

Health impact assessment of proposal to burn tyres in a cement plant

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Abstract

A cement plant located in a small English town applied for a variation in its license to allow it to use chopped tyres as fuel in the cement kiln in part replacement for coal. The local health authority (PCT), a statutory consultee in the Integrated Pollution Prevention and Control (IPPC) process, requested an Health Impact Assessment (HIA) of the proposal to inform its response. A combination of interviews with key informants, literature search and participatory methods was used. The HIA broadly concluded that the proposal was unlikely to cause adverse impacts. The attempt to be impartial and the failure to confirm health fears disappointed many residents. The HIA had to be completed very quickly and it proved impossible to produce meaningful participation within this time scale. It is also suggested that very few PCTs have adequate resources to make the assessment of health impacts necessary for them to properly fulfil their role in the IPPC process.

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Keywords: Cement; Tyre-burning; Participation

1. Introduction

This paper describes a Health Impact Assessment (HIA) of a proposal to change the fuel used in a cement plant. It was carried out to support a health authority, known as a Primary Care Trust (PCT), in preparing its response to consultation under the Integrated Pollution Prevention and Control (IPPC) process. The HIA provided both a tool for the PCT to assemble evidence on

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which to base its response and a framework for the permit issuing authority to consider health consequences.

2. Background

Rugby is a small market town (population 50,000) in the West Midlands region of England. Cement manufacture started at the current site in 1865. At first the quarry and factory were outside the town. However in the latter part of the 19th century more houses were built, some for cement workers but most for others, so that the residential area has come to extend right up to the boundaries of the cement works. Initially chalk was quarried locally, but now local supplies have been exhausted and chalk is piped as a wet slurry from a quarry 36 miles away. The kilns on the site have been replaced several times. The most recent kiln number 7 was commissioned in February 2000 and was much larger (produced about four times as much cement clinker) and yet had far lower emissions than the kilns it replaced.

Cement manufacture is one of many industrial processes, whose operation is regulated by a permit from the Environment Agency. Many cement plants have commenced burning tyres and various industrial wastes. This not only reduces their fuel costs but may also attract premiums for the disposal of wastes. In August 2001 the cement company, which was permitted to burn coal and petcoke, applied to the Environment Agency for a variation in its license, which would permit them to substitute up to 40% of the coal burned in the plant with chopped old tyres—potentially up to 10 tonnes an hour. Many residents were concerned at this proposal and formed an action group “Rugby in Plume” to oppose it.

Many of the local residents have long held grievances against the cement plant. Initially their chief complaint was of dusts from the plant, which settled on local houses, gardens and cars. The new kiln built in the late 1990s, was larger and visually more intrusive (the tower is 104 m high and wider than its predecessor). This caused further complaint as some residents felt they had not been adequately consulted about the new plant. While the new plant was being commissioned there were allegations that the process was not adequately controlled. The proposal to burn tyres caused further concern and was strongly opposed by many residents.

The European Union landfill directive ([EU Directive 1999](#)), bans the land-filling of whole tyres from the beginning of 2003, and will extend to shredded tyres from 2006. In 1999 around 450,000 tonnes of waste tyres were generated in the UK. The Environment Agency anticipated many applications under IPPC to burn tyres in cement kilns, and produced a ‘Tyre Burning Protocol’ in 2001. This document ([Environment Agency, 2001](#)) lays out ground rules under which tyre burning applications would be considered and sets out a procedure for evaluating if a plant should be permitted to burn tyres. It sets out eight stages:

- Consultation by the operator
- Application for tyre burning

- Consultation and assessment
- Permit to burn tyres, subject to trial performance
- Trial phase
- Reporting
- Assessment of report
- Permission to recommence use of tyres

The HIA was intended to inform the assessment stage and, should a trial permit be granted, to suggest success criteria for the trial.

The Integrated Pollution Prevention and Control (IPPC) was introduced by the EU IPPC Directive of 1996 (EU Directive, 1996). It requires the permit issuing authority to take account of the whole environmental performance of the plant, i.e. emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, risk management, and so on. It is used to assess and regulate potentially polluting point sources across the European Union. The directive came into force in the UK for new plants from 2002 and will be extended to all plants by 2007. The directive is based on the concept of Best Available Technique (BAT). The operator of a process is required to use the best available technique to minimise emissions. If a superior technique becomes available in the lifetime of the license, then the operator can be required to upgrade his processes.

