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# Soil peels: their preparation and presentation

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# Soil land water update

## Soil peels: their preparation and presentation

Tim Overheu, Soil Research Officer

Soil peels are an exciting and inexpensive technique for collecting an exact reproduction of soil profiles. They are an excellent product for displays and soil extension activities.

Introduced in the mid-1960s, the soil peel (lackfilm) technique was initially developed using a flexible glue product in combination with a cloth base, and was used to preserve soil stratigraphy at geo-archaeological excavations (Voight & Gittins 1977). The method described in this update introduces refinements to the technique for heavy and consolidated clay or duplex soils in Western Australia.

Applying and removing a soil peel requires a skill that is developed with practice. Each soil peel needs to be treated individually, as the technique differs a little with each soil type and also depends on the texture, structure and moisture of the soil profile.

Preparing and presenting each soil peel after removal is also time consuming. However, once the soil peel is finished and displayed, the interest it creates will be overwhelming. You will have a functional and striking display that can be used at open days, catchment workshops or hung in the office or foyer of your business (Figure 1).

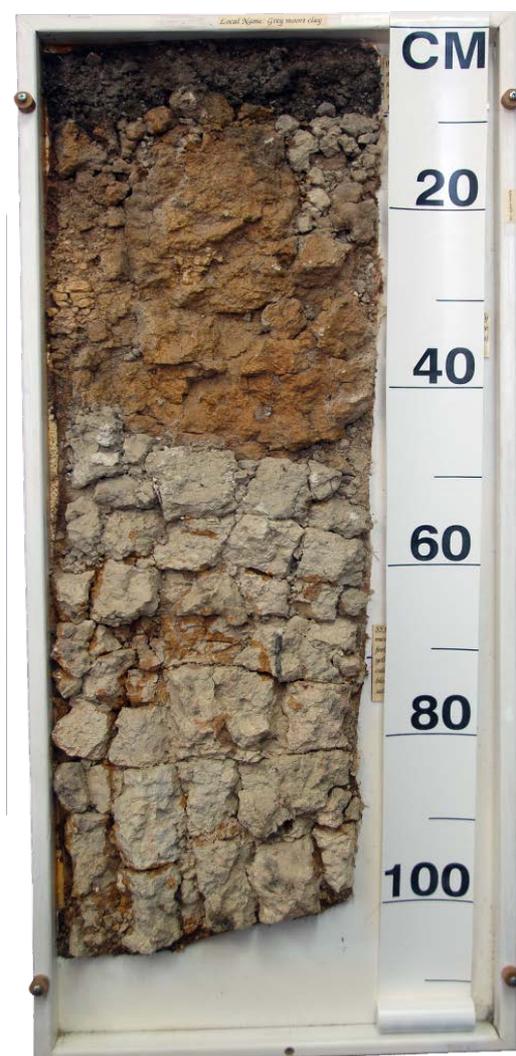


Figure 1 Soil peels are artistic, striking and an effective way to introduce soils to the community

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## Applying a soil peel

### The soil face

The best soil peels are collected from a soil pit, preferably dug by a backhoe. However, any vertical soil face, such as a clean road cutting, can be used, except for loose sands which may need to be cut back at a lower angle.

The best time for digging a soil pit is also the best time for collecting a soil peel—when the soil is moist throughout—usually late Spring or late Autumn. Excessively wet or dry times are not ideal for collecting soil peels.

Avoid digging a soil pit in areas that are frequently waterlogged, and ensure that you check for underground cables by contacting Dial Before You Dig, Australia's national referral service for information on underground pipes & cables ([1100.com.au](http://1100.com.au)).

Safety is paramount when working in soil pits, and the relevant safety guidelines should also be adhered to when constructing the pit. The Commission for Occupational Safety and Health has a Code of Practice on excavation which can be viewed on their [WorkSafe WA](http://WorkSafe WA) website.

A good, backhoe, soil pit is about 2.5 to 3 m long, about 1 m wide (1–2 buckets) and about 1.5 m deep. The end face of the soil pit should face north, to be well-lit by the sun during the day, and the trailing edge of the pit should be gently stepped, to allow easy access and an easy exit should an animal accidentally fall into the pit.

