

Public Perception of a Low Level Radioactive Waste Facility Proposal : A Case Study during a Planning Application

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ABSTRACT

The company running a landfill site in North Northamptonshire, England, which was already approved for disposal of hazardous wastes in the landfill, applied to the County Council for Planning Permission to dispose of radioactive waste on the site. The proposal was for disposal of low level radioactive waste containing less than 200 Bq gm⁻¹ of a range of radioactive elements found in the nuclear and medical industries. The proposal was strongly opposed by local residents, who made strong representation at the open County Council Planning Committee meeting. There was concern about increased lorry traffic, and fact that all waste would come from out of the county. However, much of the evidence presented by the local pressure groups related to their perception of the risks of radiation. In particular, there was a concern that all radioactivity was dangerous, which manifested itself in a heightened anxiety about the degree of hazard associated with very low level waste, both in terms of the ambient dose rate, and the amount of radioactivity leaking into the surrounding countryside. There was also mistrust that the limits would be adhered to, that the site would be properly maintained after the facility was full, and a concern that there would be further applications and extension of the life-time of the facility which would increase risk.

This paper reviews the public presentations and makes some recommendations for future planning applications.

KEYWORDS: Low Level Radioactive Waste, Public Perception, Risk Analysis.

1. INTRODUCTION

The announcement that the company running a hazardous waste site near King's Cliffe in Northamptonshire, UK, wished to apply for a new license at the site to include low level radioactive waste was greeted with immediate local public opposition. The company, Augean PLC, applied to the County Council for planning permission to dispose of the waste, and many local groups and individuals made written and verbal representations opposing the proposal.

The proposal was to accept radioactive waste in the lower part of the Low Level Waste (LLW) band, limited to containers with a surface dose-rate of less than 10 $\mu\text{Sv}\cdot\text{hr}^{-1}$, which would be placed in a pit with an impermeable lining, covered with soil, and ultimately sealed with an impermeable lining forming a sealed cell, and earth bund. The waste would be high volume, including contaminated building materials, with limited radioactive contamination. Radioactivity reaching any water leaking from the cell (known as leachate) would be limited by the solubility of the radioactive material, the primary containment, and the impermeable lining. The village of King's Cliffe, with around 1,200 inhabitants, is around 1.5 miles from the site.

Many of the representations expressed concern about the radioactive risks associated with the proposal, despite the fact that the regulatory authority, the Environment Agency, considered that the proposals were acceptable.

This paper reviews the issues relating to radiation risk raised by the public and the implications for similar future proposals. Other reasons were cited for refusing permission for disposal of the waste. These included the fact the National Policy for disposing of radioactive waste had not been completed, and that the site, although in the centre of the England, was not close to any one nuclear power station, which were perceived as being the sources of the majority of waste to be disposed, and therefore where the waste should be

landfilled (proximity principle). This paper also does not consider whether the public perception of harm should legally be taken into account in the planning process, which was dealt with at length in the Planning Inspector's report (Smith, 2011, p44-52).

2. CHRONOLOGY

The East Northants Resource Management Facility (ENRMF) is an existing hazardous waste landfill site operated by Auegan PLC near King's Cliffe, Northamptonshire. In August 2009, Auegan submitted a planning application to Northamptonshire County Council to extend disposals to Low Level Waste (LLW). According to their statements, this would principally be construction waste, mainly soils and rubble, with small amounts of radioactivity, arising from the demolition of ancillary buildings, such as offices and infrastructure, at decommissioning power stations, as well as other sources, such as hospitals and science and research facilities. At that stage, Auegan commenced a programme of local consultation and presentations.

In addition to the necessary application for approval under the Radioactive Substances Act from the Environment Agency which was made in July 2009, Auegan applied for planning approval from Northamptonshire County Council (NCC). The Environment Agency issued a Draft Environmental Permit on 19 February 2010, which indicated that they were minded to grant the Permit subject to further consultation.

The NCC Development Control Committee met in public session on 16 March 2010 to consider this application and, despite a recommendation by the County's planning officers to approve the proposals, the Councillors resolved to refuse the application. A petition with 3,077 signatories was presented to NCC prior to the meeting. Auegan appealed this decision, and subsequently a public inquiry was held from 26 October 2010 to 24 November 2010. The Planning Inspector upheld the appeal, and on 24 May 2011, the Secretary of State issued a letter confirming this. Local residents appealed against this through the courts, finally losing at the Court of Appeal on 17th January, 2012. Radioactive waste was first delivered to the site on 21st December 2011.

