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ENVIRONMENT AGENCY

ENVIRONMENT AGENCY NORTH WEST REGION NORTH AREA

(EXTRACTS FROM)

SUBMISSION TO CUMBRIA COUNTY COUNCIL'S INQUIRY INTO THE FOOT AND MOUTH CRISIS



4.3.3. The first carcass deposits took place on 28th March 2001. Pyre ash deposits started in late July and are still ongoing. The disposal of blood contaminated leachate at Alco started around May and is still ongoing.

4.3.4. The approximate total weight of carcasses, sheep, cattle and pigs disposed of during the crisis was as follows: Hespian Wood 27,500 tonnes; Flusco Pike 11,500 tonnes; Distington 6,500 tonnes. Ash disposal to date is approximately 50-60,000 tonnes shared between Hespian Wood and Lillyhall landfills.

4.3.5. Environmental impacts can be assessed as follows:

- Carefully employed operational measures, undertaken at the sites during acceptance of carcasses and other FMD wastes, have ensured no specific pollution has been caused at landfills by the acceptance of FMD wastes. The possible spread of FMD virus through leachate has been controlled by vigorous virus control procedures overseen by DEFRA, predominately by raising the pH of the leachate using alkaline materials.
- Significant odours were generated during carcass acceptance at certain landfills when trenching into previously deposited waste. 350 complaints were received during the height of the crisis. The Agency's own monitoring verified that the odours could be considered detrimental to the local environment. In order to reduce the impact of odours a range of measures were employed. Measures included reduced trenching operations, additional cover, upgrades to the gas extraction system, operational measures such as the use of bark chippings and additional odour suppression sprays. Odour problems peaked between 15th April to 15th May. All sites have returned to a state where odours related to FMD are not significantly impacting the local environment and odours are equivalent to those which existed before the crisis.
- The deposition of pyre ash in landfills was closely controlled and monitored. There is no evidence of any adverse impact on the environment being caused by this activity.

4.3.6. Concerns were raised locally over the longer term impact of landfill void space being lost to Cumbria and the potential need for additional landfills to compensate. However, the rapid degradation of carcasses in the landfill environment and the use of Great Orton has nullified those concerns.

4.4. Mass Burial Site (Watchtree, near Great Orton) - DEFRA operated

4.4.1. The site at Great Orton represents the largest single carcass burial site in Cumbria and the UK with an authorised capacity of 500,000 carcasses. The site was built specifically to accommodate carcasses arising from the FMD cull. The site is owned and operated by DEFRA. An authorisation under the Groundwater Regulations 1998 was issued which authorised the disposal of carcasses and set conditions that regulated how the site should be built, specified that environmental monitoring should be undertaken and what records should be kept and submitted to the Agency. The absolute necessity to locate such a site was pressing if a significant public health problem was to be avoided and the foot and mouth outbreak brought under control. The Agency responded to the request to assess a mass burial site within 48 hours and

the site was located with guidance from the Agency in consultation with other interested bodies. It has been designed with input from Agency staff on a containment principle that makes use of the hydrogeology of the site, low permeability barriers, bentonite barriers and deep peripheral drains. A detailed groundwater and surfacewater monitoring programme is in place. Agency staff maintained a continuous presence at the site during the construction and disposal phases and are in regular attendance and liaison with DEFRA to ensure proper environmental standards are maintained.

4.4.2. In total the site received 466,312 animals for disposal between 27th March and 7 May 2001. The vast majority, 448,508 (96%), of these were sheep of which 293,163 (62%) were slaughtered on site. The site accepted some farm cattle 12,085 (3%), but was specifically prohibited from accepting cattle born before 1st August 1996. The table below summarises the numbers of animals disposed of at the site and their source.

Species and Source	Numbers	Percentage
Sheep Slaughtered at Watchtree	293,163	62%
Abattoir Sheep	82,302	18%
Farm Sheep	73,043	16%
Farm Cattle	12,085	3%
Farm Pigs	5,719	1%
TOTALS	466,312	100.00%

4.4.3. The impact of the site at Great Orton on the local environment has been as follows:

- The local community had serious concerns about the use/development of Watchtree as a carcass burial site. A liaison committee was set up to ensure that the local community was kept informed of developments at the site and to provide a platform for the community to express their views. The committee while not removing the concerns of the community has gone some way to alleviating them and is an example of good practice.
- Odour has been an issue at the site both at the start, while slaughtering and burial took place and in the later phases when leachate started to be produced. Good management practice encouraged by the Agency staff who were permanently on site minimised but not entirely eliminated odours. Latterly, once site restoration took place in autumn 2001 odour ceased to be an issue at the site.
- Between 26th April and 31st December 2001 the leachate from Watchtree was tankered to Workington WWTW and discharged directly to the Irish Sea via a long sea outfall. Initially the leachate was untreated but it was subsequently treated via a Dissolved Aeration Flotation (DAF) unit at the site so as to reduce the solids, biochemical oxygen demand (BOD), chemical oxygen demand (COD) and remove the colour prior to disposal to sea. Monitoring and modelling indicates that the disposal via Workington WWTW has had little or no impact on the Irish Sea. Permission for this discharge was given by the Agency under the emergency powers contained in the Water Resources Act 1991. Following detailed discussions with DEFRA the emergency provision was withdrawn at the end of

2001. The leachate is now removed from the site without treatment, before being tankered under contract to authorised waste water treatment works outside Cumbria in the North East and Midlands.

- Minor localised pollution incidents have resulted from the works on site. However, these were brought under control rapidly.
- The volume of traffic to and from the site was significantly increased, with an impact on the local community and road infrastructure. However, the rural nature of the site will have limited the impact in terms of increased air pollution.

