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| Report No: | REP12-02-02 |
| File No: | W121 |
| Date: | 18 January 2012 |
| Information Only - no decision required | |

REPORT SUMMARY

Report to: Environment & Planning Committee
Meeting Date: 16 February 2012
Subject: Sheep Dip Project
Report Author: Jenny Easton, Resource Scientist - Contaminants

EXECUTIVE SUMMARY

Sheep dips are a historic legacy with the residual arsenic and dieldrin, creating a potential risk to stock and people.

Council had previously trialled the handheld equipment (XRF) to test soil for metals, and sourced practical advice for farming around old dip sites.

Nineteen dip sites were tested in October 2011 and half of the dip sites had no or minimal arsenic, and the others had about 60 m² per dip that exceeded the stock grazing guidelines, with small areas of high concentrations of pesticide residue.

The landowners responded well to the project and were given the technical advice as well as low cost methods to manage the potential risks from the dip.

Testing metals in soil using handheld equipment is a very practical and efficient way to locate the extent of arsenic in surface soil around sheep dips, and investigate metal contamination from other types of industrial and horticultural activities.

More landowners have requested free soil testing, and another round of soil testing with the XRF is being planned subject to funding bids with Ministry for the Environment.

RECOMMENDATION

That the report REP12-02-02 be received.

DRAFT RESOLUTION

THAT the Environment & Planning Committee receives the Sheep Dip Project report REP12-02-02

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1. AIM OF SHEEP DIP PROJECT

To assist landowners with old sheep dips assess the associated risks to stock, and provide practical advice for farming around old dipsites.

2. BACKGROUND

- 2.1 Sheep dip contamination is an historic legacy from the decades when arsenic and dieldrin were used as sheep dip chemicals. Arsenic is a carcinogenic metal and stays in the soil - it does not break down, and dieldrin is an organochlorine and is extremely slow to break down. It is 50 years since these chemicals were last used and yet concentrations high enough to kill stock if they graze close to old dips, and potentially fatal to children playing beside old dips have been found around old dips in New Zealand, and in this district. Managing the risks from the dips is easy once they have been located and the extent of contaminated soil determined.
- 2.2 In 2009 we trialed the method of using a hand held XRF device around 20 sheep dips, 10 in TDC and 10 in NCC. The XFR measures the concentration of metals in soil, to delineate the extent of arsenic in surface soil. The XRF plus technician was shown to be an efficient process, with an average cost of \$500 per site; half the cost of 20 lab samples for arsenic, and has the additional practical benefit of immediate results which make it easy to follow the trail of arsenic out from the dip.
- 2.3 However, in 2009 there was no technical advice available to give farmers about the risks to stock or the environment generally. Council obtained funding from Envirolink and supervised the production of a set of four Sheep Dip Fact Sheets with practical information for farmers to manage the risk from dips.
- 2.4 In 2009 we obtained Ministry for the Environment Contaminated Site Remediation Fund money to trial the XRF, and the soil testing was free to landowners.

3. START UP FOR OCTOBER 2011 INVESTIGATIONS

3.1 Locating Dips

Advertising the in the local Newspaper and council magazine Newline stimulated a response from local historians, interest from Federated Farmers, and raised awareness amongst farmers.

The old dip sites were located and the current landowner asked if they would like to have free soil testing for arsenic around their dip site and provided with practical advice. The response was good, and once we had about 20 dips, organising the field work started.

Sites closer to Richmond had been used in the pilot study in 2009, but the 2011 project involved dips further out in the district. Murchison, Tutaki, Owen Valley, St Arnaud, Pokororo, Tadmor, Orinoco, Lee Valley, Takaka, Canaan, and one in Richmond. Some farms had more than one dip.

3.2 Preview visit

The locations were visited first, to meet the landowner, sight the dip so we did not waste the XRF time finding them, make sure they had not been already capped, or built over. Also we could estimate the time needed for travel and soil testing to draw up an efficient travel pattern, with some flexibility.

4. SITE INVESTIGATION

4.1 Soil Testing

The chemicals are most concentrated beside the splash area at the entry to the dip and the exit from the draining pen, so these areas were tested first, then any contamination followed out at 5 metre or 2 metre intervals depending on the results. Testing was on bare soil, or turf turned over to expose bare soil. The XRF readings were recorded on a sketch map on graph paper, flags put at all the locations exceeding the stock grazing guideline (arsenic 38ppm), and a series of photographs taken. One soil sample was taken from the high arsenic area for lab testing for dieldrin. (The XRF does not test for organochlorines.) The landowner was present at all but two sites to watch the proceedings, discuss the findings and consider options to manage the risk from the dip if the readings were high. They were given the set of Sheep Dip Fact Sheets and later received a letter, copy of the map and the dieldrin results.

4.2 Management Options Around The Dips

The landowner decides whether they need to change their present farming regime around the dip. Some cheap options are to exclude stock from the contaminated areas by fencing, or placing gravel over the dip area, or cover with fresh soil and re-grassed, or shrubs or trees planted. The stock

grazing regime can be changed so vulnerable animals (young lambs, calves, poultry, pigs and bulls) are not exposed to the dip residues. The dip area can be excluded from break feeding. The dips that are not yet filled in could have the contaminated soil from around them put into the dip, and then capped with clean material.

