

Application by Frontier Plastics to install a gamma irradiator, Pontllanfraith, Gwent - comments upon the proposed development.

**Paul Mobbs, Mobbs Environmental Investigations and Research, 3 Grosvenor Road, Banbury OX16 8HN.
0295 261864.**

Introduction.

As part of a larger application for a waste incinerator, now withdrawn, the applicants are proposing to build a plant to irradiate and thus sterilise plastic items.

Though this type of development is not strictly defined under Schedule 1 of the Environmental Assessment Regulations (SI. 1988/1199), it would certainly require an Environmental Statement (ES.) under Schedule 2. The ES. for this development was included as part of the larger ES. for the incinerator, and is very limited in its scope.

There are many other issues which seemingly have not been considered in this application - specifically its relation to the local development plan, the position of the application in regard to general planning acts and guidances, and the possible 'blight' effect such a development could have on the surrounding area.

The application and Environmental Assessment.

The application has been submitted with an environmental statement. However, the relevant part of the ES. - which relates to the irradiator - does not conform to the necessary standards laid out in the Environmental Assessment regulations (SI. 1988/1199), nor the explanatory circular (Welsh office 23/88, DoE 15/88).

Schedule 3 of the EA. regulations specifies that the following information should be submitted:

- a). A description of the development proposed, comprising information about the site and the design and size or scale of the development.*
- b). The data necessary to identify and assess the main effects which that development is likely to have on the environment.*
- c). A description of the likely significant effects, direct and indirect, on the environment of the*

development, explained by its reference to its possible impact upon human beings, flora, fauna, soil, water, air, climate, the landscape, the interaction between any of the foregoing; material assets and cultural heritage.

d). Where significant adverse effects are identified with respect to any of the foregoing, a description of the measures envisaged in order to avoid, reduce or remedy those effects.

e). A summary in non-technical language of the information specified above.

Section five of the ES., which deals specifically with the irradiator, only meets the requirements of part (a), briefly skips over parts (b) and (d), and does not meet the requirements of part (c).

With such a development the main identifiable effects are:

- * The direct effects of the normal operation of the installation, particularly;
 - radiation levels outside the building.
 - generation of gases or other products by chemical or nuclear activation processes.
 - everyday impact of operation (e.g., noise, smells).
 - any routine discharges from the installation.

- * The direct effects of the abnormal operation of the installation, particularly;
 - explanation on a number of accident scenarios.
 - the likely radiological consequences of a 'maximum credible accident' involving a release of radioactive products.

- * The indirect effects of the operation of the installation, particularly;
 - effects of the transport of radioactive materials to and from the site.
 - effects on the surrounding properties - e.g., blight due to their proximity to a site licensed under the Radioactive Substances Act.

- * The direct/indirect problems caused by the decommissioning/ demolition of this plant, and subsequent reuse of the land.

Each of the above will be considered in detail later.

The application and the local development plans.

The local development plan zones this land for development in use classes;

B1 - defined as business or industrial usage, particular offices (other than those classed under A2 - financial and professional services), the research and development of products or processes, or for any industrial process. This final point is further qualified by the point that the development must not spoil the amenity value of the area by reason of noise, vibration, smell, fumes, smoke, soot, ash, dust or grit, and the use must be one which can be carried out in any residential area.

B2 - defined as any general industrial activity not defined in classes B1 or B4 to B7.

B8 - defined as storage and distribution, though not including any retail aspects which fall under class A1.

It is obvious that the siting of an irradiation plant - potentially able to hold a quantity of radioactive materials equivalent to a small nuclear research reactor, does not fit into any of the above classes, and should normally be classed in uses B4 to B7.

The basic assumption in UK planning regulations is that development should be allowed. However, the Town and Country Planning Act and the newly revised Planning Policy Guidance No.1 ("General Policy and Principles") qualifies this by stating that development should fall within the guidance of the local development plan (Town and Country Planning Act s.72(2)). Where development outside of the plan is allowed there must be material considerations in favour of it (Town and Country Planning Act s.54(A)).