4.4.4. In summary, the impact of the Watchtree site on the environmental factors within the Agency's remit has been minor, with the most significant impact being that caused by odours, which is regulated by the local authority. The minor impact is in no small measure due to the effort put in by Agency staff to ensure that environmental matters were addressed by DEFRA. The Agency believes that its contribution from the identification of the site, its input into the design, supervision of construction and other activities on the site have been a major contribution to the successful outcomes at the site. That said the local community remains concerned at having had a major disposal facility built on its doorstep. DEFRA are currently seeking retrospective planning permission from Cumbria County Council and have submitted proposals to develop the site for use as a nature reserve or similar.

4.4.5. The Agency will have a long term commitment in regulating the site and continued monitoring will be necessary in order to assess site performance.

5. On Farm Disposals (Agency Groundwater Authorisations)

5.1. Background

5.1.1. The Agency received 508 requests from DEFRA to undertake assessments for disposal of carcasses and ash on the infected farms and premises. Under the Groundwater Regulations (1998) the Agency was required to undertake prior risk assessment of the disposals, authorise or refuse the disposal and put in place any necessary requisite surveillance.

5.1.2. The key role of the Agency in this process was to determine the risks to the surface waters, groundwater and conservation sites. By necessity the Agency was only able to undertake a desktop risk assessment that considered:

- the groundwater vulnerability (e.g. likely presence of clay or other suitable covering material to prevent pollution of groundwater).
- proximity to surface water.
- proximity of any known surface or groundwater abstractions in the area.
- proximity to conservation interests and ancient monuments.

5.1.3. Where necessary consultation was undertaken with English Nature, and indeed during the height of the incident English Nature worked in the Agency's Penrith Office to ensure a rapid turn around of the assessments. Information on private and public water supplies were made available by the Local Authorities and included as part of the Agency assessment.

5.1.4. Approval of the site would then be given, if appropriate, subject to confirmation of our assessment by a site investigation (digging trial pits) and also subject to the provisions of The Water Code. This code stipulates the minimum distances that disposal sites should be away from streams, springs, boreholes and field drains etc.

5.1.5. The Agency set a target time of three hours for risk assessments in response to the fact that the speedy disposal of carcasses was critical. This was largely met in Cumbria.

5.1.6. A similar assessment procedure was carried out for the disposal of disinfectants (see below), however, the target time was increased to seven days, as these operations were less time critical.

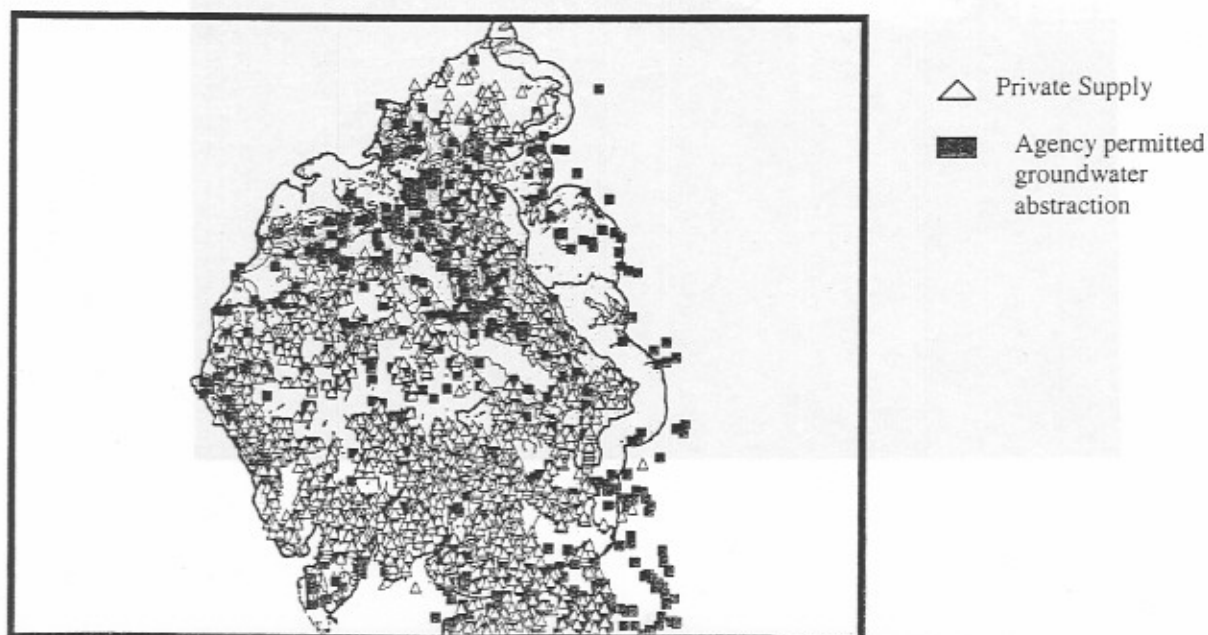
5.1.7. The statistics on disposals routes are still being collated and verified by DEFRA, but nationally some 600,000 tonnes of carcasses have been disposed of. This is equivalent to about two per cent of annual household waste or 30 per cent of commercial and industrial food waste.

5.2. Burning

5.2.1. There were over 950 pyres in England and Wales, including over 460 in south west England, 169 in the Upper Severn, 138 in Wales (excluding Upper Severn), 130 in Cumbria and 55 in the Agency's Northumbria Area

5.2.2. Burning was requested when the burial of carcasses would present an unacceptable risk to groundwater, surface water or conservation interests. Figure 2 below shows the density of private and public water abstractions in Cumbria, which was a significant constraint on the burial of carcasses. Furthermore, burning of cattle over five years old was undertaken following the concerns over the risk of BSE infective agents leaching into the environment and presenting a risk to human health. This aspect of carcass disposal conflicted with the practicalities of identifying a suitable area away from communities and the associated issues of smoke and other emissions to the atmosphere.

