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| Procedure Title | Operation of the Gibson portable corer and extraction levers | | |
| School/Business Unit | ERS | Location (building/lab/  workshop if applicable) | Agronomy (Trevena Shed) |

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| SOP Development Date | 04/2018 | Prepared by | Oliver Knox |
| SOP Review Date | 04/2021 | Version # | 1 |

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| **Relevant Australian Standards / Codes of Practice / Legislation** |
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| **Chemicals and Relevant Safety Data Sheets** (can be obtained via UNE subscription to ChemWatch) |
| * All commercial products (no need for SDS), but Petrol, spray oils, SAE10W-30 oil and EP C0 Grease are used with this equipment. |
| **Plant & Equipment Required** |
| * **Corer, Coring tubes, extraction rod, strap wrench, paper clips, donger (hammer for top of coring tube), small knife, chain, heavy gauge bolt/large screw driver and core puller** |
| **Licenses Required** |
| * None |
| **Competencies Required** |
| * Training is desirable - see Agronomy lecturing staff who have used the machine |

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| **Section 1 - PPE Required** |



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|  | Dust Mask | Face Shield | Foot Protection | Hair Net | Protective Clothing | Respirator | Sun Protection | Breathing Apparatus |
| Compulsory |  |  | X |  |  |  | X |  |
| As needed |  |  |  |  |  |  |  |  |



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|  | Hand Protection | Hearing Protection | Safety Glasses | Safety Harness | Safety Helmet | Safety Vest | Apron/Lab Coat | Welding Mask |
| Compulsory | X | X | X |  |  |  |  |  |
| As needed |  |  |  |  |  | X |  |  |
| Additional PPE/Notes | | | | | | | | |
| Class 4 hearing protection, greater than 22dB attenuation  Safety glasses to AS/NZS1337 medium impact rating  Gloves suited to manual handling - leather or other abrasion resistant material, antivibration  gloves are recommended  Steel capped boots | | | | | | | | |