The 1996 EU IPPC directive requires permit issuing authorities to have in place a method for assessing the health effects of a process when considering applications for permits. In determining whether to grant a permit for a process under IPPC in England, the Environment Agency is required to consult with a number of local bodies. Under the revised legislation the health authority for the area in which the plant is located was added to the list of organisations that had to be consulted. When the application for tyre burning was first made the key statutory consultee was the local authority—Rugby Borough Council. Warwickshire Health Authority, the relevant health authority at the time, also reviewed the proposal and submitted a response, which indicated that they could find no compelling evidence that tyre burning at the cement plant would have a negative health impact on the local population. However, in April 2002, shortly after Warwickshire Health Authority had made this response, the English health service (NHS) was reorganised (Department of Health, 2001) and the health authority was replaced by three smaller health authorities known as Primary Care Trusts (PCT). The board of the new Primary Care Trust (PCT) for Rugby was uneasy about the tyre burning proposal and one of its first actions was to lodge an objection to the tyre burning plan with the Environment Agency. They then asked the Health Impact Research Unit at the University of Birmingham to conduct an HIA of the proposal.

The statutory time limit for a response from the Environment Agency had already expired when this request was made but the agency was eager that health impacts should be assessed. Although the statutory consultation period had

expired, all parties including the cement company agreed that a period of 6 weeks should be allowed for the HIA. This period was subsequently extended to 8 weeks.

3. Process of the HIA

Meetings with the two Directors of Public Health, the Chief Executive and the Chairman of the PCT served to identify their concerns and produced agreed terms of reference, which were:

To assess the probability and magnitude of health impacts (good and bad) of substituting up to 40% chopped tyres for the coal fuel which is currently used at Kiln 7 at the Rugby Cement Works. The assessment should pay attention to impacts on the population of Rugby but also consider wider populations. The assessment should include consideration of the baseline situation and how health effects could be predicted and subsequently monitored.

It was agreed that the assessment should be based on the World Health Organisation definition of health (WHO, 1946).

All documents which had been submitted as part of the IPPC process and placed in the public domain were reviewed. Copies are held by the Environmental Health department of Rugby Borough Council, who were coordinating the council's input to the IPPC process. Among these documents was the health risk assessment prepared by the previous health authority and an assessment of the probable impact on air quality (CHMRC 2001). The Environmental Health department also identified key local stakeholders within the council and in the community, who had expressed particular interest or concern about the proposal.

Discussion with senior executives from the cement company and a tour of the plant gave understanding of the issues as the company saw them and why the change of fuel was important to them. They were also able to inform us about the many technical issues involved in running a modern cement kiln and direct us to relevant materials in the cement literature. Discussions with officers of the Environment Agency were also extremely helpful. Local experts, mainly from the Chemical Hazards Management and Research Centre (CHMRC) at the University of Birmingham also gave very useful advice on technical aspects.

Local stakeholders were consulted by two methods. First those stakeholders who had been identified were written to and invited to contact the assessment team to give their opinions of the risks or benefits of the tyre burning proposals. They were also asked to submit any evidence they thought relevant. The PCT also put advertisements in the local press inviting anyone with concerns to come and discuss them at "Health Impact Assessment surgeries" which were held over 3 days.

As a result of these discussions and literature searches a list of intermediate factors (mechanisms by which health might be affected), and health impacts was constructed. Local residents were particularly concerned about particulate and

dioxin emissions and about asthma, which they believed to be highly prevalent in the town. Further literature review and enquiries were then undertaken to assess the likely direction and magnitude of impacts through these intermediate factors. Because of pressure of time the literature search was not systematic.

An open drafting process was used while writing the report. That is to say preliminary and incomplete drafts were made available to all interested parties. The intention of working in this way was to make the assessment process as open as possible and allow all parties to see the direction in which the assessors' thoughts were turning. It also allowed errors to be identified and corrected as soon as possible. The report authors made clear that any part of a draft could be changed and that they were in no way bound by statements in earlier drafts.