Figure 2. Private and Agency Permitted Groundwater Abstractions in Cumbria

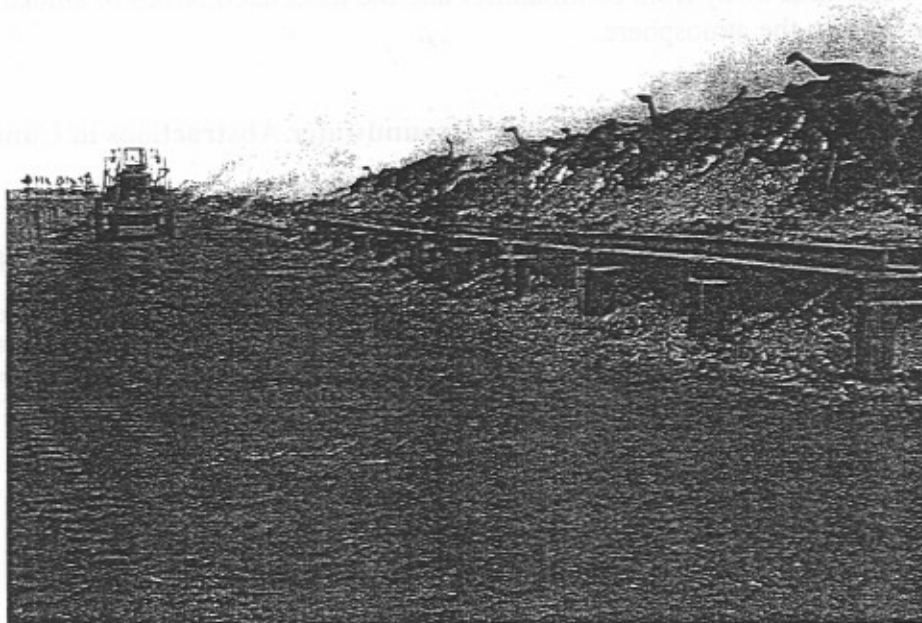


5.2.3. The Agency is not the lead organisation dealing with issues of BSE and the understanding of the movement of prions in water is not properly understood. At a national level the Agency has asked SEAC (Spongiform Encephalopathy Advisory Committee) for further advice on this issue and has identified the need for further research into the environmental fate of prions.

5.2.4. A typical pyre for 300 cows included some 175 tonnes of coal, 380 railway sleepers, 250 pallets, four tonnes of straw and 2,250 litres of diesel. Such a pyre could:

- Release body fluids, disinfectants and excess liquid fuel into the ground immediately before burning. In some areas where additional groundwater protection was required a number of pyre pits were lined to contain these.
- Emit particles (including PM_{10}), sulphur dioxide, nitrogen dioxide and other products of combustion such as dioxins or poly-aromatic hydrocarbons (PAHs).
- Leave 15 tonnes of carcass ash and 45 tonnes of other ash to be disposed of.
- Contaminate air and water from other waste burnt on the pyres.

5.2.5. There was also concern that pyres may lead to spread of the disease through the dispersal of the virus in the plume. Below is a picture of the major burn site constructed at Hallburn airfield near Longtown.



5.2.6. National estimates for total pollutant emissions were made for a range of typical pyre sizes and for the total of all animals burned up to 6 April 2001 in England and Wales (DoH *et al.*, April 2001). These will be updated when the final disposal data are available. Emissions of sulphur dioxide and nitrogen oxides are likely to be less than one per cent of UK annual emissions while particles (PM₁₀) may reach a few per cent. The dioxin estimates are very uncertain so conclusions cannot be drawn from them (for comparison, dioxin emissions on bonfire night are about 30 grams annually and those from waste incineration were 37 grams in 1999). Well managed burning destroys most pathogens.

Table: Estimated air pollutant emissions nationally from pyres.

Pollutant	Estimated emissions	Percentage of UK annual emissions
All pyres to April 2001¹		
PM ₁₀	1,171 tonnes	0.45
sulphur dioxide	424 tonnes	0.04
nitrogen oxides	184 tonnes	0.01
PAHs	15 tonnes	1.04
dioxins	25 to 252 grams	7 to 73
Pyre of 1,000 cattle		
PM ₁₀	12.5 tonnes	0.01
sulphur dioxide	4.5 tonnes	0.00
nitrogen oxides	2.0 tonnes	0.00
PAHs	0.2 tonnes	0.01
Dioxins	0.27 to 2.7 grams	0.8 to 7.6

¹Based on estimates of 75,435 cattle, 266,878 sheep and 14,234 pigs burned.

Source: DoH *et al.*, April 2001

5.2.7. Pyres had to be sited and designed taking into account proximity to residential areas to reduce potential risks to human health including annoyance and stress. Guidance on siting was supported by modelling of the potential impacts (DoH *et al.*, April 2001).

5.2.8. The total number of on farm burn sites used by DEFRA in Cumbria was 130. Ash was buried at 64 of the sites and ash from the remaining 66 sites has been removed and buried at a commercial landfill site¹.

5.2.9. We are continuing to look at on farm burial of ash and it may be that ash is removed from more burial sites at a future date. The following issues arose due to the disposal of carcasses on pyres in Cumbria:

- There was a lack of perception of Air Quality impact in the initial stages and Local Authorities, with their duties under the Air Quality Regulations, were not consulted by MAFF. The Agency highlighted this issue and eventually good consultation arrangements were put in place.
- Pyres were lit in inappropriate locations near high population centres where residents were exposed to high levels of smoke. Local Authorities received considerable numbers of complaints.

