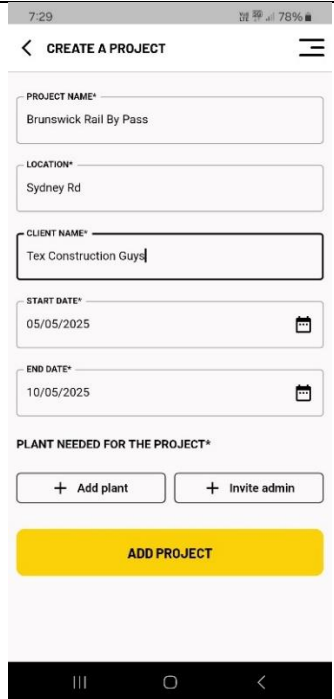
Creating a Project & Allocating Plant Used on the Project.

Screen Shot From APP

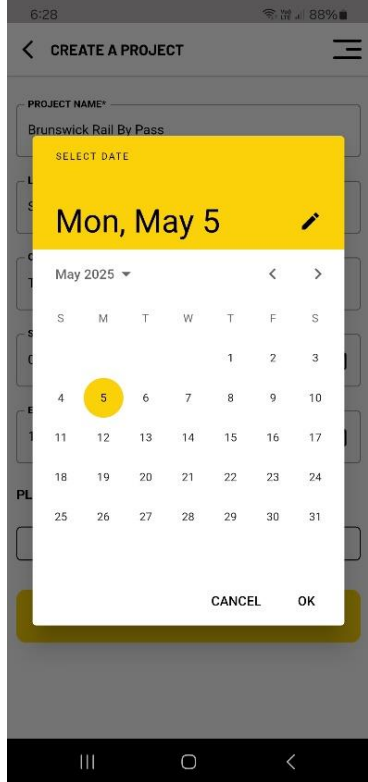


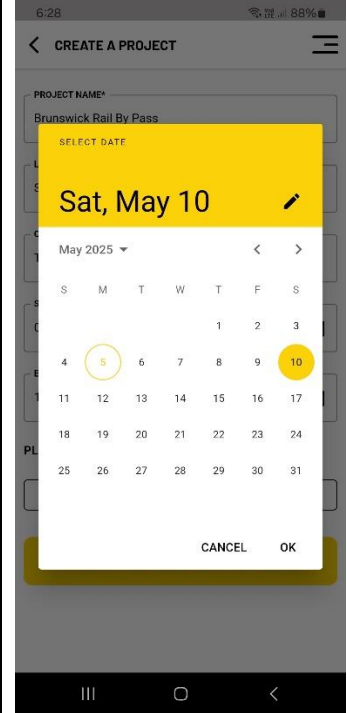
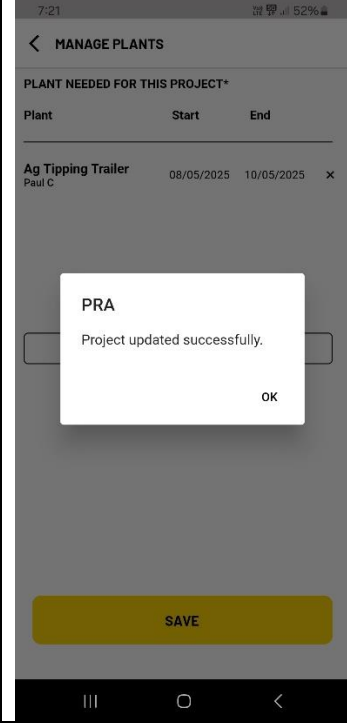
Description of Activity

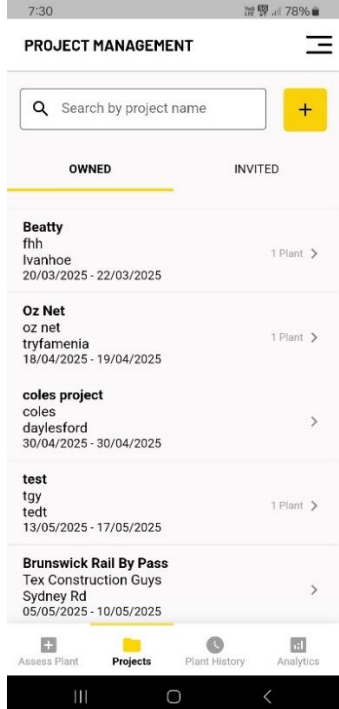
- At the bottom of the Dashboard you can see the heading Projects.
- You can use this function to create as many project jobs as you like where you can allocate the start and end date of projects, the type of equipment to be allocated to each project and when the equipment will be on site with a start and finish date and if you have double booked that item of plant on other projects you will be warned and prevented from double booking the plant on the same date.
- PRA also allow you to invite your contractors plant via email if they are also using the PRA APP.
- With projects you can plan your entire week, month or years work and the allocation of plant. It will warn you if plant is due for reassessment.
- To commence hit the top right Yellow Plus Sign to Add a New Project

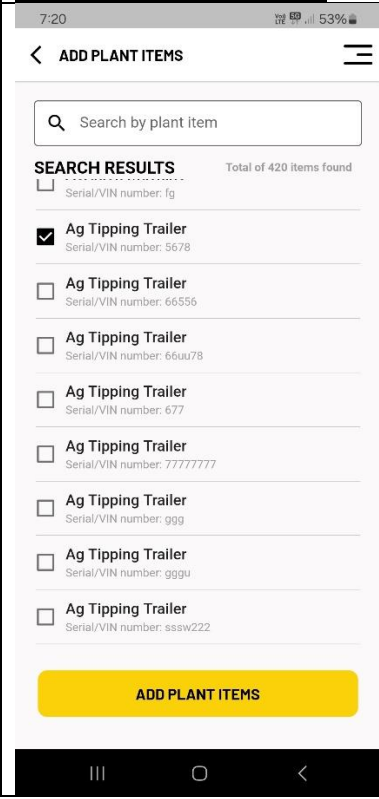


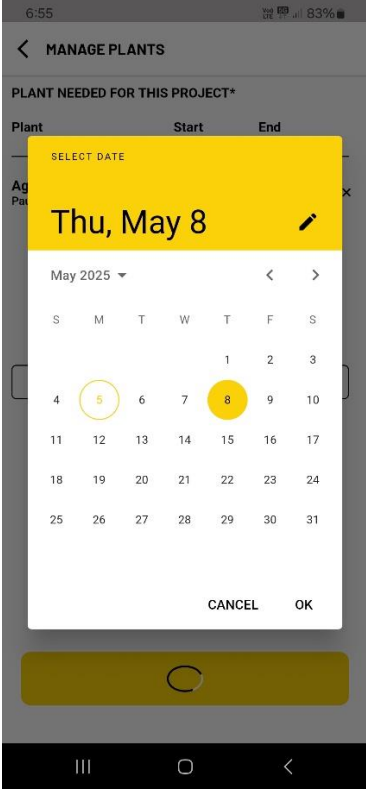
- Enter all relevant details in required fields.
- Once this is completed including the Start date and End Date of the Project, you can hit the Add Plant Button or Invite Admin Button for external people/Contractors to be added to your Project via their email registered in the PRA APP.
- You are required to add all the plant items including their start and finish date you require to be available on the project.
- Once all equipment and dates are added, hit the Add Project Button and the new project is generated.

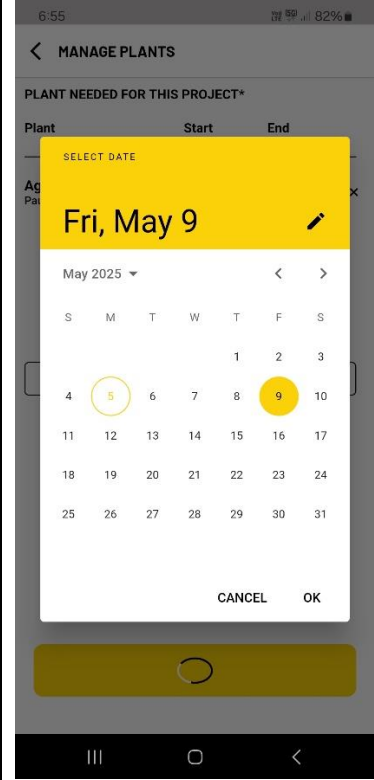
Screen Shot From APP	Description of Activity
	• Here I have generated a Project Called The Brunswick Rail by Pass, commencing on the 5th of May and Finishing on the 10th May. • Beginning Date of Project is the 5th May 2025

Screen Shot From APP	Description of Activity
	The end date of the Project is the 10th May 2025
	The New Project is generated and the message displayed Project Updated Successfully

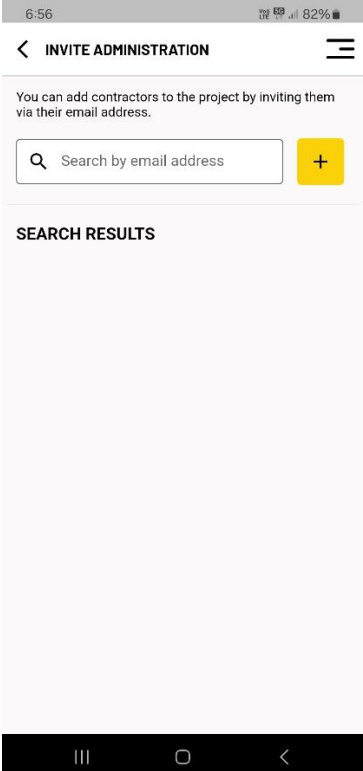
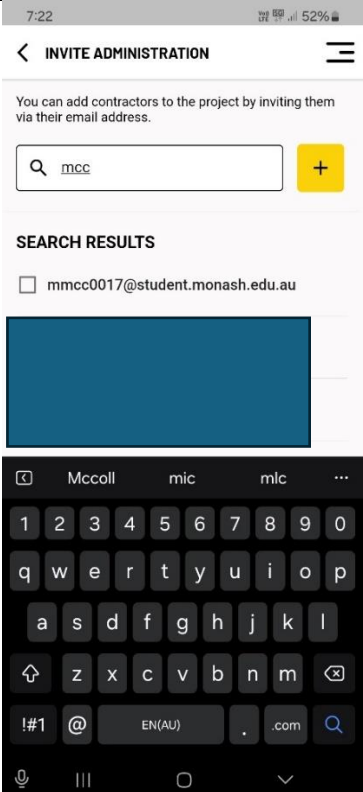
Screen Shot From APP	Description of Activity
	• You can see the title at the bottom of the List Brunswick Rail By Pass, as the New Project has been successfully generated. • You can generate a Project without adding Plant and add the Plant Later if you are unsure of the plant required at the time of generating the project.
	• Here you can hit Manage Plant and a list of your plant previously registered in PRA will appear so you can allocate them to the project. • You can also invite your contractors and their plant to the project and if they have their plant registered on the PRA App. • You can see for each item of plant there is a start date and end date within the dates of the Project. You must allocate plant to the project within the dates you allocated to the project.

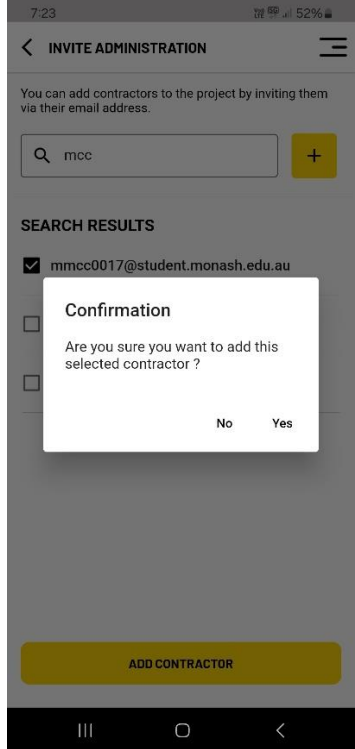
Screen Shot From APP	Description of Activity
	• After hitting the Manage Plant Yellow button above, you will see the heading + Add Plant. • As before when you were generating the New Project and had the Option then to add Plant, you can remove or add more plant or adjust date4s by using the Manage Plant Icon Yellow Button. • You need to save plant items you have selected to add to the project.
	• Like this screen shot your plant registered within PRA will be listed so you can tick box the plant you wish to add to the new project.

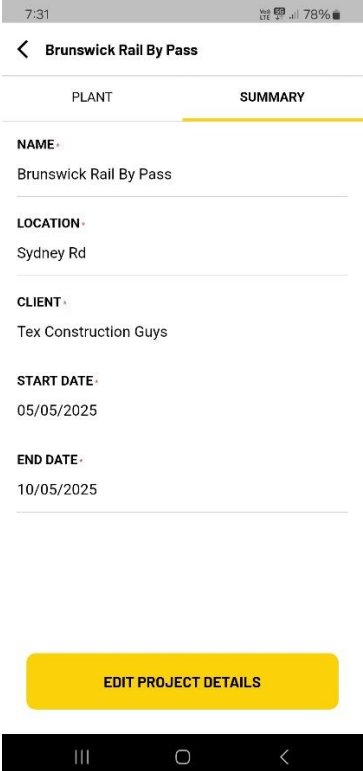
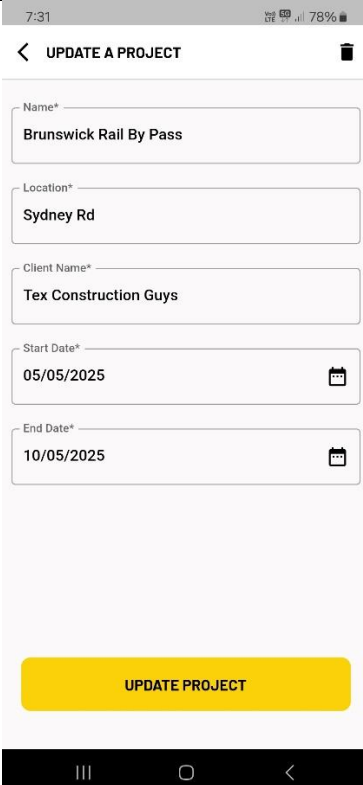
Screen Shot From APP	Description of Activity
	• Here I am adding the start date and end date of the plant item for the project. • I have selected the 8th of May the AG Tipper Trailer will be on site and the 9th May it will be finished and removed from site. • If the AG Tipper Trailer was booked elsewhere during this project allocated timeframe PRA will warn you that the equipment is booked elsewhere on the same dates.
	• Start Date of Trailer onsite

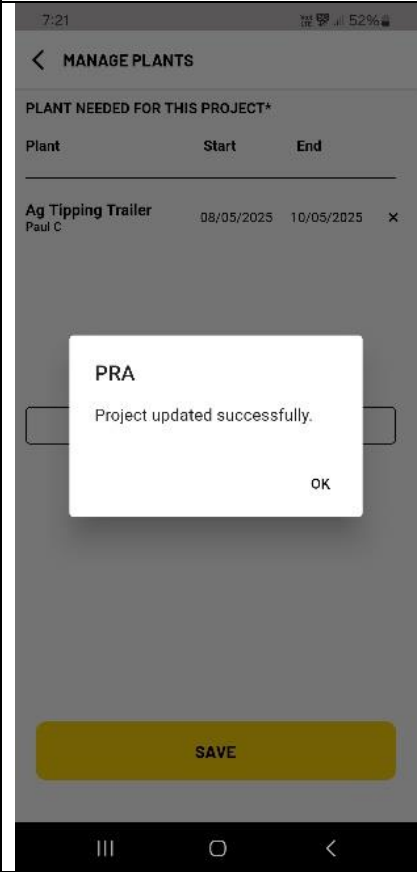
Screen Shot From APP	Description of Activity
	9th May End Date of trailer on site.

Adding Contractors to a Project & Editing Project Details	
Screen Shot From APP	Description of Activity
6:56 82% < Brunswick Rail By Pass PLANT SUMMARY Plant Items due for reassessment this week0 Plant Items due for reassessment this month0 Plant Item Start End Ag Tipping Trailer Serial/VIN number: 567808/05/20209/05/202 Company name: Rr55 Report expiry date: 04/05/2026 MANAGE PLANT MANAGE CONTRACTORS □ <	Trailer Added.

Screen Shot From APP	Description of Activity
	By hitting the Manage Contractor button you can add whatever contractor emails you have listed.
	All you need to do is tick the box of which contractors you wish to invite to the Project.

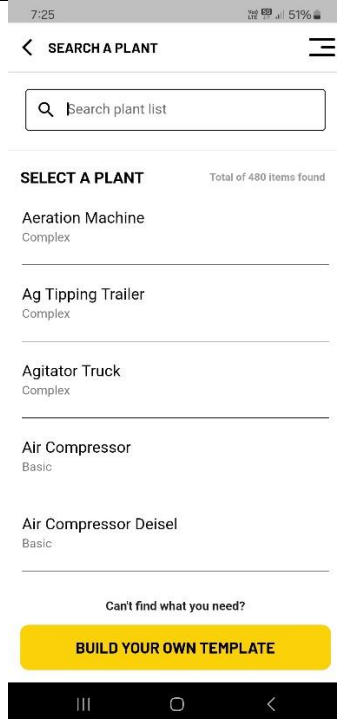
Screen Shot From APP	Description of Activity
	Listed Contractors once selected are signalled with a Confirmation that you want these contractors on the project.
	Under the Manage Plant Icon you can enter the area to edit the project details or delete the project.

Screen Shot From APP	Description of Activity
 7:31 78% < Brunswick Rail By Pass PLANT SUMMARY NAME Brunswick Rail By Pass LOCATION Sydney Rd CLIENT Tex Construction Guys START DATE 05/05/2025 END DATE 10/05/2025 EDIT PROJECT DETAILS	Here you can tap the top summary bar and at the bottom select Edit Project Details.
 7:31 78% < UPDATE A PROJECT Name* Brunswick Rail By Pass Location* Sydney Rd Client Name* Tex Construction Guys Start Date* 05/05/2025 End Date* 10/05/2025 UPDATE PROJECT	- Here you can edit details including start or end date of the project, plant details including start date and end date. - You can delete the project on the top right hand corner rubbish bin icon.

Screen Shot From APP	Description of Activity
 The screenshot shows the 'MANAGE PLANTS' screen in the PRA app. At the top, the status bar shows 7:21, 52% battery, and signal strength. Below the title bar, there's a section 'PLANT NEEDED FOR THIS PROJECT*'. A table lists a plant: 'Ag Tipping Trailer' by 'Paul C', with a start date of '08/05/2025' and an end date of '10/05/2025'. A dialog box is centered on the screen with the text 'PRA Project updated successfully.' and an 'OK' button. At the bottom, there is a large yellow 'SAVE' button.	Here the icon indicates that the edit details have been updated.

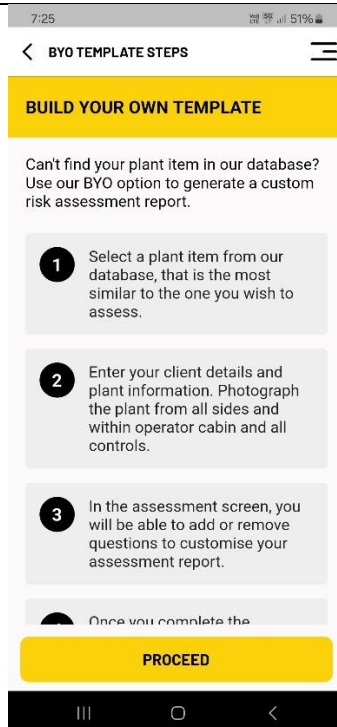
How To Create a New Risk Assessment Template Using BYO. Build Your Own

Screen Shot From APP

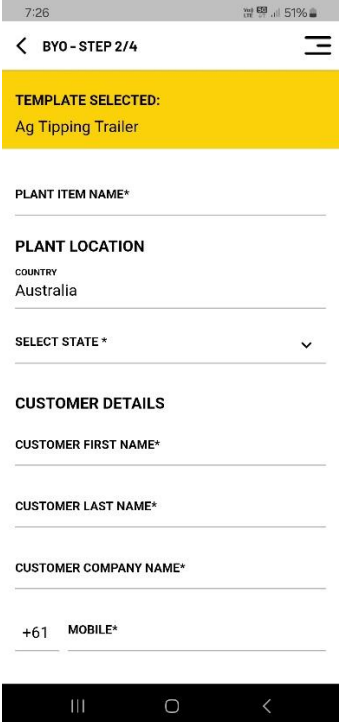
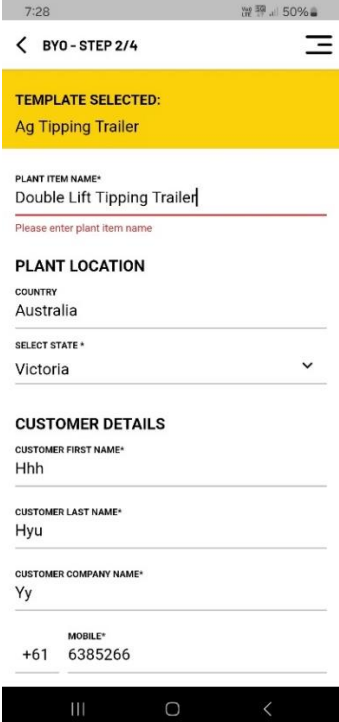


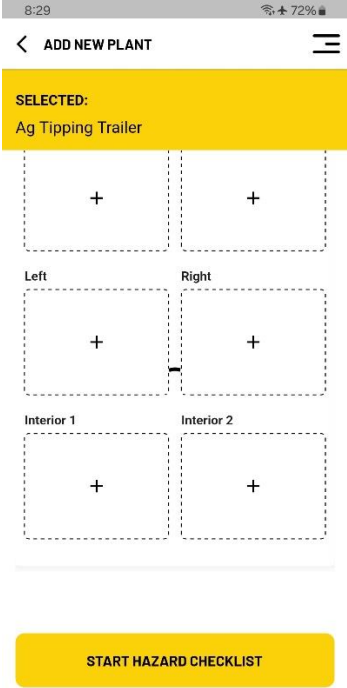
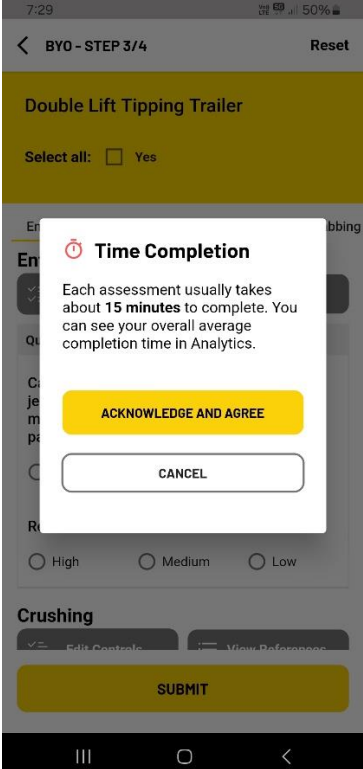
Description of Activity

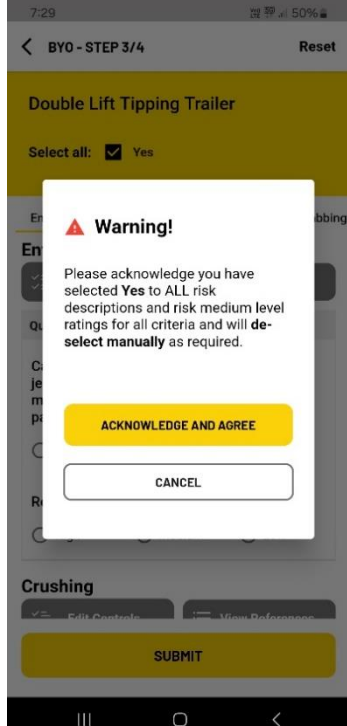
- If PRA does not have the correct piece of equipment you are using in our index, you can pick an item as close to your plant as possible, and PRA will pull up this template which you can edit the controls and submit the report with photos to PRA Technical Staff for Approval. We will review your comments and edited controls and adjust and or approve the report within 48 hours. If you require quicker approval, email our office requesting a fast track approval and we will notify you if it is possible.
- In This example I am selecting the AG Tipping Trailer as my base document template to be modified for a piece of Equipment not in the PRA App which I am Calling The “Double Lift Tipping Trailer”.