The soil face from which the peel will be collected, as well as the sides, should be as near to vertical as possible, to present the soil pit face as a true, vertical exposure of the soil profile. Near vertical sides also aids removal of the peel and minimises the risk of the soil pit slumping or collapsing, distorting or ruining the soil peel.

It is best to apply the materials that make the soil peel on a uniform and relatively flat, vertical face of the soil pit. Cut back the face with a crowbar or spade to create a fresh surface, and gently trim away any protruding roots. Take care not to smear the soil face, because in heavier textured soils, smearing will block soil pores and stop the latex penetrating. In lighter textured soils, you can lightly brush the soil face with a banister brush, starting at the top.

### Preparing your work area

After digging your pit, place all the materials you will need close to hand. Protect your clothes with old over-clothes, overalls or other protective clothing that can be disposed of after use because

cured latex is almost impossible to remove from fabric.

Fill a bucket with rainwater or bottled water and add cloudy ammonia at about 100 millilitres per litre—cloudy ammonia will reduce precipitation of latex, prevent spoiling of equipment used to apply latex and assist clean-up. Fill a hand-held, garden spray atomiser with latex that is diluted with rainwater to the desired consistency, which will vary depending on the soil type and moisture (see 'first coat', below). Label this atomiser as dilute latex solution. Fill another atomiser with undiluted latex solution. Place both atomisers upside down in the dilute ammonia solution. Do not use town tap water, because the chloride will often cause the latex to precipitate out the solution mix.

Any cheap, hand-pumped, air pressure-operated, garden atomiser is suitable as a sprayer, but it may need slight modifications to prevent the emulsion from blocking the feed lines and nozzle. A small 'o' ring can be placed around the piston to stop the latex leaking back into the atomiser. Orifices can also be drilled out to 1 mm diameter and all fine screens can be removed. These modifications, however, are not usually necessary, as most atomiser sprayers are easy to dismantle and clean. Piston displacement sprayers are unsuitable for applying latex.

Determine the size of your finished peel, and cut some open-weave fabric (cheesecloth or muslin are both suitable, as is any open-weave gauze) slightly larger than the desired size. Set this large sheet of fabric aside in a clean area or plastic bag. Then, cut enough 30 cm square sheets of fabric to cover the same area as the large sheet, allowing 5 cm overlaps for each small square. Place these sheets aside with the large sheet, in a clean area.

Prepare a second bucket of dilute cloudy ammonia for washing latex off your hands and equipment, between applications. Tacky latex will make everything from cloth to dirt and straw stick to your hands.

### First coat

The first coat is critical. The soil face is held together with three or four coats of diluted latex (diluted with about 50 per cent water). Good penetration, complete coverage and drying to a tacky state are essential. Saturating the face with the diluted latex solution is desirable, but do not allow saturated soil to flow because this will create false features in the finished peel (Figure 2).

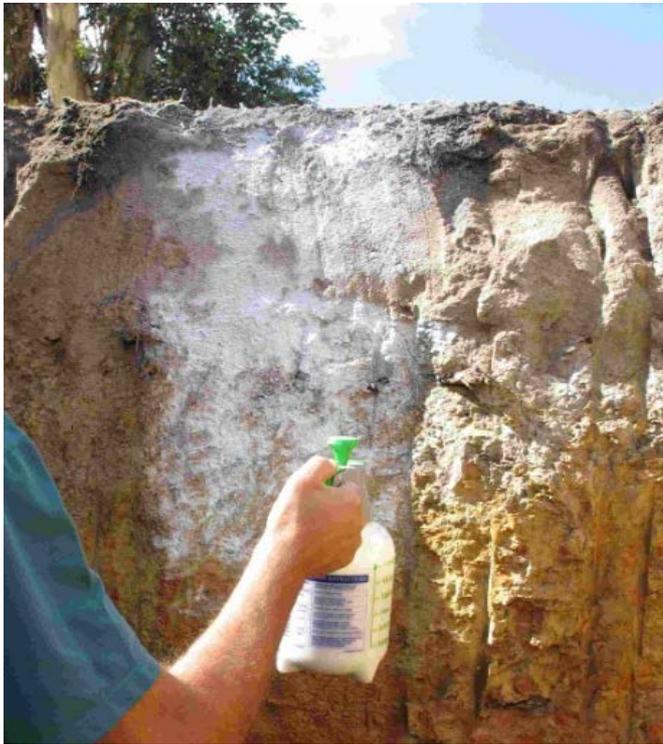


Figure 2 First coat of latex is a diluted spray of about 50 per cent latex and 50 per cent water