The final document was submitted to the PCT board. A summary of impacts is shown in [Table 1](#) and the full report is available on the Health Development Agency HIA Gateway web site ([Cook and Kemm, 2002](#)). The report could be

Table 1
Summary of likely health impacts if tyre burning were to be permitted

Intermediate factor	Likely impact
<i>Emissions</i>	
Trace metals	Increase in zinc, small decrease in most other trace metals. No impact on health or small benefit.
Dioxins	Change unlikely—needs to be carefully monitored. If no change—no health impact.
Particulates	Possibility of some increase in particulates. Impact depends on the size distribution of the particulates. Observable health changes unlikely.
Oxides of Nitrogen	Probable reduction—small health benefit.
Sulphur dioxide	No change—no health effect.
Carbon monoxide	Slight reduction.
<i>Other factors</i>	
Content of cement	Health impacts unlikely.
Catastrophic failure	Unlikely.
Tyre storage	Minimal health risk from storage of tyres onsite at Rugby Offset by health gain from a reduction in coal stored.
Transport	The number of lorry journeys transporting fuel will not change significantly, but distribution may change and more road miles covered.
Noise	No change predicted by Company.
Amenity	No change predicted.
Psychological distress	Anxiety and uncertainty about consequences could reduce mental health.
Economic viability	Improved financial viability of company could boost local economy and employment and so impact positively on health.
Sustainability	Prevent the need for accumulation and alternative disposal of tyres many of which have considerable negative impacts. Contribute to reduction in emission of greenhouse gases (CO ₂) and so positive health impact.
Alkaline waste and landfill	No change predicted.
Fugitive emissions	No change predicted.

read as suggesting that any changes would be minimal, and if anything slightly beneficial to the health of the local population. This conclusion was crucially dependent on predictions of stack emissions from the plant if fuel was changed based upon modelling undertaken by the company. If trials of tyre burning were to be permitted it would be important to undertake adequate monitoring to confirm these predictions.

The report was discussed by the PCT board at an open meeting at which members of the public were able to comment and give their views. After this meeting the PCT board wrote formally to the Environment Agency giving their views on the conditions which should be applied if the Agency decided to authorise a trial period of tyre burning.

4. Lessons to be learnt

Both IPPC and HIA are relatively new processes and it is important to learn from experience. The key points requiring discussion seem to be involvement of health authorities (Primary Care Trusts) in the IPPC process, timing and scope of the HIA, participation, conflict resolution and resourcing of HIA.

5. Involvement of health authorities

It is only with the introduction of the new IPPC regulations that health authorities became a statutory consultee on proposals to operate potentially polluting plants ([Statutory Instrument, 2000](#)). Primary Care Trusts (PCT) thus acquired a new duty to assess the health consequences of processes regulated under IPPC. It is unclear how well PCTs are equipped to fulfil this duty. Most PCTs have no more than two or three public health specialists none of whom is likely to have particular expertise in HIA or control of environmental pollution. In this case it is notable that the new health authority took a different view from the health authority which it replaced. Rugby PCT were able to seek support from a regional unit but there is no assurance that similar support would be available to other PCTs in a similar situation.

6. Timing and scope of the HIA

Time pressure was an important factor in this HIA, which did not start until the statutory consultation period was ended. There is no doubt that it would have been preferable if the HIA had been started much earlier about the time that the proposal was put out for consultation. However for reasons explained earlier this did not happen. There was considerable discontent among some local residents who felt that adequate time had not been given for the HIA. The statement made

by the assessors that a full systematic literature search had not been undertaken caused particular concern and there is no doubt that a full search of the literature on particulates, dioxins, and emissions when tyres were used as a fuel would have taken many months. However the authors were satisfied that they had taken account of the main themes in the literature.

Some would argue that the assessors were ill advised to do an HIA within such a tight time scale. If they had declined it is probable that the PCT would have had to make its comments based on a much less thorough enquiry than the HIA produced and the Environment Agency would have had to decide how to proceed without an HIA report. It has to be recognised that for some opponents of the proposal all delay was good and therefore the longer any HIA the better.

A further source of concern to the residents was the scope of the HIA, which was deliberately limited and concerned solely with the question of how burning a fuel mix including tyres would differ from burning the current fuel mix. It was not concerned with the question of how the existing cement plant impacted on health. Once it had been concluded that emissions from the stack top would be unchanged detailed modelling of plumes could add no further information and was not undertaken.

7. Participation

Participation in HIA has been recognised as intuitively appealing but practically difficult (Parry and Wright, 2003). Throughout this HIA an attempt was made to follow a very open and inclusive process, first by holding open surgeries and second by using open drafting. While confident that the principles behind open drafting are correct, there were several practical points that made it less inclusive than was intended. Drafts were sent out as email attachments and then made available on a web site run by the local opposition group Rugby in Plume. It was clear that this method of distribution did not reach all those who wanted to receive drafts. Second a very rapid return of comments on drafts was requested so that the tight timescale for the HIA could be adhered to. It was hoped that the drafts could form the basis for a discussion “without prejudice” but many residents preferred to submit their comments as a group view requiring time for them to reach a consensus view before responding. For these reasons the open drafting did not produce as inclusive a process as was wished and one must conclude that if open drafting is to be used much more time must be allowed.