¹ It should be noted that these figures are subject to final validation

- Pyres were often incorrectly built using unsuitable materials so that they burned/smouldered for several weeks causing nuisance complaints. A correctly constructed pyre should have burned out in 3 days.
- Pyres were often lit without thought for wind direction and impact on nearby residents
- Inappropriate materials such as tyres, plastics and old sleepers impregnated with a range of dangerous substances were used despite objections by the Agency. These would have caused unnecessary levels of pollutants such as dioxins, toxic metals and volatile organic compounds (VOC's) in the plume. Use of poor quality coal gave excessive sulphur dioxide levels in the plume.

5.2.10. Although releases may not seem significant beside large industrial sources it should be emphasised that they were at ground level where the poorly dispersed plume directly affected people. Immediate distress was caused to the population in particular to those with existing respiratory problems. Public protest at the impact of pyres was such that DEFRA ceased to use pyres as a disposal option in Cumbria as of 24th April 2001.

5.2.11. With the cessation of the use of pyres, air quality returned to normal fairly quickly. As Air Quality (AQ) objectives are based on long term averages, the limited AQ data available shows that no AQ standards were breached and to date there is no evidence to suggest that emissions from the pyres have had a detrimental effect on human health or the natural environment. It may be that the report on the use of pyres by the Department of Health, the Agency et al, when published, plus additional information from monitoring programmes will provide more information on health issues.

5.3. Burial-on-farm

5.3.1. On farm burial was employed at 49 premises in Cumbria to dispose of carcasses. Burial of carcasses creates the following hazards for groundwater.

- Body fluids will be released (about 16m³ per thousand adult sheep and 17m³ per hundred adult cows within two months).
- The leachate may contain very high concentrations of ammonia (up to 2,000mg/litre), have a high chemical oxygen demand (COD)(up to 100,000mg/litre, about a hundred times that of raw sewage) and contain potassium (up to 3,000mg/litre). Sheep dip chemicals, barbiturates and disinfectants may be released but have not been found in significant amounts.
- The leachate may contain pathogens including *E.coli* 0157, *Campylobacter*, *Salmonella*, *Leptospira*, and the protozoa *Cryptosporidium* and *Giardia*, although a travel time of 50 days (outside Source Protection Zone I) should protect against pathogens apart from protozoa.
- Most degradation will occur within five to ten years but contaminated leachate may be released for 20 years or longer.

5.3.2. DEFRA identified potential burial sites and the Agency undertook desktop risk assessments to ensure that burial sites did not pose a risk to the environment as described earlier.

5.3.3. Carcasses of cattle over five years old (born before 1st August 1996) should not have been buried or landfilled. This was due to the risk of BSE transmission to groundwater as assessed by the Agency and DEFRA. This risk also applied to the burial of ash from older cattle. However, before this risk was fully recognised in the first few weeks of the crisis, older cattle had been buried at some sites. Where necessary these are subject to further risk assessment to decide if any further action is required.

5.3.4. Following the lifting of the FMD access restrictions to farms, the Agency and DEFRA conducted joint site inspections to verify the position of the on farm ash burials, which included some where the Agency had not been notified. It should be noted that the Agency took the decision not to send an officer to supervise each disposal on the grounds that the officers would need to move in and out of infected areas and, therefore, risk further spread of the disease. This site visit and subsequent re-assessment included:

- confirmation of the information used in the desk top risk assessment.
- undertaking a more detailed assessment where necessary.
- re-consultation with relevant bodies (e.g. Local Authorities and English Nature).
- identification of any environmental impacts (e.g. pollution of controlled waters).
- identification of the need for any remedial actions (e.g. cutting and sealing of field drains).
- updating the accuracy of disposal records for future reference and the public registers.

5.3.5. Only after completion of this process was the ash buried. If it was decided the risk was unacceptable the ash was removed for disposal at commercial landfill.

5.3.6. The final part of the Groundwater Regulations (1998) requirements is requisite monitoring, and DEFRA and the Agency has agreed a programme to fulfil these requirements.

6. OTHER ENVIRONMENTAL IMPACTS OF FOOT AND MOUTH DEALT WITH BY THE AGENCY

6.1. Hallburn Airfield, Longtown

6.1.1. In addition to being asked to risk assess potential burial sites the Agency was also asked to assist in the identification and assessment of the Hallburn site. Originally chosen though subsequently abandoned, as a mass burn site, Hallburn went on to play a critical role as a transfer station for materials, equipment, vehicles, staff and animal carcasses.

6.1.2. The logistics and scale of the operation meant that large vehicles used to transport carcasses to the final disposal points could not access the farms to remove them. It was therefore necessary to identify a site where carcasses could be brought in order

to tranship them from the smaller vehicles to the larger transport units. The Agency having risk assessed the site, also maintained a presence on the site to supervise construction of the containment facilities, detox units and storage areas.

- 6.1.3. Latterly, the Agency has been in liaison with DEFRA over the decommissioning of the site and removal of contaminated materials, which is still in progress.

6.2. Disposal of Disinfectants

- 6.2.1. The principal disinfectants used by DEFRA in Cumbria were citric acid, FAM30 and Vircon S. Citric acid is the only disinfectant that can be disposed of without requiring an authorisation under the Groundwater Regulations. As the Agency had no idea which disinfectants were to be used at any particular farm it adopted the precautionary principle. The Agency conducted 1331 disinfectant disposal risk assessments for DEFRA. Of these 1121 were granted groundwater authorisations. Most of the other 210 applications were withdrawn by DEFRA and re-submitted, while a small percentage were refused on the grounds that they presented a high environmental risk.

- 6.2.2. A similar risk based approach was used when siting both mobile and fixed vehicle disinfecting stations.

- 6.2.3. The potential impact of the disposal activities on both surface waters and ground water has been minimised by undertaking rigorous risk assessments of the disposal sites prior to permitting any disposal to take place. Only 27 incidents of disinfectant getting into surface waters have been reported to the Agency in Cumbria.