It is preferable to apply the first coat of dilute latex to a slightly moist, soil face. For a dry soil profile, use a fine water spray to lightly dampen the soil face before applying the dilute latex, taking care to not apply too much water and create 'fall aways'. For a dry soil or heavy clay profile, water can be placed in a shallow trench cut behind the soil face the day before latex application, to wet up the profile.

It is easiest to apply the first coat with a hand-pumped, atomiser spray on most soil materials. In dense or heavy and coherent clay soils, up to four parts water can be added to one part latex to achieve best penetration. Brushing on the first coat of latex often brings complications, even on coherent clay soils, and is not recommended.

Latex dries on contact with air. To reduce clogging between applications, place the atomisers upside down in the bucket containing the rainwater and cloudy ammonia mix.

Blockages will occur despite modifications to the sprayers, but they can usually be cleared with a fine wire or needle. Ideally, dismantle and wash the sprayers immediately after the first coat of latex. This is often impractical when collecting several soil peels in a day, so a thorough wash with diluted cloudy ammonia at the end of the day will do.

Badly clogged sprayers are essentially useless, even though they can be cleared by prolonged soaking in kerosene or turpentine. Dismantle them and save the parts for the next sprayer unit.

## Second and third coats

As the latex dries, the soil face becomes coherent, that is, it does not rub off easily. Now is the time to spray on thickly, up to three more coats of undiluted latex. Brushing on will still create problems at this stage.

Apply a layer of the fabric between the second and third coats of latex (or third and fourth, depending on your judgement of the coherency of the soil face) to reinforce the soil peel. Using the 30 cm squares, overlap all joins by 5 cm and work the fabric into close contact with all parts of the soil face, by gently brush painting with undiluted latex and by pressing the fabric into all indentations and around protruding stones or roots. Make sure there are no air bubbles (Figure 3).



Figure 3 Use a paint brush to fix the 30 x 30 cm fabric and latex to the soil profile, ensuring no air bubbles and a good contact with the soil face.

The best way to ensure good contact with all parts of the soil face is to work methodically from one corner of each fabric square. Do not stretch the material because the fabric will then only bond closely with protruding parts of the soil face. It is preferable to allow the fabric to fold upon itself to mould around lumps and bumps than to stretch it. This is best done with a brush but fingers can be used carefully. It is also advantageous to apply the fabric to a slightly tacky, latex surface. A double layer can be applied around the edge of the peel.

## Drying time

Dry latex repels water; therefore, the final applications of the latex emulsion should always be placed on a tacky latex surface. On a warm, windy day, for example 28 °C, one thin layer of latex may only take about two minutes to dry.

Time between coats is crucial. A moment of distraction can mean the difference between the soil bonding to the cloth in all spots and a final product which lasts for years, or a soil peel that falls apart a few weeks after removal.

Unfortunately, drying time between latex coats needs to be gauged on the day, as it can vary from two minutes to one hour, depending on site location, profile moisture status and weather conditions.

## Last layer of fabric

The last layer of fabric applied to the soil peel should be in one piece, rather than small squares, so as to cover the full length of the soil peel. Final coat(s) of latex are brushed over the cloth, ensuring a thick uniform cover over the whole face of the soil peel. Once completed, leave the peel to dry (Figure 4).