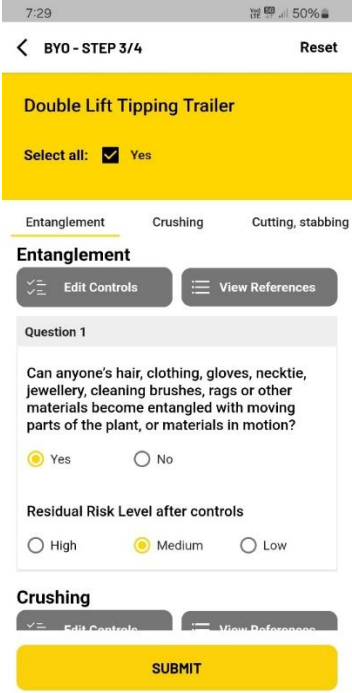
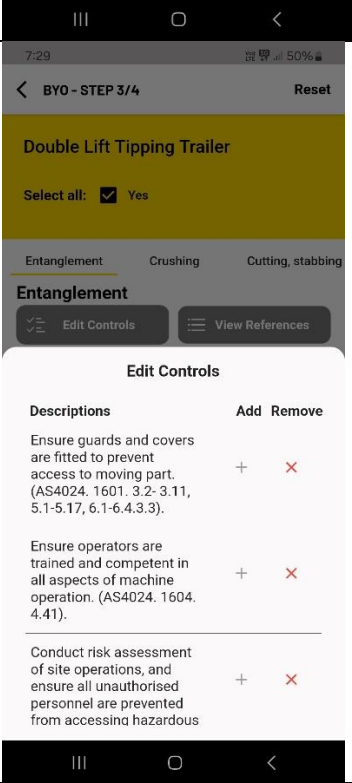


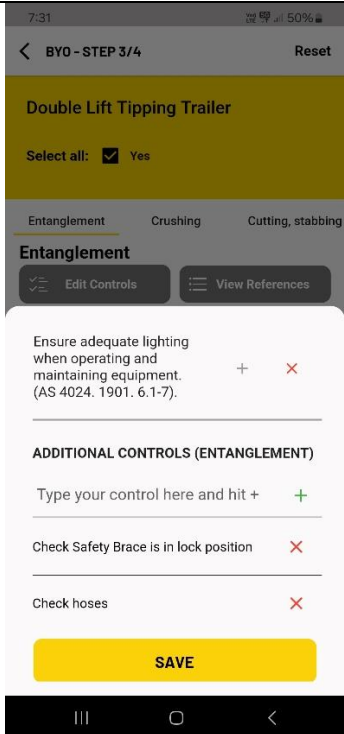
- This next slide after selecting Build Your Own Template at the bottom of the screen, explains the process that I am taking you through now.
- Note on some Phones you need to lower the keyboard in order to see and access the Icon at the bottom of your screen called Build Your Own Template as Yellow Button.
- After reading this blurb, hit the Icon button below “Proceed” to enter into the BYO Input Details Area, which is the same as the Risk Assessment details with the only difference that you need to give the name of the new machine you are creating the template for.

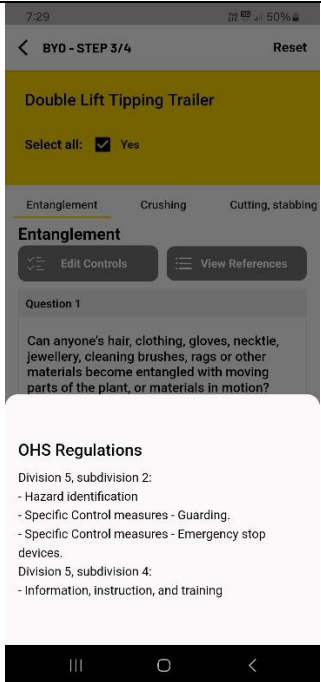
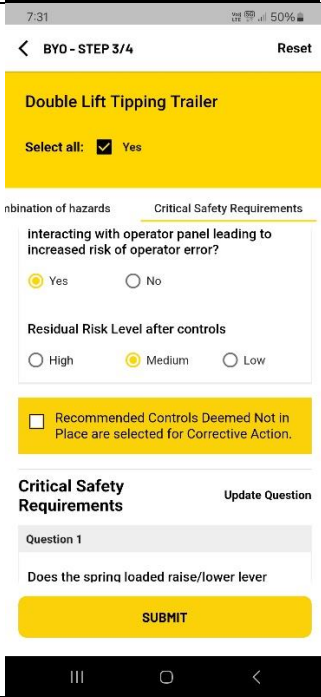
Screen Shot From APP	Description of Activity
	• Complete usual customer and equipment required fields. I have chosen the AG Tipping Trailer as my Base Template. • As you can see, I have given a new Name to the Template being the “Double Lift Tipping Trailer”
	• Under Plant Item Name I have called it the “Double Lift Tipping Trailer”.

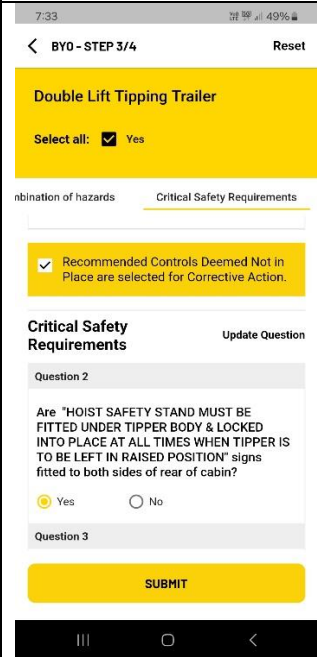
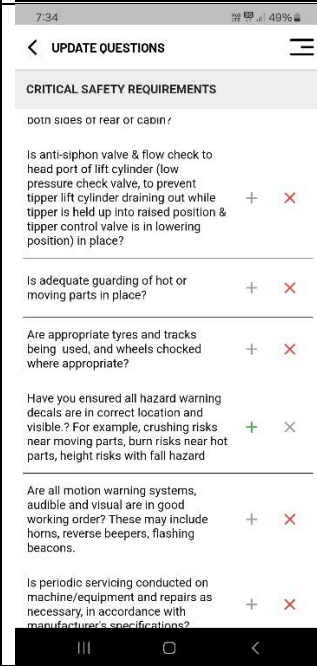
Screen Shot From APP	Description of Activity
	• After entering in all details including the equipment serial number and registration number, make and model extra as you deo in a normal Risk assessment and add your photos. • When adding photos of the equipment. Ensure you stand back and take clear photos that show the entire equipment. Close ups on controls. • If possible please take additional photos of as many angles and close ups and set back shots of the equipment and email them to BYO@plantriskassessment.com.au • After uploading photos hit the Start Hazard Checklist.
	• Again like in the risk assessment function it will ask you to acknowledge you are being timed and you are required to also select the checkered box Select all Yes, that all Hazards are Risk as a Fail Safe and to ensure you read and can edit all displayed safety controls on the Edit Controls button.

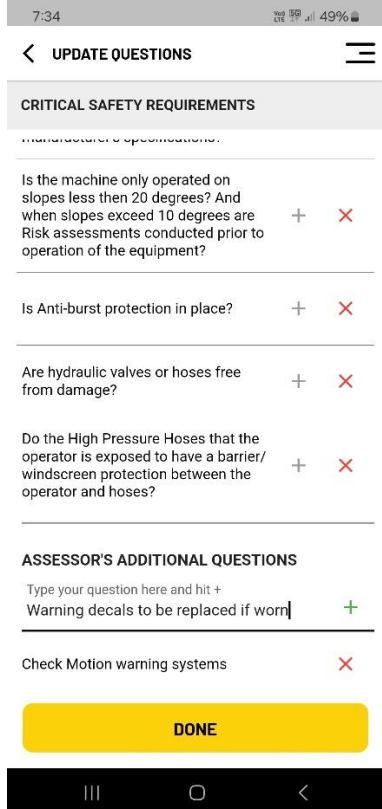
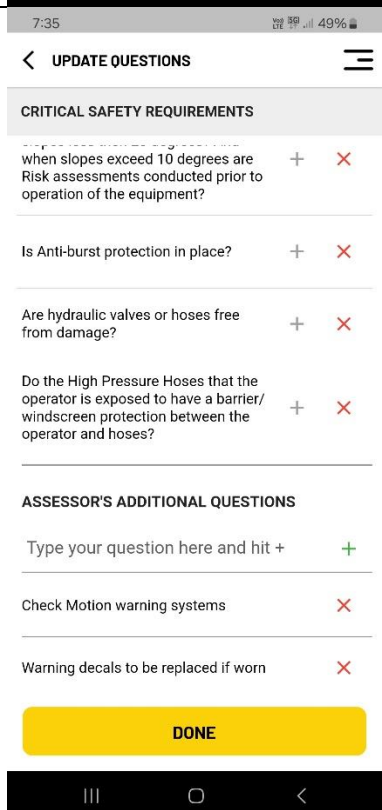
Screen Shot From APP	Description of Activity
	Again like in the risk assessment function it will ask you to acknowledge you are being timed and you are required to also select the checkered box Select all Yes, that all Hazards are Risk as a Fail Safe and to ensure you read and can edit all displayed safety controls on the Edit Controls button.

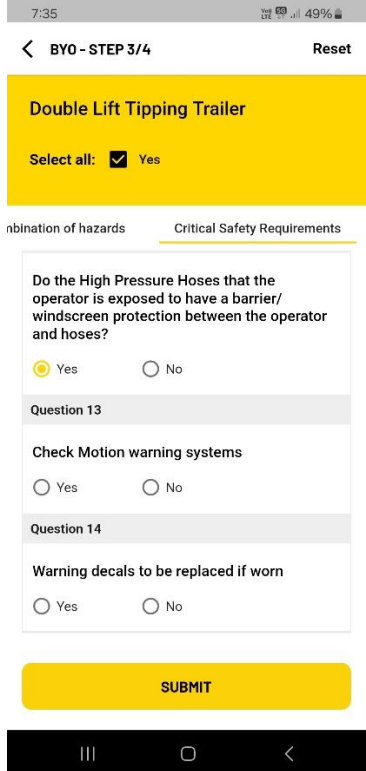
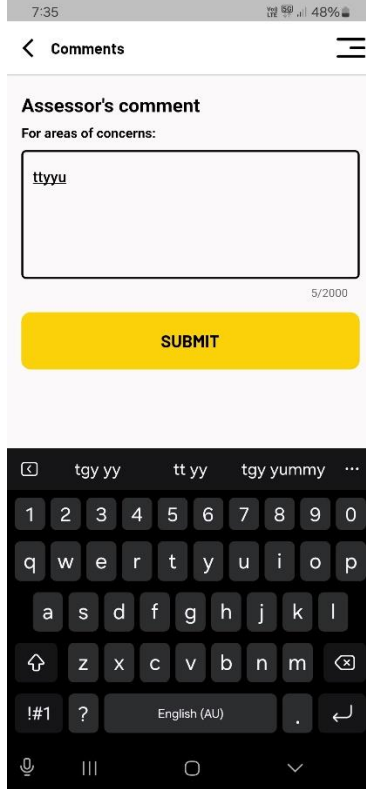
Screen Shot From APP	Description of Activity
	Under Each Hazard Category such as Entanglement, Crushing, Striking etc there is an Edit Controls function that you can tap and view all the safety Controls PRA has recommended to be in place for Entanglement, Crushing etc. Choose the controls you want in or out of the new report you are developing based on your understanding if they relate to the New Equipment The “Double Lift Tipping Trailer” and at the bottom of the list of controls is a function to add as many new controls as possible that you recommend that are not present in the list you are reviewing.
	- Here you can see from the screen shot the ability to add or remove safety controls that are in the AG Tipping Trailer Plant Safety Assessment Template. - You should be by the machine of the “Double Lift Tipping Trailer” as I have called it in this example when evaluating whether the controls are applicable or not.

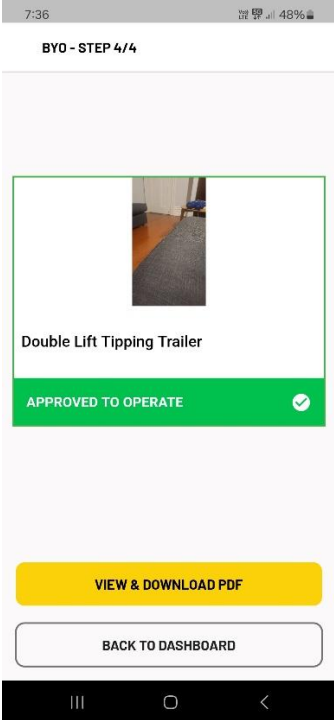
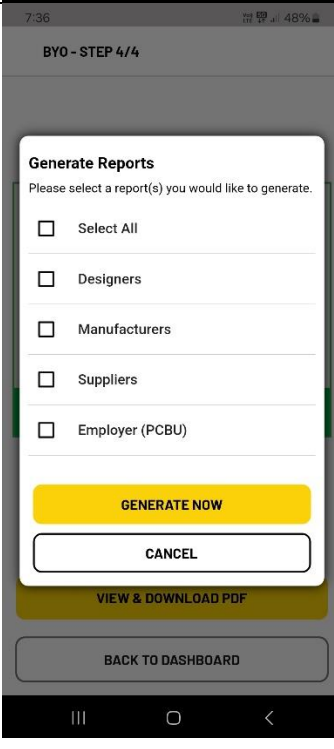
Screen Shot From APP	Description of Activity
	At the bottom of the list of controls there is a heading, “Additional Controls (Entanglement) and under this is text stating type your control here and hit the Plus + sign and you can add as many new controls you think should be added to manage hazards of the new plant item.

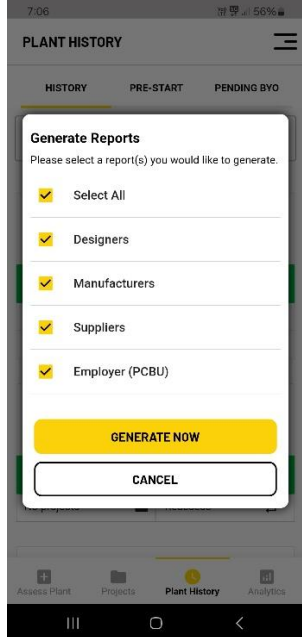
Screen Shot From APP	Description of Activity
	The legislation reference is available if you wish to look up these areas for greater detail, no different as to when you are doing a standard Plant Risk Assessment.
	You must tick the checkered box just before or above Critical Safety Controls, in order to submit the New BYO Report. You must Edit as Well the Critical Safety Controls regarding there applicability and or whether you need to add more new Critical Safety Controls. Remember Critical Safety Controls are seen as essential and high risk safety controls that must be in place, such as ROPS Roll Over Protection.

Screen Shot From APP	Description of Activity
 7:33 49% < BY0 - STEP 3/4 Reset Double Lift Tipping Trailer Select all: ☒ Yes Combination of hazards Critical Safety Requirements ☒ Recommended Controls Deemed Not in Place are selected for Corrective Action. Critical Safety Requirements Update Question Question 2 Are "HOIST SAFETY STAND MUST BE FITTED UNDER TIPPER BODY & LOCKED INTO PLACE AT ALL TIMES WHEN TIPPER IS TO BE LEFT IN RAISED POSITION" signs fitted to both sides of rear of cabin? ☒ Yes ☐ No Question 3 SUBMIT	• Check the Box that Recommended Controls have been reviewed and then commence editing the Critical Safety Controls. • You can see here that I have removed Question 1 and you can only see Question 2. All the other questions, Questions 3, 4 extra are listed below.
 7:34 49% < UPDATE QUESTIONS CRITICAL SAFETY REQUIREMENTS both sides of rear of cabin? Is anti-siphon valve & flow check to head port of lift cylinder (low pressure check valve, to prevent tipper lift cylinder draining out while tipper is held up into raised position & tipper control valve is in lowering position) in place? + X Is adequate guarding of hot or moving parts in place? + X Are appropriate tyres and tracks being used, and wheels chocked where appropriate? + X Have you ensured all hazard warning decals are in correct location and visible? For example, crushing risks near moving parts, burn risks near hot parts, height risks with fall hazard + X Are all motion warning systems, audible and visual are in good working order? These may include horns, reverse beepers, flashing beacons. + X Is periodic servicing conducted on machine/equipment and repairs as necessary, in accordance with manufacturer's specifications? + X	• Again here you can add or subtract Critical Safety Controls. If you add controls they will be added to the bottom of the list of critical safety controls.

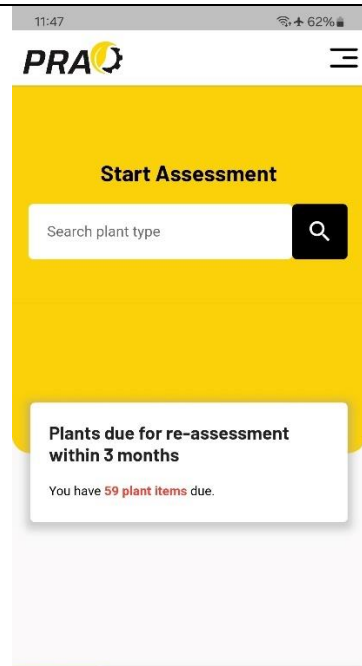
Screen Shot From APP	Description of Activity
 7:34 49% < UPDATE QUESTIONS CRITICAL SAFETY REQUIREMENTS Is the machine only operated on slopes less than 20 degrees? And when slopes exceed 10 degrees are Risk assessments conducted prior to operation of the equipment? + X Is Anti-burst protection in place? + X Are hydraulic valves or hoses free from damage? + X Do the High Pressure Hoses that the operator is exposed to have a barrier/ windscreen protection between the operator and hoses? + X ASSESSOR'S ADDITIONAL QUESTIONS Type your question here and hit + Warning decals to be replaced if worn + Check Motion warning systems X DONE	- Here you can see it says Assessors Additional Questions. I have added – Check Motion Warning Systems and below that screen shot here the other control – Warning Decals to be replaced if worn. - You need to hit the Done button when complete.
 7:35 49% < UPDATE QUESTIONS CRITICAL SAFETY REQUIREMENTS when slopes exceed 10 degrees are Risk assessments conducted prior to operation of the equipment? + X Is Anti-burst protection in place? + X Are hydraulic valves or hoses free from damage? + X Do the High Pressure Hoses that the operator is exposed to have a barrier/ windscreen protection between the operator and hoses? + X ASSESSOR'S ADDITIONAL QUESTIONS Type your question here and hit + + Check Motion warning systems X Warning decals to be replaced if worn X DONE	

Screen Shot From APP	Description of Activity
	• As you can see the two additional; questions I added to my Double Lift Tipping Trailer BYO is “Check Motion Warning Systems” and “Warning Decals to be replaced if Worn” have been added at the end of Critical Safety Controls as New Controls for the New Template. • You then are required to submit the report.
	• Like the Risk Assessment Report you can add whatever general comments you like here that gives us additional information to better evaluate the new plant item to be added to the data base for your use once PRA Approves its Use.

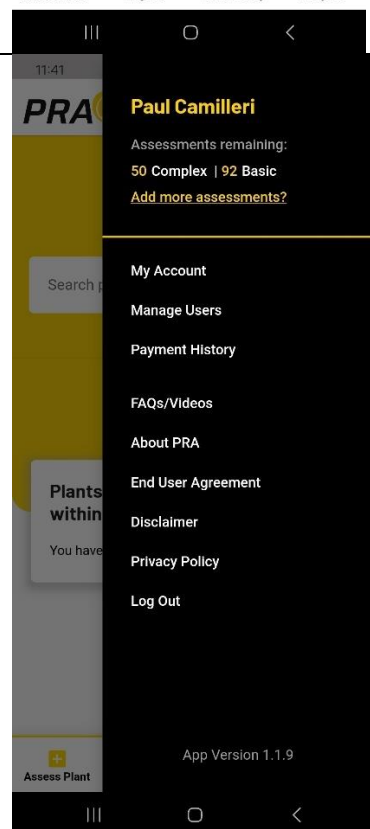
Screen Shot From APP	Description of Activity
 7:36 48% BYO - STEP 4/4 Double Lift Tipping Trailer APPROVED TO OPERATE VIEW & DOWNLOAD PDF BACK TO DASHBOARD	• Again this screen appears regarding approved to operate. • The plant is not approved to operate as it's a Pending BYO but it is just saying you have completed all the fields correctly. • Select View and Download report
 7:36 48% BYO - STEP 4/4 Generate Reports Please select a report(s) you would like to generate. ☐ Select All ☐ Designers ☐ Manufacturers ☐ Suppliers ☐ Employer (PCBU) GENERATE NOW CANCEL VIEW & DOWNLOAD PDF BACK TO DASHBOARD	• The next screen after you select View & Download PDF is the Legal Reference Criteria which you need to select one or all the to appear in the preamble of the report. It has no effect of the controls you have approved. It's just a summary in the preamble of the report. • I generally recommend generating all criteria, as you never know who may view your report, and it does no harm to the report by having the Plant Safety Regulations in the Report that relates to Designers, Manufacturers, Suppliers and End Users in the preamble of the report.

Screen Shot From APP	Description of Activity
	Here all the checkered boxes are ticked.
	Remember the report can take up to 45 seconds to generate.

Accessing Your Account & Managing It

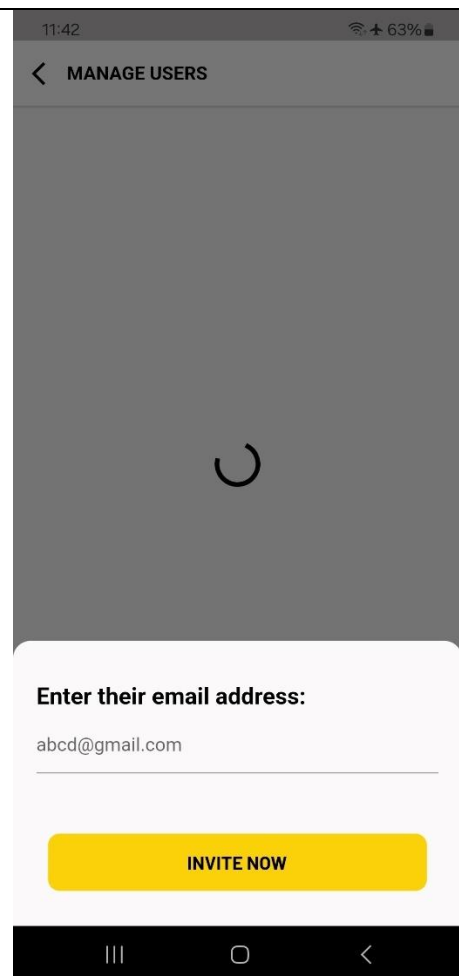


- The Top Right Corner of the PRA App is where you access your account.