- 6.2.4. No long-term impact has been observed on surface water or groundwater to date. However, given the level of activity (especially with disinfectant disposal) there may have been some minor transient impact that has not been observed by or reported to the Agency.

- 6.2.5. The Agency's groundwater team has commissioned a project to assess the impact of foot and mouth disposals both in general and with a specific focus on the Eden Valley aquifer (i.e. the most critical aquifer). The project completion date is 31 March 2002 and may give further insight into the impact of FMD disposals on the environment.

- 6.2.6. The Agency also offered dedicated hotlines and training to DEFRA field officers on disinfectant and slurry disposal issues.

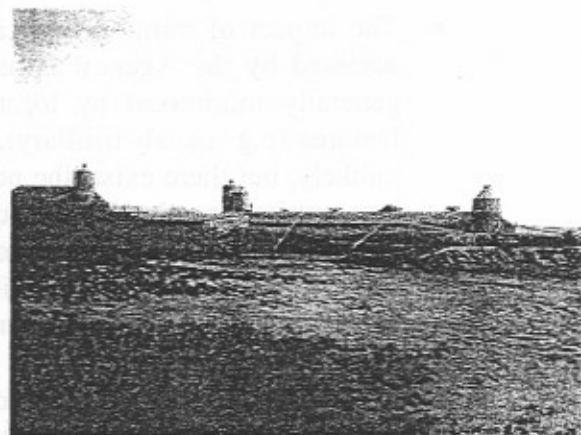
6.3. Farm Slurry

- 6.3.1. At the time of the outbreak of the disease at the end of February many slurry systems were already approaching their winter capacity, normally 4 months. As the outbreak spread farmers tried to protect their herds, on the advice of DEFRA, by keeping them inside for as long as possible and consequently herds were not released to pasture until mid May, even mid June. When systems were full to capacity slurry spreading was permitted in controlled circumstances.

- 6.3.2. As cleansing and disinfection of the farms became a major operation the need to contain the large quantities of washwaters and farm effluents was identified. DEFRA

began the construction of temporary storage lagoons to provide additional storage capacity. The Agency has issued 592 letters authorising the siting of the lagoons. The temporary lagoons are not compliant Control of Pollution (SSAFO) Regulations and consequently approvals were only given for a maximum 12 months usage.

6.3.3. In some areas, and particularly in the Penrith Spur, where ground conditions did not favour the construction of temporary lagoons. Instead above ground-tanks were used. Two main types have been used and are generally described as Dutch or butyl tanks. These are built with a 3 month life span in mind and problems did occur. Below is a photograph of a collapsed tank showing 30,000 gallons of pig slurry escaping. Such tanks are not designed to take liquids with specific gravity's greater than water and it had been overfilled. Fortunately, none of the slurry entered controlled waters. As a result of this incident DEFRA undertook an audit of all above ground tanks to confirm their integrity. In total 16 incidents of slurry/silage pollution in Cumbria were reported to the Agency.



6.4. Disposal of other Agricultural Waste

6.4.1. Non livestock material on farms where animals have been slaughtered has of necessity been disposed of as agricultural waste. As the waste is not controlled waste the Agency has no record of how much or where such waste has been disposed. DEFRA have stated that they have no record of the quantities disposed of. They have been able to confirm that the following disposal routes have been used across Cumbria but do not have details on a farm by farm basis.

- Hay, straw and wood disposed of on pyres.
- Hay, bedding and straw disposed of to middens then spread on fields.
- Plastics to pyres or on farm burial pits.
- Cowmats used to line stalls, to landfill.
- Asbestos to landfill or on farm burial pit.
- Farm equipment to on farm burial pits.
- Chemicals disinfectants retained for future use.

6.4.2. Clearly disposal of agricultural waste in this manner imposes an additional burden on the environment but it is very difficult to make a judgement as to its immediate environmental impact. In the longer term, the Agency's routine environmental monitoring programme may pick up any adverse impact.

6.5. Soils

- 6.5.1. Impact on soils has not been fully assessed. Possible impacts could be increases in poly-aromatic hydrocarbons (PAH's) and dioxins in soils adjacent to pyre sites or within the plume deposition footprint, but without quantitative data we are unable to confirm or refute this.

6.6. Biodiversity

- 6.6.1. Very limited information is available as to the impact of FMD on biodiversity, due primarily to the fact that field surveys have been suspended / cancelled over much of the NW Region (British Trust for Ornithology bird surveys, great crested newt, otter, freshwater pearl mussel and watervole to name but a few). Routine monitoring has similarly been affected (Agency river sampling and biological monitoring, English Nature site condition monitoring). However, the following observations have been made:

- The impact of burning and carcass burial on sites of conservation interest was assessed by the Agency as part of the associated risk assessments. These were generally minimised by locating sites a safe distance from sensitive interest features (e.g. marsh fritillary). Short range NOx and SOx impacts are therefore unlikely, but there exists the possibility of long range impacts of eutrophication of low nutrient peatland sites such as the Solway raised mires and the Pennine blanket bogs. There is some concern, that in a few cases, pyres and disposal sites were not sited at agreed locations, so there remains the possibility of unforeseen impacts on biodiversity concerns.
- There is anecdotal evidence of localised impact on wildlife in farm buildings during disinfection, post-FMD infection. Bats, owls, swallows and housemartins have been displaced by thorough scouring of farm buildings.
- The infection and subsequent destruction of animals grazing the coastal saltmarshes on the Solway have meant no grazing has occurred this summer. There are concerns the rank sward that has developed over this period is not suitable for over-wintering geese to the extent that Rockcliffe marsh is being mowed to restore condition prior to their arrival.
- Several coastal natterjack toad colonies have similarly been affected by the loss of grazing and the subsequent development of rank grasses, the effect of which has yet to be quantified due to access restrictions.
- Observations indicate a lot more flowers in the countryside, even on improved pasture due to the lack of grazing pressure. Most grasslands were cropped as big bale silage, hay or haylage. On common land where semi-natural vegetation dominates, the reduction in grazing pressure is likely to have provided some real gains.