It should be noted that the Fukushima nuclear power station disaster, following the Tōhoku earthquake and tsunami, occurred on 11 March 2011, and therefore did not influence public perception or the planning process until after the Secretary of State's decision.

3. METHODOLOGY

The documents from the planning process and the subsequent appeal and planning inquiry are available on websites including those of Auegan PLC, Northamptonshire County Council and King's Cliffe Wastewatchers. These have been reviewed, together with statements made at the County Council Development Control Committee meeting.

4. CONCERNS RAISED

4.1 KNOWLEDGE OF THE RANGE OF RADIATION DOSES AND RISKS

The written and verbal submissions by King's Cliffe Wastewatchers and local residents stressed the risk of radioactivity, as well as the uncertainty of such risks. Some concerns related to the likelihood of the radioactivity escaping the containment of the waste, and escaping into the water courses, and into the air.

"We shall produce evidence from other sites, either operating or planned, to show that King's Cliffe is markedly inferior. We shall argue that in public perception this makes the proposal unsafe." (King's Cliffe Wastewatchers, 2010).

Whilst some comments related to the chance of accidents or design failures, many comments suggested that the health risks were inherent to radiation. These comments appeared to take no account of the strength of the radioactivity. Some noted that any risk was too high, and did not compare the risk to everyday risks, such as their risk in driving to the Inquiry, or having a chest x-ray. In this regard, it is worth noting that King's Cliffe, and other nearby villages, are in a high-radon area, where 10 to 30% of existing housing has a likelihood of having average indoor radon levels over the Action Level of 200 Bq.m⁻³, and yet, according to

Health Protection Agency (HPA) figures, only 18.5% have tested their homes for radon (Rees *et al.*, 2011); even though occupants could be receiving radiation doses, and hence health risks far greater than those that may come from the waste facility.

While many over-estimated the risks, there was some logic to the submissions which asked why the local community should suffer any additional risk, however, small, when the radioactivity disposed there would come for outside the county. In this the complainants did not accept a national view that the waste is being generated, and argued the proximity principle applied.

In considering the submissions, the Planning Inspector made the following comment :-

“There is a wide gulf between the scientific evidence/technical assessment and the lay opinion in the locality, based on misperceptions, misconceptions and misinformation. The maximum radiation dose that a member of the public could receive is, even adopting extremely conservative assumptions, so tiny that it should when objectively assessed give rise to no concern.” (Smith, 2011).

4.2 CONCERN ABOUT LOW RADIATION RISKS

As part of the concerns about radiation risks, concern was expressed in the submissions that no level of radiation dose is safe.

“We are unconvinced by the oft-repeated arguments of the Appellant, the regulators, and most of the scientific establishment as to the safety of Low Level Radioactive waste.” (King’ Cliffe Wastewatchers, 2010).

In part this is a consequence of public unawareness of the relative risks of everyday life, and a lack of acceptance of the logic of the scientific assessment and categorisation of low risks. It is also a consequence of the linear no-threshold theory of radiation risks, where the difficulty experts have in presenting this concept can cause the public to infer that there is an appreciable risk, and, also, that doubt exists about the extent of this risk, as demonstrated in this quotation from Wastewatchers :-

“We will refer to evidence from Government, and other, documents, to show official and public concern over the safety of this material. We will point out that the EA confirms there will be health effects resulting from it, and question its assumption that these are of no consequence to those living near to the site. We would also argue that these doubts are sufficient to constitute an ‘objective’ perception of harm.” (King’ Cliffe Wastewatchers, 2010).

Finally, although the majority of the scientific community, and organisations such as ICRP, and regulatory authorities, such as the Environment Agency, are clear on the extent of radiation risks, the application of legislation to limit the risks, and also the means to assess the risks, the public take notice of other experts to suggest that the scientific community is deeply divided, and that there is doubt on such radiation risks.