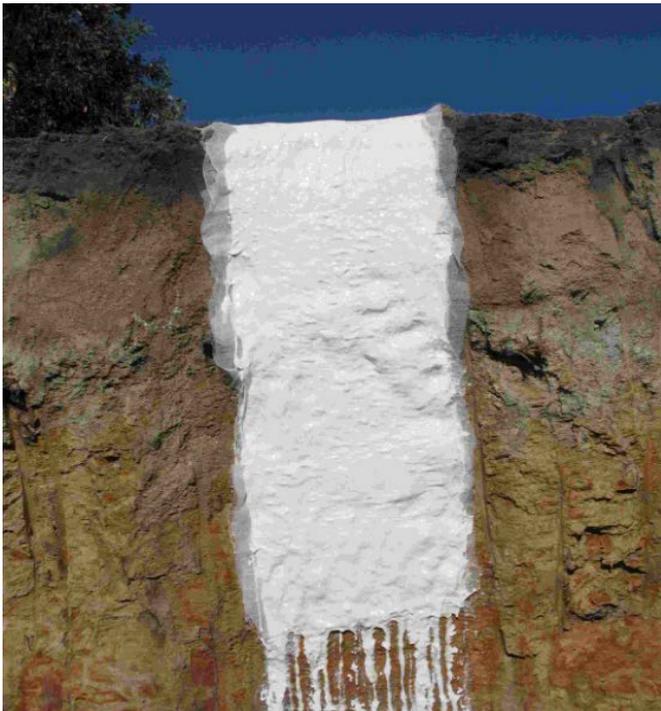


Figure 4 After a final coat of undiluted latex, the finished soil peel is left to dry

The peel must cure before its removal from the soil face (Figure 5). Curing usually takes one to two days, although it may take up to a week in cool, wet weather.

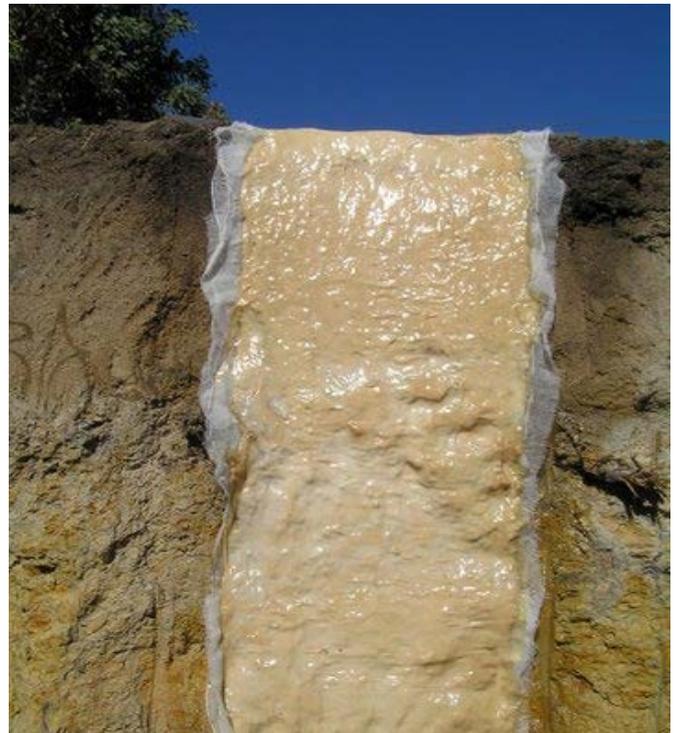


Figure 5 After 24 hours, the soil peel is dry and ready to be removed

## Removing the soil peel

A frame or backing board is generally not needed when removing the peel, provided the removal begins from the bottom and sides of the peel, and not from the top. Use a geological pick, small trenching tool or a crow bar (with a steady hand), and hand shears when required, and chisel, chip and scratch around the peel (Figure 6).



Figure 6 Removing a soil peel requires chiselling, chipping and scratching around the peel, starting from the bottom and sides

In most soils, the peel should be cut away from the face at about two to three times the thickness of the largest structural element in the profile. Literally 'peeling' the profile by pulling off the latex/fabric sheet will only be successful in dry, uniform sands.

Removing the soil peel requires at least two people, because of the weight of the peel with its soil burden. Usually one person carefully cuts the peel while the other supports or holds up the peel against the soil pit face because every time the peel bends, soil material is lost and false soil structure is created. Larger peels and peels constructed on clay soils may require three people for the removal stage, but two people can usually handle peels up to 150 cm by 50 cm.