- Here you can see the number of Complex Risk Assessments I have which is a purchase cost of \$140 plus gst plus Apple/Goggle Charges.
- Complex Plant are generally Mobile Plant, such as Forklifts, Cranes, Excavators, Civil Equipment extra.
- Basic Credits are worth half this charge of 70.00 plus gst and charges.
- Basic plant includes things such as generators, air condition units, air compressors and hand tools.
- You can add more of each of these by purchasing them on the PRA App, under “Add more assessments”

Adding and Inviting Users under Manage Users



- You can link employees and staff to your account by inviting them using the Invite Now button, and adding their email.
- Once invited and part of your group under your account, you can allocate whatever credits you like to each invitee/employee/person.

PLANT GENERAL SAFETY INFORMATION INCLUDING REGULATIONS & CODES OF PRACTICE, WITH EXAMPLES

Prepared by: PRA: Glow Technologies Pty Ltd &
Australian Risk Services Pty Ltd

Phone: +61408184892
email: joshua@plantriskassessment.com.au
URL: <http://www.plantriskassessment.com.au>

WELCOME

This program has been designed to improve safety associated with Plant, with the aim of contributing to a safety culture that will assist us to achieve the company vision of ‘No Harm’.

To achieve this vision we need to have a thorough understanding of Workplace Health and Safety (WHS) and know that it is supported by robust management systems with clear accountabilities and guidance.

BACKGROUND

Why is this important?

Plant is a major cause of workplace death and injury in Australian workplaces.

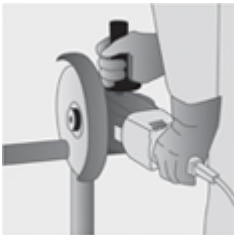
There are significant risks associated with using plant and severe injuries can result from the unsafe use of plant, including:

- limbs amputated by unguarded moving parts of machines
- being crushed by mobile plant
- sustaining fractures from falls while accessing, operating or maintaining plant
- electric shock from plant that is not adequately protected or isolated
- burns or scalds due to contact with hot surfaces, or exposure to flames or hot fluids.

There are between **65,000 and 70,000** plant-related workers' compensation claims costing some **\$550 million** in workers' compensation payments each year.

In addition, there are over **200 plant-related fatalities** every year Australia wide. Because of the risk of injury associated with the use of plant, State and Territory jurisdictions have enacted many measures over the years in order to reduce both the incidence and severity of accidents.

Common causes and injuries



- 38% of injuries caused by machines are caused by powered equipment and tools
- 13% of injuries caused by machinery and equipment were to hands and fingers



- 19% of injuries caused by machinery and equipment are caused by crushing, pressing and rolling machinery.
- 17% of injuries caused by machinery and equipment were to arms



- 18% of injuries caused by machinery and equipment are caused by cutting, slicing and sawing machinery
- 13% of injuries caused by machinery and equipment resulted in amputation



- 3% of injuries caused by machines are caused by conveyors
- 28% of injuries caused by machinery and equipment were to the head and neck



- 22% of injuries caused by machinery and equipment are caused by other pressure, and production line machinery
- 11% of injuries caused by machinery and equipment resulted in broken bones

Recent prosecutions

Defendant: Details of successful prosecution against Car-O-Liner Australia Pty Ltd

Description: On 16 February 2010 a 42 year old male sustained fatal injuries when a bench rack vehicle hoist frame collapsed on him.

Decision date: 12-08-2011

Circumstance of aggravation: Fatality

Penalty amount: \$90 000

Other costs: \$3223.70

Defendant: Details of successful prosecution against Carrington Ginning Pty Ltd

Description: On 20 May 2009, a 27 year old female worker sustained serious injuries after being caught between a cotton bale and the bagging chute within a 'cotton gin'

Decision date: 01-03-2010

Circumstance of aggravation: Grievous bodily harm

Penalty amount: \$40 000

Other costs: \$2071.00

Defendant: Details of successful prosecution against Wickham Farms Killarney Pty Ltd

Description: On 14 October 2008, an 18 year old female worker sustained injuries when both her arms were dragged into and became trapped in the rotating auger screw of a potato processing machine.

Decision date: 25-03-2010

Circumstance of aggravation: Grievous bodily harm

Penalty amount: \$43 000

Other costs: \$2919.00

Defendant: Details of successful prosecution against Macquarie Assets Services Limited

Description: On 10 December 2005 a 45 year old contractor, employed as a part-time cleaner at the Nambour Plaza Shopping Centre, was fatally injured when one part of a security gate weighing 900 kilograms fell

Decision date: 25-09-2009

Circumstance of aggravation: Fatality

Penalty amount: \$90 000

Other costs: \$42 639

Defendant: Details of successful prosecution against Colquhoun Constructions Pty Ltd

Description: On 22 January 2010 a 36 year old road roller operator sustained serious injuries to his back and chest when he lost control of the roller he was operating, it rolled down a steep slope

Decision date: 30-11-2010

Circumstance of aggravation: Grievous Bodily Harm

Penalty amount: \$43 000

Other costs: \$8075.90

An employee driving his own vehicle struck and killed a pedestrian on a pelican crossing after falling asleep at the wheel. Although driving on company business the employee has failed to take out the necessary business insurance cover and the employer had no procedures to check this. The employers were also accused of asking the employees to operate longer hours in an effort to increase business.

The employee was jailed for 3 years and banned from driving for 10 years.

The verdict on the directors and management involved is still awaited.

An employee was recently flung from his van after momentarily falling asleep at the wheel. The employee was paralysed and will not walk again for the rest of his life. He can now sue his employers for damages expected to exceed £1 million.

His final reward award will be reduced by 33% because of his own contributory negligence in not wearing a seatbelt, and knowing he was at risk of falling asleep after working for 19 hours without a break.

The Court of Appeal decided that he was “in that predicament because his employers had put him there”.

A spokesman for the Fleet Safety Association said that although the driver himself made no attempt whatsoever to manage the risk he was exposing himself to, it appears that the employer encouraged a risk-taking approach to driving. A statement from the driver’s manager stating that “eating is cheating and you can sleep when you are dead” supported this.

An employee using a non-hands-free phone whilst driving on company business lost control of his vehicle and collided with another vehicle, resulting in the death of the other driver.

The employee was sentenced to 3 years in prison and banned from driving for 4 years.

The employers were cleared of all blame when it was shown that all their procedures and policies were in line with the legislation, and that specific instructions had been issued to all employees regarding the use of mobile phones whilst driving.

In other words the employers complied with their Duty of Care responsibilities correctly, but the employee chose non-compliance.

The meaning of key terms

Plant includes any machinery, equipment, appliance, container, implement and tool, and includes any component or anything fitted or connected to any of those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools and amusement devices.

Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand, for example a screw driver, is not covered by the WHS Regulations. The general duty of care under the WHS Act applies to this type of plant.

Certain kinds of plant, such as forklifts, cranes and some pressure equipment, require a license from the WHS regulator to operate and some high-risk plant must also be registered with the WHS regulator.

Competent person means a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

A competent person has a more specific meaning in the following circumstances:

- For design verification, the person must have the skills, qualifications, competence and experience to design the plant or verify the design.
- For inspection of plant for registration purposes the person must have:
 - educational or vocational qualifications in an engineering discipline relevant to the plant being inspected, or
 - knowledge of the technical standards relevant to the plant being inspected.
- For inspection of mobile cranes, tower cranes and amusement devices the person must:
 - have the skills, qualifications, competence and experience to inspect the plant, and be registered under a law that provides for the registration of professional engineers (in jurisdictions where such a law exists), or
 - be determined by the WHS regulator to be a competent person.

Fail safe means a state or condition where, if any component or function of the plant fails, a system exists to prevent any increase in the risks. For example, if the primary hoist brake fails on a crane

lifting a person in a workbox, the secondary hoist brake will prevent uncontrolled dropping of the workbox.

However, once the secondary brake is engaged, a lower level of safety has been reached. The situation must be made safe and the fault rectified so that the fail safe capability is re-established.

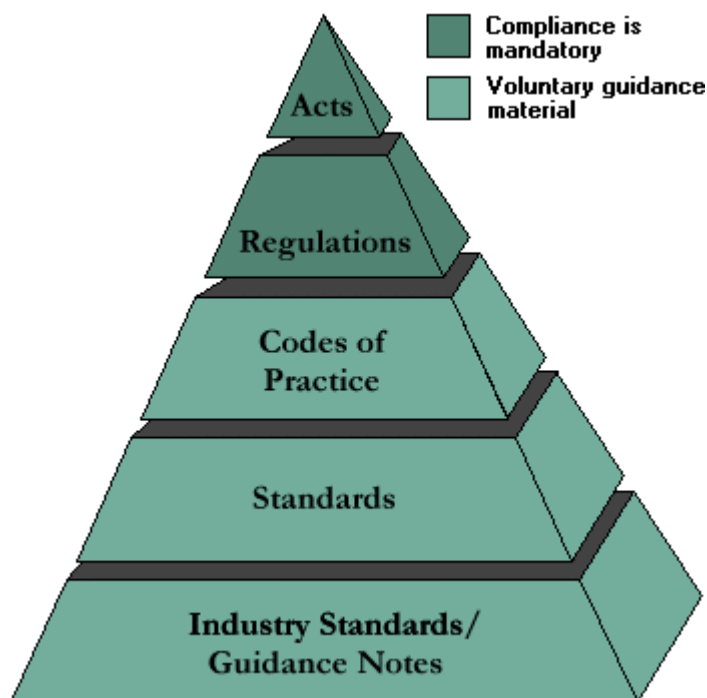
THE LEGAL FRAMEWORK

Key changes from the current OHS legislation include:

- The definitions of plant and supply – the definition of plant also includes a structure.
- Inclusion of specific plant
- Removal of some specific duties
- Removal of references to Australian Standards
- Registration of plant design

WHS Regulations: Chapter 5

The legal framework



Australian health and safety law is governed by a framework of Acts, Regulations and support material including codes of practice and standards, as illustrated in the diagram on the left.

Supporting material outlines how employers in consultation with their employees should approach the management of health and safety at work.

Acts

Who makes them?

An Act or Statute is law made by parliament and enforced by government departments. Refer to the contact list for the government department responsible for administering the Health and Safety Act in your State or Territory.

What do they do?

Health and Safety Acts set out legal rules that govern workplaces to ensure persons in workplaces do not suffer injury or illness.

Where do they apply?

At any place where people are required to work. A workplace is not necessarily a building. It can be a factory or vehicle or anywhere else defined by the Act as a workplace and can include outdoors. Small Businesses are not exempt from health and safety law.

When are they enforced?

Not complying with an Act is considered an offence and can result in a fine, or the issuing of either an improvement or prohibition notice. Some States and Territories are able to issue on the spot fines. A breach of an Act does not have to result from an accident or a person being injured at work. For example a dangerous piece of unguarded machinery being used in the workplace would in itself constitute a breach.

Regulations

Who makes them?

A Regulation is made under the principal Acts governing occupational health and safety legislation.

What do they do?

Regulations support a principal Act by outlining how the general obligations of an Act will be applied in a workplace. Regulations are usually made in relation to a particular type of health and safety issue, such as asbestos, first aid, or a dangerous chemical. Not complying with a regulation is considered an offence and can result in a fine, issuing of an improvement or prohibition notice or imprisonment.

Where do they apply?

Where the principal Act applies.

When are they enforced?

Like an Act, any section of a Regulation can be breached at any time and a breach does not have to result from a serious accident.

Codes of Practice

Who makes them?

State and Territory Governments are able to approve codes of practice through the powers of the principal occupational health and safety Act.

What do they do?

They are supporting material additional to Acts and Regulations. They give practical advice and guidance on how to comply with the general obligations set out in the Act and Regulations.

Where do they apply?

Where the Act and Regulations apply. However, sometimes the guidance provided in a code may only cover specific areas of the principal Act or regulation.

When are they enforced?

A breach of a code is not by itself a breach of an Act or Regulation. However all codes of practice can be used as evidence in court to demonstrate what an employer should have been doing to comply with the obligations under the Act or Regulations to ensure a safe workplace. For this reason it is best to comply with the requirements of a code of practice, unless another solution achieves the same or a better outcome.

Standards**Who makes them?**

There are two main sources of standards relevant to health and safety:

National Standards produced by the National Occupational Health and Safety Commission (NOHSC), in consultation with the State/Territory Health and Safety Authorities, employee unions and employer associations.

Australian Standards produced by Standards Australia, a non-government, non-profit organisation that makes standards in consultation with overseas standards bodies and Australian working parties. The working parties comprise employer and employee organisations, and representatives from relevant State and Territory government agencies.

What do they do?

National Standards usually deal with workplace problems such as noise or dangerous working environments. Exposure Standards are guides which are used in controlling exposure to hazardous substances in the workplace.

Australian Standards provide technical and design guidance notes. Some standards are directly relevant to health and safety, such as safety and emergency equipment and fire safety standards. Other general standards will contain health and safety provisions.

Where do they apply?

National Standards are adopted by States and Territories into their occupational health and safety legislation.

When are they enforced?

Standards are only enforceable by law when they are specifically included in a State/Territory health and safety regulation.

Industry Specific Standards/Codes of Practice and National Guidance Notes**Who makes them?**

Relevant employer associations, trade unions and industry bodies are responsible for jointly developing industry specific standards and codes of practice. The National Occupational Health and Safety Commission (NOHSC) is responsible for Guidance Notes.

What do they do?

They provide practical advice and guidelines for controlling hazards and risks. Industry specific standards and codes of practice usually include solutions to common health and safety problems relevant to an industry group.

Where do they apply?

Guidance Notes will apply to any workplace throughout Australia. Industry specific standards and codes of practice apply to an industry group.

When are they enforced?

They are not enforceable by law. However industry specific standards usually aim to achieve the same if not a better result than general national standards or codes of practice.

Who is responsible

A person conducting a business or undertaking

A person conducting a business or undertaking has the primary duty under the WHS Act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking. This duty includes ensuring, so far as is reasonably practicable:

- the provision and maintenance of safe plant, and
- the safe use, handling, storage and transport of plant.

WHS Act Div 2 Sec 19 & Div 3 Sections 20 to 26

Persons who conduct a business or undertaking involving the management or control of fixtures, fittings or plant at a workplace also have a duty to ensure, so far as is reasonably practicable, that the fixtures, fittings and plant are without risks to the health and safety of any person.

The WHS Regulations include specific duties for persons who conduct a business or undertaking involving the management or control of plant (persons with management or control of plant), including requirements to:

- manage the health and safety risks associated with plant
- prevent unauthorised alterations to or interference with plant
- use plant only for the purpose for which it was designed unless the proposed use does not increase the risk to health or safety.

Officers

Officers, for example, company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the WHS Act and Regulations. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate

resources and processes to eliminate or minimise risks that arise from plant used in the workplace.

Workers

Workers have a duty to take reasonable care for their own health and safety and must not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace.

Designers

The safe design of plant plays a critical role in eliminating hazards and risks before plant is introduced in the workplace.

A designer is a person who conducts a business or undertaking that designs, redesigns or alters the design of plant or any part of the plant that is to be used or could reasonably be expected to be used at a workplace.

Designers have a duty to ensure, so far as is reasonably practicable, that the plant is without risks to health and safety to workers throughout the life of the plant. Among other things, designers must also provide specific information to the manufacturer.

Designers must also carry out, or arrange the carrying out of, any calculations, analysis, testing or examination that may be necessary to ensure the plant is safe and without risks to health and safety.

WHS Regulation, Div 2 parts 187 to 192

Manufacturers

Manufacturers have a duty to ensure, so far as is reasonably practicable, that the plant is manufactured to be without risks to workers throughout the lifecycle of the plant.

Manufacturers must advise the designer of any hazards they identify during manufacture and ensure that hazards are not incorporated into the manufacture of the plant.

Manufacturers must also arrange for any calculations, analysis, testing or examination that may be necessary to ensure that the plant is without risks to health and safety. If design registration is required, the manufacturer must give the design registration number to the person with management or control of the plant, who must ensure the number is kept readily accessible.

A reliable way to achieve this is for the manufacturer to permanently mark the design registration number on the plant.

WHS Regulation, Div 3 (parts 193 to 195)

Importers and suppliers

Importers of plant from outside Australia must take all reasonable steps to obtain information from the manufacturer and then pass this information on when supplying the plant. If this is

not available importers must carry out, or arrange the carrying out of, any calculations, analysis, testing or examination that may be necessary to ensure, so far as is reasonably practicable, that the plant is without risks to the health and safety of any person. If design registration is required, the importer will also have duties to ensure that the design of plant is registered.

Any imported plant must be inspected, having regard to information provided by the manufacturer. If this information requires the plant to be tested then the importer must undertake this testing.

WHS Regulation, Div 4 parts 196 to 197, & Div 5 parts 198 to 200

Installers (WHS Reg: Div 6 part 201)

An installer is a person who conducts a business or undertaking who sets up, assembles, places in position and connects or otherwise makes plant ready for use. Installers have certain duties under the WHS Regulations.

Specific duties

Risk management

In order to manage the risks associated with plant in the workplace it is a requirement to follow a systematic process that involves: **WHS Reg: Div 7 Subdiv 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & subdiv 2 (238 to 242)**

- identifying hazards
- if necessary, assessing the risks associated with these hazards,
- implementing and maintaining risk control measures
- reviewing risk control measures.

: A person with management or control of plant at a workplace must manage risks to health and safety associated with the plant.

: In order to manage risk under the WHS Regulations, a duty holder must:

- identify reasonably foreseeable hazards that could give rise to the risk
- eliminate the risk so far as is reasonably practicable
- if it is not reasonably practicable to eliminate the risk, minimise the risk so far as is reasonably practicable by implementing control measures in accordance with the hierarchy of control
- maintain the implemented control measure so that it remains effective
- review, and if necessary revise, risk control measures so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health and safety.

Providing and obtaining information

Designers, manufacturers, importers and suppliers all have duties to provide information about the plant to enable other duty holders to fulfil the responsibilities they have in managing the risks associated with it.

This information must be given to each person to whom the plant (or its design) is provided. Information must be passed on from the designer through to the manufacturer and supplier to the end user.

This information includes:

- the purpose for which plant was designed or manufactured
- the results of any calculations, analysis, testing or examination
- any conditions necessary for the safe use of the plant.

Consulting workers (WHS Act Div2, 3 & 4 Duties of PCBU & Officers regarding consultation parts 19,20 to 29)

Consultation involves sharing of information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

Consultation with workers and their health and safety representatives is required at each step of the risk management process.

It is important to consult workers as early as possible when planning to introduce new plant or change the way plant is used.

The WHS Act requires that employer consults, so far as is reasonably practicable, with workers who carry out work who are (or are likely to be) directly affected by a work health and safety matter.

If the workers are represented by a health and safety representative, the consultation must involve that representative.

Consultation, co-operation and co-ordination of activities with other duty holders

There may be other businesses involved with plant at the workplace, for example, who carry out installation or repair, or who share the workplace. For example, if your company owns or manages an on-hire business and workers undertake work at other workplaces then employer should exchange information with the host business to determine:

- if workers could be exposed to hazardous plant
- what each of you will do to control any associated risks.

If the company uses plant (for example, mobile plant such as a forklift) at a workplace that is shared with other businesses employer should talk to those businesses about the risks the plant could cause them and work together in a co-operative and co-ordinated way to manage the risks.

The WHS Act requires that employer consults, co-operates and co-ordinates activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

Registering plant

Certain items of plant and types of plant designs must be registered.

Registrable plant must be:

- design registered before it is supplied
- item registered before it is used.

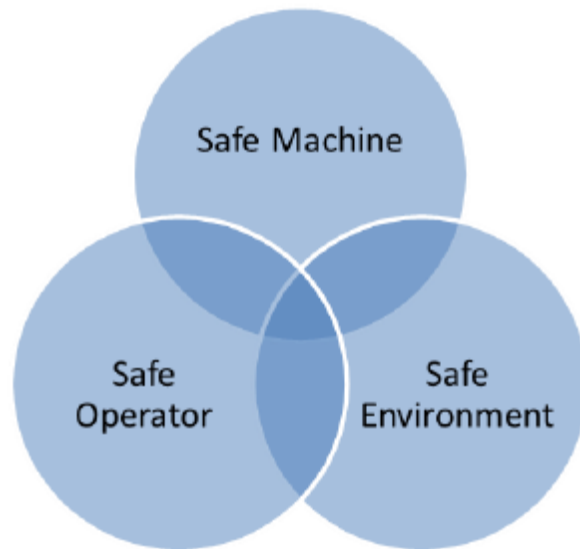
RISK MANAGEMENT

There are three key areas of activity to consider:

- Safe Plant
- Safe Environment
- Safe Operator

The risk management process consists of:

- Hazard identification
- Risk assessment
- Control of hazards
- Monitor and review



Safe Plant

Ensure plant is safe for use:

- Plant risk assessment and review against:
 - WHS legislation
 - Australian and International Standards
 - Leading industry practice
- Daily inspection and fault rectification process
- Proactive and robust maintenance regime
- Standard Safe Operating Procedure (SOP)

Hazard identification

Identifying hazards involves finding all of the things and situations that could potentially cause harm to people. Hazards associated with plant generally arise from:

- The plant itself. For example, hazards associated with a forklift would include hazards relating to its mobility, its electrical, hydraulic and mechanical power sources, its moving parts, its load-carrying capacity and operator protection.
- How and where the plant is used. The forklift, for example, may have hazards arising from the kind of loads it is used to lift, the size of the area in which it is used and the slope or evenness of the ground.

Inspect the plant

Inspect each item of plant in your workplace and observe how it is used. Talk to your workers and their health and safety representatives to find out what their experience is with the plant they operate, inspect or maintain.

If you have hired or leased plant, you should also consult the person who owns the plant about potential hazards, because you both have responsibility for ensuring that the plant is safe and without risk to health and safety.

When identifying hazards you should think about all the activities that may be carried out during the life of the plant at your workplace, such as: installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling. For each of these activities, you should consider whether the plant could:

- cause injury due to entanglement, falling, crushing, trapping, cutting, puncturing, shearing, abrasion or tearing
- create hazardous conditions due to harmful emissions, fluids or gas under pressure, electricity, noise, radiation, friction, vibration, fire, explosion, moisture, dust, ice, hot or cold parts
- cause injury due to poor ergonomic design, for example if operator controls are difficult to reach or require high force to operate.

