



NSWRAB SOP9

Use of the R3 Unit (propane-oxygen device)

Background

The R3 Unit (formerly called the Rodenator) is a gas explosive device that pumps a calibrated mixture of propane (using liquefied petroleum gas) and oxygen into a warren and then ignites the mixture causing a high energy blast wave to travel through the warren.

The likelihood of creating a sufficient blast pressure to render rabbits immediately insensible followed by a rapid death without recovery of sensibility depends on a number of factors that must be controlled. For small warrens, that is, with seven or fewer entrances, the R3 Unit can be an effective tool for killing rabbits when all entrances have been adequately sealed. The use of the R3 Unit in warrens that have more than seven entrances or are deeper than 1.5 metres is not recommended due to the higher likelihood that rabbits will be injured and not killed immediately and will therefore suffer.

This standard operating procedure (SOP) is a guide only; it does not replace or override the relevant legislation that applies in NSW. The SOP should only be used subject to the applicable legal requirements (including WHS) operating in the relevant jurisdiction.

Individual SOPs should be read in conjunction with the overarching Code of Practice for that species to help ensure that the most appropriate control techniques are selected and that they are deployed in a strategic way, usually in combination with other control techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

Application

- Operators must be fully trained in the effective, safe and humane application of this equipment.
- This SOP is for use with the R3 unit only. It does not apply to older models or different types of gas explosive devices which may be less humane, ineffective or unsafe.
- The R3 Unit should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control. Reducing and maintaining low rabbit numbers by a combination of control methods over time is more effective than repeated (seasonal) use of a single method.
- The R3 unit is used to kill rabbits and disrupt small warrens in areas that are inaccessible to ripping (e.g., rocky areas, under trees, along rivers and in steep sandbanks) and in areas where ripping is undesirable because of the risk of soil erosion.

- R3 unit technology uses a mix of oxygen (97%) with LPG (3 %) to create a blast that generates sufficient concussive force that will create a lethal outcome in a fully sealed warren. Due to the complex structure of warrens, the varying moisture levels underground and the different soil types across Australia, each operator needs to gain an understanding through experience of how long each blast will need to be for optimal results. Regardless of the conditions, each warren must be fully sealed in order to maximise the blast pressure. A smoker identification unit must be used to detect all openings.
- The degree of warren disruption and collapse can be variable and will depend on the size of the warren, soil type and the topography.
 - Use of the R3 Unit on warrens that have more than seven entrances and are deeper than 1.5m only results in partial collapse, with some tunnels not collapsing after blasting. Other methods of warren destruction should be considered in these cases.
 - Warrens in decomposed granite soils appear to have the greatest collapse following a blast, whereas warrens in sandy soils may only result in partial collapse.
 - If the warren is on a slope, blast pressures in the higher parts of the warren are likely to be less than lower sections.
- Some warrens will require more than a single blast to achieve the desired outcome. This can be recognised by the overall impact of the blast zone. Above-ground cracking is often observed and will track along the direction of the warren tunnels, the sealed openings will be blown out and often sink holes will appear. Depending on soil type and timing of the flow, there will often be an above-ground display of flying dirt and debris, but this is less likely in sandy soils.
- Clearing surface harbour such as blackberry stands, hollow logs and rock piles may need to be performed prior to warren destruction to enhance the effectiveness of control programs and to slow re-colonisation.
- Trained dogs can be used to chase rabbits underground prior to warren destruction. However, it is unacceptable to set a dog onto a rabbit with the intention of catching or killing it.
- Clearing of native vegetation or disturbance of sites with Aboriginal or archaeological significance is subject to compliance with various local, state and federal legislation. If in doubt, always check with the appropriate authority before undertaking warren and harbour destruction programs. Contact [NSW National Parks and Wildlife Service](#) for more information on places of significance.

Animal welfare implications

Target animals

- If rabbits are rendered immediately insensible due to the blast-generated pressure waves and they do not regain consciousness prior to death, there will be no suffering. Thus, when blast pressure is adequate it is likely that the majority of rabbits will die without significant suffering; however, there could still be some variability in the injuries received by each animal.

- The injuries experienced by rabbits are consistent with the effects of an explosion and include superficial burns to the skin, perforated eardrums and extensive haemorrhages in the lungs.
- Humane use of the R3 Unit depends on the experience and knowledge of the operator. The R3 unit must be set up and used correctly to ensure that blast pressures are sufficiently high to render rabbits immediately insensible and to cause injuries severe enough to kill them without them regaining sensibility.
- To achieve adequate blast pressure:
 - Warrens must be small, with no more than seven entrances and shallow (less than around 1-1.5 metres below ground level).
 - Burrows in the warren must be sealed prior to blasting. A 'smoker' must be used to detect all openings.
 - The duration of gas flow required will depend on the size of the warren but must be enough to achieve an adequate blast pressure throughout the entire warren (i.e., could be up to six minutes for warrens with seven entrances).
- If there is any doubt that blast pressure has not been adequate, operators must always quickly repeat the procedure, paying particular attention to resealing any new openings.
- When it is unlikely that adequate blast pressure can be achieved, it is unacceptable to use the R3 Unit as a method for killing rabbits.
- Rabbits are exposed to the propane/oxygen mixture for a short period of time prior to ignition, however the concentration of propane is not high (around 2%) so the likelihood of suffering due to hypoxia is low. Rabbits will also be exposed to the mineral oil smoke from the smoker unit for a short period of time when the entrance seals are being checked, but it is unlikely that this would cause significant irritation.
- Warren destruction also affects rabbits that are not inside the warren at the time by removing their protection from extreme heat, cold and predators. Most rabbits that are forced to live above ground after their warren has been destroyed will have little chance of survival.