- 6.6.2. In summary there have been some gains and some losses. The long term impact on biodiversity will be determined by the course taken by the farming community as it seeks to restore the industry.

7. IMPACT OF FOOT AND MOUTH ON OTHER AGENCY WORK

7.1. For the Environment Agency at Penrith the majority of its core work is in the field actually working in the rural and urban environments. The closure of footpaths and movement restrictions meant that access to the countryside was extremely limited. In addition the Agency took the decision not to enter onto farms or rural land as a bio-security measure, except in the case of a category 1 incident (i.e. the most serious) or flooding event. In those circumstances where access to land was necessary, guidance and assistance from DEFRA was sought and appropriate disinfection protocols used.

7.2. As a consequence Agency operations in Cumbria were severely reduced and in some cases did not take place. However, resources were re-deployed as part of the Agency's response to foot and mouth, or in other areas of work not affected by the crisis. Examples of those areas of work affected include:

- Routine chemical and biological monitoring of water quality in surface watercourses was curtailed between April - December 2001. Since January 2002 monitoring programmes have resumed. Biological monitoring of 120 river sites, with a previously well documented history has shown no evidence of any general or widespread decline in the biological quality of Cumbrian rivers coincident with the foot and mouth epidemic and the activities associated with it. Though there were a number of water pollution incidents reported to the Agency, the fact that we have subsequently been unable to detect any decline in quality at monitoring sites implies that any impacts from these events were limited, localised and/or transient.
- The lack of routine clearance of trees and other material from small watercourses has reduced levels of flood protection and land drainage in some areas although it may have had benefits for wildlife. No capital or non-emergency flood defence works were delayed as a result and contingency plans were in place in the event of a flooding event.
- There have been no incidents reported to the Agency in Cumbria of private or public water supplies being impacted by FMD.
- The outbreak did cause some minor work programmes to be delayed and three major improvement projects to be delayed because of access restrictions. The three projects are :
 - a) A one year delay to the construction of a new fish pass at Heltondale on the upper Lowther.
 - b) A delay to the completion of a low flow alleviation scheme on the River Gelt.
 - c) Improvements to the waste water treatment works in the Duddon estuary to be carried out by United Utilities.

With restrictions lifted these projects can now progress.

- There is no evidence to support whether or not there has been an increase in illegal activities. Much of the illegal activity investigated by the Agency is identified by either officer's contact with operators, intelligence gathering, or reports from the public. As neither officers nor the public have been out 'in the field' due to foot and

mouth movement restrictions, intelligence gathering has been severely limited and as such it is not possible to quantify any increase in activity.

8. CONCLUSIONS

- 8.1. Overall the foot and mouth crisis is believed not to have had a major impact on the environment within Cumbria. Where the impacts have been apparent (e.g. odours at carcass burial sites, plumes and chemicals from pyres, spills of slurry and disinfectant to surface waters) the duration has been relatively short. The use of modern citric acid disinfectants rather than the phenolic based products used in 1967, meant the potential risk posed by widespread disinfectant use was greatly reduced. Where the impact has been positive e.g. less pressure on the landscape due to fewer animals and fewer tourists, the impact has been of longer duration but likely to be transient as visitors will return and farmers will restock.
- 8.2. The above conclusion is based on the mainly qualitative information available to date. It may be that, as more quantitative data becomes available either through routine monitoring or via specific FMD focussed monitoring programmes we will revise our conclusion.
- 8.3. Public concern was significant and understandable. However, there were some examples of mis-information demonstrating the importance of clear lines of communication and dissemination of information from the earliest possible opportunity to avoid undue concern. Co-ordination between environmental and health monitoring programmes and dissemination of information to all relevant organisations and the wider public is also essential. There is also a need to develop an effective method of public consultation that allows the general public to participate, yet does not slow any actions unnecessarily.
- 8.4. The relatively low level of environmental impact is in no small measure due to the rigour with which the Agency has sought to protect the environment. Throughout the precautionary principle has been adopted, risks being assessed by means of risk assessment procedures in advance of action being permitted, at times in the face of significant resistance. In addition, at regulated sites such as landfills, licence conditions have been enforced irrespective of the emergency that existed and pressures on staff to take a more "pragmatic" approach. Finally we have put in place monitoring regimes to check that the actions we sanctioned will not leave an adverse legacy for Cumbria.

9. RECOMMENDATIONS

- 9.1. Further monitoring and research is required to assess long-term impacts and clarify any uncertainties that may remain over environmental and health impacts from the disposal methods used. For its part the Agency is continuing to do this in liaison with local authorities and health authorities.

9.2. During a large scale incident such as FMD the Agency would recommend:

- Better co-ordination of all organisations involved in environmental issues, especially in respect of local air quality and environmental health issues.
- Data management and the co-ordination of the provision of information in an accurate and timely manner needs to be an important aspect of any contingency plan reviews.
- A review of contingency planning for all organisations may be required to ensure that lessons learned from the latest foot and mouth disease outbreak are used to ensure more effective implementation of resources in any future similar situations. In particular, incidents or crisis's involving the use of more aggressive or persistent chemicals.
- The role of public consultation should be included in any future contingency plans.