Other factors to consider include:

- the **condition** of the plant, for example its age, its maintenance history and how frequently the plant is used
- the **suitability** of the plant, for example is it actually being used for its intended purpose?
- the **location** of the plant, for example what is its impact on the design and layout of the workplace and are workers able to access the plant without risk of slips, trips or falls?
- **abnormal situations**, for example what abnormal situations, misuse or fluctuation in operating conditions can you foresee?

A checklist to assist in identifying hazards associated with plant is at Appendix B.

Review safety information

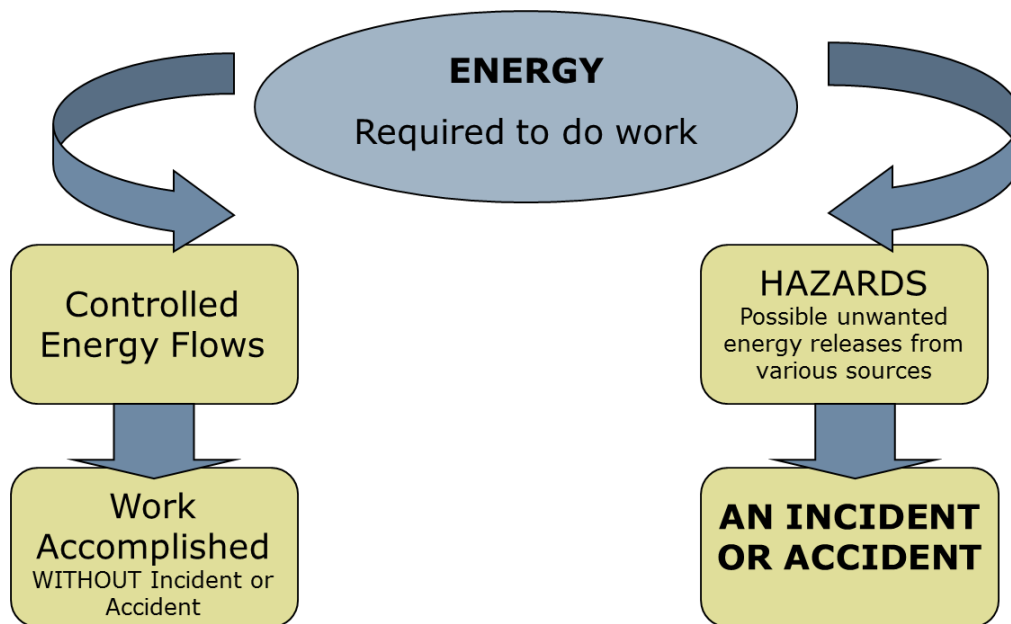
Information about hazards, risks and control measures relating to plant in your workplace can be obtained from:

- manufacturers, importers or suppliers of the plant
- maintenance technicians or specialists such as engineers
- your workers
- WHS regulators, unions and other organisations
- businesses or undertakings similar to your own
- technical standards.

Review incident records and data

Check your records of workplace injuries and illness, dangerous incidents, plant inspection reports and maintenance logs, workers' compensation records and the results of any investigations to collect information about plant hazards.

Identifying hazards by looking at energy



You can also identifying hazards by looking at energy. Unwanted energy sources include:

- Gravity - falling or things falling
- Electrical - contact or arcing
- Mechanical - moving vehicles or parts
- Chemical - inhale, touch, ingest, etc
- Pressure - air, spring, etc
- Noise - level and duration
- Thermal – hot/cold surfaces
- Radiant - light, radiation
- Body Mechanics - lifting, position etc

Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard combined with the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether existing control measures are effective
- what action you should take to control the risk

- how urgently the action needs to be taken.

A risk assessment is unnecessary if you already know the risk and how to control it.

To assess the risk associated with plant hazards you have identified, you should consider the following:

What is the potential impact of the hazard?

- How severe could an injury or illness be? For example, lacerations, amputation, serious or fatal crushing injury, burns, loss of hearing
- What is the worst possible harm the plant hazard could cause?

How likely is the hazard to cause harm?

- Is it highly likely or unlikely to happen?
- How frequently are workers exposed to the hazard? For example if plant is used constantly with five operators per shift and three 8-hour shifts and there is a lack of high level control measures, the risk will increase compared to the occasional use by a single operator.

Other factors to consider when undertaking a risk assessment include:

- In what type of conditions is the plant used in (for example, in a confined space, muddy or dusty environment)?
- What is the condition of the plant? For example, is it old and missing safety features found on new plant? Is it reliable or often needing emergency maintenance?
- If there are other people or items of plant in the vicinity, what effect do they have on the likelihood or consequence?
- Where and when is access required during the installation, operation or maintenance of plant and in an emergency?
- What work practices and procedures exist in relation to plant safety (for example, isolation to carry out maintenance, emergency shut-down)?
- What kind of training, information, instruction and supervision is provided to workers and other persons who may be exposed to plant?
- Does the plant's safety depend on the competency of its operators?
- How is work organised? For example:
 - the speed of the process line
 - pedestrian and vehicular traffic around the plant
 - time spent on repetitive tasks
 - shift work arrangements
 - any production incentives that may affect health and safety.

Common plant hazards

Hazard	Typical problem	Typical injury
Moving parts of plant, or movement of material processed/handled by the plant	Moving parts accessible to employees; parts of plant (or material processed/ handled by the plant) fall or fly off; uncontrolled or unexpected movement of plant or materials; runovers, rollovers.	Crush injuries; entanglement; shearing of body parts; being struck by moving objects; amputation; cutting, stabbing and puncturing - injuries may range from short-term to serious, as well as fatalities.
Hot parts of plant	Contact with plant at high temperatures.	Burns.
Fire and explosion	Explosion of gases, vapours, liquids or other substances caused by operation of the plant.	Shock; burns; loss of consciousness; fatalities.
Electricity	Water near electrical equipment; plant contacting live electrical conductors; overload of electrical circuits; damaged switches, leads or cables.	Shock; burns; loss of consciousness; fatalities
Slips, trips and falls	Uneven or slippery surfaces; poor housekeeping in the vicinity of plant; falls from heights due to lack of proper work platform or guard rails.	Fractures; sprains and strains; fatalities.
Manual handling	Constrained or awkward body posture; repetitive or awkward movements; exerting high forces; lifting heavy or awkward objects	Fractures; sprains and strains
Noise	Noise from pumps and motors; impact noises; shearing noises; compressed air spraying	Hearing loss; fatigue

Risk ranking and score

Risk is defined as the chance of something happening that will have an impact on objectives, people, plant or the environment.

The purpose of ranking hazards is to provide the means to:

- Determine the hazard risk level so the hierarchy of controls can be applied to eliminate or reduce the hazard to ALARP.
- Determine the order of priority when allocating resources to control hazards identified through the risk assessment process.

- Demonstrate hazard control to ALARP after the risk assessment process.

Plant risk assessment are conducted in a generally qualitative nature. That is, they are ranked and/or scored according to likelihood (probability) of the hazard occurring and the consequence of the hazard should the hazard occur.

Deciding what needs to be assessed immediately and what can wait will be a function of the makeup of the fleet and the owner's perception of the risk of plant items.

Risk Matrix					
Consequences	Likelihood or Probability				
	Almost Certain (expected)	Likely (will probably occur)	Moderate (might occur – has happened)	Unlikely (could occur – known to happen)	Rare (practically impossible)
No Incident or First Aid Injury	High 15	Medium 19	Low 22	Low 24	Low 25
Medical Treatment	High 10	High 14	Medium 18	Low 21	Low 23
Alternate Work or Lost Time Injury	Extreme 6	High 9	High 13	Medium 17	Medium 20
Serious or Permanent Injury	Extreme 3	Extreme 5	Extreme 8	High 12	High 16
Fatality	Extreme 1	Extreme 2	Extreme 4	Extreme 7	High 11

Any hazard assessed as presenting a low and/or medium risk level will be controlled using a combination of controls as appropriate.

Any hazard assessed as presenting a high risk level must be controlled using a combination of at least one engineering control and lower level controls as appropriate. Where this isn't possible, Workplace Manager consultation must take place.

Any hazard assessed as presenting an extreme risk level will be controlled using elimination and engineering as the primary source of controls. Where this is not possible, Workplace Manager consultation must take place.

Controlling risks

The ways of controlling risks associated with plant are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the *hierarchy of risk control*. The WHS Regulations require duty holders to work through this hierarchy to choose the control that most effectively eliminates or, where that is not reasonably practicable, minimises the risk in the circumstances. Specific controls are required under the WHS Regulations for certain types of plant, such as:

- powered mobile plant
- plant that lifts or suspends loads
- industrial robots
- lasers
- pressure equipment
- scaffolds.

The hierarchy of control measures

Elimination – The most effective control measure is to remove the hazard or hazardous work practice associated with the plant. For example, buy pre-sawn timber instead of using a power saw.

Many hazards can be addressed before introducing plant into your workplace, that is, in the planning and purchasing stages. For example, purchasing machinery that is designed and built to produce low noise levels is more effective than providing workers with personal hearing protectors. This also avoids costly modifications to plant after it is purchased.

If elimination is not reasonably practicable, you must minimise the risk by:

Substitution – Substitute the plant (or hazardous parts of it) with plant that is safer. For example:

- using a cordless drill instead of an electric drill if the power cord is in danger of being cut.

Isolation – separate the hazardous plant from people, either by distance or physical barrier. For example:

- constructing a booth from which the plant can be operated remotely
- using concrete barriers to separate mobile plant from workers.

Engineering controls – Include modifications to tools or equipment, for example installing guards to prevent contact with moving parts of machinery or installing a roll over protective structure on a tractor.

Administrative controls – If risk remains, it must be minimised by implementing administrative controls, so far as is reasonably practicable, for example installing a tag-out system to ensure that workers are aware that the plant is isolated from its power source and must not be operated while maintenance or cleaning work is being done. Providing training

and supervision, using warning signs or arranging work to minimise the time spent near noisy machinery are all examples of administrative controls.

Personal protective equipment (PPE) – Any remaining risk must be minimised with suitable PPE, such as providing workers with breathing protection, hard hats, gloves, aprons and protective eyewear.

Administrative control measures and PPE rely on human behaviour and supervision, and used on their own, tend to be least effective in minimising risks.

Combining control measures

In many cases, a combination of control measures will provide the best solution. For example, protecting workers from flying debris when using a concrete cutting saw may involve guarding the blade, isolating the work area and using PPE such as a face shield.

Maintaining and reviewing risk control measures

The control measures that are implemented must be reviewed and, if necessary, revised to make sure they work as planned and that no new hazards have been introduced by the control measures.

You should consult your workers to obtain feedback on the plant and work processes being used and consider the following questions:

- Are the relevant workers aware of the control measures and do they understand them?
- Are the control measures, for example guards, working effectively in both their design and operation?
- Have all hazards associated with the plant been identified?
- Has the purchase of a new item of plant made the job safer?
- Are safety procedures being followed?
- Has an incident occurred in relation to the plant?
- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

When deciding how frequently to carry out a review, you should consider the level of risk (high risk plant may need more frequent review) and the type of plant involved (there may be particular stages in the life of the plant where a more frequent review is needed).

Regulation 37: Control measures must be maintained so that they continue to protect workers and other people from the hazards associated with plant. The control measures must be:

- fit for purpose
- suitable for the nature and duration of the work
- installed, set up and used correctly.

Regulation 38: A person conducting a business or undertaking must review and as necessary revise control measures:

- when the control measure is not effective in controlling the risk
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control
- if a new hazard or risk is identified
- if the results of consultation indicate that a review is necessary
- if a health and safety representative requests a review.

Proactive and robust maintenance regime

Proactive maintenance is important because:

- It is a legislative safety requirement
- It delivers improved safety and efficiency
- It helps maximise uptime and minimise breakdowns

Div 7 Sub 2 part 213 - Maintenance and inspection of plant

- 1) The person with management or control of plant at a workplace must ensure that the maintenance, inspection and, if necessary, testing of the plant is carried out by a competent person.
- 2) The maintenance, inspection and testing must be carried out:
 - a) in accordance with the manufacturer's recommendations, if any; or
 - b) if there are no manufacturer's recommendations, in accordance with the recommendations of a competent person; or
 - c) in relation to inspection, if it is not reasonably practicable to comply with paragraph (a) or (b), annually.

Standard safe operating procedures for plant item

Development, provision and training in machine Safe Operating Procedures is important because:

- It is a legislative safety requirement
- It delivers improved safety and efficiency

Safe Operating Procedures are simple, readable guidance regarding dos and don'ts when using the plant, preferably limited to 1 page.

It is important to recognise that this is NOT A TASK SOP, and therefore does not need to contain comprehensive task related instructions. It is a summary of key issues for a competent operator to remember, and abide by when using the plant.

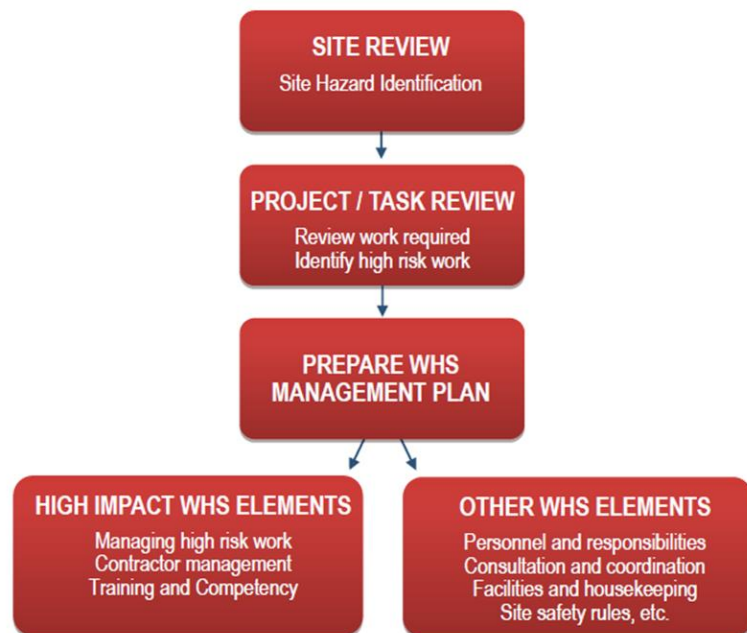
Section 19 (3), Div 3 (20-26), Div 4(27-29) WHS Act Without limiting subsections (1) and (2), a person conducting a business or undertaking must ensure, so far as is reasonably practicable:

- d) the safe use, handling and storage of plant, structures and substances
- f) the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking

Safe Environment

Ensure site and task hazards are identified, assessed and controlled:

- Site review
- Project task review
- Prepare the WHS Management Plan
- Implementing high impact elements of WHS Management Plan



Site Review

The review of site attributes is the logical first step in ensuring SAFE ENVIRONMENT for the project.

This should be undertaken using a traditional hazard identification, risk assessment and control process, which generates information which is then used in planning the management of task hazards.

SITE ATTRIBUTES	DETAILS
Access and egress to site	Vehicle and pedestrian traffic, parking, employee pedestrian access etc.
Geographic conditions	Slope, rivers/creeks etc.
Geological conditions	Unstable ground conditions, undermining, sinkholes etc.
Weather conditions	Extreme heat, cold, wind, rain, snow or ice and seasonal factors etc.
Neighbouring operations	That may create hazards on site such as fume, toxic substances, noise, explosion, cave in, deluge etc.
Size of site	Relative to project footprint – crowding, deliveries, storage
Location of site	Travel fatigue issues, work in combat zone or politically unstable country or province, possible terrorism etc.
Other attributes	That may represent a hazard during or after construction works

Project Task Review

It is important to take a risk management approach when undertaking this review and to map out the areas of work which are likely to involve HIGH RISK WORK.

This will result in the clear identification of the type of high risk tasks that will or may be undertaken as part of the project. Armed with this information, the WHS Management Plan can be prepared.

Falls and falling objects
Traffic management
Essential services
Hazardous manual tasks
Hazardous chemicals
Asbestos
Confined spaces
Access and security
Electricity
Mobile and Other Plant
Noise
Steel construction

Prepare the WHS Management Plan

This plan documents the approach to managing safety on a project.

All elements of the plan are important, however HIGH IMPACT ELEMENTS require much more active management to develop and deliver.

If high impact elements are not approached diligently, safety on the project will almost certainly be sub-standard in the areas that deliver the most critical systems and safeguards.

Elements of a WHS Management Plan

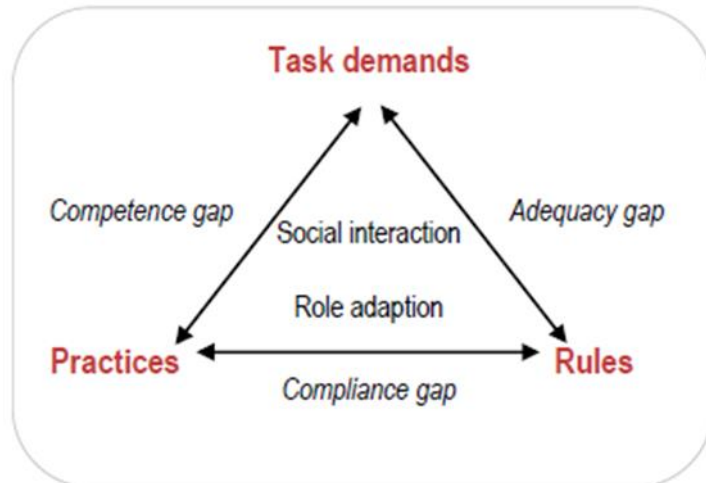
A	Managing High Risk Work
B	Contractor Management
C	Induction and Training Requirements

Key personnel and responsibilities
Consultation, cooperation and coordination arrangements
Provision of facilities and housekeeping
Specific site safety rules. These should include, but not be limited to: • Housekeeping • Traffic management • Incident reporting & management • First aid & emergency response • Alcohol & drugs • Plant & Equipment – site rules • PPE • High risk work—management principles

Managing High Risk Work

The Safe Work Australia Code of Practice for Construction Work identifies that a SWMS must:

- identify the work that is high risk construction work
- specify hazards relating to the high risk construction work and risks to health and safety associated with those hazards
- describe the measures to be implemented to control the risks
- describe how the control measures are to be implemented, monitored and reviewed.



GAP	HOW TO MINIMISE THE GAP
The adequacy gap reflects the gap between how the SWMS says the task <i>should be</i> carried out and how the task will practically <i>need to be</i> carried out	Ensure development of the SWMS is facilitated by an experienced supervisor or equivalent Develop in consultation with personnel who are or shall be involved with undertaking the task
The compliance gap reflects the gap between what has been agreed as the task process in the SWMS and how the task is being carried out	Ensure all personnel are aware of the existence, importance and content of SWMS Conduct periodic observation audits against SWMS Good old fashioned supervision is crucial in maintaining the right work environment where knowledge of and adherence to proper procedure is respected
The competence gap reflects the gap between what is required to do the task in accordance with the SWMS, and the knowledge and capabilities of individual personnel	Ensure training and induction processes are followed

Safe Operator

Ensure the operator is competent to operate the plant and perform the task required

- Operator Training and Competency Assessment
- General Safety System Knowledge
- Site Specific Procedures and Knowledge



Operator training and competency assessment

The principle is the need for operators to be trained and certified as competent to a transparent standard.

This helps to reduce the risks associated with varying operator skill by aiming to ensure a minimum standard of competency.

General safety system knowledge

This is principally aimed at ensuring operators have been through relevant inductions, and have a good working understanding of the safe systems of work employed by their organisation to manage safety risks, no matter where they are working.

This includes:

- WHS Organisational Structure, WHS Consultation overview and mechanisms
- Hazard identification, risk assessment, incident reporting and injury management process
- Emergency procedures
- Site work WHS Management overview

Site specific procedures and knowledge

Site rules and requirements based upon the contents of the site WHS Management Plan, including:

- Key personnel and responsibilities
- Consultation, cooperation and coordination arrangements
- Provision of facilities and housekeeping
- Specific site safety rules – developed in light of Steps 1 and 2 (Site and Project Review)
- Site safety rules should include, but not be limited to:

- Housekeeping, Traffic Management, PPE
- Incident reporting & management
- First aid and emergency response
- Alcohol and drugs
- Plant and Equipment – site rules
- High risk work – management principles

Section 3 Exercises

What are the steps in the '**Risk Assessment Processes**' in place for Plant?

- (i) _____
- (ii) _____
- (iii) _____
- (iv) _____
- (v) _____
- (vi) _____

Complete the following statements

A Plant risk assessment must be completed when

- (i) _____
- (ii) _____
- (iii) _____
- (iv) _____

In order from lowest to highest what are the elements of the Hierarchy of Controls?

- (i) _____
_____ (____).

- (ii) _____.
- (iii) _____.
- (iv) _____.

(v) _____.

(vi) _____.

Where could you find copies of the relevant Plant forms and procedures within your organisation?

CONTROLLING RISKS: FROM PURCHASE TO DISPOSAL

(Div 7 Sub div 1 (203), Sub Div 2 (204 to 213), Sub div 3 (part 214 – 226))

Purchasing and hiring plant

Many injuries and illnesses associated with plant occur due to a failure to select the right equipment for the job. Before you purchase plant, check that it is suitable for the intended use, including the environment it will be used in and the workers using it. Discuss your needs with the plant supplier, who must provide you with information about:

- the purpose for which the plant was designed or manufactured
- the results of any calculations, analysis, testing or examination
- any conditions necessary for the safe use of the plant
- any alterations or modifications made to the plant.

Before purchasing, hiring or leasing plant you should also determine:

- the hazards and risks associated with installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling of the plant
- control measures needed to minimise these hazards and risks
- the manufacturer's recommendations in relation to the frequency and type of inspection and maintenance needed
- any special skills required for people who operate the plant or carry out inspection and maintenance
- any special conditions or equipment required to protect the health and safety of people carrying out activities such as installation, operation and maintenance
- any alterations or modifications to be made to the plant.

You should check whether the plant includes some or all of the following characteristics:

- contact with or access to dangerous parts is prevented, for example by using guards and protective structures
- it is of sturdy construction and has tamper-proof design
- there are no obstructions to the plant operator
- it has fail safe operation
- it is easy to inspect and maintain
- it does not introduce other hazards (for example, manual handling problems or excessive noise) into your workplace
- it incorporates measures to minimise risks during use (for example, low noise).

Purchasing second-hand plant

Particular care should be taken when purchasing second-hand plant.

Where plant has been in service prior to purchase and information regarding safe use is not available, a competent person should be engaged to assess the plant and develop this information.

Second-hand plant, even if free from identified faults, is often missing some of the safety features currently required in similar new equipment. These features may need to be retrospectively fitted to effectively control the risk in the new workplace.

Div 5 (198 - 200) A supplier of second-hand plant must ensure, so far as is reasonably practicable, that any faults that may give rise to health and safety risks are identified. The supplier must provide information in writing about the condition of the plant and any identified faults or, if the plant is supplied only for spare parts or scrap, that it is not to be used as plant.

Hiring plant

When you hire plant, both you and the person you have hired it from must ensure, so far as is reasonably practicable, that the plant is safe to use. During the time that the plant is in your possession you will have control over the way the plant is used in the workplace.

