Question 1: To what extent do you think our proposed approach to providing national-scale existing information about geology relevant to long-term safety is appropriate? Please give your reasons.

I attended several sessions during 2012 when the siting process was running on a voluntarism basis. A constant (and in my view ill thought out) plea was that the entire country should be surveyed from a geological point of view before any community interest was elicited.

Question 2: To what extent do you think that the proposed national information sources are appropriate and sufficient for this exercise? Please give your reasons.

As a non-geologist, it's difficult to know what other information is available but presumably you will also make use of whatever you can get from the private sector oil and gas operators, coal, potash, tin mining etc. This may be commercially sensitive but there may be information that could be released by these industries which would be of use to RWM (almost by definition, if information is not commercially valuable, because there are no mineral deposits or wells are dry, it would be of value to RWM – since RWM's thrust is to find areas which don't have mineral deposits). What about NIREX's work?

Question 3: To what extent do you agree or disagree with the proposed form of the outputs from geological screening? What additional outputs would you find useful?

Points 3.32 and 3.33 The proposed form of the outputs is: "a series of brief narratives.....The narratives will be illustrated with maps, where appropriate .... accessible to a non-specialist audience" "some members of these communities..... access to more detailed information" The population as a whole is non-scientific and especially non- geological (think of a pub quiz or Trivial Pursuit – questions are sport, TV, entertainment of a generally low brow nature, history, geography). You have the challenge of responding at this level on a subject where you have geologists (technically competent specialists in the subject) trying to convey their professional findings to groups of people who are by and large scientifically and geologically illiterate (so no understanding of rock types, structures, ground water, economic geology) in a way that they can understand. I attended a presentation session on 20 October 2015 in Carlisle. The RWM presenters were good and the team as a whole was professional and engaging. Most of the most vocal members of the audience seem to have misunderstood (deliberately or otherwise) the objective of the meeting: they led us off into engineering, packaging standards/ specifications, failed to understand the step by step approach, attacked the professional standing of one of the RWM team, or were opposed to the principle of a DGR etc. The quality of questions/ input from the audience was pretty poor. The intellectual level was that of a reasonably bright 13-15 year old – this is what you have to pitch at. 1. Accessible to non-specialists Are you going to have one booklet per BGS region or are you going to carve up the country in some other way? You could consider providing a stand alone glossary of definitions, explanations of geological principles, petrology, geological eras etc to accompany each booklet By narrative, I assume that you mean the written word i.e. a booklet, with maps where appropriate. This will not provide information adequately, although it's a necessary starting point. A lot of people are flummoxed by a map (ask the Mountain Rescue) and will have difficulty relating 2D cross sections to what is under the ground. You need 3D drawings to convey what is (probably) there. The BGS GB3D video is a start but it was too fast and is probably over the heads of a lot of the population. There have been a number of TV series on scientific subjects aimed at the non-specialist audience e.g. David Attenborough (botany, zoology), Brian Cox/ Patrick Moore (astronomy) and the Scottish archaeologist with long hair – Neil

Oliver? (archaeology). I suggest that you use these programmes as a yardstick. Jim Al-Khalili did a good programme on Sellafield. These appear to have gone down well with the lay public. Get a presenter of this calibre and get him or her to make a series of regional 20-30 minute presentations talking about the geology. The presenter could talk through a 3D stratigraphic model made of modelling foam plastic (is this 3D printable?), supplemented with pictures by way of illustration so people can "hang" their understanding on something: Suggested tone of the script. Very Rough Script Action Hallo. This is Cumbria. We are looking for a block of rock that would be able to host a repository. We need a repository in which to place radioactive waste safely until its radiation level has reduced. A repository is a series of chambers or vaults in rock connected by tunnels like the London Underground. It needs to offer a chamber space roughly equivalent in volume to a road of houses (like Coronation Street) with about 800 houses on each side of the road – it would be 4kms / 2.5 miles long or it could be on two or three or four layers. Footprint on the ground shrinks as levels multiply. Points to 3D block with surface features marked Computer simulations • Coronation Street picture • Stack the houses in different arrays: one level, two levels, three levels, four levels 3D picture of a repository Let's peel away the top (e.g.) 200 metres of Cumbria. This is soil/ overlay/ faulted. We want to look at the rocks that lie between 200m and 1000m below the surface. Back to 3D model Peels off the top layer Right, now let us look at what we have left - Starts pointing out the different formations: Borrowdale Volcanics These are the sort of rock types that you find being deposited today in ?????. Age, lithology, faulting, colour, some places used for flooring Each formation a different colour Picture of a kitchen floor (Kirkstone) Skiddaw Slates make up Skiddaw, age blah, blah, blah Picture of Skiddaw Carboniferous Limestone..... Picture of outcrop in the South Lakes Penrith Sandstone – this is of Permian Age which means that it was laid down in a desert environment like Wadi Rum which was where the Lawrence of Arabia film was made about ??00 million years ago (not the film – the sandstone!). It's used a lot for building like this and this and this. Pictures of Peter O' Toole on camel Carlisle Castle St Bee's Head Etc – the other major formations Now we can rule out what isn't suitable (explain why because of water, faulting, folding, lithology, minerals, too small, seismicity etc) Discard from the model what we don't want. Blank unsuitable areas out on a road map. There are lots of factors to take into account apart from geology but the areas that are left could be of interest. These include: • A • B • C • D • E Identify potential host areas Any questions – point the person in direction of more info, the booklet(s) Picture of booklet, available from street address or website. Details of source data Next stage is for communities to volunteer so put your hands up! You'll get lots of jobs, lots of money etc. Discuss at council level. This could be a valuable educational resource in schools. See **http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/minecraft/home.html?src=topNav#/46751/64/-49177/-6/0/0** **http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/minecraft/3d/home.html** A geologist on my table at the discussion mentioned a game called "Minecraft" which is presumably the basis for the above websites. Find a 10 year old child and ask them to research this for you! 2. More detailed information I suggest that you give access to the source data mentioned on page 18 of the consultation document. I understand that this is in the public domain anyway.

Question 4: Do you have any other views on the matters presented in the draft Guidance?

1. There is distrust of the political process (with good reason – c.f. Cumbria County Council's undemocratic veto in 2013). 2. There is an inadequate understanding of what we are talking about. I think that you need to restate the following points in very simple terms: • The bulk of the waste legacy was created from units between 194? and 1990. The benefits to the UK population were largely reaped by those born between 1890 and 1970 and were electricity and defence. • It amounts to how much (use the Coronation Street example above – which

is more "accessible" than the Royal Albert Hall). • Dangerous for how long and how dangerous – without causing panic • Alternative disposal ideas considered: – UK, France, US, Germany etc all working on this since 1970s. Ideas – not only geological repositories but also shooting into space, Greenland icecap, ocean trenches etc, can't export it because of international law. The geological repository is the general conclusion. • Could build generations of guarded/ maintained warehouses at Sellafield but allowing 100 year structural life then it would be ??? (how many) human generations (NB Cumbrian generations are shorter than those in some other places). Would not want to rely on political stability, economic resources and governance over such a long period – only about 32 generations since the Norman Conquest (since then – X royal family dynasties, last 100 years alone Y different governments, Z wars/ revolutions/ plagues etc) and only 64 generations since Brits running around with nothing on apart from blue paint. • Safety is of paramount importance. A release could be how bad? relative to Fukushima or Chernobyl. What area affected? • People would be happier if they thought that retrieval was a possibility. • A bit about the waste likely to be generated by new build.

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