The Islwyn Local Plan (currently on deposit) outlines the following criteria for the siting of employment generating developments:

E4: "the development of derelict, under-used and vacant land and the conversion of suitable buildings for appropriate employment use will normally be permitted where:-

- it is compatible with adjoining and surrounding land uses.
- it is environmentally acceptable.
- satisfactory access, parking, loading/unloading facilities can be made available."

EP1: "16.62ha at Newbridge Road, Pontllanfraith, is allocated for development for B1, B2 and B8."

The Gwent Structure Plan (draft for consultation) also puts forward a number of separate policies on employment generating development. Specifically:

E7: "there will be a presumption against the establishing of industries which have the potential for causing severe harm to people or severe damage to property or the natural environment over a large area."

E9: "there will be a presumption against the establishing of industries which have the potential for causing major environmental pollution by virtue of the nature or materials

stored, processed or manufactured."

The criteria outlined in the Gwent Structure Plan draft are further supported by the draft Planning Policy Guidance on Planning, Pollution and Waste Management. This outlines a case that developments which have the potential for causing large scale pollution should only be allowed in specified zones - not in areas incompatible with such uses.

It is difficult to see any material gain in allowing this development. In particular, the siting of a development of a development which entails some 'risk' in its operation, which could blight local properties, and which could cause some businesses to move away or not relocate to the area, means that there is very little gain in accepting the change of usage.

The Governments White Paper on the environment, "This Common Inheritance", outlines the Governments policy on the environment. In relation to planning and development control it states....

"Planning control is primarily concerned with the type and location of new development and changes. Once broad land uses have been sanctioned by the planning process, it is the job of pollution control to limit the adverse effects that operations may have on the environment. But in practice there is common ground. In considering whether to grant planning permission for a particular development, a local authority must consider all the effects, including potential pollution; permission should not be granted if that might expose people to danger."

There is insufficient information within this application to judge beyond doubt the safety of this plant. Therefore, as outlined in, "This Common Inheritance", and other recent planning/pollution control guidances, the precautionary principle should be applied; and due to the doubt planning permission should be refused.

The concept of 'blight' has not been outlined in any way at all, but it is a material planning consideration. The development of a facility storing such a large amount of radioactive material would be bound to have some effect on the land values around the immediate boundary of the plant, and may make the reuse of this land at a future date very difficult.

The direct effects of the normal operation of the installation.

The environmental assessment contains little on the effects of the plant in normal operation. There is a brief mention of ozone generation from the irradiation of the air around the irradiator - but little else. This is very curious. Given that the irradiation plant is of a standard design from an established company there should be a wide range of information available on all aspects of the plants operation. For example...

* **Radiation levels:** There is no mention of projected radiation levels at the boundaries of the site, or in the immediate area around the irradiator. As this plant is of a standard design already in use, facts about radiation levels around the plant should be available. Though the licensing and regulation of the site is mentioned, there is little relating to public protection measures - for example the extra responsibilities within the local fire, police and district environmental health department will mean extra expenditure for the local authorities and thus local council tax payers.

Under a new EC directive on emergency planning at sites housing radioactive materials (which the HSE has failed to implement by the November 1991 deadline), every site is required to draw up an emergency plan and issue information to the residents within a defined "emergency planning zone". By the strict interpretation of the directive, plans must not only consider the on-site effects - transport of radioactive materials must also be considered.

* **Generation of gases:** It is noted in the assessment that ozone gas will be formed from the irradiation of the air surrounding the irradiation plant. This is not the complete picture, and ozone will not be the only product of irradiation.

High energy gamma radiation alters the electronic configuration of the electron shells surrounding the nucleus of any atom it ionises. Chemical changes then result in the break up of ionic or covalent bonds and the formation of new compounds. More serious is the evolution of ionised atoms/molecules which do not immediately form new bonds with other atoms. These so called 'free radicals' are harmful to health and damage crops and plants.

A further problem, not identified, will occur when the cobalt source is lowered into its storage pond. Irradiation of the water will cause the formation of small quantities of hydrogen gas - obviously a problem if the area around the pond is not well ventilated.

