1997 REPORT SHOWS TOXIC CHEMICAL LEAKAGE OUTSIDE TOXIC DEPOT

By Murray S. Thompson (BAppSci Environmental Health with Distinction 1998, Hons I Social Ecology 1999, University of Western Sydney) Copyright © 1998, 2010
http://poisonedpeople.com
http://poisoningandlegalaction.com.au/mcs.htm
EMAIL: poisonedpeople@gmail.com

The ADI Half Yearly (to June 1997) Report on the groundwater monitoring program at the Castlereagh Waste Depot clearly shows that the depot is leaking.

Bores along the perimeter of the depot, along with bores located more than half a kilometer *outside* the depot indicate a disturbing array of toxic contaminants.

Which Contaminants and Where?

Several organic compounds have been found in Bore 943a (see **Figure 1**, page 4), which is located on the south-east perimeter, on Llandilo Road and just over the road from Fifth Rd in Berkshire Park. Volume I of the Report specifically notes that Bore 943a "contained several organic compounds similar to those found in onsite bores" (ADI 1997a:52).

Volatile halogenated compounds (VHCs) (including 1,1–dichloroethane, chloroform, methylene chloride (dichloromethane) and trichloroethene), total petroleum hydrocarbons (TPH) (ADI 1997a:20; 1997b:Appendix B), and the semivolatile organic isophorone (detected before January 1997 [1997b:Appendix B]) were found.

Toluene, methyl ethyl ketone, and methyl isobutyl ketone are listed among the contaminants found in groundwater at this bore site (ADI 1997a:20-21).

The story of chemical leakage continues with Bores 942C, located just inside the north-east perimeter, and 941 (on the perimeter, south of the John Morony Correctional Centre). 942C showed "moderate concentrations" of TPHs (0.856 mg/L) and "low concentration[s] of formaldehyde" (1.3 mg/L). 941 also demonstrated the presence of TPHs in the groundwater, including toluene (ADI 1997a:22). It is important to note here that the ADI Report often notes that contaminants were not detected before this test period. This clearly shows contaminant *movement*. However, the obvious source of these toxic wastes "can not be established with certainty", according to these 'experts'. Proposed sources are given as "a local source or cross contamination of the bores during drilling and installation" (ADI 1997a:22).

With wastes indicated along two sides of the depot, we should then ask if chemicals are indicated as leaking *beyond* the perimeter. Yes they are. The south and the western perimeters have offsite bores that clearly contain indicators of toxic chemical wastes.

First, Bore 317A, located *on* the southern perimeter shows upward trends in the chlorinated hydrocarbons 1,1–dichloroethane and -ethene, *cis*–1,2- dichloroethene and trichloroethene (ADI 1997a:42).

Next, Bores 904, 905, 906, 969 and OSMB5, located from 200 to 500 meters *outside this perimeter*, have varying indications of the following chemicals: chloroform, trichloroflouromethane and vinyl chloride.

What are these chemicals doing *outside* the depot in the groundwater? Probably the same as the TPHs, toluene and VHCs in the perimeter bores 941 and 943A: migrating!

Bore OSMB2, located offsite and across The Northern Road from the depot, indicates 0.083 mg/L of TPHs in June 1997 (ADI 1997a:Table 12F-1), along with traces of arsenic, cobalt, phenol, di-n-butylpthalate, and butylbenzylpthalate (ADI 1997a:Table 12F-2).

Upgradients, 'perched groundwaters' and chemical diffusion

It was noted in the Report that Bores 905 and OSMB5 are "located upgradient to the WMC…" (ADI 1997a:27). The wording implies that the chloroform in groundwater in these two bores could not be sourced from the depot. Further to this, the presence of the chloroform, as with other chemicals found in bores along the depot perimeter, is considered to represent an "anomaly" (ADI 1997a:27). An anomaly is what you call a situation when you don't want to call it what it really is: chemical leakage from a source containing "one million tonnes of liquid waste... dumped at Castlereagh over the past 20 years" (Kerr, 1995:3).

Perched groundwaters: this term has developed a mythical quality over the past few years with regard to Waste Service NSW (WSNSW) and other authorities' usage of it. It is a term that magically 'explains', without ever providing rational and physical proof, why the groundwaters beneath the depot are somehow totally isolated from all other

geological structures. According to WSNSW theory, chemicals cannot cross this barrier and escape into groundwaters adjacent to the depot.