Before you hire the plant you should assess whether the plant is suitable for its intended use. You should also check that the plant has been inspected and maintained by the supplier according to the manufacturer's specifications. This may involve checking the log book or maintenance manual. You should also ensure that the supplier provides you with the manufacturer's information about the purpose of the plant and its proper use.

Any person who hires or leases plant to others will have duties as a supplier of plant and as a person with management or control of plant. This means that they must ensure, so far as is reasonably practicable, that the plant is safe to use and properly maintained. They must also provide specific information with the plant about how to operate it safely.

In most cases the supplier will be responsible for inspecting and maintaining the plant. However, if the plant is to be hired for an extended period of time, you and the supplier may develop arrangements to ensure that the plant is adequately inspected and maintained throughout the lease. This may involve the supplier coming to your workplace to maintain the plant, or you maintaining the plant while it is at your workplace.

The arrangements you make will depend on your ability to inspect and maintain the plant in accordance with the manufacturer's specifications. If you choose to maintain the plant yourself during the lease, you should provide all information and records about the maintenance to the hirer at the end of the lease.

Installation and commissioning of plant Div 6 (part 201)

Installing plant

An installer should ensure:

- plant is erected or installed in having regard to the manufacturer's instructions, including ensuring that specialised tools, jigs and appliances necessary to minimise any risk of injury during installation are used
- access to and egress from plant complies with relevant standards
- plant is stable during installation
- the interaction of plant with people, work processes and other plant is considered

- environmental factors affecting installation and use (e.g. wet conditions) are considered
- all electrical installations associated with plant comply with AS 3000 (also known as the Australian/New Zealand Wiring Rules) as far as it is relevant.

The installer should notify the designer, manufacturer, supplier and/or the person with management or control of plant of any new risks identified during the installation of the plant.

WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

A person with management or control of plant at a workplace must ensure that:

- plant is not commissioned unless the person has established that the plant is, so far as reasonably practicable, without risks to the health and safety of any person
- the person installing or commissioning the plant is a competent person, and is provided with all the information necessary to minimise risks to health and safety, and
- the processes for the installation, construction and commissioning of plant include inspections that ensure, so far as is reasonably practicable, the risks are monitored.

Positioning plant in the workplace

Plant should be positioned so that:

- risks from hot plant (such as friction, molten material, hot gases) are controlled through restricted access, guarding or insulation
- there is sufficient space (suggested 600 mm, the minimum width of a walkway) for safe access to the plant for operation, cleaning, maintenance, inspection and emergency evacuation
- the plant does not obstruct doorways and emergency exits
- the proximity to other plant does not have a negative effect on the operation of the plant or work processes
- the plant rests on a suitable foundation where required—for example, on a floor or other support that ensures the plant is stable and secure
- ventilation is adequate to deal with the nature and volume of any emissions from the plant
- workers and others are not exposed to noise levels greater than those stated in the exposure standard for noise under the WHS Regulation.

Commissioning plant

Commissioning plant involves performing the necessary adjustments, tests and inspections to ensure plant is in full working order to specified requirements before the plant is used.

Commissioning includes recommissioning.

The person who commissions plant should ensure that:

- the commissioning sequence is in accordance with the design specifications
- tests, such as dummy runs, are carried out to check that the plant will perform within the design specifications.

Instruction, training and supervision WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

Before plant is used in your workplace, you must provide your workers and other persons who are to use the plant with information, training, instruction or supervision that is necessary to protect them from risks arising from the use of the plant.

You must also provide the necessary safety information to persons who are involved in installing, commissioning, testing, maintaining or repairing plant, as well as decommissioning, dismantling or disposing of plant. This should include information on the types of hazards and risks the plant may pose to the person when they are carrying out these activities.

This information may be supported with safe work procedures that include instructions on:

- the correct use of guarding and other control measures
- how to safely access and operate the plant
- who may use an item of plant, for example only authorised or licensed operators
- how to carry out inspections, shut-down, cleaning, repair and maintenance
- traffic rules, rights of way, clearances and no-go areas for mobile plant
- emergency procedures.

Any emergency instructions relating to an item of plant should be clearly displayed on or near it.

Training programs should be practical and ‘hands on’ and take into account the particular needs of workers, for example literacy levels, work experience and specific skills required for safe use of the plant.

Supervisors should take action to correct any unsafe work practices associated with plant as soon as possible, otherwise workers may think that unsafe work practices are acceptable.

Using plant in the workplace. WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

Workers who operate plant should be competent, or suitably supervised during training, so that they do not put themselves or others at risk. It is important to retain all operating manuals and instructional material provided by the manufacturer in order to correctly operate and maintain the plant once it is in the workplace. You should also consider and address the risks that may arise from:

- operator fitness for work, for example, fatigue
- carrying out routine or repetitive tasks
- local conditions and working procedures.

A person with management or control of plant at a workplace must:

- so far as is reasonably practicable, prevent unauthorised alterations to or interference with the plant
- take all reasonable steps to ensure the plant is only used for the purpose for which it is designed, unless a competent person has assessed that the proposed use does not increase the risk to health and safety, and

- ensure all safety features, warning devices, guarding, operational controls, emergency stops are used in accordance with instructions and information provided.

High risk work licences

Certain types of plant, such as industrial lift trucks and some types of cranes, require the operator to have a high risk work licence before they can operate the plant. Schedule 3 of the WHS Regulations sets out the classes of high risk work licences and the types of plant involved.

Making changes WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

If you intend to alter the design of the plant, change the way the plant is used or change a system of work associated with the plant, you should carry out the risk management process again.

If you intend to use plant in a different way or for a purpose that it was not designed for, you must ensure that the risks associated with the new use are assessed by a competent person. For example, if an item of plant that is designed to cut wood is intended to be used to cut metal, all hazards associated with that use must be identified and the appropriate controls implemented. This may mean the provision of a lubricating and/or cooling fluid system to ensure that the cutting process does not generate excess friction or heat.

The competent person's assessment should:

- include all aspects of the proposed task
- outline the reasons a purpose-designed item of plant cannot be used for the proposed task, such as the impracticability of using it or additional risks that using purpose-designed plant would generate
- take into account the recommendations of the designer, manufacturer or supplier of the plant and ensure the proposed use is not outside its capabilities
- identify differences between the item of plant and one that is purpose-designed for the task, and describe measures used to control the risks that such plant is designed to control
- amend any relevant documentation, for example, operator and maintenance manuals and signage

If a competent person decides that the plant is not suitable for the proposed task, it must not be used for that task.

Making alterations to plant

Prior to making any alterations to plant you should consult with the designer and manufacturer to ensure all relevant safety issues have been considered. Any alterations you make to the plant will result in you assuming the obligations of a designer or manufacturer.

If the original designer or manufacturer cannot be contacted (for older plant or imported plant), the alterations should be carried out by a competent person in accordance with the relevant technical standards.

In the case of plant that requires design registration, the altered design must be registered if the alteration to the design may affect health and safety.

Plant should be isolated from power sources and be unable to be switched on or activated accidentally before alterations begin or while alterations are being carried out.

Before returning altered plant to service you should:

- have control measures in place to eliminate or, where that is not reasonably practicable, minimise any risks created by the alteration, including providing information and training for users and supervisors about the changes
 - inspect and test the plant, having regard to the altered design specifications and relevant technical standards.

Inspecting plant WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

The inspection of plant should be conducted in accordance with a regular maintenance system to identify any:

- potential problems that were not anticipated during plant design or task analysis
- deficiencies in plant or the equipment associated with use of plant, for example wear and tear, corrosion and damaged plant parts
- adverse effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Inspection of associated work processes should be conducted regularly to identify any:

- unsafe work practices associated with the use of plant
- negative effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Regularly inspect hand-held powered plant and repair or replace them when necessary, and replace damaged or worn parts (such as grinding wheels).

Any control measures implemented, such as guards and warning devices, must be regularly inspected and tested to ensure they remain effective.

You should keep an up-to-date register of the items of plant requiring regular inspection and maintenance. It should include information on:

- allocated responsibilities for people dealing with inspections
- standards against which plant should be inspected
- the frequency of inspections
- critical safety instructions to be followed during inspection, for example, the isolation procedure
- the procedures for particular types of inspections, including:
 - periodic inspections
 - specific tests
 - repaired or modified plant
- any variations from normal operation or dangerous occurrences and any trends that may be occurring.

Reasonably practicable control measures must be implemented to ensure the health and safety of the person conducting the inspection, for example by ensuring that plant is switched off or isolated from the energy source to avoid accidental re-energising of dangerous parts.

Any guards that are removed must be replaced correctly to prevent access to the hazardous part of the plant when it is returned to use.

A person with management or control of plant at a workplace must ensure that maintenance, inspection, and if necessary testing, of plant is carried out by a competent person in accordance with manufacturer's recommendations, or if those aren't available, in accordance with recommendations of a competent person. If it is not reasonably practicable to comply with the manufacturer's recommendations or the recommendations of a competent person, the inspection and testing must occur annually.

Maintenance, repair and cleaning of plant WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

Plant must be maintained and repaired according to the manufacturer's specifications or, in the absence of such specifications, in accordance with a competent person's recommendations. For example, ensure fluid levels and pressures are correct and ensure brakes are functioning properly.

Plant should be isolated before maintenance or cleaning commences. Where plant is isolated and plant shutdown will result, any total or partial shutdown should not allow a hazardous situation to be created.

Isolated or disengaged plant should:

- not hinder or interfere with the operation of any other plant
- have guards in place where a risk of injury is identified
- not obstruct access.

A process should be put in place to enable effective communication and consultation with affected workers and other persons conducting a business or undertaking to prevent any risk to health and safety arising from restarting the operation of the plant which has been shut down due to inspection, maintenance or cleaning.

Where plant cannot be isolated, methods to prevent accidental operation must be implemented. The work should be carried out under controlled procedures to allow for maintenance and cleaning without risk to the health and safety of the person performing the work.

If there is a need to operate plant during maintenance or cleaning, the person with management or control of the plant must ensure that the operators' controls allow the safe operation of the plant while a person is undertaking the maintenance or cleaning.

If the plant is operated by a person other than the person who is carrying out the maintenance or cleaning, the person operating the plant must be authorised to do so by the person with management or control of the plant.

Following maintenance all guarding must be replaced prior to start-up of plant.

Damaged plant should be withdrawn from service until any risks to health and safety have been controlled.

Storing plant WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

Plant that is not in use must be stored so that it does not create a risk to workers or other people in the workplace. Where plant is to be placed in storage, you should:

- ensure relevant health and safety information supplied by the designer or manufacturer is provided to the person who is to dismantle or store the plant
- implement control measures to eliminate or, if that is not reasonably practicable, minimise the risks of damage to plant during storage, for example from corrosion as a result of exposure to residues of hazardous substances and deterioration of consumables.

Before plant is used after an extended period of storage, the plant should be re-commissioned by carrying out the same level of testing and inspection when it was first commissioned.

Plant that has been taken off-line constitutes plant not in use. For example, an automatic robot on a welding line may be taken off-line due to a product design modification no longer requiring the use of the robot for the particular product. The robot is therefore still fully functional but is no longer in use. The robot must not be left in a state that presents a risk to health or safety. This may be done by isolating the work station from the power supply, employing lock-out and tag-out systems, and providing physical stops to prevent movement in the event of accidental powering of the plant. Further information on isolating energy sources is provided at Section 4.5 of this Code.

Powered mobile plant may present a risk to health or safety if measures are not taken to prevent the plant moving of its own accord (for example, rolling down a sloping surface) or to prevent unauthorised operation. For example, an industrial lift truck at the end of or during a shift is plant that is frequently not in use and unattended for short periods of time. The person with management or control should ensure that the operator of the truck understands the required safety procedures when leaving the truck unattended. This would include ensuring that the truck has been parked on a firm, level surface with the handbrake applied, the motor switched off and rendered inoperable, for example by removing the key.

A person with management or control of plant at a workplace must ensure that plant not in use is left in a state that does not create a risk to the health or safety of any person.

Decommissioning, dismantling and disposing of plant

WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242)

You should identify any hazards inherent in the process of decommissioning and dismantling the plant (for example, exposure to hazardous substances). The plant should be dismantled in accordance with the designer's and manufacturer's instructions.

Disposing of plant may include reselling (in full or part) or scrapping (waste disposal and/or recycling). If the plant is to be resold, the seller will take on the duties of a person that supplies plant. The seller should ensure that the plant is safe to load, transport, unload and store. Any information relating to the plant design, registration, installation, operation and/or maintenance must be provided with the plant to the reseller or buyer.

If the plant is to be scrapped, you should consult with local waste disposal authorities or organisations so that the plant is safe to load, transport, unload and dispose of.

If the plant is to be used for scrap or spare parts, you must inform the person you are supplying the plant to that the plant is being supplied as scrap or spare parts and that the plant in its current form is not to be used as plant. This must be done in writing or by marking the item of plant.

A person with management or control of plant at a workplace must ensure that:

- plant is not decommissioned or dismantled unless it can be carried out without risks to health and safety so far as is reasonably practicable
- the person who decommissions or dismantles the plant is a competent person and is provided with all available information necessary to eliminate, or where this is not reasonably practicable, minimise risks to health and safety, and
- the processes associated with the decommissioning and dismantling include inspections to ensure, so far as is reasonably practicable, that risks associated with these activities are monitored.

PLANT REGISTRATION Part 5.2 & 5.3

Schedule 5 of the WHS Regulations requires certain plant designs and items of plant to be registered (registrable plant). Schedule 5 is reproduced at Appendix A.

You must not allow the use of any registrable plant in the workplace if it has not been registered.

Design and altered design registration

You must register a plant design if:

- it has not already been design registered, or
- you alter the plant design by modifying the plant and the alterations to the design may affect health and safety.

In order to register a plant design, the design must be verified by a design verifier who must provide a statement that the design has been produced in accordance with published technical standards or engineering principles specified by the designer.

A design can only be verified by a person who is eligible to be a design verifier under the WHS Regulations. The types of people who would be competent to verify the design of plant may include someone who:

- has educational or vocational qualifications in an engineering discipline relevant to the design to be verified
- has knowledge of the technical standards relevant to the design to be verified
- has the skills necessary to independently verify that the design was produced in accordance with the published technical standards and engineering principles used in the design
- is certified by a body that is accredited or approved by the Joint Accreditation System—Australia and New Zealand or an equivalent overseas body to undertake conformity assessments of the design against the relevant technical standards.

For example, this could include someone who is registered on the National Professional Engineers Register administered by the Institution of Engineers Australia and is determined by that Institution to be competent to design or inspect the relevant type of plant, or is a member of the Institution of Engineers Australia with the status of Chartered Professional Engineer.

When registering a plant design, the WHS regulator will issue a plant design registration number. This number must then be given to the manufacturer, importer or supplier of plant. These duty holders must ensure that the design registration number is provided to the person with management or control of plant at the workplace.

The person with management or control of plant at the workplace must then ensure that the design registration number is kept readily accessible in the vicinity of the plant at all times. A

reliable way to achieve this is to permanently mark the design registration number on the plant.

Changes to design registration

If a registered plant design is altered so as to require any new risk control measures, the altered design must be registered.

Item registration

A person with management or control of an item of plant specified in Part 2 of Schedule 5 of the WHS Regulations must apply to the WHS regulator to register that item of plant.

In order to have an item of plant registered, the item must be inspected and a statement provided by a competent person stating that the plant is safe to operate. A person is competent to inspect an item of plant if the person has educational or vocational qualifications in an engineering discipline relevant to the plant, or knowledge of the technical standards relevant to the plant to be inspected.

If the design of the plant was also required to be registered, the design registration number must be included with the application.

Duration of registration

Registration of an item of plant applies for five years, and takes effect on the day the registration is granted and expires five years after that date.

Once the item of plant is registered

When the item of plant is registered, the WHS regulator will issue a registration document. This document will list the name of the registration holder, any associated business name, the registration number and the date of effect of the registration. This document must be kept and made available for any inspection required under the Act.

If it is lost, stolen or destroyed, you will need to apply to the WHS regulator that registered the plant for a replacement document as soon as possible, outlining the reasons for needing a replacement.

The WHS regulator may impose any conditions it considers appropriate on the registration of the plant, including conditions in relation to the use and maintenance of the plant, record keeping or provision of information to the WHS regulator.

You must ensure that the item registration number is permanently marked on the item of plant in a location that is readily accessible. It will generally be a simple task to mark large items of plant with the item registration number by either etching the number in place or by fixing the number in place on a plate in a position that will not lead to damage or removal over time.

On some items, such as a tower crane that may comprise many parts assembled in a variable configuration to suit a particular site, it may not be feasible to mark each component of the

plant. In such cases the item registration number should be marked on those components that are readily accessible and able to be seen when the crane is fully assembled.

Registration renewal

The registration of the item of plant will expire exactly five years from the date that the registration is granted. To renew the registration for the item of plant you must apply to the WHS regulator before the registration expires.

Changes to item registration

If there is any change to any information provided at the time of item registration, or in relation to the registration itself, you have 14 days to advise the WHS regulator of the change. This must be done in writing. In particular, you must provide written notice to the regulator if:

- the item of plant is altered to the extent that it requires new risk control measures
- the item of plant is usually fixed but has been moved
- the registration holder no longer has management or control of the item of plant.

Section 5 Exercises

List two items of Plant from your workplace which require 'Design Notification'?

(i) _____

(ii) _____

List Two items of Plant from your workplace which require a license?

(i) _____

(i) _____

KEEPING RECORDS

WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242).

While you must keep records associated with plant requiring design or item registration, it is good practice to keep records for other types of plant in your workplace. Keeping records of the risk management process demonstrates potential compliance with the WHS Act and Regulations.

It also helps when undertaking subsequent risk assessments.

Records on items of plant that may be kept could include:

- the unique plant identification number
- plant design registration information
- relevant data from commissioning
- compliance statements and/or test certificates
- manufacturer's specifications and user manuals
- results of inspections
- results of tests on the plant, including safety devices (for example, protective earth continuity tests, testing of mechanical guarding, stop time measurement)
- information on maintenance and major repairs carried out
- information on major modifications
- information on use that deviates from intended operating or design conditions
- results of risk assessments carried out on plant
- information, instruction and training provided to workers
- competencies of operators.

A person with management and control of plant must keep a record for plant that requires design or item registration, including records of all tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the plant.

These records must be kept for the period the plant is used or until the person relinquishes control of the plant.

The records must be available for inspection under the WHS Act and be made available to any person to whom the person relinquishes control of the plant, for example, if you sell the plant, those records should be transferred to the person who purchased the plant.

If there is a presence sensing safeguarding system at a workplace the person with management or control of the plant must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling or alterations for the life of the plant or until control is relinquished or in any other case for 5 years.

SPECIFIC CONTROL MEASURES

WHS Reg: Div 7 Sub div 1 (203), Subdiv 2 (204 – 213), Subdiv 3 (214 to 226) (Div 4 subdiv 1 (235 – 237) & sub div 2(238 to 242).

Guarding plant

A guard is a physical or other barrier that can perform several functions, including:

- preventing contact with moving parts or controlling access to dangerous areas of plant
- screening harmful emissions such as radiation
- minimising noise through the application of sound-absorbing materials
- preventing ejected parts or off-cuts from striking people.

If guarding is used, the person with management and control must ensure that:

- if access to the area of plant requiring guarding is not necessary during operation, maintenance or cleaning, the guarding is a permanently fixed barrier,
- if access to the areas requiring guarding is necessary during operation, maintenance or cleaning, the guarding is an interlocked physical barrier,
- if it is not reasonably practicable to use a permanently fixed barrier or an interlocked physical barrier, the guarding is a physical barrier that can only be altered or removed using a tool, or
- if it is not reasonably practicable to use a permanently fixed barrier, an interlocked physical barrier or a physical barrier fixed in position, the guarding includes a presence-sensing safeguarding system.

Guarding must:

- be of solid construction and securely mounted so as to resist impact or shock
- prevent by-passing or disabling of the guard
- not create a risk in itself (for example it must not obstruct operator visibility, weaken the plant, cause discomfort to operators or introduce new hazards such as pinch points, rough or sharp edges)
- be properly maintained
- control any risk from potential broken or ejected parts and workpieces
- allow for servicing, maintenance and repair to be undertaken with relative ease, and
- if guarding is removed the plant cannot be restarted unless the guarding is replaced.

Permanently fixed physical barriers

Permanently fixed physical barriers are designed to be welded or incorporated into the body of the machine. In Figure 1, the plant's power transmission is not required to be accessed during normal operation, maintenance or cleaning. It is therefore practicable to have the gear arrangements enclosed in gearbox housing to prevent access to moving gears. This has eliminated the risk associated with entanglement.

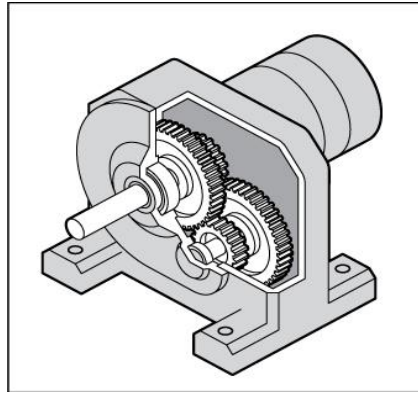
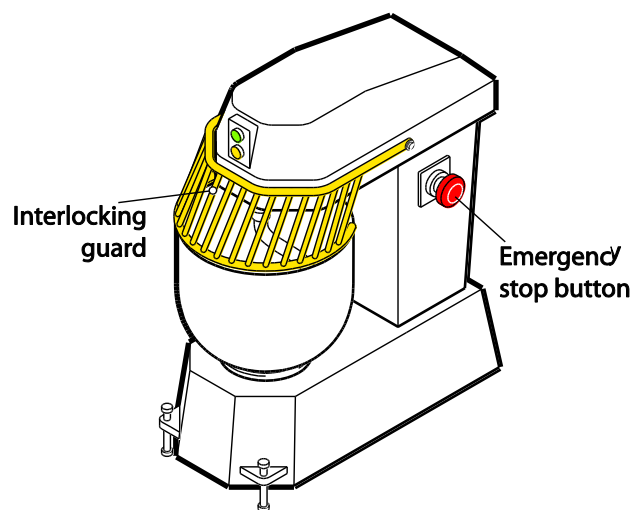


Figure 1: Cut-away view of a fixed physical barrier encasing the gear assembly and electric motor

Interlocked physical barriers

An interlock guard is connected to the plant's operational controls so that the plant is prevented from operating until the guard is closed. The guard cannot be opened or removed until the dangerous parts of the machine have fully come to rest. In Figure 2, the hinged top guard on the food mixer has a positively operating insertion key which automatically cuts off the plant's power when the lid is opened or removed. This allows the blades to come to rest. If the moving parts do not stop immediately once the power is cut off, then a guard should be designed to delay release of the locking mechanism until the moving parts have stopped.



Food mixer with an interlocking arm.

Figure 2: Food mixer with interlocking guard

Physical barriers fixed in position

Physical barriers that are securely fixed in position should be easy to remove and replace but only with the aid of a special tool, such as a spanner, Allen key or similar tool, and only when the machine is not in operation (see Figure 3). Devices such as wing nuts or wedge inserts, which can be operated using fingers or become stuck, should not be used.