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| **Section 2 - Procedure** |
| Dial **1100** (Dial Before You Dig) if you are using the post driver in a built up area and are  unsure of the location of services  **Starting the hammer**  Start and operate the Christie Post Driver unit outdoors, and in a ventilated area  · Never wrap the Honda GX35 pull starter rope around the hand  · Do not quick release the Honda GX35 starter grip, guide the starter rope back slowly to permit the rope to rewind properly  · Failure to observe instructions regarding the pull starter may result in injury to the operator’s hand and damage to the starter  Ensure the ground is firm or select a solid surface, in an open well-ventilated area.  Maintain good balance and secure footing on both feet, with feet as far apart as the shoulders.  Place the Christie Post Driver, resting on the receiver barrel on firm ground with the top handle in left hand to stabilize machine.  Prime the fuel bulb and switch stop switch to on, engage choke.  Grasp the Honda GX35 engine pull starter grip and pull up and out. Excessive force or speed is not required.  Guide the starter rope back slowly to permit the rope to rewind properly.  · Should the engine not start easily, or the pull starter offer resistance, refer to the Troubleshooting section of the user manual.  **Driving the cores**  Start motor safely as described in *starting the hammer*.  Lube the coring tube if applicable, push a couple of paper clips over the coring end (CUATION – the edge of the tube is sharp) and insert the small donger (hammer adaptor) into the head of the tube.  *For Microbial work* use the modified coring tube, no lube, the orange plumbing inserts (lubes lightly on the outside) and the larger (~30 cm long and 2 kg) donger.  Stand the coring tube in the required position by lightly tapping the post into the ground with a rubber mallet or have a second operator help steady the post (mind your head on the hammer and remember the exhaust can be hot).  Lift the Christie Post Driver post driver over and on to the post (ensure the user is capable of lifting 15 kg to shoulder height before attempting this).  Ensure the coring tube is in a vertical position and the Post Driver is on in a parallel plane to the post.  · Correct alignment is depicted on the safety label on the receiver barrel.  Ensure the operator maintains a stable standing position with feet as far apart as the width at shoulders. Keep body weight balanced. The hammer tends to pull back toward the operator whilst in action, so have the second operator monitor this.  Pull down on the Post Driver with 5-10kg of downward force.  · This is mandatory to ensure the internal hammer mechanism is engaged in the correct operating position, and reduce unexpected movement while driving.  Gently pull the throttle trigger (yellow trigger on right handle) until the hammer action is felt.  Once the post has been observed as being driven in to the ground, then fully depress the throttle trigger and drive the post to the desired depth.  · If the post does NOT drive into the ground cease driving, remove the post and move along a short distance and retry.  **Never** drive a post until the receiver barrel touches the ground.  Once the desired depth is reached, release the throttle fully so the Honda GX35 Engine is idling, and the hammer action has stopped. Remove the hammer and take care not to lay down in such a way so as to permit soil to enter the hammer cowl.  **Never** operate the throttle unless the Post Driver is on a post, and between 5-  10kg downward force is exerted on the handles.  **Removal of the coring tube**  Remove the hammer and then remove the donger. CAUTION – this may have become hot during insertion so use gloves and the strap wrench if needed to remove.  Take the chain and insert the bolt or large screw driver through the holes in the coring tube so as to engage in the tubed D bolt on the end of the chain within the coring tube.  Place the foot of the blue core puller as near to the coring tube as possible (watch out for the bolt and on soft soil place a larger board under the pullers foot).  Raise the arm of the puller, have a second operator place the chain into the metal catch then apply pressure on the arm to raise the coring tube.  CAUTION – ensure good communication between the chain and puller operators. If the chain is not well seated it can jump, pulling too soon can catch the chain operator in the mechanisms. There is also a pinch point (red taped) on the puller, so do not place hands near the pivot in the puller.  Once the lever has been pulled as far as possible, lift the handle, remove the chain link, lift the chain and reinsert the next appropriate link into the metal catch and repeat until the coring tube has been pulled. Once the coring tube is recovered make sure all equipment is carried to the next coring site.  **Recovery of soil**  Lay the recovered coring tube into one of the half pipe collection trays.  Remove the paper clips from the core end and, if needed run a small knife around the end of the corer to free the soil. CAUTION – knife and core end are sharp, so avoid unnecessary pressure, wear gloves and cut away from the operator.  Use the long wooden handle or another suitable pusher to now push the soil from the sore into the recovery tray. This is often easier if the second operator monitors the soil cores arrival at the top of the tray and holds it, whilst the pusher slides the coring tube down the handle.  Section and recover the soil from the tray and move on.  *For Microbial work* the process is similar except the orange recovery tube may need for the pushing handle to engage with the plastic where it meets the coring tube rather than pushing the soil face. Once recovered the ends are wrapped in Glad wrap/cling film, taped and cool stored for return to the lab. |
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| **Section 3 - Potential Hazards** | **Risk Score\*** | **Controls** | **Residual Risk\*** |
| Fuel vapours – fire risk | 13 | Always fill the engine when cold, on level ground and at a distance from where it is to be started an operated. Allow any spent fuel to evaporate | 6 |
| Blow from the machine when in use | 9 | Ensure the operator has and maintains a steady stance and is in contact with the machine (engineering controls on handle). If a second operator is guiding the coring tube then make sure both are aware of the position and distance of the hammer from their head and body | 6 |
| Vibration | 12 | Wear gloves, ideally anti vibration to limit the physical impact of the machine. Do not use for prolonged periods or if issues, such as tingling of the digits and limbs, is experienced. | 6 |
| Noise exposure | 18 | Wear hearing protection as described at all times and if not directly involved in coring then move away from the hammer and operator. | 10 |
| Crushing injuries | 13 | Be aware of the hammers moving parts, establish good communication between team members, do not operate core puller unless sure that hands and fingers are clear of the chain and pinch points. | 6 |
| Burns | 13 | The donger, core head and hammer exhaust can become hot during operation. Wear gloves and long sleeved shirts and long pants to limit skin exposure to hot surfaces. Be prepared to allow parts to cool before handling. | 6 |
| Cuts | 13 |  |  |

\* The risk score and residual risk is determined by following steps 1-4 below in the risk score calculator below.

