



Rural Contamination Scenarios

Lightning Ridge 2013

Malcolm Dale

Principal Environmental Scientist

EDAP

Environmental Development and Allied Professionals

PARSONS BRINCKERHOFF

Overview

- Introduction
- Types of rural contamination
- Contamination examples in rural settings
- Exposure scenarios
- Asbestos in soil
- Challenges for rural contamination
- Summary
- Contaminated land links
- Questions?

PARSONS BRINCKERHOFF

Types of rural contamination

Contaminated sites, are not limited to urban areas, are also present in rural areas.

- Agricultural (feedlots, saleyards, fertilisers, crop spraying, cattle and sheep dips)
- Junk yards (car/wrecking, farm tips, machinery graveyards)
- Building fabric/materials
- Landfills
- Fuel storage (service stations/farm tanks)
- Old railway lines
- Mining areas
- Sewerage/waste treatment plants
- Asbestos (buildings, dumping, naturally occurring asbestos)

PARSONS BRINCKERHOFF

Sheep & cattle dips/sprays

Primary contaminant sources
Pesticide storage/mixing
Pesticide container disposal/washing out
Dripping animals/dip, holding yards, paths
Dip overflow
Seepage from base of dip
Air dispersion (from spray dip)
Primary contaminants
Organochlorine pesticides (DDT, DDD)
Organophosphate pesticides (Chlorpyrithos)
Other pesticides (Ethion)
Arsenic
Mixing agents (incl hydrocarbons)
Others

PARSONS BRINCKERHOFF

Depots/workshops

Primary contaminant sources
Fuel storage and dispensing
Waste oil tanks/sumps/spills
Bitumen/emulsion storage/use
Service pits
Waste including batteries
Chemical storage incl pesticides
Primary contaminants
Total petroleum hydrocarbons (TPH)
Benzene, toluene, ethyl benzene, xylene (BTEX)
Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc)
Pesticides
Polycyclic aromatic hydrocarbons (PAHs)
Asbestos

PARSONS BRINCKERHOFF

Farm tips/illegal dumping

Primary contaminant sources
Vehicle bodies/parts/waste oils/tyres
Pesticide containers
Fencing materials
Dead animals
Building materials (incl asbestos)
Household waste
Primary contaminants
Pesticides residues
Heavy metals (particularly Cu, Pb, Zn)
Hydrocarbons (bitumen, waste oil etc)
Bacteriological
Asbestos
Unknowns

PARSONS BRINCKERHOFF

Agricultural activities

Primary contaminant sources
Pesticide storage/mixing/use
Fertiliser storage/use
Crop/pest spraying
Effluent (saleyards, feedlots etc)
Spills and leaks from machinery
Air dispersion (from spray dip)
Primary contaminants
Pesticide residues
Heavy metal residues
Nutrients (nitrogen, ammonia etc)
pH
BOD/bacteriological
Many others

PARSONS BRINCKERHOFF

Farm buildings

Primary contaminant sources
Heating oil/fuel storage
Chemical storage
Asbestos building materials
Spills and leaks of hydrocarbons
Incinerators
Metal corrosion
Primary contaminants
Hydrocarbons
Heavy metals (particularly Pb)
Pesticides (e.g. for termites)
Paints/solvents etc
Asbestos
Many others

PARSONS BRINCKERHOFF

Exposure scenarios

Exposure	Risk
Ingestion of lead based paints, impacted dust or soil	M-H
Ingestion of vegetables or eggs grown in contaminated soil	L-M
Ingestion of water impacted by metals, organics or other compounds	M
Dermal contact with metals or organic compounds	M
Inhalation of dust metals and PAHs	L-M
Inhalation of toxic fumes e.g. benzene	L-M
Inhalation of asbestos fibres during renovation, demolition or earthworks	M-H
Asphyxiation from build up of toxic gases or depletion of oxygen	L
Explosions resulting from build of flammable vapours (including methane)	L
Migration of runoff to water ways	M
Erosion of sediment to drainage lines	M

PARSONS BRINCKERHOFF

Asbestos in soil

More asbestos found at children's oval

» NATALIE O'BRIEN

Widespread asbestos contamination has again been discovered across a children's football field in Rockdale, prompting fears the oval may have long been a dumping ground.