* **Noise and smell:** Though the impact of noise and smell will probably be minimal from a plant of this type, a statement should be made to conform with the environmental assessment.

* **Routine discharges:** There is no mention of how routine discharges will effect the local environment. It has already been noted that ozone will be discharged, and as highlighted it is likely that other free radicals may be present in the vented air. One point which has not been highlighted is the water from the storage pond. How often is it changed and discharged?. In the event of corrosion of or leakage of radioactivity from the source, how will the water be checked and disposed of?.

The direct effects of abnormal operation of the plant.

The area of most concern has to be the likelihood and consequences of an accident involving

the irradiator. From an assessment of risk, it is not likely that a serious accident could happen with the irradiator itself - but this does not take into account human error or direct interference. The most likely source of an accident is probably the transport of radioactive materials to and from the site.

* **Accident scenarios:** As part of any emergency planning procedure a number of accident scenarios should be developed. Remedial measures to guard against these can then be incorporated into the initial design, or retrofitted to the existing plant. Four basic scenarios can identified....

a). Catastrophic loss of containment: For example, a direct hit by a crashing aircraft. Where large quantities of radioactive material are involved it is normal practice to demarcate 'no fly zones' for one mile around the installation. This is done at most UK. research laboratories, nuclear installations and large chemical/oil plants.

b). Fire: For example, a build up of explosive gases in the irradiator building. This might cause an explosion which could damage the irradiator, or a fire inside the irradiator might damage or burst the packages holding the cobalt.

c). Deliberate interference: For example, sabotage within the plant or terrorist action from outside the plant.

d). Seismic disturbance: Earthquakes. Although the British Isles are considered earthquake free, there are regular seismic tremors occurring all the time - mostly to the West of Scotland and in the Irish Sea. For example, an earthquake in Carlisle in 1979 registered about 5.4 on the Reichter Scale, and cause widespread structural damage. A similar incident happen in Shropshire in 1991. In addition to deep seismic activity, in the South Wales area mining subsidence also has to be considered as a potential threat to any development.

Consequences of an accident.

There are many possible accident scenarios which are likely (that is, a chance on more than one in ten-thousand per year of operation). Rather than dwell on the mechanics of the accident, it will be simpler to consider the consequences of a release of radioactive materials from the plant or from the transport of radioactive materials.

The effects of an accident have been assessed using the National Radiological Protection Boards standard emergency procedures, as set out in the document, "NRPB Emergency Data Handbook" - NRPB/R182 (March 1986). Since this document was produced the International Committee on Radiological Protection have lowered the standards for exposure to ionising radiation by around 60%. Similarly the Derived Emergency Reference Levels for radionuclides will have to be revised downward by a similar proportion. The calculations can therefore be assumed as understating the true extent of the effects of any accident by 50 to 60%.

Though it would be possible to model the contamination effects using standard plume modelling techniques, it would be inappropriate in this case. The topography of the South Wales valleys makes accurate plume modelling difficult, as most models use a 'flat earth' approach. When applying modelling to the valleys around Pontllanfraith, modelling at distances in excess of one kilometre will produce fairly useless results, partly because of the steep sided valleys departing markedly from the 'flat earth' approach, and partly because of the wind vortices and downdrafts caused by the movement of air over and through the valley.

The results of release modelling are set out in appendix A, sections 1 to 6. Each section consists of numeric data, a graphical interpretation of that data, and a map showing the extent of contamination from the accident site.

Six scenarios were chosen...

- 1). A transport accident where 75% of the load escapes to air.
- 2). A transport accident where 10% of the load escapes to air.
- 3). A transport accident where 1% of the load escapes to air.
- 4). A plant accident where 5% of the irradiator contents escape to air.
- 5). A plant accident where 0.1% of the irradiator contents escape to air.
- 6). A plant accident where 0.05% of the irradiator contents escape to air.

The results are summarised below...