Soil peels applied to heavy clay soils can be removed by cutting a second backhoe pit perpendicular to, and behind, the face that the soil peel is attached to. You can then dig back from the side of this second pit into the soil peel, always working from the bottom. Final removal of the peel from the pit can be effected by placing wide boards front and rear to 'splint' the peel and prevent it bending, and lower the peel to a horizontal position, from where it can be lifted out of the pit. Allow adequate time and do not rush this process, and work carefully to prevent the peel inadvertently collapsing and to prevent injury—soil peels can be heavy (up to 10 kg)!

The peels are best transported flat and may be stacked together, interleaved with several sheets of newspaper. Never roll peels up for transport, even if space is lacking. Upon arrival to the preparation work area, separate the peels and allow them to air dry for at least a day before finishing.

### Preparing and presenting the soil peel

When the peels are sufficiently dry, gently brush or vacuum off loose soil material, and trim the sides to give a neat or straight edge. Trimming the peel will be difficult; use a sharp Stanley knife or similar, and hand shears.

Soil peels can be heavy. The weight depends on the type and density of soil material, for example, a peel showing a deep sand profile will usually be much lighter than a peel showing a dense clay. When planning the wooden display case, consider the weight of the peel and whether it is to be hung from a wall for display. Each display box should be about 0.6 m by 1.2 m. The edging should be about the same size as the thickness of the peel. Inexpensive wood is suitable.

With dense, gravelly and heavy clay soils, it may be necessary to use Bondcrete® to glue in some blocks of clay, gravel or rocks that are loose or

falling out of place. The Bondcrete® is also used to glue the peel into the wooden display case.

After the peel has adhered to the backboard of the display case, Bondcrete® can be sprayed over the surface of the peel to protect it from moisture and inquisitive hands. This also gives the profile a bonded finish and moist appearance.

### How long will a peel last?

The life span of a soil peel depends on the quality of the materials used, the care with which the latex was applied to the soil face, and the effort and time spent in preparing the peel for presentation. Constructed with care, a soil peel should last at least 10 years and possibly a lot longer, with some minor maintenance along the way.

### Estimated total cost

The approximate material cost for ten complete soil peels in wooden display cases is about \$700 (\$70 per peel). Perspex covers will protect the peels from inquisitive hands when on display. Covering ten peels with perspex adds about \$400 to the total cost.

### Materials and costs

Most of the materials listed below can be used (depending on quality) for more than one soil peel. You will need:

- scissors
- hand shears (for cutting the edges of peel for presentation)
- strong knife (for example, locking Stanley knife or similar)
- spade
- crow bar
- geological pick or trenching tool
- rubber gloves
- overalls, disposable over-clothes or old clothes
- at least two, hand-pumped, 1 litre, standard garden spray atomisers
- several 10 L buckets to temporarily store atomisers in diluted cloudy ammonia and to assist clean-up
- tools to clean and dismantle the spray atomisers
- glass jars with lids for the latex (or an alternative to glass jars is a jug to scoop raw latex out of the 20 L pails the latex is supplied in)
- six, 25 mm paint brushes—four cheap disposable ones and two reasonably good quality ones

- 2–3 m of cheesecloth, gauze or similar open-weave fabric for each profile
- 20 L of rain or bottled water to dilute the latex and for clean-up
- cloudy ammonia to mix with clean-up water
- 20 L plastic pails of water-based latex emulsion. One litre will cover a 0.6 m by 1.2 m soil profile, depending on the soil type. The water-based soluble latex, product type 'Enva-Tex 0805HV', is available from most craft supply stores. The critical feature is that the latex must be water soluble (and not precipitate out of the solution when mixed with water)
- banister brush or wire brush to clean-up the profile face before applying the latex
- plywood and pine edging (2 cm by 5 cm) for the display boxes. Display boxes are relatively easy to construct
- pre-cut perspex sheets, 1.2 m by 0.6 m by 3 mm (optional)
- tin(s) of Bondcrete®
- plastic syringes to apply Bondcrete® under loose gravels and clay blocks
- tin(s) of gloss white paint (dirt can be wiped off the gloss surface of the display box)
- vacuum cleaner, to remove excess soil material during preparation for display.

### Give it a go!

Take the basic methodology and experiment with a few profiles until you get it right. Remember that soil types from different regions have different characteristics and the methodology and skills may need to be modified for the next soil pit. Give it a go and don't be discouraged if your first peels are not masterpieces.

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