The shock discovery of chunks of asbestos in the topsoil on the Ador Avenue ground was made after Rockdale City Council had spent almost $600,000 cleaning up an illegal dumping of asbestos-contaminated soil at the site in 2010.

Documents obtained by Fairfax Media under government information access laws have shown the oval, which was home to the St George United Football Club, had been given the "all clear" when workers discovered more asbestos.

An email to the council in April last year said workers had "found building waste, glass, concrete footings, security fencing in disrepair or missing and most alarmingly a considerable amount of asbestos which flies in the face of your 29/11/11 final clearance certificate."

Environmental experts conducted more tests, checking the soil to a depth of 20 centimetres and found asbestos in five spots. Their report warned last August that "the site is not safe with regard to the asbestos hazard".

The report suggested two options to fix it – removing the top 20 centimetres of soil or "capping" the area.

But an internal email in November last year revealed the council got a second opinion that was more favourable in "terms of budget and constraints". A council spokesman said they went with the second opinion, which was to "emu pick" fragments of asbestos, lay a geotextile surface and returf.

"The important thing is that there were no free asbestos fibres identified in any soil sample. The pieces of asbestos cement sheet were bonded, and could not be crumbled, pulverised or reduced to powder by hand pressure," the spokesman said.

"Disgusted": Resident [redacted] outside Ador Avenue Reserve.

In October 2010, the St George United Football Club arranged for clean topsoil to be delivered to the field. The sand arrived, but 3000 tonnes of it was found to be contaminated with building waste and asbestos. Internal council emails reveal that the sand came from a local building site. Fairfax Media has been told that the oval has been top dressed with sand numerous times in the past seven years.

After the dumping, the Environmental Protection Authority issued a number of clean-up notices, only to withdraw them and then reissue a clean-up order against the council.

By November 2011, the council had paid $546,397.25 for disposal of the contaminated soil. It was then discovered the ground still contained asbestos.

No one has been charged with the dumping. The council has entered a secret deal with the company that supplied the top soil. The deal, which is the subject of confidentiality agreements, is understood to involve the company paying just a fraction of the clean-up bill. Fairfax Media has been told that a third party was suspected of involvement and documents show the council had attempted to continue investigating the illegal dumping.

The council spokesman said Ador Avenue Reserve was still closed but the soil had been tested for asbestos and other contaminants and had again been given the "all clear".

[redacted] was "disgusted" to learn there was still asbestos on the sports field. She and her husband, Alfred, bought their house on Ador Avenue 18 years ago.

"We used to walk our dog [on the ground], our kids used to play soccer, and my husband used to coach a few soccer teams there," she said.

with Julie Power

Do you know more? Email n.obrien@fairfaxmedia.com.au

was "disgusted" to learn there was still asbestos in the playing field...
We use to walk our dog, our kids use to play soccer & my husband use to coach soccer....there

SMH 21 Apr 2013

PARSONS BRINCKERHOFF

Types of asbestos

- Amosite (brown/grey)
- Amphibole
- Chrysotile (white)
- Crocidolite (blue)
- Serpentine (green)

Until the late 1960s, the Australian industry used both serpentine (75%) and amphibole (25%) asbestos. Later, chrysotile increased to approximately 95% and blue and grey asbestos declined to 5%.

PARSONS BRINCKERHOFF

Asbestos in soils

Who is at risk of developing asbestos-related diseases?