Modern research into landfill technology, however, contradicts ADI upgradient insinuations and exotic perched groundwater theories. Note:

> The objective of controlling the hydraulic conductivity is clearly one of limiting advective contaminant transport (ie the movement of contaminants with moving water) through the liner. However, despite more than a decade of research and the existence of good supporting field data, it is only recently that it has been generally recognized that there is a second contaminant transport process which will occur even through a very low hydraulic conductivity clay liner: that process is chemical diffusion. ...diffusion may be the dominant contaminant transport mechanism in a well-constructed clay liner. Furthermore, contaminants can escape from a waste disposal site, by diffusion through a liner, even if water flow in the liner is into the landfill (Rowe 1994:219) (emphasis added).

When one adds an EPA admission of chemical leakage from waste cells into groundwater beneath the depot (EPA official 1995, pers. comm., 26 April [recorded at the Community Monitoring Committee meeting at the Penrith City Council Chambers]) to the above scientific research, it becomes all too clear that THE WASTE DEPOT IS LEAKING.

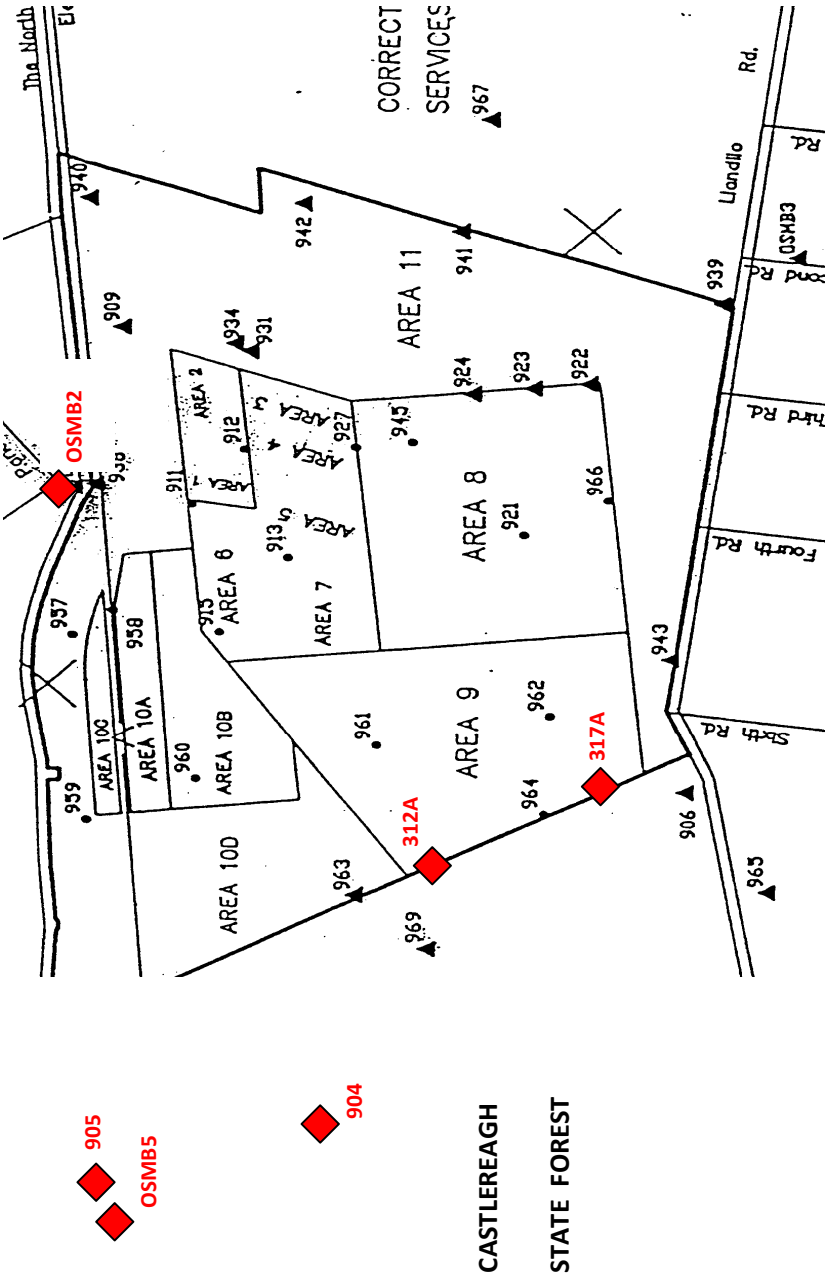

Figure 1 Site Plan and Location of Monitoring Boreholes (additional bore locations added as large diamond shapes) (Waste Service NSW 1996:Appendix 1)

Student Research Confirms Chemicals on Property

Surface and bore water tests on a property 2 km south-west of the Castlereagh Waste Depot confirm the presence of large amounts of sodium chloride, phosphorus and cadmium.