Environment Agency,
Ghyll Mount,
Gillan Way,
Penrith 40 Business Park,
Penrith,
Cumbria,
CA11 9BP

26 April 2002

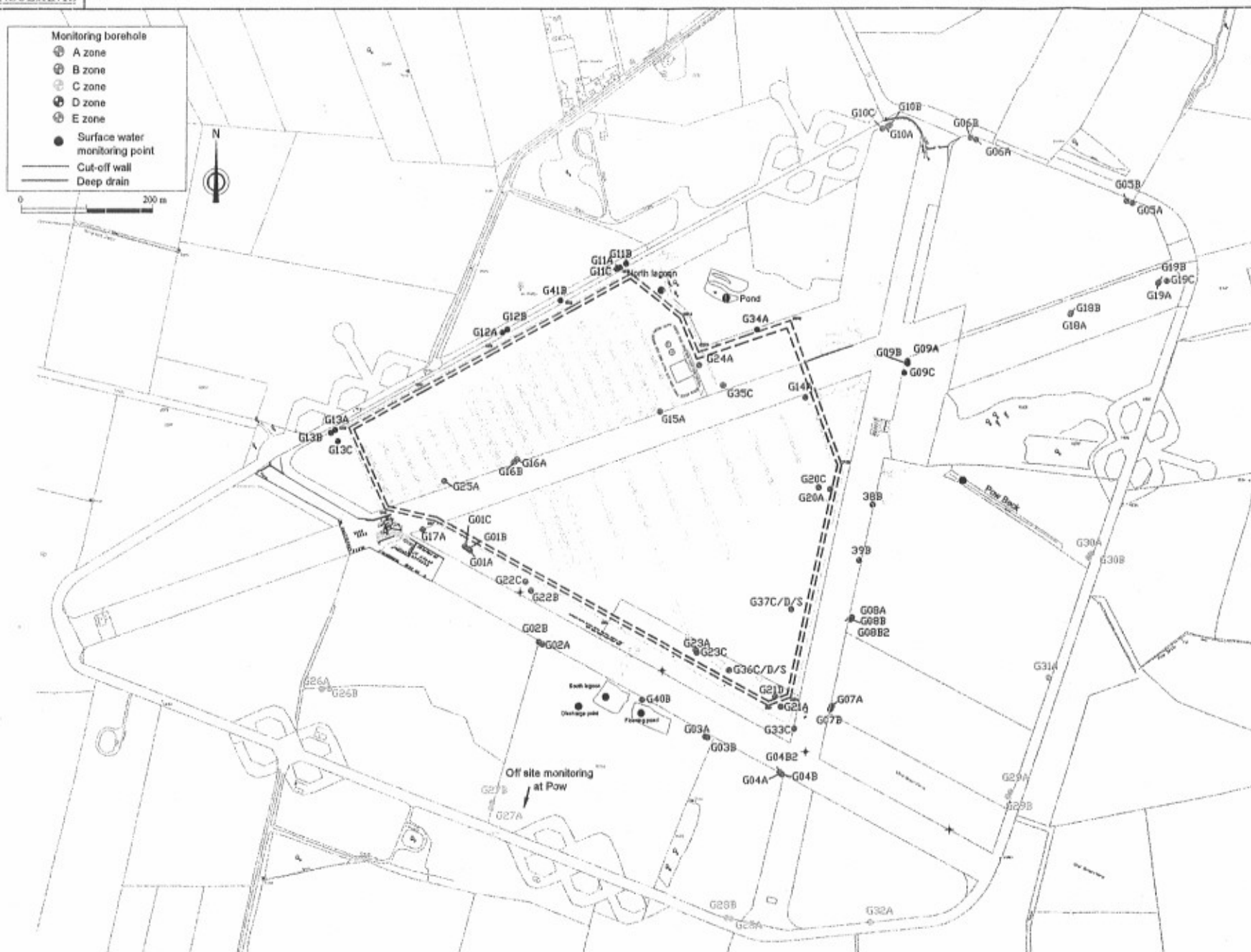


Figure 3.1 Watchtree - leachate generation profile