On the other hand the process was undoubtedly successful in tapping the knowledge held by the residents group. They were extremely well informed about literature and web-sites covering use of tyres as fuel in cement plants and were in contact with many toxicologists and other experts who supported their views. They were very helpful in directing the assessors to these sources and it is unlikely that much of this material would have been found without the help of the residents.

Public involvement was less extensive than wanted and for reasons of time limited to residents of Rugby. The HIA “surgeries” were only advertised in the Rugby local paper. While this was the group most immediately affected since most of the emissions from the stack grounded within 2 km, those living at a greater distance would also experience some of the impacts. More distant communities would benefit from decreased need for alternative disposal of tyres to landfill or storage dumps where they would pose a risk of uncontrolled combustion.

8. Conflict resolution

One of the claimed benefits of participation in HIA is that it increases ownership of the final decision and helps to reduce conflict (Kemmm, 2000). It cannot be claimed that this HIA achieved this. Before the HIA was proposed there was already conflict. Many residents distrusted the cement company, and also the Environment Agency, which was viewed as too sympathetic to the company. The view was already firmly embedded in the minds of some residents that use of tyres as fuel would be yet another environmental insult inflicted by the company on the town. When the HIA was announced these residents hoped it would provide evidence to support their view. In this context the idea of an impartial assessment was a disappointment to many.

The meetings with individuals or small groups were informative and enjoyable. This allowed people to express their views and concerns, and the assessors to explore these in depth. There was also one large public meeting organised by a local parish council and attended by 120 residents. The two authors and the chair of Rugby PCT also attended and the meeting was chaired by the chair of the parish council. This meeting became an occasion for deeply felt advocacy by opponents of tyre use and provided little opportunity to explore other views.

When it became clear that the HIA did not support their fears many residents concluded that it was wrong and badly done. Given the deeply entrenched views it was probably unrealistic to hope that this HIA process could contribute much to conflict resolution. Experience of social learning elsewhere has shown it to be a process requiring many months and not compatible with the short time scale for this HIA.

One particular area of conflict was interpretation of the precautionary principle. Both the residents’ group opposed to tyre burning pressure group and the board of the PCT claimed to be guided by this principle. Their interpretation might be viewed as a presumption in favour of the status quo summarised in the adage ‘never do anything unless you have concrete evidence that it is safe to do’ (Raffensperger and Tickner, 1999). There are several examples where this interpretation of the precautionary principle has resulted in increased health risk (recent examples include use of disposable instruments for tonsillectomy (Frosh et al., 2001) and banning of residual DDT sprays

(Lancet, 2000)). Others have argued that the risks of change have to be compared with the risks of the status quo and precaution has to be informed by comparative risk analysis (Starr, 2003). The HIA report argued that accumulation of used tyres also posed a risk (for example uncontrolled combustion) and that therefore a measure, which disposed of tyres could have both positive and negative impacts.

9. Resources

In addition to the time of PCT board members, borough council environmental health staff, cement company employees, environment agency staff, university staff and residents time the HIA took 265 h of the author's time. None of this was charged to the HIA but either covered by the individuals employing authority or given free. Incidental expenses such as room hire and travel were similarly covered by employing authorities. This contrasts with EIA, which is normally undertaken by consultants and paid for by the proposers. While it was possible to undertake the HIA without specifically identified funding in this case, it is clearly not a model for HIA in other contexts. If HIA is to be required as part of the IPPC process then there is a need for a facility with expertise in HIA that can be called upon by a PCT and which is adequately funded. One way of funding such facilities would be to require the proposer to pay for the HIA.

10. Conclusion

This paper has described how an HIA was undertaken to inform a local health authority (PCT) in preparing its response to the Environment Agency consultation under IPPC regulations. Lessons learnt include the difficulty of arranging adequate participation and conflict resolution when working to a very tight timescale. It is suggested that there needs to be an HIA facility with adequate funding arrangements to support health authorities (Primary Care Trusts) in fulfilling their duty to respond to consultations under IPPC.

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