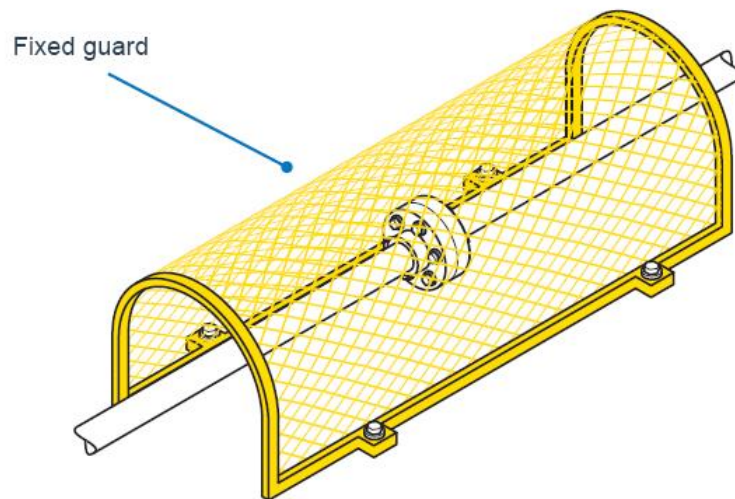


Figure 3: Fixed guard on rotating shaft or coupling.

Physical barriers such as perimeter fences securely fixed in position may prevent access to dangerous areas. Any access points, for example gates and doors, should be secured with a lock and key or an interlocking system (see Figure 4). Isolation procedures may be necessary where there is a danger of machines activating while a person is inside the barrier. For example, when an interlocked door is accidentally closed the machine should not automatically restart.

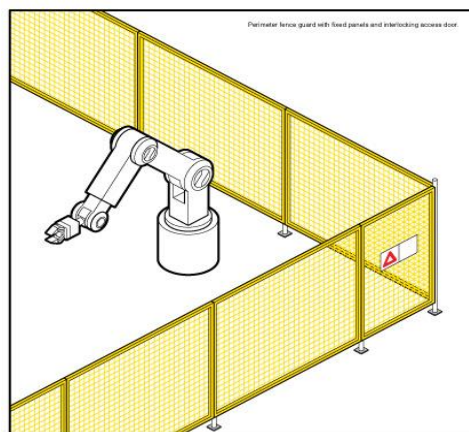


Figure 4: Perimeter fence guard with fixed panels and interlocking access door

Adjustable guarding incorporates movable sections or panels of the guard to allow materials to be fed into the guarded area while still preventing physical contact (see Figure 5).

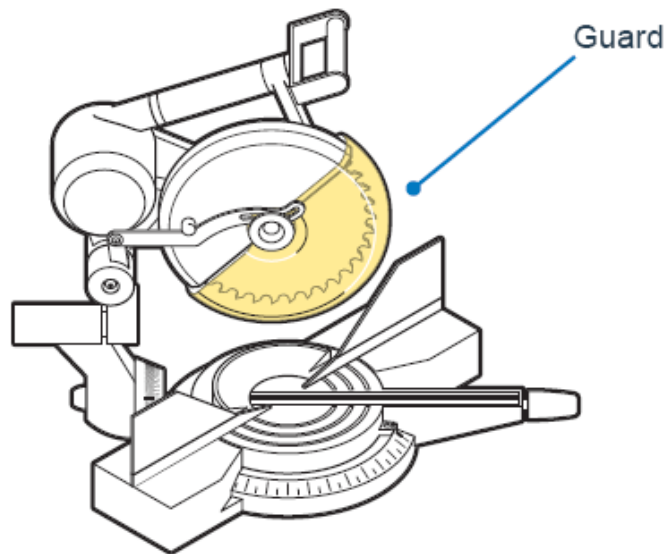


Figure 5: Self-adjusting guard for a drop saw.

Physical barrier guarding should be strong enough to resist normal wear and shock that may arise from failure of the parts or processes being guarded; and to withstand prolonged use with a minimum of maintenance.

Presence sensing systems

If physical guards are not reasonably practicable, then a presence sensing system can be used to control the risk. These systems detect when a person (or part of a person's body) enters the danger zone and stops the machine. Photoelectric light beams, laser scanners and foot pressure mats are examples of these type of guards. They rely on sensitive trip mechanisms and the machine being able to stop quickly, which may be assisted by a brake (see Figures 6 and 7).

Effective presence-sensing safeguard systems require the selection of a trip device appropriate for the work being done, and the correct location of beams with light activated devices, taking into account speed of entry and machine stopping time.

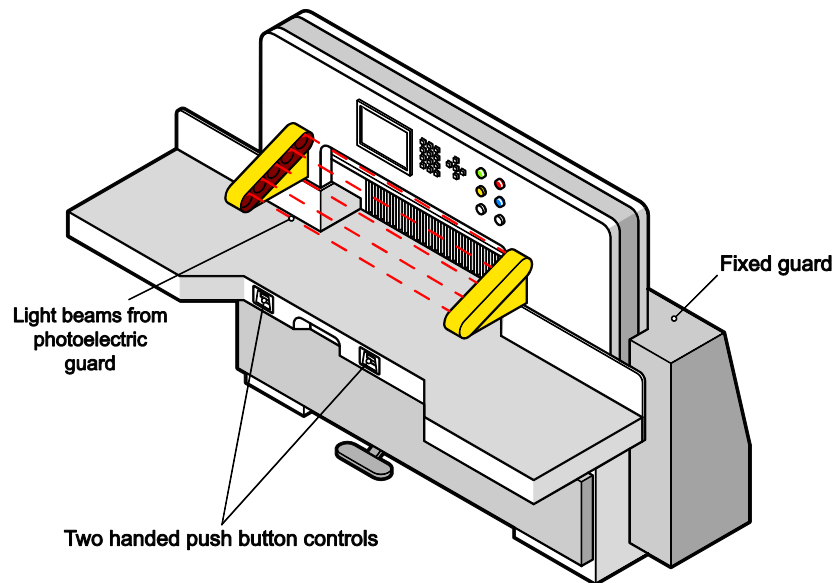
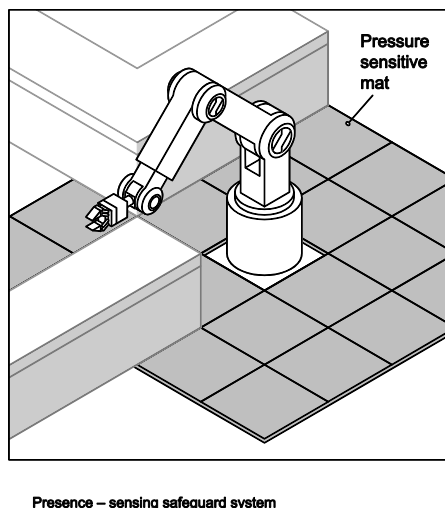


Figure 6: Paper cutting guillotine with a combination of guards, including a photoelectric light curtain



Presence – sensing safeguard system

Figure 7: Pressure sensitive mat

Environmental factors

When using a guard you should consider the environment in which it may be used. Some examples of poor guard selection include: guards on high frequency welders that become electrically charged, heating of guards in hot processes and wire mesh guards on machines emitting splashes.

If a guard is likely to be exposed to corrosion, you should consider corrosion-resistant materials or surface coatings.

Colour coding

It is good practice for all guards to be painted the same colour. For example:

- use high visibility yellow, provided it is different to the plant's colour, so that it can be clearly seen when a guard has been removed or when it is not in its proper place
- paint the surfaces behind the guard a contrasting or bright colour so that when the guard is removed, the exposed colour is clearly visible and it is easy to identify that the guard has been removed, alerting workers to possible danger.

For some types of plant, it may be necessary to choose colours that contrast with workpieces, where these need to be visible through the guarding.

Removal of guarding

If any type of guarding is removed for the purposes of maintenance or cleaning, it must be replaced before the plant is put back into normal operation. The plant should not be able to restart unless the guarding is in place. When removing guarding, eliminate the energy source by disconnecting the power supply or by locking out motive power sources.

Operator controls

Badly designed operator controls can lead to unintentional and unsafe operation of plant. For example, a control for setting the speed on a saw should not be a simple slider or rotary control that may be accidentally adjusted during operation. It should be graduated in fixed lockable steps.

Operator control devices should be designed:

- to enable the plant to be 'fail safe'. For example, when hand pressure is released on a lever controlling up and down movement, the lever will return to the neutral position and movement will stop
- to be within easy access of the operator
- so the intended function can be easily read and understood, especially in the case of dials and gauges
- so the movement of the control is consistent with established convention, for example, anticlockwise to open, clockwise to close
- so the desired effect can only occur by intentional operation of a control, for example, provision of a starting control
- to withstand the rigours of normal use, undue forces and environmental conditions,
- so they are located outside danger zones
- so they are readily accessible for maintenance.

A person with management or control of plant at a workplace must ensure that any operator controls are:

- identified so as to indicate their nature, function and direction of operation
- located so they can be readily and conveniently operated
- located or guarded to prevent unintentional activation, and
- able to be locked into the "off" position to enable disconnection from energy sources.

Emergency stops

Emergency stop devices should not be the only method of controlling risks. They should be designed as a back-up to other control measures.

Once engaged, the emergency stop controls should remain that way. It should only be possible to disengage the emergency stop controls by a deliberate action. Disengaging the emergency stop control should not restart the plant. It should only allow the normal starting sequence to be activated.

In the case of plant or parts of plant designed to work together, stop controls (including the emergency stop control) should be capable of stopping the plant itself as well as all the equipment interrelated to its operation, where continued operation of this related equipment may be dangerous.



Figure 8: Emergency stop button

If the design of plant at a workplace includes an emergency stop control, the person with management or control of the plant must ensure that:

- the stop control is prominent, clearly and durably marked and immediately accessible to each operator of the plant;
- any handle, bar or push button associated with the stop control are coloured red
- the stop control cannot be adversely affected by electrical or electronic circuit malfunction.

Where plant is designed to be operated or attended by more than one person and more than one control is fitted, the multiple controls must be of the “stop and lock-off” type so that the plant cannot be restarted after a stop control has been used unless each activated stop control is reset.

Warning devices

Warning devices should be used where there is a likelihood of moving plant colliding with other plant or workers in the vicinity of the plant. There are a number of warning devices that can be fitted to moving plant to alert the operator and others in the workplace.

A person with management or control of plant at a workplace must ensure that an emergency warning device is positioned on the plant to ensure that the warning device will work to best effect.

If there is a possibility of the plant colliding with pedestrians or other powered mobile plant, the person with management or control of the plant must ensure that the plant has a warning device that will warn persons who may be at risk from the movement of the plant.

Automatic audible alarms

Automatic audible alarms are usually fitted to warn of forward or reversing movement. These alarms emit an intermittent sound which is activated when the gear or drive lever is engaged.

If automatic audible alarms are used, the sound should be distinct and clearly audible only in the hazard area. If several items of plant are using the same warning device it may be difficult for workers to be aware of which item of plant is moving or is about to move. It is also possible that workers will become desensitised to the sound. For this reason it may be more effective to combine audible alarms with other warning devices, such as flashing lights.

Motion sensors

Motion sensors also warn with sound. They are sensitive to movement and are activated by motion in the required direction. These devices are suitable for plant that moves suddenly in any direction, such as rollers, bulldozers, excavators, boom lifts or scissor lifts.

Motion sensor alarms usually deactivate after a short time. They should not be deactivated if the operator has restricted vision when reversing.

Lights

Lights are usually used to warn of forward and reversing movement. These lights are wired to operate continuously or in hazard mode by flashing, usually when reversing. They generally work when the gear or drive lever is engaged.

It is important to choose the intensity and colour of the lights appropriate to your workplace to ensure that the moving plant can be seen. For example, an orange warning light may be suitable inside a warehouse but may not be seen in sunlight.

Flashing lights

Rotary flashing lights are coloured revolving lights that are usually mounted in a prominent place, such as the top of a vehicle cabin. They can be wired to operate continuously or activated by a switch. They are suitable to be used on any items of plant that moves in the workplace, such as forklifts or skid steer loaders.

Flashing lights may not be suitable for plant that:

- is stationary for long periods of time
- operates in restricted areas, such as trucks travelling on defined site roads.

Percussion alarms

Percussion alarms are mechanical devices that are fitted to an axle or gear shift. When plant moves, a cam raises a hammer that drops repeatedly onto a bell or sounding plate. These alarms are relatively cheap to install, however they require regular maintenance to ensure they continue functioning effectively.

Radio sensing devices

Radio sensing devices activate when the operator selects reverse. A light and alarm sounds inside the cabin to alert the operator if a pedestrian is within a predetermined distance from the rear of the plant.

Air horns

Horns are suitable for powered mobile plant with long breaking distances, such as trucks. Some large workplace or sites may require a truck to “stop and sound horn before continuing”.

Isolation of energy sources

An isolation procedure is a set of predetermined steps that should be followed when workers are required to perform tasks such as maintenance, repair, installation and cleaning of plant.

Isolation procedures involve the isolation of all forms of potentially hazardous energy so that the plant does not move or start up accidentally. Isolation of plant also ensures that entry to a restricted area is controlled while the specific task is being carried out.

The lock-out process is the most effective isolation procedure. The process is as follows:

- shut down the machinery and equipment
- identify all energy sources and other hazards
- identify all isolation points
- isolate all energy sources
- control or de-energise all stored energy
- lock out all isolation points
- tag machinery controls, energy sources and other hazards
- test by ‘trying’ to reactivate the plant without exposing the tester or others to risk. Failure to reactivate the plant means that the isolation procedure is effective and that all stored energies have dissipated. This may require further measures to safely release these energies, for example hydraulic or pneumatic pressure, suspended weight or compressed springs.

In order for the isolation procedure to be effective, you should identify all energy sources likely to activate the plant or part of it and isolate or de-energise these to avoid the plant being inadvertently powered. Energy sources include:

- electricity (mains)
- battery or capacitor banks
- solar panels
- fuels
- heat
- steam
- fluids or gases under pressure (water, air, steam or hydraulic oil)
- stored energy (e.g. compressed springs)
- gravity
- radiation.

In order to isolate plant you should use a device that effectively locks out the isolation points. These devices include switches with built-in locks and lock-out circuit breakers, fuses and valves. Other devices include chains, safety lock-out jaws (also known as hasps) and safety padlocks.

When isolating an energy source you should use a lock that allows one or more padlocks to be fitted. If more than one person is working on the plant at the same time, you should ensure that each worker is able to attach a padlock to the device (see Figure 9). This will prevent access to the energy sources while the work is being carried out.



Figure 9: Example of lock-out with a tag and the padlocks of two workers

Another way to allow multiple locks to be used is to have one padlock on the isolation point, with the keys locked in a box that has been locked separately by each worker.

Each worker involved in the maintenance, cleaning or repair of the plant should have a lock, tag and key for each isolation point. There should be no duplicate key for any lock, except a master key that is kept in a secure location and should only be used in an emergency.

If more than one energy source needs to be isolated to enable safe shut-down of the plant, the single key to each lock-out device should be held by the same person.

Tags should only be used as a means of providing information to others at the workplace. A tag should not be used on its own as an isolation device; only a lock is effective at isolating the energy source.

Putting it all together

Now that we have covered all the basics it is time to put it all together.

Using the blank risk assessment form supplied, we will conduct a Plant risk assessment on an item of plant or equipment in the workplace.

The first thing we need to consider is the make up of the team who will conduct the assessment. A suitably qualified and experienced person needs to be authorised by the workplace manager to carry out and lead the risk assessment.

Other team members shall ideally be competent operators of the Specific item of the plant, as they will have a detailed knowledge of the operation of the plant. Additionally consultation with and involvement of suitably qualified and competent maintenance personnel will greatly benefit the process.

For the purposes of this exercise, one of the group shall be the leader; one is to be the scribe and the last a Subject Matter Expert.

Once you have completed the risk assessment, complete a 'Condition for use of plant form' and generate a 'Plant and Equipment Tag Sticker' (do not affix yet).

Select a spokesperson and report back to the class on your findings.

APPENDIX A – REGISTRABLE PLANT

List of plant requiring registration of design as outlined in Schedule 5 (Part 1) of the WHS Regulations

- Pressure equipment, other than pressure piping, and categorised as hazard level A, B, C or D according to the criteria in Section 2.1 of *AS 4343 Pressure equipment – hazard levels*
- Gas cylinders covered by Part 1.1 of *AS 2030.1 Gas cylinders - General Requirements*
- Tower cranes including self-erecting tower cranes
- Lifts, including escalators and moving walkways
- Building maintenance units
- Hoists with a platform movement exceeding 2.4 metres, designed to lift people
- Work boxes designed to be suspended from cranes
- Amusement devices covered by Section 2.1 of *AS 3533.1:2009 - Amusement Rides and Devices*, except Class 1 structures (see below)
- Concrete placement units with delivery booms
- Prefabricated scaffolding and prefabricated formwork
- Boom-type elevating work platforms
- Gantry cranes with a safe working load greater than 5 tonnes or bridge cranes with a safe working load of greater than 10 tonnes, and any gantry crane or bridge crane which is designed to handle molten metal or Schedule 10 hazardous chemicals
- Vehicle hoists
- Mast climbing work platforms
- Mobile cranes with a rated capacity of greater than 10 tonnes

Note: The plant listed as requiring design registration does not include:

- a heritage boiler
- a crane or hoist that is manually powered
- an elevating work platform that is a scissor lift or a vertically moving platform
- a tow truck
- certain Class 1 structures including:
 - playground structures
 - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
 - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves
 - inflatable devices that are sealed
 - inflatable devices that do not use a non-return valve.

List of plant items requiring registration as outlined in Schedule 5 (Part 2) of the WHS Regulations

- Boilers categorised as hazard level A, B or C according to criteria in Section 2.1 of AS 4343 - *Pressure equipment - hazard levels*.
- Pressure vessels categorised as hazard level A, B or C according to the criteria in Section 2.1 of AS 4343 - *Pressure equipment - hazard levels*, except for gas cylinders; LP Gas fuel vessels for automotive use, and serially produced vessels.
- Tower cranes including self-erecting tower cranes.
- Lifts, including escalators and moving walkways.
- Building maintenance units.
- Amusement devices covered by Section 2.1 of AS 3533.1:2009 - *Amusement Rides and Devices*, except for certain Class 1 structures (see below).
- Concrete placement units with delivery booms.
- Mobile cranes with a rated capacity of greater than 10 tonnes.

Note: The plant listed as requiring item registration does not include:

- a crane or hoist that is manually powered
- certain Class 1 structures:
 - playground structures
 - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
 - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves
 - inflatable devices that are sealed
 - inflatable devices that do not use a non-return valve.

APPENDIX B – HAZARD CHECKLIST COP INSIDE PRA

Description of plant: _____		
Activities (e.g. use, cleaning and maintenance): _____		
Assessed by: _____		
Date: _____		
‘Yes’ to any of the following indicates the need to implement appropriate control measures		
Entanglement	YES	NO
Can a person’s hair, clothing, gloves, necktie, jewellery, cleaning brush or rag become entangled with moving parts of the plant?		
Crushing	YES	NO
Can anyone be crushed due to: - material falling off the plant? - uncontrolled or unexpected movement of the plant? - lack of capacity for the plant to be slowed, stopped or immobilised? - the plant tipping or rolling over? - parts of the plant collapsing? - coming into contact with moving parts of the plant during testing, inspection, operation, maintenance, cleaning or repair? - being thrown off or under plant? - being trapped between the plant and materials or fixed structures? - other factors not mentioned?		
Cutting, Stabbing or Puncturing	YES	NO
Can anyone be stabbed or punctured due to: - coming in contact with sharp or flying objects? - coming in contact with moving parts during testing, inspection, operation, maintenance, cleaning or repair? - the plant, parts of the plant or work pieces disintegrating? - work pieces being ejected? - the mobility of the plant? - uncontrolled or unexpected movement of the plant? - other factors not mentioned?		
Shearing	YES	NO
Can anyone’s body parts be sheared between two parts of the plant, or between a part of the plant and a work piece or structure?		

Striking	YES	NO
Can anyone be struck by moving objects due to: • uncontrolled or unexpected movement of the plant or material handled by the plant? • the plant, parts of the plant or work pieces disintegrating? • work pieces being ejected? • mobility of the plant? • other factors not mentioned?		
High Pressure Fluid	YES	NO
Can anyone come into contact with fluids under high pressure, due to plant failure or misuse of the plant?		
Electrical	YES	NO
Can anyone be injured by electrical shock or burnt due to: • the plant contacting live electrical conductors? • the plant working in close proximity to electrical conductors? • overload of electrical circuits? • damaged or poorly maintained electrical leads and cables? • damaged electrical switches? • water near electrical equipment? • lack of isolation procedures? • other factors not mentioned?		
Explosion	YES	NO
Can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances, triggered by the operation of the plant or by material handled by the plant?		
Slipping, Tripping and Falling	YES	NO
Can anyone using the plant, or in the vicinity of the plant, slip, trip or fall due to: • uneven or slippery work surfaces? • poor housekeeping, e.g. offcuts, cables, hoses obstructing walkways, spills not cleaned up? • obstacles being placed in the vicinity of the plant? • other factors not mentioned?		
Can anyone fall from a height due to: • lack of a proper work platform? • lack of proper stairs or ladders? • lack of guardrails or other suitable edge protection? • unprotected holes, penetrations or gaps? • poor floor or walking surfaces, such as the lack of a slip-resistant surface? • steep walking surfaces? • collapse of the supporting structure? • other factors not mentioned?		
Ergonomic	YES	NO
Can anyone be injured due to: • poorly designed seating		

• poorly designed operator controls? • high forces? • repetitive movements? • awkward body posture or the need for excessive effort? • vibration? • other factors not mentioned?		
Combination of hazards	YES	NO
Can anyone be injured due to unexpected start-up, unexpected over-run/over-speed (or similar malfunction) from: • failure/disorder of the control system, for example, a hydraulic system? • restoration of energy supply after an interruption? • external influences on electrical equipment? • other environmental factors (gravity, wind, etc.)? • errors in the software? • errors made by the operator ?		
Other hazards	YES	NO
Can anyone be injured due to: • noise? • inadequate or poorly placed lighting? • entry into any confined spaces of the plant? • failure to select plant that is suitable for its intended use? • contact with hot or cold parts of plant? • exposure to hazardous chemicals, radiation or other emissions released by the plant? • lack of operator competency? • other factors not mentioned?		



