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Dear Stewart

Geological Disposal – Transport Movements

I understand that Richard Greenwood from Cumbria Tourism has asked whether NDA could quantify road (or rail) movements in more detail based on the GDF reference design – or whether there are comparator GDF projects overseas that might have considered transportation impacts and from which NDA could draw lessons or extrapolate to better illustrate potential impacts in the UK.

As with transport infrastructure requirements this is a difficult issue to address at such an early stage in the MRWS process. There is a wide range of options relating to the transport system for a GDF and it is likely to be some time before we can quantify, with any degree of certainty, transport movements and how these might be distributed between different transport modes and through time. However, the information below provides an indication of possible road and rail movements. The information is based on RWMD's Generic Environmental and Sustainability Assessment[1], Generic transport system designs[2], Generic disposal facility designs[3] and recent manpower and skills analysis. As the information is not based on a specific location a number of assumptions underpin it.

Radioactive waste packages

Disposal of the "Baseline Inventory" of higher activity radioactive wastes described in the MRWS White Paper (Ref) would involve transporting over 145,000 waste packages to a disposal facility from various locations across the UK. Based on the reference conceptual design this would mean a GDF receiving around 1800 packages per year for the first 30 years of operation (~ 35 per week), around 1300 per year for the following 20 years (~ 25 per week) and around 500 per year thereafter (~ 10 per week).

Translating waste package numbers into transport movements involves making assumptions about transport modes (e.g. road vs rail) and about the design and capacity of transport systems. For transport by road one waste package equates to one transport (lorry) movement to and from a disposal facility. For transport by rail, a number of waste packages would be transported by a single train. Exactly how many would depend on package weights and the design of the rail system, but a typical train might carry up to 20 waste packages.

If we assume all waste packages are transported by road then, initially, this would equate to about 1800 lorry movements per year to and from the GDF (~ 35 per week), reducing to about 500 per year during later operational phases (~10 per week).

If we assume all waste packages are transported by rail, and based on trains carrying up to 20 waste packages, then this would equate to an initial number of train movements to and from the disposal facility of at least 90 per year, reducing to at least 25 per year during later operational phases.

It is possible that a combination of road and rail will be used for moving the waste packages.

Construction materials

Little quantitative work has been done on the transport movements associated with construction materials. However, the Generic Environmental and Sustainability Assessment considered this issue and, based on figures for bulk materials given in the generic design report, estimated a total of almost 140,000 lorry movements over the construction, operational and closure phases of a disposal facility. This is an average of about 1200 per year (~ 23 per week), although the number of lorry movements would be quite variable and significantly higher than this during the early construction phase and during GDF closure.

This estimate is a "worst case" in environmental / carbon footprint terms with all material being brought to the site by road. If practicable, it is likely that most bulk materials would be delivered to the site by rail.

Rock spoil

For our reference conceptual design we have assumed that all of the excavated rock spoil could be stored on the surface and then either re-used in construction and backfilling, or for landscaping and site restoration. Under this scenario there would be no requirement to transport rock spoil off-site. Under different scenarios (e.g. different inventories for disposal; different host geologies; different disposal system concepts) then there may be surplus rock spoil to be taken off-site. In such cases it is likely that bulk spoil transport would be by rail.

Personnel

Our current manpower analysis estimates that, on average, over 800 workers would be employed at the site during the initial construction phase – to first waste emplacement. Thereafter the number would reduce to less than 600. During the closure phase it would reduce again to less than 200.

If each individual were to travel to the site by car, then this would equate to over 800 car movements to and from the site each working day during the initial construction phase. However, we would develop and implement a travel plan for the site to encourage more sustainable modes of transport. This could, for example, include the provision of a park and ride scheme, improved public transport, safe cycle routes and so on. The detailed requirements of personnel transport will be considered during future design development for a GDF and will take into account local needs and sensitivities.

Daily personnel movements to and from the site would be concentrated during shift changes with, potentially, several hundred vehicles entering and exiting the site within a relatively short space of time.

Comparable projects overseas

It is difficult to find overseas projects that are directly comparable, or where information on transportation impacts is readily available. However, some information is available for the following:

Onkalo [4]
For the Onkalo repository in Finland waste packages are likely to be transported to the facility by road, although rail and sea options for at least part of the journey are being considered. There will be relatively few transport movements per year (in the order of 10) and many of these will be from the nearby power station at Olkiluoto.

Little information is available on construction traffic but the site will employ around 100 people, of which it is assumed 50% will travel by public transport.

Overall, the transport impacts of the Onkalo repository are judged unlikely to be significant and will be masked by the 4500 vehicle movements per day associated with the nearby Olkiluoto power plant.

Yucca Mountain[5]

A number of transport options for waste packages were considered for the Yucca Mountain repository in Nevada but two were looked at in detail – "mostly road" and "mostly rail". Under the former scenario, it was estimated there would be 2200 truck movements to and from the facility each year and 13 rail movements. Under the latter it was estimated that there would be only 45 truck movements but 400 rail movements. Both scenarios assumed an operational lifetime of 24 years. Following publication of the original environmental impact assessment in 2002, a decision was taken to adopt the "mostly rail" scenario.

Most of the adverse environmental effects of waste transport were assessed as "low" or "very low", except for noise nuisance which was assessed as "low" to "moderate" depending on the routes / scenario being assessed and modal split.

Little information is available on construction traffic or personnel movements.

I hope that this information helps to answer Richard's query. If you need anything further please let me know.

Yours sincerely

Mark Gough

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1 Entec (October, 2010) *Geological Disposal: Generic Environmental and Sustainability Report for a Geological Disposal Facility – Main Report* (Entec Doc Reg No.: 26069-02)

2 NDA – RWMD (November 2010), *Geological Disposal: Generic transport system designs* (NDA/RWMD/046)

3 NDA – RWMD (November 2010), *Geological Disposal: Generic disposal facility designs* (NDA/RWMD/048)

4 Posiva Oy (May 1999) *The final disposal facility for spent nuclear fuel – Environmental impact assessment report*

5 US Department of Energy (February 2002) *Environmental Impact Statement for a geological repository of spent nuclear fuel and high level radioactive waste at Yucca Mountain, Nye County Nevada* (DOE EIS-0250)

US Department of Energy (June 2008) *Supplemental Environmental Impact Statement for a geological repository yof spent nuclear fuel and high level radioactive waste at Yucca Mountain, Nye County Nevada* (DOE EIS-0250F-S1)