5. RESULTS

5.1 Minimal or No Arsenic

Nineteen old dip sites were investigated and 10 of these had minimal or no arsenic residues. Two of these sites were vegetable gardens of properties where old dips had been completely covered over, two were old spray dips that would have used different chemicals, some were well designed and managed small dips and one was a footbath not dip.

5.2 Area Affected

The area around the dip sites with arsenic above stock grazing guidelines was usually 20 metres x 30 metres, with one dip site twice that size.

5.3 Arsenic Concentration

The highest concentration of arsenic at five dip sites was 5 to 10 times the stock grazing guidelines, and three dip sites had 50 to 100 times the guidelines. There was a small (3 m²) area with 1.4% arsenic or 500 times the stock guidelines, presumably from a spill of dip powder. Stock currently do not use that paddock, but that concentration of arsenic is potentially fatal to a child if they ingested some of the soil while playing around the dip, and the landowner has been advised to remove the soil or cap this area.

5.4 Risks to Stock

One dip site had poultry in the release paddock above stock guidelines, and they will be moved. One dip site which unfortunately had high dieldrin as well as arsenic, had been used to house pigs for a few years, and the landowner will not repeat that high risk use.

5.5 Residential Zoned Land

One dip site was on residentially zoned land and the landowner will remediate the site before it can be used for residential land use. The National Environmental Standard for soils became operative on 1 January 2012, and the residential soil contaminant standard for arsenic has been reduced from the previous 30ppm to 17ppm arsenic.

5.6 Potential Drowning Hazard

A third of the dips were filled in and with one exception the others were covered over with wood or metal mesh to prevent entry. The exception was still open, with steep sides and water in it and thus a drowning hazard. It was located on a paper road, and therefore may have some implication for Council to cover or fill it in. Discussions are being held with the landowner.

5.7 Dieldrin

Dieldrin is relatively expensive to test for at \$90 per sample and only one soil sample was taken from the dips that also had elevated arsenic. This result gives an indication whether dieldrin was used, but does not give accurate assessment of the extent in the surface soils which may be different from the pattern of the arsenic.

Of the nine sites sampled, three were below detection, four were below 1ppm, and one very high at 57ppm and another at 3ppm. The stock grazing guideline for dieldrin is 0.01ppm with a risk of bioaccumulation into stock meat, milk and eggs.

In hindsight the nine dips without elevated arsenic should have been tested for dieldrin as it is possible that this was the only chemical used when it was available 1940-1961, rather than the previous assumption that arsenic was the main dip chemical of choice, and dieldrin was sometimes used in the same dips. This sampling regime will be adopted with any further dip sites.

5.8 Copper

Sometimes there are footbaths beside the sheep dips and the foot rot chemicals were either formalin, which does not leave a residue, or copper a metal that remains in the soil often visible as blue/green specks. At high concentrations copper is phytotoxic producing areas of stunted grass, and at moderate concentrations it is toxic to soil organisms including earthworms, but not stock or humans. The XRF detected 4% of copper at one footbath site, 400 times too high for earthworms and soil health.

6. DISCUSSION

6.1 The Project Was Successful

Location of sheep dips is the key to managing the risk, and the combination of free soil testing and practical advice encouraged farmers and other landowners to find out what the soil was like around their historic dip. It was a hands-on practical way to raise awareness of the potentially toxic sheep dip residues that may remain in the soil around old dip sites, and discuss the range of low cost options to manage the risk from them. We received good feedback and a number of farmers said they decided it was better to know whether there was a

risk from the old dip than to continue with the uncertainty for their stock health and their family.

More landowners have come forward requesting free soil testing for metals.

6.2 Heavy Metals at a Slipway

While we had the XRF in Takaka for a sheep dip we checked the beach and estuary at the Waitapu slipway and found very high concentrations of copper (8%) and also lead, zinc and tin, exceeding by 1,000 times the estuary sediment guidelines. The issues around this site and eight other slipways are being followed up.

6.3 XRF Efficacy

In 2009 there were only two XRFs in NZ, and we hired the XRF and technician from Auckland. However, now there is a consultant in Havelock licenced to use an XRF which makes it cheaper and more convenient.

In addition to testing around the other slipways, we can use it to investigate the problems of retail storage of treated timber, historic orchard spray sheds, clean fills and other HAIL sites (Hazardous activity and industry list).

It is also available for landowners to use when they excavate or remediate a site, such as a sheep dip on residential land. It is very cost effective, and the immediacy of the results saves time and money.

6.4 Funding

The Ministry for the Environments Contaminated Sites Remediation Fund will consider funding 50% of the next XRF project as a "Preliminary Site Investigation" after council has carried out the "desk top" study to locate the old dips. A similar deal may be possible with the Slipways. The next application round for CSRF is March 2012 and both these projects will be put forward.

7. RECOMMENDATION

That this report is received

8. DRAFT RESOLUTION

THAT the Environment & Planning Committee receives the Sheep Dip Project report REP12-02-02

A handwritten signature in cursive script that reads 'Jenny Easton'.

Jenny Easton

Resource Scientist - Contaminants

Appendices: Photographs of sheep dips



Outline of filled-in plunge dip, metal ramp at entry.



Flags showing extent of arsenic contamination out from the corrugated iron spray dip



This sheep dip yard has been used for pigs, and their pen on the concrete draining pad.



Flags out from buried dip opposite mound.



Above: Dip site with 1.4% arsenic near dip entry at flag “4” and flags showing extent out from that end.

Below: Same dip with rubble in it.