We are all exposed to low levels of asbestos in the air we breathe every day. Ambient or background air usually contains between 10 and 200 asbestos fibres in every 1000 litres (or cubic metre) of air (equivalent to 0.01 to 0.20 fibres per litre of air). However, most people do not become ill from this exposure, because the levels of asbestos present in the environment are very low. Most people are also exposed to higher levels of asbestos at some time in their lives; for example, in their workplace, community or home. However, for most people, this kind of infrequent exposure is also unlikely to result in any ill effects.

eNhealth, May 2012 *Asbestos – A guide for householders and the general public*

PARSONS BRINCKERHOFF

Asbestos containing materials (ACM)

Adhesives	Fire blankets & curtains
Asphalt floor tiles	Fire doors
Boiler/furnace Insulation	Fireproofing materials
Brake shoes (vehicle, rail, elevator)	Flashing
Cable trays	Heating and Electrical Ducts
Caulking/Putties	Gaskets
Ceiling tiles and panels	Insulation
Fibrous cement pipes	Joint Compounds
Fibrous cement roofing	Laboratory flame hoods
Fibrous cement sheeting	Pipe insulation
Chalkboards	Plaster acoustic & decorative
Compressed fibro	Sprayed insulation
Construction Mastics/fillers	Thermal tapes
Electric Wiring Insulation	Textured paints/coatings
Electrical Fuse Box Backing	Vinyl floor tiles/sheets

PARSONS BRINCKERHOFF

Asbestos in soils terms

Non-friable asbestos/bonded asbestos	Material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound such as, cement (fibro), brakes and vinyl floor tiles
Asbestos Fines	Asbestos fines (AF) includes free fibres of asbestos, small fibre bundles and fragments of ACM that pass a 7 mm x 7 mm sieve.
Friable asbestos	Is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry
Naturally occurring asbestos (NOA)	The natural geological occurrence of asbestos minerals found in association with geological deposits including rock, sediment or soil

Source: Workcover & NEPM (being revised)

PARSONS BRINCKERHOFF

Asbestos in rural settings

- Derelict house burned by vandals. Asbestos cement sheeting explodes like stone on a fire and shards of fibro impact surrounding soils.
- Fire damaged fibro can also lose its integrity and be classed as friable asbestos.
- Abandoned houses/sheds on farms. Decay or demolition results in ACM fragments impacting soils

PARSONS BRINCKERHOFF

Asbestos in rural settings (cont)

- Building rubble buried following demolition of an old house or shed.
- Illegal dumping of asbestos sheeting
- Dumping of asbestos sheets in farm tips
- Importing asbestos impacted fill for general earthworks
- Used as formwork for concrete structures

PARSONS BRINCKERHOFF

Asbestos in soil (cont)

- Non-friable asbestos in fill (with other building rubble)

- Old non-friable asbestos which becomes friable as the cement weathers

PARSONS BRINCKERHOFF

Asbestos in soil (1943)

PARSONS BRINCKERHOFF

Asbestos in soil (overlay)