Scenario.	Evacuation distance. (metres).	Sheltering distance. (metres).	Ground distance. (metres).	evacuation distance. (metres).
1.	150.		800.	0.
2.	0.		150.	0.
3.	0.		0.	0.
4.	>1000.	>1000.		>1000.
5.	600.		>1000.	275.
6.	400.		>1000.	200.

Scenario.	Evacuation area. (m. sq.).	Sheltering area. (m. sq.).	Ground area. (m. sq.).	evacuation area. (m. sq.).
1.	1480.	6415.		0.
2.	0.		1480.	0.
3.	0.		0.	0.
4.	>1000.	>1000.		>1000.
5.	5922.	>1000.		2714.

6.

3948. >1000.

1974.

The maps produced with each set of modelling show the distribution of contamination. Each is colour coded as follows:

RED - area would have to be evacuated.

GREEN - people occupying the area would have to take shelter.

GREY - the ground in this area would be contaminated above the acceptable level, and access to this area would have to be restricted or the surface of the area would have to be removed and disposed of.

The graphs are also hatched with the same colour coding.

The indirect effects of operation of the plant.

There are a number of factors which have not been addressed in the limited environmental statement, but should be looked into as part of a properly compiled statement.

*** Effects of the transport of radioactive materials to/from the site.**

As stated earlier, the routes used to transport materials to this plant - by the nature of their high activity - would fall within the EC directive on radiological emergencies. Those living near to the road would have to be issued with information on the possible effects of any accident.

Transport accidents involving radioactive materials are dealt with through the NAIR scheme, administered through the National Radiological Protection Board. If a police, fire or ambulance officer discovers that radioactive materials are part of a cargo at a road accident, the NAIR scheme is called into action.

Response in NAIR is divided into two parts. 'Stage 1 assistance' involves an assessment by a trained officer who is on call for NAIR incidents. If the preliminary assessment finds that materials have been emitted to the environment, the officer will call upon the assistance of trained specialists. 'Stage 2 assistance' involves alerting the specialists and getting them to the scene of the accident to supervise the recovery and decontamination operations.

Stage 1 assistance in the Gwent constabulary area is run from the Cardiff Royal Infirmary. If stage 3 assistance is required, specialists would have to be brought in from Oldbury Power Station near Bristol. Obviously, there will be a lengthy delay in getting emergency personnel up from Cardiff. However, should stage 2 assistance be required, it could take a long time to

get specialists from Oldbury.

Where accidents are likely, many local fire services have invested in specialist training. But the scope of the fire services response can only be limited, and would mostly be aimed at containing the initial incident and preventing the situation becoming worse.

The applicants should make a case for there being an effective system for responding to any accident involving materials being moved to or from the site.

*** Economic effects upon the area around the plant.**

One of the most marked effects, not discussed in the assessment, will be the effect on local property values. When the EC Directive on emergency planning is finally implemented by the HSE, local residents will have to be informed about the possible consequences of an incident at the plant, or involving vehicles transporting materials to/from the plant. Such information would probably be turned up in a search by a surveyor/solicitor as part of a conveyance.

Even if it were proven that the plant were safe, there would still be some hesitancy by prospective house/factory/office owners at moving to an area containing such an installation. From the granting of planning permission, the plant would be a blight upon local property values. This factor needs to be assessed further by the applicant and the local authority.

*** Problems of plant decommissioning and subsequent reuse of the land.**

As with blight in the immediate area, finding a use for the land after the plant is closed could be a problem. For example, what if the company owning the plant when bankrupt five years after its construction?. Who would be responsible for its maintenance and eventual dismantling. Even if the company bought the plant on the understanding that the company supplying the materials was responsible for their removal, what if they went bankrupt?.

There is no reference to the removal of the active materials from the site and decommissioning of the plant when it finally reaches the end of its life. This surely must be one of the important considerations when considering an application for a plant of this type.

Summary/Recommendations.