Although not acting in a professional capacity, University of Western Sydney – Hawkesbury students during 1995/96 found evidence of the above chemicals on a farm property located just 2 km from the depot. In the case of the toxic heavy metal cadmium found in the property's *bore water*, the laboratory determination of a significant level of 1.2084 ppm (1,208 ppb) was made by Technical Officers at the University. This level, according to figures set by Alloway (1990:31) is 604.2% greater than the normal lithosphere (rocky crust) concentration and 2014% beyond normal soil levels.

How Toxic Are These Chemicals?

Various studies have been accessed for this section in order to determine the toxicities of some Bore and property chemicals.

Cadmium, and other heavy metals are toxic "at quite low concentrations" (Cresser, Killham & Edwards 1993:152). Cadmium is implicated "in bone deformations" (Rowland & Cooper 1983:170), the longterm development of obstructive pulmonary disease and emphysema (Philp 1995:141), carcenogenicity in animals and humans (O'Neill & Dodet 1985:10), and nephrotoxicity (WHO 1989:168).

Vinyl chloride (Bores 904, 905, 906, 969 and OSMB5) causes liver, brain, lung and lymphoid tissue cancer (Siemiatycki 1995:103-104) and is a skin irritant (Rowland & Cooper 1983:176). It also induces tumours of the blood in the occupationally exposed and is a suspected *mutagen* (Alloway & Ayres 1993:216).

Chloroform (four of the above Bores) is implicated in cancer (Philp 1995:81;Alloway & Ayers 1993:216) and hepato- (liver) and nephro- (kidneys) toxicity (Philp 1995:152).

Toluene (Bores 941 and 943A), an organic solvent, is a mucous membrane and skin irritant (Rowland & Cooper 1983:174). More disturbingly, toluene is described as "a neurotoxin which is absorbed through the lungs…" In this respect, "it can induce mild abnormalities of the CNS… [and] death due to its inhalation has occurred as a result of solvent abuse… (Alloway & Ayres 1993:44;216). Methyl ethyl ketone (Bore 943A) can cause dermatitis and has an "irritant action on the eyes and respiratory system" (Rowland & Cooper 1983:175).

Formaldehyde (Bore 942C) is a respiratory irritant and a suspected carcinogen (Rowland & Cooper 1983:173).

Arsenic (Bore OSMB2) causes liver and lung cancer (Rowland & Cooper 1983:58), as well as skin cancer (Sunderman 1985:17).

Phenol (Bore OSMB2) is corrosive and poisonous (Aviado 1976:1068) and "can cause vomiting, eye and respiratory problems…" (Bender 1991). Further, phenol causes changes to enzymes within the endoplasmic reticulum (in cells), particularly in the liver, but also the kidneys, lungs and intestines (Alloway & Ayers 1993:210).

Chlorinated hydrocarbons (Bore 317A) promote allergic reactions such as dermatitis and are also narcotizing agents (Rowland & Cooper 1983:176-7). These very persistent contaminants have a high potential for human toxicity indicated by "reproductive defects in phytoplankton and, in mammals and birds, microsomal enzyme induction [a modification imposed on germ cells (Kellogg 1976:702)], tumor promotion, estrogenic effects and immunosuppression" (Philp 1995:77).

Trichloroethene (Bores 317A and 943A) is an organic solvent that promotes dermatitis and has narcotizing effects (Rowland & Cooper 1983:176-7). It should be noted here that 1,1,1-trichloroeth*ane* has produced deaths in acute occupational exposure and heart failure through solvent abuse (Alloway & Ayres 1993:217).

Dichloromethane (Bore 943A) converts to carbon monoxide "which forms carboxyhemoglobin in the red blood cells" (Philp 1995:153), thus reducing oxygenation and impairing respiration.

It must be pointed out here that residents around the Castlereagh Waste Depot can be exposed to fumes and liquid leachates 24 hours a day, this being a far more critical situation than monitored *occupational* exposures to chemicals. It is no wonder, then, that teratogenic impacts on livestock and humans have been noted by the landholders on a disturbingly regular basis.

Requiem

The above-listed convergence of chemical analytes found in test bores on the perimeter and outside the Castlereagh Waste Depot and the symptomatology also listed, critically synchronizes with the illnesses experienced by Londonderry residents living close to the depot.

It may be the sad truth that toxic chemicals, disposed of by way of a cruel partnership between an aberrant technology's intractable and dangerous wastes and a generally

negative governmental view of 'working class'/rural areas, are crippling the productive potential of the Londonderry region. And since the liquid wastes buried at the depot have permeated extensively, it may be very reasonably concluded that the sustainability of these lands has been and will be, for a long time into the future, severely compromised.

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