Non-target animals

- Warren destruction using the R3 Unit can kill animals other than rabbits if they are inside the warren at the time. If a warren appears to be vacated by rabbits and possibly occupied by non-target species (e.g., wombats, snakes, lizards, dingoes), the R3 Unit must not be used.
- Warren destruction may also have a negative impact on non-target species that use the warren or surrounding harbour, by removing their protection from extreme heat, cold and predators. Harbour such as native vegetation, logs and briars that are used by rabbits may also be an important habitat for native animals including amphibians, reptiles, small mammals and ground-dwelling or ground-feeding birds. The benefit of rabbit harbour removal should be assessed against the risk to native wildlife especially in conservation areas.

- Non-target native animals that are inadvertently injured or displaced during the R3 unit blasting or harbour removal procedure should be taken to a registered wildlife carer or veterinarian for assessment.
- If using dogs to work an area prior to warren destruction, the following should be observed:
 - Dog handlers must be experienced and the dogs well trained, i.e., they must be easily controlled by a whistle or call, obey the handlers' commands and will not chase or attack non-target animals including domestic livestock. Dogs that are deliberately bred or trained to attack without provocation must not be used. Suitable breeds would include terriers, Labradors and others that are keen to chase but unlikely to catch a rabbit.
 - Handlers must not encourage dogs to attack and kill rabbits. Rabbits trapped in hollow logs etc. (where they are visible, but the dogs can't access them) should be shot (refer to *NSWRAB SOP8 Ground shooting of rabbits*).
 - Rabbits caught by dogs should be killed by a shot to the brain or by cervical dislocation. Rabbits should never be left to die a slow death after being maimed.
 - Ensure that small dogs are not inside the warren before blasting takes place. They should be well restrained during blasting operations to prevent them from entering the warren.
 - For more details refer to [GEN002 The care and management of dogs used for pest animal control](#).

Workplace health and safety considerations

- Appropriate personal protective equipment, including long trousers, boots, helmet and a face mask or safety glasses must be worn.
- Operating in fire restriction periods poses a risk of an above-ground fire. The R3 Unit will create a small amount of flame with certain conditions. If the settings on the unit are fine tuned to use only the required percentage of LPG to ignite the oxygen then the amount of flame can almost be eliminated.
- When calibrating and using the R3 Unit, the area around the operator should be clear of other persons and there must be no naked flames, running engines or cigarettes nearby. Operators and assistants should wear appropriate hearing protection.

Equipment

- R3 Unit.
- LPG gas bottle.
- Oxygen gas bottle.
- Smoker identification unit.
- Fire prevention equipment.
- Hearing protection.
- Safety glasses.

Procedures

Assessment of site and estimation of rabbit numbers

- To maximise effect on rabbit populations, a careful on-site risk assessment should be undertaken. Map the location of all warrens, take note of surface harbour and topographic features. For large areas, experienced spotters on motorbikes can be used to log the location of warrens using GPS before warren destruction commences.
- The density of rabbits on the site should be estimated using spotlight counts and warren monitoring. The location and numbers of rabbits on neighbouring properties should also be approximated. If the density of rabbits is high, it is best to poison or fumigate beforehand so that few rabbits are left.
- If it is suspected that native wildlife are using the warren, their presence can be determined by using sand pads, i.e. a 1m² area of raked earth or sand outside of the warren entrance, to detect and identify footprints. Small sticks placed over the warren entrance can also detect activity.
- Contact your local LLS for more information and advice on site assessment and monitoring of rabbit numbers.

Blasting procedure

- Clear warrens of loose logs, rocks, woody weeds and large shrubs etc. Take care not to endanger any native wildlife that may be using the harbour.
- All warrens with open entrances should be destroyed even if they are not currently active.
- It is important to drive any rabbits in the area underground before blasting takes place. This can be achieved by making loud noises or using dogs to work the area, chasing the rabbits into the warrens. Most rabbits will be underground during the middle of the day, especially when the weather is hot.
- Rabbits will often carry material into a warren to provide bedding, which is flammable once dry. Always ensure that there is no combustible material in the warren before commencing the oxygen-LPG flow for a follow-up blast. The risk of fire is low, but the R3 Unit can be damaged if it comes into contact with underground flames. This will have a blow-torch effect at the point of entry. The presence of an underground fire will be shown by smoke emitting from one or more of the blown openings.
- Refer to the current R3 Unit Operating instructions (available from Jansen Farm Services P/L) for detailed instructions on setting up, calibrating and operating the unit.
- For further information and any technical assistance contact Jansen Farm Services P/L.

Assessing effectiveness

- The effectiveness of the R3 unit should be monitored by noting the presence of re-opened entrances 2-3 days after treatment. Any re-openings can be treated further using the R3 Unit or with fumigation.

References

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