Given the inadequacy of the environmental assessment for a development such as this, my recommendation must be that the local authority refuse permission. This can be done on three well established criteria:

- 1). The environmental statement - or rather that part of the greater environmental statement which covers this part of the application - does not contain the necessary information required in the [Environmental Assessment Regulations (SI. 1988/1199)].
- 2). The information which has been presented with the application is insufficient to correctly determine the application, or decide upon conditions to put upon any planning consent [Town and Country Planning Act 1990 (s.70) and DoE Circular 1/85 ('Planning Conditions')].
- 3). The proposed development does not conform with the draft development plans and there is not real gain to the local community from granting permission for the development [Town and Country Planning Act 1990 (s.72(2) & s.54(A))].

Should the authority grant permission without further detailed information it would be a gross dereliction of their duty under various Acts and guidances, and would be an action meriting judicial review.

Given the fact that the proposed plant is in use elsewhere, the lack of information regarding the operation and final decommissioning of the plant is reprehensible. If the authority are minded to continue with the application, or the applicants resubmit the application with a new environmental statement, it is imperative that the following points (in order of importance) are addressed:

- * the final decommissioning of the plant and subsequent reuse of the land.
- * the monitoring and discharge of water from the storage pond should be fully explained, and an assessment possible responses to the corrosion of the packages and leakage of cobalt.
- * there should be a full engineering fault assessment for the plant under its proposed operating conditions, together with a full emergency planning assessment looking at a number of credible sceanrios. This should include modelling of the possible spread of contamination from the site and the financial costs to the local population.
- * there should be a similar risk assessment to that stated above for the transport of materials to and from the plant.
- * there should be detailed information on the projected radiation levels around the plant - including information on similar plants already in operation.
- * the generation and discharge of ozone and free radicals should be assessed and a case made for the proposed discharges. The possible build up of hydrogen from the pool should also be considered.

* there needs to be a reassessment of the regulatory system outlined in the environmental statement, to include details of how the EC directive on emergency planning will be implemented and what extra costs may be incurred by the local police and fire service, and the county emergency planning department, in relation to the proposed development.

* there should be a thorough investigation of the possible blight on local properties should this development go ahead.

Until such studies have been carried out to the extent outlined in this document, I do not see how the planning authority can make a proper determination of this application.

Paul Mobbs,
Mobbs' Environmental Investigations and Research,
3 Grosvenor Road,
Banbury,
Oxon. OX16 8HN.

0295 261864.

Appendix A - accident modelling.

The effects of an accident have been assessed using the National Radiological Protection Boards standard emergency procedures, as set out in the document, "NRPB Emergency Data Handbook" - NRPB/R182 (March 1986). Since this document was produced the International Committee on Radiological Protection have lowered the standards for exposure to ionising radiation by around 60%. Similarly the Derived Emergency Reference Levels for radionuclides will have to be revised downward by a similar proportion. The calculations can therefore be assumed as understating the true extent of the effects of any accident by 50 to 60%.

Though it would be possible to model the contamination effects using standard plume modelling techniques, it would be inappropriate in this case. The topography of the South Wales valleys makes accurate plume modelling difficult, as most models use a 'flat earth' approach. When applying modelling to the valleys around Pontllanfraith, modelling at distances in excess of one kilometre will produce fairly useless results, partly because of the steep sided valleys departing markedly from the 'flat earth' approach, and partly because of the wind vortices and downdrafts caused by the movement of air over and through the valley.

Six scenarios were chosen...

- 1). A transport accident where 75% of the load escapes to air.
- 2). A transport accident where 10% of the load escapes to air.
- 3). A transport accident where 1% of the load escapes to air.
- 4). A plant accident where 5% of the irradiator contents escape to air.
- 5). A plant accident where 0.1% of the irradiator contents escape to air.
- 6). A plant accident where 0.05% of the irradiator contents escape to air.

The maps produced with each set of modelling show the distribution of contamination. Each is colour coded as follows:

RED - area would have to be evacuated.

GREEN - people occupying the area would have to take shelter.

GREY - the ground in this area would be contaminated above the acceptable level, and access to this area would have to be restricted or the surface of the area would have to be removed and disposed of.

The graphs are also hatched with the same colour coding.