“We shall call an expert witness on the health effects of Low Level Radiation, Dr. Chris Busby, to question the statements that such levels are safe. This will add support to our arguments that not enough is known about radiation effects to render this application free from concern.” (King’ Cliffe Wastewatchers, 2010)

4.3 LEUKAEMIA AROUND POWER STATIONS

One objection raised verbally at the NCC Development Control Committee meeting of 16 March 2010, and also made in writing to the Planning Inquiry was the potential for an increase in childhood Leukaemia. One member of the public who spook at NCC had found a report on the leukaemia cluster at Sellafield, which was initially linked to radiation received by the fathers, who were Sellafield workers (Gardner *et al.*, 1990). In reality further research has cast significant doubt on this hypothesis, and established that a more likely hypothesis was a viral agent linked to a large influx of people from elsewhere to work at the facility who had no prior exposure or immunity to the viral agent (COMARE, 2002; Wakeford, 2009).

This does demonstrate the limits of using the internet as a source of high grade information.

It is worth noting that the question of childhood disease is an emotive issue in the locality, as Corby is nearby, and there have been a number of childhood abnormalities linked to inadequate clearance of a contaminated steelworks, and where the Borough Council lost a court case and had to agree compensation to families (see for example Daily Telegraph, 2009). The common perception that radiation can result in similar abnormalities adds to local concern.

4.4 BEST AVAILABLE TECHNIQUES AND THE LEVEL OF RADIOACTIVE WASTE

“We shall produce evidence from other sites, either operating or planned, to show that King’s Cliffe is markedly inferior. We shall argue that in public perception this makes the proposal unsafe.” (King’ Cliffe Wastewatchers, 2010).

One important area of discussion was around the issue of the Best Available Techniques (BAT) assessment of the arrangements at the site, and whether the design was sufficient. It should be noted that the site was planned to be open, so that rain could fall on the partially covered waste, whilst the cell was being filled, over a number of months. Images of other radioactive waste sites with waste in strong metal containers in underground areas or with a roof were shown to the NCC committee, and at the Planning Inquiry. This was quoted as a major reason why the NCC committee rejected the application. As noted in the Planning Inspectors report, most of the sites are designed to accept waste with higher levels of activity than the maximum proposed of 200 Bq.g⁻¹, and therefore had to have a higher standard of design.

It is perhaps worth noting that the proposed limit is at the lower end of the official “Low Level waste (LLW)” category, which can otherwise extend to 4000 Bq.g⁻¹, which some of the other sites could receive. Other categories are called Very Low Level (VLLLW), and Intermediate Level Waste (ILW). This may add to public confusion, especially in view of the limited awareness of the very wide range of radioactive concentrations, and the mistrust that the operator can distinguish and refuse higher activities, or would seek an upward extension of the license.

4.5 MISTRUST OF OPERATOR

Many submissions centred around whether the operator would perform the work to the required standard, and would ensure that the accepted waste was within the agreed limits, and therefore there would be leaks of radioactivity in the air, and to watercourses.

4.6 MISTRUST OF REGULATOR

The comments of the King’s Cliffe Wastewatchers extended to concern that the Environment Agency would not monitor the site sufficiently.

“Independent monitoring is in the hands of the regulator - the Environment Agency. We shall question the independence of this body, and also the desirability of an organisation being solely responsible for the external monitoring of systems that it helped set up, and which it authorised.” (King’ Cliffe Wastewatchers, 2010).

4.7 CONSIDERATION OF WORST CASE SCENARIOS

As noted above, there was concern that the potential for accidents, acts of God, and other incidents had not been adequately considered in the assessment of the safety of the site, either by the operator or the regulatory authorities.

“Given this concern we are unconvinced by the tone and content of the risk assessment, which we believe errs too much on the side of risk denial. We shall look at individual examples to see how far they cover expected, and unexpected, eventualities.” (King’ Cliffe Wastewatchers, 2010).

4.8 “THIN END OF THE WEDGE” ?

A final reason for local opposition was that the application would be the thin end of the wedge, making it easier for the operator to apply to extend the lifetime of the site, or to accept waste of higher radioactivity.

The application by Augean proposed that the final disposal of radioactive waste in June 2013, and public concern was that granting this initial application would lead to applications for further disposals at the site,

which would be harder to reject. Augean gave notice to NCC in June 2010 of its wish to apply for a license to extend the site to adjacent land and continue to use the site until 2026. This was prior to the Planning Inquiry, and was raised as an issue by many at the Inquiry.