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| **Section 4 - Spill Procedure and Waste Disposal** |
| Maintain the corer in a safe and contained work environment. Fuel use is minimal, but fill in a well ventilated area on a flat surface from which spilled fuel can evaporate. |

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| **Section 5 – First Aid** |
| Administer first aid as appropriate.  Ensure a trained first aider is available as part of the operator team and that a first aid kit is available.  For more severe injuries contact emergency services (000). |

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| **Section 6 – Incident Management / Emergency Procedures** |
| In the event of an incident or mechanical failure of the machinery then cease all coring operations and return the machine to the lending staff in the Agronomy department, ensuring someone is made aware and given a description of the issue.  Report all incidents via Skytrust or, if a student operator, have your supervisor do this for you within 24 hours of the incident occurring. |

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| **STEP 1** | | | | | **STEP 2** | | | | |
| **Determine likelihood of occurrence** | | | | | **Determine severity/consequence/cost** | | | | |
| **Risk Score Calculator: Definition of Terms** | | | | | | | | | |
| Rare | Would only occur in very exceptional circumstances | | | | Insignificant | No personal injury, or a minor first aid; and/or Reversible env. impact; and/or no media coverage; and/or Financial cost under $2000 | | | |
| Unlikely | Could occur at some time | | | | Minor | Minor personal injury (first aid treatment); and/or Reversible env. impact requiring minor remediation; and/or Minor adverse local media coverage; and/or Cost $2000-$50,000 | | | |
| Possible | May occur at some time (has happened at other places) | | | | Moderate | Serious personal injury (medical treatment); and/or Reversible env. impact requiring moderate remediation; and/or Minor adverse capital city media coverage; and/or Cost $50,000-$250,000 | | | |
| Likely | Will probably occur again (has happened here before) | | | | Major | Serious Personal Injury/long term absence; and/or Serious env. impact requiring significant remediation; and/or Major adverse/extended national media coverage; and/or Cost $250,000 - $1m | | | |
| Almost Certain | Is expected to occur here in most circumstances | | | | Catastrophic | Fatality(ies)/ long term impairment; and/or Disastrous env. impact requiring major remediation; and/or Government intervention; and/or Financial cost more than $1million | | | |
| **STEP 3: Determine Risk Score** | | | | | | | | | |
| **Risk Score Calculator: Matrix** | | | | | | | | | |
|  | | | **Severity/Consequence/Cost** | | | | | | |
| **Likelihood** | | | **Insignificant** | **Minor** | | | **Moderate** | **Major** | **Catastrophic** |
| **Rare** | | | 1 | 3 | | | 6 | 10 | 15 |
| **Unlikely** | | | 2 | 5 | | | 9 | 14 | 19 |
| **Possible** | | | 4 | 8 | | | 13 | 18 | 22 |
| **Likely** | | | 7 | 12 | | | 17 | 21 | 24 |
| **Almost Certain** | | | 11 | 16 | | | 20 | 23 | 25 |
| **STEP 4: Determine Risk Score Response Priority** | | | | | | | | | |
| **Risk Score** | | **Risk Score Response** | | | | | | | |
| 23 - 25 | | Severe risk. Highest of priorities. Must be rectified immediately. | | | | | | | |
| 20 - 22 | | Very high risk. Requires urgent attention for quick resolution. Temporary controls to be implemented. | | | | | | | |
| 11 - 19 | | Moderate to high risk. Prompt planning and resolution required with consultation. | | | | | | | |
| 4 - 10 | | Low to moderate risk. Consult and identify controls that are reasonably practicable | | | | | | | |
| 2 - 3 | | Very low risk. Minor issue for monitoring | | | | | | | |
| 1 | | Insignificant Risk | | | | | | | |
| **STEP 5: Implement the Highest Control Possible** | | | | | | | | | |
| **Hierarchy of Controls** | | | | | | | | | |
| Eliminate the hazard | | | | | | | | | |
| Substitute the hazard with something safer | | | | | | | | | |
| Isolate the hazard from people | | | | | | | | | |
| Introduce engineering controls | | | | | | | | | |
| Implement administrative controls | | | | | | | | | |
| Use Personal Protective Equipment (PPE) | | | | | | | | | |

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| **Approval of SOP** | | | |
| Name | Oliver Knox | Title | Dr (HSR for WG4) |
| Date | 04/04/2018 | Signature |  |

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| **Sign Off** | | | | |
| The University shall provide information and training to workers to enable them to perform tasks safely. This section is signed by workers (and supervisors) to indicate their understanding of the Safe Operating Procedure and indicates their competence to complete the job in a safe manner as deemed by their supervisor. Workers should always consult with their supervisor where there is concern about the safety of a task that effects themselves or others. | | | | |
| Date | Worker Name | Worker Signature | Supervisor Name | Supervisor Signature |
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| ***Records Storage Instructions*** |
| *All completed SOPs are to be recorded in TRIM Container A17/2181 utilising a TRIM license in your School/Business Unit. Completed SOPs are to be published on Safety Hub for ongoing utilisation.* |