ADVISORY NOTICE

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AUSTRALIAN AND INTERNATIONAL STANDARDS FOR EARTHMOVING MACHINERY

CMEIG members have observed industry confusion as to what Australian and International standards are being specified in customer tenders. The aim of this paper is to clarify the technical standards applicable to earthmoving machinery. Table 1 and 2 provide this detail. In addition, CMEIG notes the following-

- The majority of Australian Standards relating to earthmoving machinery were modified or direct-text adoptions of pre-existing ISO standards. These ISO standards have continued to evolve to represent global industry best practice. Work is ongoing to maintain alignment between AS and ISO standards.
- There is a misconception that Australian Standards carry more 'weight' than international standards under applicable Australian laws. In reality, the Australian Work Health and Safety (WHS) Laws as applied in various Australian States and Territories require risks to health and safety to be addressed so far as is reasonably practicable. This can involve the use of Australian or International Standards, insofar as each addresses the aforementioned legislative requirement to adequately address risks to health and safety.
- It is common for customer tenders to specify 'broad-brush' requests to 'comply' with certain standards. It's important to note that standards may or may not cover each specific application/machine/use-case i.e. it may not be possible to claim 'compliance' or 'conformance' to standards in their entirety. It is also important to note that it may not be possible to claim 'compliance' or 'conformance' to standards published after the machine has already been designed, irrespective of manufacturing date.
- ME-063 – Standards Australia Technical Committee for Earthmoving Equipment, the primary committee for Australian earthmoving machinery standards development, has recently undertaken a broad-ranging portfolio refresh, removing about 60 aged standards and is now taking a three-pronged strategy of direct international standards adoptions, modified international standards adoptions where warranted, all while continuing to retain Australian benchmark standards. There are around 100 standards in this pipeline to provide Australian industry with a set of contemporary performance-based earthmoving equipment standards.

- State and local government authorities have produced a range of guidelines, codes of practice, recognised standards, position papers for the construction, mining and quarrying industries. Some useful links are provided below:

National WorkSafe Authority Contact Details

SafeWork Australia Ph: (02) 93871248

<https://www.safeworkaustralia.gov.au/>

New South Wales (NSW) Ph: 131050

<https://www.resourcesandgeoscience.nsw.gov.au/>

<https://www.safework.nsw.gov.au/>

Queensland (QLD) Ph: 1300362128

<https://www.dnrme.qld.gov.au/>

<https://www.worksafe.qld.gov.au/>

Western Australia (WA) Ph: 1300307877

<https://www.dmp.wa.gov.au/>

<https://www.commerce.wa.gov.au/worksafe>

Victoria (VIC) Ph: 132360

<https://www.worksafe.vic.gov.au/>

Northern Territory (NT) Ph: 1800019115

<https://worksafe.nt.gov.au/>

South Australia (SA) Ph: 1300365255

<https://www.safework.sa.gov.au/>

Australian Capital Territory (ACT) (02) 93871248

<https://www.worksafe.act.gov.au/about-worksafe-act>

Worksafe Tasmania: Ph: 1300366322

<https://worksafe.tas.gov.au>

In all cases, it is advisable to consult the ISO catalogue online to ensure that you have the current version of the international standard. Go to- <https://www.iso.org/committee/52172.html>.

Contact your manufacturer for more details.

Table 1 - Technical standards commonly referenced in relation to earthmoving machinery

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 1019:2000	Internal combustion engines - Spark emission control devices	Specifies requirements for spark arrestors on internal combustion engines. More Information	USDA 5100-1D
AS/NZS 1200-2015	Pressure equipment	A 'parent' document for use by the pressure equipment industry. Refer to comments on AS 1210.	Refer to comments on AS 1210.
AS 1210-2010	Pressure vessels	This is a pressure vessel design standard that is used for the purpose of obtaining Australian pressure vessel design registration for appropriate vessels. Note that other comparable standards/schemes exist. Note that it is also typical for earthmoving machinery manufacturers to provide a Plant Design Registration certificate as evidence of conformance to an appropriate pressure vessel design standard.	ASME BPVC VIII (USA) Pressure Equipment Directive (PED) 2014/68/EU (formerly 97/23/EC (Europe)) EN 14359 High Pressure Gas Safety Act (Japan)
AS/NZS 1269 (Series)	Occupational noise management (Series)	These are occupational noise management standards not specific to earthmoving machinery. Earthmoving machines are generally noise tested to ISO 6393/6394/6395/6396	ISO 6393:2008 ISO 6394:2008 ISO 6395:2008 ISO 6396:2008
AS 1271-2003	Safety valves, other valves, liquid level gauges and other fittings for boilers and unfired pressure vessels	Australian standard specifying requirement for the design, construction and testing of various valves. Note that international equivalents exist.	ASME BPVC VIII.I ISO 4126 (series) Pressure Equipment Directive (PED) 2014/68/EU (formerly 97/23/EC (Europe))
AS 1318-1985	Use of colour for the marking of physical hazards and the identification of certain equipment in industry (known as the SAA Industrial Safety Colour Code)	Withdrawn in 2017 Technically similar to ISO 3864-1:2011 and ISO 3864-2:2016	ISO 3864-1:2011 ISO 3864-2:2016
AS 1319-1994	Safety signs for the occupational environment	AS1319-1994(R2018) applies primarily for the occupational environment. ISO 20474.1:2017 provides more specific guidance. See ISO 9244 for earthmoving machinery safety labels and general principles for their use. Also see ISO 7010 and ISO 3864.	ISO 9244:2006 ISO 3864 (series) ISO 7010:2019 ISO 20474.1:2017

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 1418 (Series)	Cranes, Hoists and Winches (Series)	These are craneage standards and not an appropriate conformance standard for earthmoving machinery including those used for lifting purposes incidental to their primary task (see specific listing for AS 1418.8)	N/A
AS 1418.8-2018	Cranes, hoists and winches Special purpose appliances	AS 1418.8 includes a section dealing with incidental lifting with earthmoving machinery. Presently, there is some misalignment with the related international standards for earthmoving machinery: ISO 20474.1:2017 ISO 20474.5:2017 ISO 10567:2007 ISO 14397-1:2007 More information – Link 1 and Link 2	ISO 20474.1:2017 ISO 20474.5:2017 ISO 10567:2007 ISO 14397-1:2007
AS/NZS 1554 (Series)	Structural Steel Welding (Series)	These are a series/set of Australian structural steel welding standards. They are not specific to earthmoving machinery and it can be impractical to expect conformance to these standards for welding on an earthmoving machine. It is typical for earthmoving machinery manufacturers to leverage practices described in various international welding standards including AS/NZS 1554 (series), but typically precedence is given to the lessons and practices each OEM has identified are most suitable for the specific machine/design or manufacturing process.	N/A
AS 1657-2018	Fixed platforms, walkways, stairways and ladders - Design, construction and installation	Defers to AS 5327:2019 for earthmoving machinery access systems in the scope of AS 1657. Note that AS 5327 is a modified adoption of ISO 2867. More information	AS 5327-2019 ISO 2867:2011 ISO 2860:1992 ISO 3411:2007
AS/NZS 1891 (Series)	Industrial Fall-arrest Systems and Devices	Proper placement and installation of personal protective equipment anchorage points is very nuanced on earthmoving machinery. Whereas AS/NZS 1891 (series) is written around general industrial applications. Requirements in this standard, as well as other comparable global standards and guidelines (e.g. 29 CFR 1926 (M), Directive 2001/45/EC, ISO 14567) may be considered. However, it will typically not be possible to claim conformance to such standards.	29 CFR 1926, Subpart M Directive 2001/45/EC ISO 14567

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 2012.1-1990	Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition Determination of compliance with limits for exterior noise	Superseded by AS ISO 6393:2019 A direct text adoption of ISO 6393:2008 AS 2012.2 was a direct text adoption of ISO 6393-1985	ISO 6363:2008
AS 2012.2-1990	Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – Stationary test condition Operator’s position	Superseded by AS ISO 6394:2019 A direct text adoption of ISO 6393:2008 AS 2012.2 was a direct text adoption of ISO 6393-1985.	ISO 6394:2008
AS/NZS 2080-2006	Safety glazing for land vehicles	Superseded by AS 2080-2019	N/A *See comments on AS 2080-2019
AS 2080-2019	Safety glazing for land vehicles	This standard is focused on road vehicles (scope discusses land vehicles – not defined). Though many aspects are transferrable to earthmoving machines, it needs to be applied with context. E.g. In its application in the automotive industry, the following alternative standards are also generally acceptable equivalents: UN ECE R43 JIS R 3211-1998 ANSI Z26.1-1996 BS AU178:1980 NZS 5443-1987	UN ECE R43 JIS R 3211-1998 ANSI Z26.1-1996 BS AU178:1980 NZS 5443-1987
AS 2294-1991	Earth-moving machinery - Protective structures	Superseded by AS 2294 Parts 1-4 More information	N/A *See comments for the various parts of AS 2294
AS 2294.1-1997	Earth-moving machinery - Protective structures - General	Pending revision/withdrawal Technically equivalent to ISO 3471:1994 for ROPS and ISO 3449:1992 for FOPS More information	ISO 3471:2008 ISO 3449:2005
AS 2294.1 SUPPLEMENT 1-2003	Earth-moving machinery - Protective structures - General - Operator protective structures fitted to plant used in timber industry (forest operations) (Supplement to AS 2294.1-1997)	Withdrawn in 2017 Replaced by ISO 8084:2003 More information	ISO 8084:2003
AS 2294.2-1997	Earth-moving machinery - Protective structures Laboratory tests and performance requirements for roll-over protective structures	Withdrawn in 2008 Identical to ISO 3471:1994 More information	ISO 3471:2008
AS 2294.3-1997	Earth-moving machinery - Protective structures Laboratory tests and performance requirements for falling-object protective structures	Withdrawn in 2008 Identical to ISO 3449:1992 More information	ISO 3449:2005
AS 2294.4-1997	Earth-moving machinery - Protective structures Specifications for deflection-limiting volume	Withdrawn in 2008 Identical to ISO 3164:1995 More information	ISO 3164:2013

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 2538-2016	Vehicle Support Stands	This is an automotive vehicle support stand standard for axle stands or jack stands (e.g. car jacks). Other similar standards also exist (e.g. ASME PALD – Safety Standard for Portable Automotive Lifting Devices). There is no equivalent standard for earthmoving machinery support stands. While some aspects of these standards may be helpful/translatable (e.g. the stability and load capacity principles), these standards are not written with earthmoving machinery applications in mind. Moreover, the variety and differing applications of earthmoving machines typically requires purpose-built support stands proven in use/suitable for the intended application. Standards such as AS 3990 and AS 4100 (or their international equivalents) are sometimes used for design.	N/A
AS 2664-1983	Earthmoving machinery - Seat belts and seat belt anchorages	Withdrawn in 2008 Based on ISO 6683:1981 More information	ISO 6683:2005
AS 2868-1986	Classification of machinery for earthmoving, construction, surface mining and agricultural purposes	Withdrawn in 2008	N/A
AS 2670.1	Evaluation of human exposure to whole-body vibration General requirements	Identical to ISO 2631-1:1997 (R2017) This standard covers general requirements for evaluation of human exposure to whole body vibration (WBV). ISO 7096:2020 and ISO/TR 25398:2006 are more appropriate references for earthmoving machinery human exposure to WBV.	ISO 7096:2020 ISO/TR 25398
AS 2951.0-1988	Earth-moving machinery - Nomenclature - General introduction and listing	Withdrawn in 2006	N/A
AS 2951.1-1988	Earth-moving machinery - Nomenclature - Basic types	Withdrawn in 2008 Identical to ISO 6165:1987	ISO 6165:2012
AS 2951.2.1-1988	Earth-moving machinery - Nomenclature - Dimensions and symbols - Base machine	Withdrawn in 2008 Identical to ISO 6746-1:1987	ISO 6746-1:2003
AS 2951.2.2-1988	Earth-moving machinery - Nomenclature - Dimensions and symbols - Equipment	Withdrawn in 2008 Identical to ISO 6746-2:1987	ISO 6746-2:2003
AS 2951.3-1988	Earth-moving machinery - Nomenclature - Tractors	Withdrawn in 2008 Identical to ISO 6747:1982	ISO 6747:2013
AS 2951.4-1988	Earth-moving machinery - Nomenclature - Loaders - Terminology and commercial specifications	Withdrawn in 2008 Identical to ISO 7131:1984	ISO 7131:2009
AS 2951.5-1988	Earth-moving machinery - Nomenclature - Dumpers - Terminology and commercial specifications	Withdrawn in 2008 Identical to ISO 7132:1984	ISO 7132:2003

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 2951.6-1988	Earth-moving machinery - Nomenclature - Tractor-scrapers - Terminology and commercial specifications	Withdrawn in 2008 Identical to ISO 7133:1985	ISO 7133:2013
AS 2951.7-1988	Earth-moving machinery - Nomenclature - Graders - Terminology and commercial specifications	Withdrawn in 2008 Identical to ISO 7134:1985	ISO 7134:2013
AS 2952.0-1988	Earth-moving machinery - Basic shapes and dimensions - General introduction and listing	Withdrawn in 2006	N/A
AS 2952.1-1988	Earth-moving machinery - Basic shapes and dimensions - Dimensions of fuel filler opening	Withdrawn in 2006 Identical to ISO 3541:1985 ISO 3541 was Withdrawn in 1996	N/A
AS 2952.2-1988	Earth-moving machinery - Basic shapes and dimensions - Drain, fill and level plugs	Withdrawn in 2006 Identical to ISO 6302:1986	ISO 6302:1993
AS 2952.3-1988	Earth-moving machinery - Basic shapes and dimensions - Lubrication fittings - Nipple type	Withdrawn in 2006 Identical to ISO 6392:1980. The ISO was revised in 1996 and is now in two parts, ISO 6392-1:1996 & ISO 6392- 2:1996	ISO 6392-1:1996 ISO 6392-2:1996
AS 2952.4-1988	Earth-moving machinery - Basic shapes and dimensions - Tractors with dozer, graders, tractor-scrapers - Cutting edges	Withdrawn in 2006 Identical to ISO 7129:1982	ISO 7129:1997
AS 2952.5-1988	Earth-moving machinery - Basic shapes and dimensions - Plough bolt heads	Withdrawn in 2006 Identical to ISO 7852:1983	ISO 7852:1983
AS 2952.6-1988	Earth-moving machinery - Basic shapes and dimensions - Dozer end bits - Hole specification	Withdrawn in 2006 Identical to ISO 7891:1984 ISO 7891 was Withdrawn in 1996	ISO 7129:1997
AS 2953.0-1988	Earth-moving machinery - Human dimensions - General introduction and listing	Withdrawn in 2006	N/A
AS 2953.1-1988	Earth-moving machinery - Human dimensions - Minimum access	Withdrawn in 2006 Identical to ISO 2860:1983	ISO 2860:1992
AS 2953.2-1988	Earth-moving machinery - Human dimensions - Physical dimensions of operators and minimum operator space envelope	Withdrawn in 2006 Identical to ISO 3411:1982	ISO 3411:2007
AS 2953.3-1988	Earth-moving machinery - Human dimensions - Seat index point	Withdrawn in 2006 Identical to ISO 5353:1978	ISO 5353:1995
AS 2954.0-1988	Earth-moving machinery - Rated loads and volumetric ratings - General introduction and listing	Withdrawn in 2006	N/A
AS 2954.1-1988	Earth-moving machinery - Rated loads and volumetric ratings - Rated operating load for crawler and wheel loaders	Withdrawn in 2006 Identical to ISO 5998:1986. ISO 5998 and ISO 8313 were withdrawn and replaced by ISO 14397-1:2002 & ISO 14397-2:2002 More information	ISO 14397-1:2007 ISO 14397- 2:2007
AS 2954.2-1988	Earth-moving machinery - Rated loads and volumetric ratings - Dumper bodies - Volumetric rating	Withdrawn in 2006 Identical to ISO 6483:1980	ISO 6483:1980

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 2954.3-1988	Earth-moving machinery - Rated loads and volumetric ratings - Tractor-scraper - Volumetric rating	Withdrawn in 2006 Identical to ISO 6484:1986	ISO 6484:1986
AS 2954.4-1988	Earth-moving machinery - Rated loads and volumetric ratings - Tractor-scraper - Volumetric rating	Withdrawn in 2006 Identical to ISO 6485:1980	ISO 6485:1980
AS 2954.5-1988	Earth-moving machinery - Rated loads and volumetric ratings - Loader and front loading excavator buckets - Volumetric ratings	Withdrawn in 2006 Identical to ISO 7451:1983	ISO 7546:1983
AS 2954.6-1988	Earth-moving machinery - Rated loads and volumetric ratings - Hydraulic excavators - Hoe type buckets - Volumetric ratings	Withdrawn in 2006 Identical to ISO 7451:1983	ISO 7451: 2007
AS 2955.0-1988	Earth-moving machinery - Tests and measurements - General introduction and listing	Withdrawn in 2006	N/A
AS 2955.1-1988	Earth-moving machinery - Tests and measurements - Measurement of tool movement time	Withdrawn in 2006 Identical to ISO 5004:1981. ISO 5004 was Withdrawn in 1992	N/A
AS 2955.2-1988	Earth-moving machinery - Tests and measurements - Method for locating the centre of gravity	Withdrawn in 2006 Identical to ISO 5005:1977	ISO 5005:1977
AS 2955.3-1988	Earth-moving machinery - Tests and measurements - Determination of ground speed	Withdrawn in 2006 Identical to ISO 6014:1986	ISO 6014:1986
AS 2955.4-1988	Earth-moving machinery - Tests and measurements - Hydraulic excavators - Measurement of tool forces	Withdrawn in 2006 Identical to ISO 6015-1:1986. ISO 6015 has since been consolidated into a one-part standard	ISO 6015:2006
AS 2955.5-1988	Earth-moving machinery - Tests and measurements - Measurement of the masses of whole machines, their equipment and components	Withdrawn in 2006 Identical to ISO 6016:1982	ISO 6016:2008
AS 2955.6-1988	Earth-moving machinery - Tests and measurements - Operator seat - Transmitted vibration	Withdrawn in 2006 Identical to ISO 7096:1982	ISO 7096:2020
AS 2955.7-1988	Earth-moving machinery - Tests and measurements - Measurement of the dimensions of whole machines with their equipment	Withdrawn in 2006 Identical to ISO 7128:1983. ISO 7128 was Withdrawn in 1989. See ISO 6746-1:2003.	ISO 6746-1:2003
AS 2955.8-1988	Earth-moving machinery - Tests and measurements - Measurement of turning dimensions of wheeled machines	Withdrawn in 2006 Identical to ISO 7457:1983	ISO 7457:1997
AS 2955.9-1988	Earth-moving machinery - Tests and measurements - Measurement of drawbar pull	Withdrawn in 2006 Identical to ISO 7464:1983	ISO 7464:1983
AS 2955.10-1988	Earth-moving machinery - Tests and measurements - Loaders - Measurement of tool forces and tipping loads	Withdrawn in 2006 Identical to ISO 8313:1986. ISO 8313 and ISO 5998 were withdrawn and replaced by ISO 14397-1:2002 & ISO 14397-2:2002 More information	ISO 14397-1:2007 ISO 14397- 2:2007
AS 2956.0-1988	Earth-moving machinery - Instrumentation and operator's controls - General introduction and listing	Withdrawn in 2006	N/A

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 2956.1-1988	Earth-moving machinery - Instrumentation and operator's controls - Excavators - Operator's controls	Withdrawn in 2006 Identical to ISO 4557:1982. ISO 4557 was Withdrawn in 1995 and replaced by ISO 10968	ISO 10968:2004
AS 2956.2-1988	Earth-moving machinery - Instrumentation and operator's controls - Operating instrumentation	Withdrawn in 2006 Identical to ISO 6011:1987	ISO 6011:2003
AS 2956.3-1988	Earth-moving machinery - Instrumentation and operator's controls - Service instrumentation	Withdrawn in 2006 Identical to ISO 6012:1982	ISO 6012:1997
AS 2956.4-1988	Earth-moving machinery - Instrumentation and operator's controls - Symbols	Withdrawn in 2006 Identical to ISO 6405:1982. ISO 6405 now has two parts	ISO 6405-1:2017 ISO 6405-2:2017
AS 2956.5-1988	Earth-moving machinery - Instrumentation and operator's controls - Zones of comfort and reach for controls	Withdrawn in 2006 Identical to ISO 6682:1986	ISO 6682:1986
AS 2956.6-1988	Earth-moving machinery - Instrumentation and operator's controls - Crawler tractors and crawler loaders - Operator's controls	Withdrawn in 2006 Identical to ISO 7095:1982. ISO 7095 was withdrawn in 1996. ISO 10968 is an appropriate reference.	ISO 10968:2004
AS 2957.0-1988	Earth-moving machinery - Operation and maintenance - General introduction and listing	Withdrawn in 2006	N/A
AS 2957.1-1988	Earth-moving machinery - Operation and maintenance - Common maintenance and adjustment tools	Withdrawn in 2006 Identical to ISO 4510-1:1987	ISO 4510-1:1987
AS 2957.2-1988	Earth-moving machinery - Operation and maintenance - Common repair tools - Mechanical pullers and pushers	Withdrawn in 2006 Identical to ISO 4510-2:1986	ISO 4510-2: 1996
AS 2957.3-1988	Earth-moving machinery - Operation and maintenance - Preservation and storage	Withdrawn in 2006 Identical to ISO 6749:1984	ISO 6749:1984
AS 2957.4-1988	Earth-moving machinery - Operation and maintenance - Format and content of manuals	Withdrawn in 2006 Identical to ISO 6750:1984. ISO 6750 now has two parts	ISO 6750-1:2019 ISO/TR 6750-2:2020
AS 2957.5-1988	Earth-moving machinery - Operation and maintenance - Guide to procedure for operator training	Withdrawn in 2006 Identical to ISO 7130:1981	ISO 7130:1981
AS 2957.6-1988	Earth-moving machinery - Operation and maintenance - Training of mechanics	Withdrawn in 2006 Identical to ISO 8152:1984	ISO 8152:1984
AS 2958.0-2000	Earth-moving machinery - Safety - General introduction and listing	Withdrawn in 2008	N/A
AS 2958.1-1995	Earth-moving machinery - Safety - Wheeled machines - Brakes	Pending revision Expected to be an identical adoption of ISO 3450:2011 but with additional guidance for in-service brake testing (presently not covered by ISO 3450:2011)	ISO 3450:2011
AS 2958.2-1988	Earth-moving machinery - Safety - Guards and shields - Definitions and specifications	Withdrawn in 2008 Identical to ISO 3457:1986	ISO 3457:2003
AS 2958.3-1992	Earth-moving machinery - Safety - Roller compactors - Brake systems	Pending revision/withdrawal Roller compactor braking requirements are covered in ISO 3450:2011	ISO 3450:2011 *See comments on AS 2958.1

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 3000-2018	Electrical installations (Wiring Rules)	This standard covers technical rules for mains-connected electrical installations in Australia. This standard was not written with earthmoving machines in mind (particularly those which typically operate at extra-low voltage DC) and so should not be viewed as a conformance requirement. IEC 60204.1 may be a more appropriate reference standard for electrical equipment of machines, but also needs to be read with similar care (general machinery electrical safety standard – some aspects do not apply to mobile earthmoving machines). ISO 14990 (series) also covers electrical safety of electric-drive machines.	IEC 60204-1:2016 ISO 14990 (series)
AS 3007-2013	Electrical equipment in mines and quarries - Surface installations and associated processing plant	This standard covers technical rules for electrical installations in surface mines and quarries. This standard was not written with earthmoving machines in mind and so needs to be treated as a reference rather than a strict conformance requirement. Note that in the scope of AS 3007:2013, it states: <i>“This standard does not apply to the following areas: (i) Earth moving machinery covered by ISO 6165 and not fed by trailing or reeling cables.”</i> IEC 60204.1 may be a more appropriate reference standard for electrical equipment of machines, but this also needs to be read with similar care. ISO 14990 (series) also covers electrical safety of electric-drive machines.	IEC 60204-1:2016 ISO 14990 (series)
AS 3868-1991	Earth-moving machinery - Design guide for access systems	Withdrawn in 2019 Replaced by AS 5327:2019. AS 5327 is a modified adoption of ISO 2867 More information	AS 5327-2019 ISO 2867:2011
AS 4024.1201-2014	General principles for design - Risk assessment and risk reduction	Identical to ISO 12100:2010	ISO 12100:2010
AS 4024.1502-2006	Safety of machinery - Design of safety related parts of control systems - Validation	This is a general machinery standard. An earthmoving machinery specific approach exists in terms of dealing with the safety of control systems through standards such as ISO 12100, ISO 19014, ISO 13849 and other aspect-specific safety standards (e.g. braking – ISO 3450, ISO 10265, steering – ISO 5010 etc.)	ISO 12100:2010 ISO 19104 (series) ISO 13849 (series) ISO 3450:2011 ISO 10265:2008 ISO 5010:2019 Etc.