However, it should be noted that the Planning Inspector explicitly recorded that he was considering the current application strictly on its merits, and that it should not create a precedent or pre-determine the outcome of the application to extend the life of the site.

5. DISCUSSION

The proposal to apply for approval to dispose of low level radioactive waste at a hazardous waste site in rural Northamptonshire has attracted continuing and vigorous local opposition throughout the planning process. Most objections related to the perceived risk from radiation, both direct, and from radioactivity leaking out from the site, despite independent expert advice that arrangements would be safe. The difference between the risk perception of the public and experts matches previous observations on risk perception which suggest that the public are more likely to object to risks that are imposed, not under their control, man-made, unfamiliar and where there is no benefit (Kletz, 1996). It is worth noting that, although the population in general, benefits from the uses of radiation which generate the radioactive waste, the fact that the waste would not be generated locally was a strong reason for objection. In addition, it was clear from the objections that the public did not appreciate the wide range of radioactivity and radiation dose, and confused the risk from high level radioactive waste and the much lower risk from the type of low level radioactive waste for which application was sought. A similar lack of appreciation of the range of radiation doses was noted by a number of studies of public perception of the risks from medical x-rays (Denman *et al.*, 2004, Freudenberg and Beyer, 2011). These studies also demonstrated a significant difference between the perceptions of experts and the general public, and prompted Freudenberg and Beyer (2011) to entitle the part of their paper reviewing this as “Experts and Laypersons Live on Different Planets.”

Denman *et al.*, (2004) also note a spread of perceptions of relative risk in their respondents, and this raises the question whether the opinions considered in this paper are representative of the general public as a whole. Freudenberg and Beyer (2011), in their review of perception of medical radiation risks, note that some patients refuse medical x-ray examinations because of the perceived risk even though their doctor confirmed that the benefits outweigh the radiation risk involved.

There were 3,077 local signatories on the petition, which is significant as the population of King’s Cliffe is around 1,200, and that of other villages within 5 miles of the site is a further 3,600. However, if the petition contained signatories from the further 250,000 who live in the towns within 15 miles of the site, the number is less impressive and may not be representative of the general public view. Indeed, the representation at the Planning Inquiry prompted the following comment in the Inspector’s report :-

“Is Wastewatchers’ evidence fairly representative of community opinion? There is no membership and it appears to be a loose association of a small number of individuals, with a possible core group of 10-12 people living mainly in King’s Cliffe, most of whom have given evidence at the inquiry.”
(Smith, 2011).

Local public opposition was also voiced in a referendum organised by the local councils in 11 nearby villages on 7th April 2011 which showed 98% support for the motion "Do you want your parish council to strongly object to the disposal of low level waste in the East Northants Resource Management Facility?" by 1696 votes to 36 (50% turnout) (BBC website, 2011).

In this analysis there is no way to judge whether the public in this instance did not have an objective view of the scale and relative value of different risks, such as radon in their homes, or whether a small subset of the general public were exceptionally risk adverse in all their concerns.

A significant contributory factor is the concern for potential accidents releasing radioactive contamination. In one study Erikson *et al.* (1991) showed that the fear of contamination is perceived as threatening because radiation is not a sensory experience. In addition, Freudenberg and Beyer (2011) note several studies where

patients, when asked to describe radioactivity, recalled images of a nuclear bomb, and the destroyed reactor in Chernobyl. No doubt a repeat study would now include the reactor at Fukushima.

Like many other local campaigns against wind turbines, incinerators or new houses, the complainants took no cognisance of any national policy or need. In this case, King's Cliffe Wastewatchers, in particular, strongly challenged the national policy.

The Nuclear Industry is encouraged to consult with the public, and to be open and prompt in doing this; and best practice is to engage the locals before plans are announced. Augean organised a number of public meetings, and set up liaison groups once their plans were announced. The Planning Inspector thought this consultation was appropriate, whilst King's Cliffe Wastewatchers (2010) felt that the operator did not carry out adequate consultation and this, far from overcoming perceptions of harm, actually increased them. Finally, the local MP, Louise Mench, in her submission to the Planning Inquiry, criticised the consultation for its "lack of clarity" (Mench, 2011).