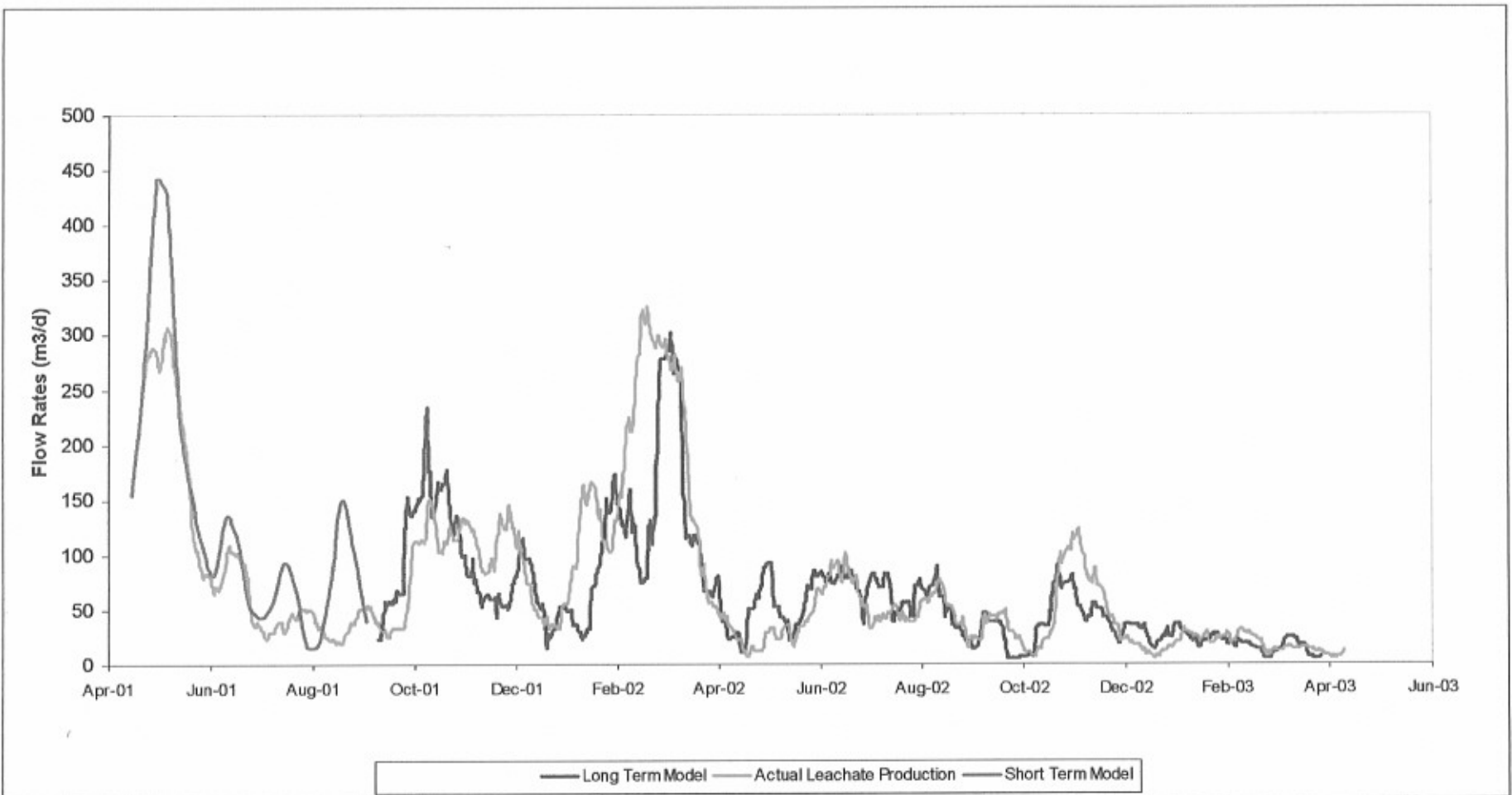


Figure 3.2 Comparison of leachate volumes - pre and post capping

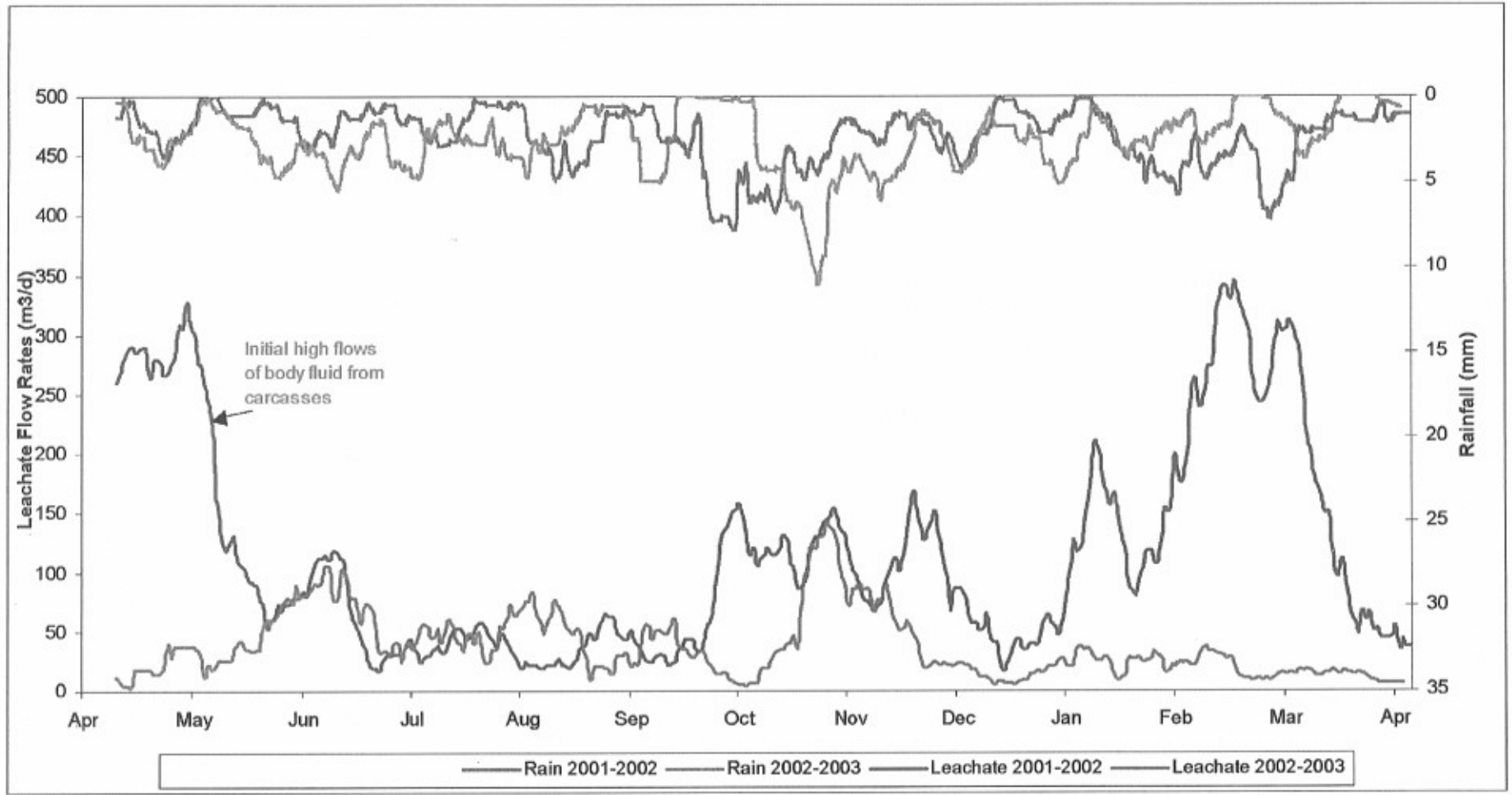


Figure 3.2

Figure 9.3 Schematic section showing dual containment system profiles