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 4024.1503-2014	Safety of machinery - Safety-related parts of control systems - General principles for design	Identical to ISO 13849-1:2006	ISO 13849 (series) ISO 19014 (series)
AS 4024.1601-2014	Safety of machinery - Design of controls, interlocks and guarding - Guards - General requirements for the design and construction of fixed and movable guards	This is a general machinery standard. Earthmoving machinery specific approach exists in terms of dealing with guards.	ISO 3457:2003 ISO 2860:1992
AS 4024.1604-2019	Safety of machinery - Design of controls, interlocks and guarding - Emergency stop - Principles for design (ISO 13850:2017 (ED.3.0), MOD)	Adoption of ISO 13850:2017 with minor modifications.	ISO 13850:2017
AS 4024.1803-2019	Safety of machinery, Part 1803: Safety distances and safety gaps — Minimum gaps to prevent crushing of parts of the human body	This is a general machinery standard. Earthmoving machinery specific approach exists in terms of dealing with minimum gaps to prevent crushing.	ISO 3457:2003 ISO 2860:1992
AS 4240 (Series)	Remote control systems for mining equipment	A related international standard exists but is not identical to AS 4240 (series).	ISO 15817:2012
AS 4343-2014	Pressure equipment - Hazard levels	This standard defines/classifies pressure vessel hazard levels.	N/A
AS 4457.1-2007	Earth-moving machinery - Off-the-road wheels, rims and tyres - Maintenance and repair - Wheel assemblies and rim assemblies	Withdrawn in 2019 A new project is now in progress to republish AS 4457.1. ISO 4250 (series) covers some aspects of what is covered AS 4457.1	ISO 4250 (series)
AS 4457.2-2008	Earth-moving machinery - Off-the-road wheels, rims and tyres - Maintenance and repair - Tyres	Pending revision/withdrawal A new project is now in progress to republish AS 4457.2. ISO 4250 (series) covers some aspects of what is covered AS 4457.2	ISO 4250 (series)
AS 4742-2003	Earth-moving machinery - Machine-mounted forward and reverse audible warning alarm - Sound test method	Withdrawn in 2008 Identical to ISO 9533:1989	ISO 9533:2010
AS 4772-2208	Earth-moving machinery – Quick hitches for excavators and backhoe loaders	Pending revision/withdrawal AS 4772-2008 is equivalent with ISO 13031-2016 but not identical.	ISO13031-2016 NSW Position Paper for Quick Hitches (link)
AS 4871.6-2013	Electrical equipment for mines and quarries, Part 6: Diesel powered machinery and ancillary equipment	It may not be possible to claim conformance to this standard as some aspects may not be applicable to earthmoving machines in applications other than coal mines. This standard is presently under revision for amalgamation with AS 3007.	N/A
AS 4988-2002	Earth-moving machinery - Hydraulic excavators - Laboratory tests and performance requirements for operator protective guards	Withdrawn in 2008 Identical to ISO 10262:1998 More information	ISO 10262:1998
AS 4987-2002	Earth-moving machinery - Tip-over protection structure (TOPS) for compact excavators - Laboratory tests and performance requirements	Withdrawn in 2019 Identical to ISO 12117:1997 More information	ISO 12117:1997

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
AS 4991-2004	Lifting Devices	Often referenced in conjunction with AS 1418. Neither of these standards are specific to earthmoving machinery. For work tools or lifting devices used in conjunction with earthmoving machinery, these are typically not intended to be used as general purpose lifting tools – only as directed by each OEM. AS 4991 or equivalent international standards may be used as reference. However, the specific nature/intended use of specific work tools may mean that it is not possible/appropriate in some cases to claim conformance to AS 4991. For lifting points fitted to earthmoving machinery, ISO 15818 is the correct standard.	ISO 15818
AS 5062-2016	Fire protection for mobile and transportable equipment	AS5062-2016 is currently used for the design of fire protection for mobile and transportable equipment. There is work ongoing to develop an ISO earthmoving machinery specific standard.	N/A
AS 5327-2019	Earth-moving machinery - Access systems	Modified adoption of ISO 2867:2011	ISO 2867:2011
AS ISO 31000	Risk management - Principles and guidelines	This is a general risk assessment standard. ISO 12100 is a more appropriate machinery risk assessment standard.	ISO 12100:2010
AS 61508 (series)	Functional safety of electrical/electronic/programmable electronic safety- related systems (Series)	Identical/Modified adoptions of the IEC 61508 series. ISO 19014 series is a functional safety standard that is designed and applicable to earthmoving machinery as opposed to AS/NZ 4024.1503, AS61508.1, AS62061 and AS4024.1502. More information	ISO 13849 (series) ISO 19014 (series)
AS/NZS 62061-2019	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems	Modified adoption of IEC 62061:2005 (including corrections and amendments). ISO 19014 series is a functional safety standard that is designed and applicable to earthmoving machinery as opposed to AS/NZ 4024.1503, AS61508.1, AS62061 and AS4024.1502. More information	ISO 13849 (series) ISO 19014 (series)

COMMONLY REFERENCED AUSTRALIAN STANDARDS		COMMENTARY	RELEVANT OR EQUIVALENT STANDARDS
DESIGNATION	DESCRIPTION		
NTC Load Restraint Guide 2018	National Transport Commission (NTC) Load Restraint Guide 2018 ¹	Covers general guidance for load restraint during road transportation. Note that earthmoving machinery lifting and tie down requirements are identified in ISO 15818.	ISO 15818:2017
ADR	Australian Design Rules ²	These are (automotive) vehicle standards and not intended to be applied to earthmoving machinery. Earthmoving machinery will typically not conform to many of these requirements which are for road vehicle registration/approval in Australia. Earthmoving machinery typically operate on Australian roads as a special purpose vehicle or under an appropriate exemption or permit.	N/A
ADR 62	Vehicle Standard (Australian Design Rule 62 – Mechanical Connections Between Vehicles)	ADR62 is often referenced as a towing standard for earthmoving machinery. Unless specified, earthmoving machinery is typically not intended for towing. Machines may be provided with a machine mounted retrieval point which conforms to ISO 10532, however this is typically not intended for general purpose towing applications.	ISO 10532
NHVR Vehicle Standards Guides	National Heavy Vehicle Regulator Vehicle Standards Guides ³	These are (automotive) heavy vehicle standards and not intended to be applied to earthmoving machinery. Earthmoving machinery will typically not conform to many of these requirements which are for heavy road vehicle registration/approval in Australia. Earthmoving machinery typically operate on Australian roads as a special purpose vehicle or under an appropriate exemption or permit.	N/A

¹ The NTC Load Restraint Guide is publicly available at the following link - <https://www.ntc.gov.au/codes-and-guidelines/load-restraint-guide>

² Australian Design Rules are publicly available at the following link - <https://www.infrastructure.gov.au/vehicles/design/>

³ NHVR Standards Guides are publicly available at the following link - <https://www.nhvr.gov.au/safety-accreditation-compliance/vehicle-standards-and-modifications/vehicle-standards-guides>

Table 2 – ISO standards commonly applied to Earthmoving Machinery⁴

DESIGNATION	DESCRIPTION
ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 2860	Earth-moving machinery - Minimum access dimensions
ISO 2867	Earth-moving machinery - Access systems
ISO 3164	Earth-moving machinery - Laboratory evaluations of protective structures - Specifications for deflection-limiting volume
ISO 3411	Earth-moving machinery - Physical dimensions of operators and minimum operator space envelope
ISO 3449	Earth-moving machinery - Falling-object protective structures - Laboratory tests and performance requirements
ISO 3450	Earth-moving machinery - Wheeled or high-speed rubber-tracked machines - Performance requirements and test procedures for brake systems
ISO 3457	Earth-moving machinery - Guards - Definitions and requirements
ISO 3471	Earth-moving machinery - Roll-over protective structures - Laboratory tests and performance requirements
ISO 3795	Road vehicles, and tractors and machinery for agriculture and forestry - Determination of burning behaviour of interior materials
ISO 4250-1	Earth-mover tyres and rims - Part 1: Tyre designation and dimensions
ISO 4250-2	Earth-mover tyres and rims - Part 2: Loads and inflation pressures
ISO 4250-3	Earth-mover tyres and rims - Part 3: Rims
ISO 4510-1	Earth-moving machinery - Service tools - Part 1: Common maintenance and adjustment tools
ISO 4510-2	Earth-moving machinery - Service tools - Part 2: Mechanical pullers and pushers
ISO 5005	Earth-moving machinery - Method for locating the centre of gravity
ISO 5006	Earth-moving machinery - Operator's field of view- Test method and performance criteria
ISO 5010	Earth-moving machinery - Wheeled machines - Steering requirements
ISO 5353	Earth-moving machinery, and tractors and machinery for agriculture and forestry - Seat index point
ISO 6011	Earth-moving machinery - Visual display of machine operation
ISO 6012	Earth-moving machinery - Service instrumentation
ISO 6014	Earth-moving machinery - Determination of ground speed
ISO 6015	Earth-moving machinery - Hydraulic excavators and backhoe loaders - Methods of determining tool forces
ISO 6016	Earth-moving machinery - Methods of measuring the masses of whole machines, their equipment and components
ISO 6165	Earth-moving machinery - Basic types - Identification and terms and definitions

⁴ Always consult your original equipment manufacturer or supplier to understand what standards may apply or have been considered. This list is not intended as a comprehensive list of standards for conformance – many of these standards may have been referred to, but conformance is not claimed. Some of the standards listed herein are in development or under revision. Standards are also updated from time to time – as such, no dates are shown.

DESIGNATION	DESCRIPTION
ISO 6165	Earth-moving machinery - Basic types - Identification and terms and definitions
ISO 6302	Earth-moving machinery - Drain, fill and level plugs
ISO 6392-1	Earth-moving machinery - Lubrication fittings - Part 1: Nipple type
ISO 6392-2	Earth-moving machinery - Lubrication fittings - Part 2: Grease-gun nozzles
ISO 6393	Earth-moving machinery - Determination of sound power level - Stationary test conditions
ISO 6394	Earth-moving machinery - Determination of emission sound pressure level at operator's position - Stationary test conditions
ISO 6395	Earth-moving machinery - Determination of sound power level - Dynamic test conditions
ISO 6396	Earth-moving machinery - Determination of emission sound pressure level at operator's position - Dynamic test conditions
ISO 6405-1	Earth-moving machinery - Symbols for operator controls and other displays- Part 1: Common symbols
ISO 6405-2	Earth-moving machinery - Symbols for operator controls and other displays- Part 2: Symbols for specific machines, equipment and accessories
ISO 6483	Earth-moving machinery - Dumper bodies - Volumetric rating
ISO 6484	Earth-moving machinery - Elevating scrapers - Volumetric ratings
ISO 6485	Earth-moving machinery - Tractor-scraper - Volumetric rating
ISO 6682	Earth-moving machinery - Zones of comfort and reach for controls
ISO 6683	Earth-moving machinery - Seat belts and seat belt anchorages - Performance requirements and tests
ISO 6746-1	Earth-moving machinery - Definitions of dimensions and codes - Part 1: Base machine
ISO 6746-2	Earth-moving machinery - Definitions of dimensions and codes - Part 2: Equipment and attachments
ISO 6746-2	Earth-moving machinery - Definitions of dimensions and codes - Part 2: Equipment and attachments
ISO 6747	Earth-moving machinery - Dozers- Terminology and commercial specifications
ISO 6749	Earth-moving machinery - Preservation and storage
ISO 6750	Earth-moving machinery - Operator's manual - Content and format
ISO 6750	Earth-moving machinery - Operator's manual - Part 1: Contents and format
ISO 6750	Earth-moving machinery - Operator's manual - Part 2: List of references
ISO 7096	Earth-moving machinery - Laboratory evaluation of operator seat vibration
ISO 7129	Earth-moving machinery - Cutting edges used on tractor-dozers, graders and scrapers - Principal shapes and basic dimensions
ISO 7130	Earth-moving machinery - Operator training - Content and methods
ISO 7131	Earth-moving machinery - Loaders - Terminology and commercial specifications
ISO 7131	Earth-moving machinery - Loaders- Terminology and commercial specifications
ISO 7132	Earth-moving machinery - Dumpers - Terminology and commercial specifications

DESIGNATION	DESCRIPTION
ISO 7132	Earth-moving machinery - Dumpers- Terminology and commercial specifications
ISO 7133	Earth-moving machinery - Scrapers - Terminology and commercial specifications
ISO 7134	Earth-moving machinery - Graders - Terminology and commercial specifications
ISO 7135	Earth-moving machinery - Hydraulic excavators - Terminology and commercial specifications
ISO 7135	Earth-moving machinery - Hydraulic excavators- Terminology and commercial specifications
ISO 7136	Earth-moving machinery - Pipelayers - Terminology and commercial specifications
ISO 7451	Earth-moving machinery - Volumetric ratings for hoe-type and grab-type buckets of hydraulic excavators and backhoe loaders
ISO 7457	Earth-moving machinery - Determination of turning dimensions of wheeled machines
ISO 7464	Earth-moving machinery - Method of test for the measurement of drawbar pull
ISO 7546	Earth-moving machinery - Loader and front loading excavator buckets - Volumetric ratings
ISO 7852	Earth-moving machinery - Plough bolt heads - Shapes and dimensions (excluding thread dimensions)
ISO 8082-1	Self-propelled machinery for forestry - Laboratory tests and performance requirements for roll-over protective structures - Part 1: General machines
ISO 8082-2	Self-propelled machinery for forestry - Laboratory tests and performance requirements for roll-over protective structures - Part 2: Machines having a rotating platform with a cab and boom on the platform
ISO 8083	Machinery for forestry - Falling-object protective structures (FOPS) - Laboratory tests and performance requirements
ISO 8084	Machinery for forestry - Operator protective structures - Laboratory tests and performance requirements
ISO 8152	Earth-moving machinery - Operation and maintenance - Training of mechanics
ISO 8643	Earth-moving machinery - Hydraulic excavator and backhoe loader lowering control device- Requirements and tests
ISO 8811	Earth-moving machinery - Rollers and compactors - Terminology and commercial specifications
ISO 8811	Earth-moving machinery - Rollers and compactors - Terminology and commercial specifications
ISO 8812	Earth-moving machinery - Backhoe loaders- Terminology and commercial specifications
ISO 8813	Earth-moving machinery - Lift capacity of pipelayers and wheeled tractors or loaders equipped with side boom
ISO 8925	Earth-moving machinery - Diagnostic ports
ISO 8925	Earth-moving machinery - Diagnostic ports
ISO 8927	Earth-moving machinery - Machine availability - Vocabulary
ISO 9244	Earth-moving machinery - Machine safety labels - General principles
ISO 9245	Earth-moving machinery - Machine productivity - Vocabulary, symbols and units
ISO 9246	Earth-moving machinery - Crawler and wheel tractor dozer blades - Volumetric ratings
ISO 9247	Earth-moving machinery - Electrical wires and cables - Principles of identification and marking
ISO 9247	Earth-moving machinery - Electrical wires and cables - Principles of identification and marking

DESIGNATION	DESCRIPTION
ISO 9248	Earth-moving machinery - Units for dimensions, performance and capacities, and their measurement accuracies
ISO 9249	Earth-moving machinery - Engine test code - Net power
ISO/TS 9250-1	Earth-moving machinery - Multilingual listing of equivalent terms - Part 1: General
ISO/TS 9250-2	Earth-moving machinery - Multilingual listing of equivalent terms - Part 2: Performance and dimensions
ISO 9533	Earth-moving machinery - Machine-mounted audible travel alarms and forward horns - Test methods and performance criteria
ISO 10261	Earth-moving machinery - Product identification numbering system
ISO 10261	Earth-moving machinery - Product identification numbering system
ISO 10262	Earth-moving machinery - Hydraulic excavators - Laboratory tests and performance requirements for operator protective guards
ISO 10263-1	Earth-moving machinery - Operator enclosure environment - Part 1: Terms and definitions
ISO 10263-2	Earth-moving machinery - Operator enclosure environment - Part 2: Air filter element test method
ISO 10263-3	Earth-moving machinery - Operator enclosure environment - Part 3: Pressurization test method
ISO 10263-4	Earth-moving machinery - Operator enclosure environment - Part 4: Heating, ventilating and air conditioning (HVAC) test method and performance
ISO 10263-5	Earth-moving machinery - Operator enclosure environment - Part 5: Windscreen defrosting system test method
ISO 10263-6	Earth-moving machinery - Operator enclosure environment - Part 6: Determination of effect of solar heating
ISO 10264	Earth-moving machinery - Key-locked starting systems
ISO 10265	Earth-moving machinery - Crawler machines - Performance requirements and test procedures for braking systems
ISO 10266	Earth-moving machinery - Determination of slope limits for machine fluid systems operation - Static test method
ISO 10268	Earth-moving machinery - Retarders for dumpers and tractor-scrapers - Performance tests
ISO 10532	Earth-moving machinery - Machine-mounted retrieval device - Performance requirements
ISO 10533	Earth-moving machinery - Lift-arm support devices
ISO 10533	Earth-moving machinery - Lift-arm support devices
ISO 10567	Earth-moving machinery - Hydraulic excavators - Lift capacity
ISO 10570	Earth-moving machinery - Articulated frame lock - Performance requirements
ISO 10968	Earth-moving machinery - Operator's controls
ISO 10987	Earth-moving machinery - Sustainability- Terminology, sustainability factors and reporting
ISO 10987-2	Earth-moving machinery - Sustainability- Part 2: Remanufacturing
ISO 10987-3	Earth-moving machinery - Sustainability- Part 3: Used machines
ISO 11112	Earth-moving machinery - Operator's seat - Dimensions and requirements including
ISO 11862	Earth-moving machinery - Auxiliary starting aid electrical connector

DESIGNATION	DESCRIPTION
ISO 12117	Earth-moving machinery - Tip-over protection structure (TOPS) for compact excavators - Laboratory tests and performance requirements
ISO 12117-2	Earth-moving machinery - Laboratory tests and performance requirements for protective structures of excavators- Part 2: Roll-over protective structures (ROPS) for excavators of over 6 t
ISO 12508	Earth-moving machinery - Operator station and maintenance areas - Bluntness of edges
ISO 12509	Earth-moving machinery - Lighting, signalling and marking lights, and reflex-reflector devices
ISO 12509	Earth-moving machinery - Lighting, signalling and marking lights, and reflex-reflector devices
ISO 12510	Earth-moving machinery - Operation and maintenance - Maintainability guidelines
ISO 12511	Earth-moving machinery - Hour meters
ISO 12511	Earth-moving machinery - Hour meters
ISO 13031	Earth-moving machinery - Quick couplers- Safety
ISO 13333	Earth-moving machinery - Dumper body support and operator's cab tilt support devices
ISO 13459	Earth-moving machinery - Trainer seat - Deflection limiting volume, space envelope and performance requirements
ISO 13539	Earth-moving machinery - Trenchers - Definitions and commercial specifications
ISO 13766-1	Earth-moving and building construction machinery- Electromagnetic compatibility (EMC) of machines with internal electrical power supply- Part 1: General EMC requirements under typical electromagnetic environmental conditions
ISO 13766-2	Earth-moving and building construction machinery- Electromagnetic compatibility (EMC) of machines with internal electrical power supply- Part 2: Additional EMC requirements for functional safety
ISO 13850	Safety of Machinery - Emergency Stop Function - Principles For Design
ISO 14397-1	Earth-moving machinery - Loaders and backhoe loaders - Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load
ISO 14397-2	Earth-moving machinery - Loaders and backhoe loaders - Part 2: Test method for measuring breakout forces and lift capacity to maximum lift height
ISO 14401-1	Earth-moving machinery - Field of vision of surveillance and rear-view mirrors - Part 1: Test methods
ISO 14401-2	Earth-moving machinery - Field of vision of surveillance and rear-view mirrors - Part 2: Performance criteria
ISO 14990-1	Earth-moving machinery - Electrical safety of machines utilizing electric drives and related components and systems- Part 1: General requirements
ISO 14990-2	Earth-moving machinery - Electrical safety of machines utilizing electric drives and related components and systems- Part 2: Particular requirements for externally-powered machines
ISO 14990-3	Earth-moving machinery - Electrical safety of machines utilizing electric drives and related components and systems- Part 3: Particular requirements for self-powered machines
ISO 15143-1	Earth-moving machinery and mobile road construction machinery - Worksite data exchange - Part 1: System architecture
ISO 15143-2	Earth-moving machinery and mobile road construction machinery - Worksite data exchange - Part 2: Data dictionary
ISO/TS 15143-3	Earth-moving machinery and mobile road construction machinery - Worksite data exchange - Part 3: Telematics data
ISO/TS 15143-4	Earth-moving machinery and mobile road construction machinery - Worksite data exchange - Part 4: Worksite topographical data
ISO 15219	Earth-moving machinery - Cable excavators - Terminology and commercial specifications

DESIGNATION	DESCRIPTION
ISO 15817	Earth-moving machinery - Safety requirements for remote operator control systems
ISO 15818	Earth-moving machinery - Lifting and tying-down attachment points- Performance requirements
ISO 15998	Earth-moving machinery - Machine-control systems (MCS) using electronic components - Performance criteria and tests for functional safety
ISO/TS 15998-2	Earth-moving machinery - Machine control systems (MCS) using electronic components - Part 2: Use and application of ISO 15998
ISO 16001	Earth-moving machinery - Object detection systems and visibility aids- Performance requirements and tests
ISO 16417	Earth-moving machinery - Hydraulic Breakers - Part 1: Terminology and commercial specifications
ISO 16714	Earth-moving machinery - Recyclability and recoverability - Terminology and calculation method
ISO 16754	Earth-moving machinery - Determination of average ground contact pressure for crawler machines
ISO 17063	Earth-moving machinery - Braking systems of pedestrian-controlled machines - Performance requirements and test procedures
ISO 17253	Earth-moving machinery and rough-terrain variable-reach trucks- Design requirements for machines intended to be driven on road
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