6. CONCLUSIONS

The application to dispose of radioactive waste at ENRMF was strongly opposed by members of the local population, and this paper has reviewed some of the main causes for concern. It is clear that many are cautious and even fearful of radiation and radioactivity, but that this is not based on awareness and assessment of the wide range of activities and doses, and that the disposal proposal is near the bottom of such a scale.

Such fear is based partly on knowledge of previous nuclear accidents, such as Chernobyl, and no doubt the recent Fukushima incident in Japan, will confirm fears that the planners do not plan for all eventualities.

Raising awareness and knowledge of radioactivity is therefore an important pre-requisite of the public acceptance of nuclear power and a clear understanding of the absolute risk involved. The polarised reaction to the Consultation process in this case suggests that if awareness and knowledge needs to be improved when a proposal to dispose of radioactive waste is presented, then it is already too late to influence local opposition. A general and national campaign to improve awareness may have more chance of success.

Similarly, the development and awareness of national policy regarding the use of radioactivity and the necessary disposal of any waste in advance of any proposal might be helpful, but this review suggests that local residents will always consider local issues more important than national strategy, especially where there is little benefit to the local population, as in this case.

REFERENCES

Augean PLC website. www.augeanplc.com/

BBC News website. 7 April 2011. Local referendum on Kings Cliffe radioactive waste plan. <http://www.bbc.co.uk/news/uk-england-northamptonshire-13003850>

COMARE (Committee on Medical Aspects of Radiation in the Environment). 2002. SEVENTH REPORT - Parents occupationally exposed to radiation prior to the conception of their children : A review of the evidence concerning the incidence of cancer in their children. Chairman: Professor B A Bridges OBE, NRPB, Chilton, Oxon, UK. ISBN 0 85951 474 9

Daily Telegraph. 2009. Corby birth defects: worst child poisoning case since thalidomide. <http://www.telegraph.co.uk/health/healthnews/5935220/Corby-birth-defects-worst-child-poisoning-case-since-thalidomide.html>

Denman, AR., Parkinson S. and Groves-Kirkby CJ. 2004. A Comparative Study of Public Perception of Risks From A Variety Of Radiation And Societal Risks. *Proceedings of the 11th International Congress of the International Radiation Protection Association, May 23-28, 2004, Madrid, Spain* (CD-Rom), ISBN 84-87078-05-2.

Erikson K. 1991. Radiation's lingering dread. *Bull. At. Sci.* (47), 34-39.

- Freudenberg LS and Beyer T. 2011. Subjective Perception of Radiation Risk. *J. Nucl. Med.* (52) Suppl 2:29S-35S.
- Gardner MJ, Snee MP, Hall AJ, Powell CA, Downes S, Terrell JD. 1990. Results of case-control study of leukaemia and lymphoma among young people near Sellafield nuclear plant in West Cumbria. *BMJ* 300(6722), 423–429.
- King's Cliffe Wastewatchers website. <http://www.kingscliffewastewatchers.co.uk/>
- King's Cliffe Wastewatchers. 2010. Submission to the Public Inquiry. 2 September 2010.
- Kletz, KA. 1996. Risk – two views: the public's and the expert's. *Disaster Prevention and Management*, 5(4), 41-46.
- Mench L. 2011. Louise's letter to the Planning Inspectorate. <http://www.louisemensch.net/kingscliffe>.
- Rees DM, Bradley EJ, Green BMR. 2011. *HPA-CRCE-015 - Radon in Homes in England and Wales: 2010 Data Review*, HPA, Chilton, Oxon, March 2011 ISBN: 978-0-85951-688-4
- Smith KG. 2011. Report to the Secretary of State for Communities and Local Government. by K G Smith an Inspector appointed by the Secretary of State for Communities and Local Government, 16 February 2011.
- Northamptonshire County Council website. <http://www.northamptonshire.gov.uk/>
- Wakeford R. 2008. Letter - Re: 'Population mixing, socio-economic status and incidence of childhood acute lymphoblastic leukaemia in England and Wales--analysis by census ward' and 'Childhood leukaemia and population movements in France, 1990-2003'. *Br J Cancer*. Oct 7;99(7):1194