PARSONS BRINCKERHOFF

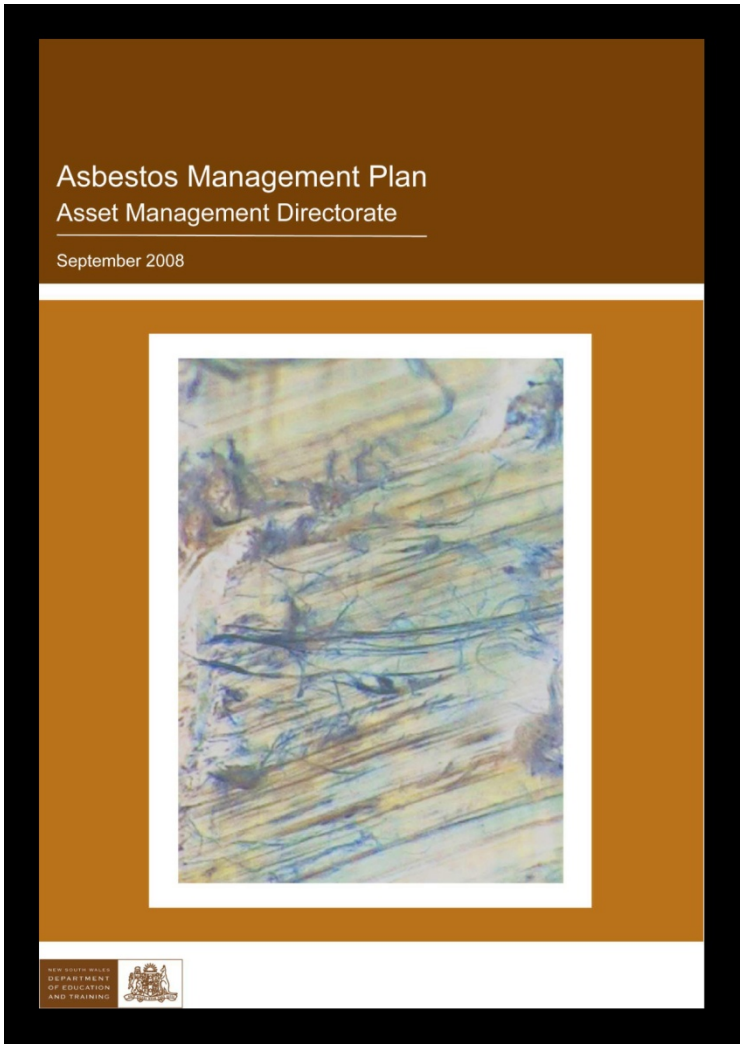
Asbestos in soil (present day)

PARSONS BRINCKERHOFF

Asbestos in soils (cont)

Main sources of asbestos impacting soil

- Demolition of buildings/fences
- Imported fill for bulk earthworks
- Building rubble used as fill
- Asbestos debris resulting for poor removal practices
- Illegal dumping
- Use/disposal of mine waste near asbestos mines (uncommon)



PARSONS BRINCKERHOFF

Challenges of rural contamination

Rural communities considering contamination issues can face many unique obstacles. These obstacles may include:

- A remote and rural geographic location.
- Costs associated with assessment and cleanup often far exceed the costs of value of the land.
- Lack of funds necessary to recruit expertise required to manage contamination issues at a council level.
- Lack of a local self-help network of professionals involved in contamination assessment, management and remediation
- Lack of local consultants with experience in contamination assessment and remediation (giving practical/sustainable advice)
- Lack of training of local staff (except EDAP)

PARSONS BRINCKERHOFF

Summary

- Sources of contamination are numerous in rural settings
- The risk to human health and the environment may be less in rural settings but needs to be assessed to determine when investigation, remediation or management is required.
- Management of water quality is important due to broader domestic, stock and irrigation use
- Assessment and remediation costs can be substantial
- Some agricultural practices (fertilising and crop/pest spraying) may have longer term impacts to soil and water quality
- Improved environmental management of chemical storage and handling and building/demolition management is required to mitigate many contamination issues
- Seek appropriate technical assistance from the regulators or reputable and experienced consultants

PARSONS BRINCKERHOFF

Other Resources/links

- NSW EPA contaminated land guidance and frequently asked questions www.environment.nsw.gov.au/clm/
- Asbestos www.health.gov.au/internet/main/publishing.nsf/Content/ohp-enhealth-asbestos-may2012.htm www.workcover.nsw.gov.au/newlegislation2012/health-and-safety-topics/asbestos/Pages/default.aspx
- Coal seam gas www.environment.nsw.gov.au/licensing/coalseamgas.htm www.appea.com.au/csg/about-csg/what-is-csg.html
- National Environmental Protection Measure (Assessing Contaminated Land) (1999) www.scew.gov.au/nepms/assessment-of-site-contamination.html (Revised version in 2013 and will contain guidance on asbestos in soils)

PARSONS BRINCKERHOFF

Questions – is this site contaminated?

PARSONS BRINCKERHOFF

PARSONS BRINCKERHOFF