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START OF TRANSCRIPT

[Nick Gardham]: Brilliant, thank you for everyone going on to mute there. That's great. Right, so hopefully everyone is signing in. I'm just going to give it another minute just to make sure everyone drops in, but I will start us off by saying, great. Welcome, everyone, into this second space. We've managed to make it here. It's never easy. You think your click on a button would just [transmerge] you but sometimes things can go wrong so well done for making it from one space to the next.

As I said, we're going to go through three topics here. We're going to start by looking at the historical perspectives before moving on to suitability of geology, then lastly looking at ensuring safety for GDF. The questions that will be asked obviously will be informed by the conversations that I've had but more importantly will be drawn from yourself as participants. How can we ask questions? Well, there's one way which is I can see a number of people on camera so you could wave frantically which is one way of doing it to get my attention.

The other way is there's a little hand icon which you can just raise your virtual hand and wave. Hopefully, I will see you and hopefully we won't have that many ambulances, police cars et cetera going by interrupting us so I apologise for that. The other way is just please use the chat box. I'll be looking at all three and if I miss any of them then I do apologise, but I've got Councillor Moore and Andy Ross with me as well – members of the working group – who

[Unclear] words are denoted in square brackets and time stamps may be used to indicate their location within the audio.

will endeavour to make sure that I don't miss anything that comes through.

I will try to keep the conversation flowing as best I can whilst also making sure we can also all get an opportunity to participate. Please use the chat box, raise your hand, but more importantly engage in the conversation. That's what we're looking for. I'm going to start by actually saying I'm delighted to be joined by Councillor Moore and Andy Ross. [I don't know whether] Andy's on my screen. He's not there yet, but hopefully he's in this space. Both Councillor Moore and Andy Ross are members of the working group.

One of the things that came out really strongly in the last webinar, but also in the geology conversation, is a bit about what's different this time. I know Councillor Moore has been involved in a number of attempts at getting the GDF into Copeland so I'm going to hand over to you to say hello to everyone Councillor Moore and just to give a bit of an introduction and then before I move to Andy Ross.

Councillor Moore: Yeah, thanks and good evening, everybody. My name is Councillor David Moore. I've been a local councillor for 37 years. I represent the parish of Seascale which is nestled between Sellafield site and the low-level waste repository at Drigg. I've had an interest in this probably all my political life starting off with the Nirex process which was a process to look for rock characterisation facility to be located at Longlands at Gosforth. That went through a process which ended up going to a public enquiry which the outcome that the Secretary of State said he wasn't going to take it forward.

That was the first of the processes that came. It was quite a flawed process and the engagement with communities wasn't good. It was led by a process of they knew best and would tell us local people what they thought would work for us and it failed obviously. Then came along the MRWS process which set up a partnership in Copeland. It was - had representatives of all councils and local community and the process was a lot better process. It engaged the local communities right from the beginning, but it was a staged process and at each stage it required – to move to the next stage it

required what was known as a three green lights which was the Copeland, the Allerdale and Cumbria County Council.

When we got to moving towards stage four, when that decision was to be taken which as I say was just a step along the line of stages, the decision by Copeland and Allerdale was to proceed giving it a green light. Allerdale and county at that time decided that they didn't want to engage any further in the process and gave it a red light. Unfortunately, that stopped that process. That was the end, that was set in the framework. If one of those authorities said no, that was the end of the process. That stage, both Copeland and Allerdale did press government to see if we could proceed as there was interest within the community to go on, but unfortunately that was the end of that process.

We are now where we are now with the RWM process working with communities and I think we have a lot of confidence in this process. I think those representatives of Copeland and Allerdale have both submitted into the consultation in putting together working with communities' document. It enabled us to put into that document all the feelings that were things that we went wrong in the previous process. What we have now is a community-led process. It's a community decision-making process and I think it's one that will work a lot better within the community. It's early stages and the working group is now set up and looking at other ways to take that forward.

Why would we be in it? I think Copeland would always be interested in this as we have 80 per cent of the waste currently stored on the Sellafield site, some of it in aging stores now. Copeland has always considered it will be the front-end of a GDF. Now, from the council's position, that could be wherever the GDF is located in England or Wales. You know, we've not taken that view yet. We've just said this is the right process to open, to engage to see if there is anything of interest to RWM and any communities interested in taking that forward. I think we've got the process to that stage now.

There's a real commitment from ourselves to engage in this. The council is not just the interested party. You know, it is also the principal authority as well that's taking it forward which there has to be in the process. I think we had joined the process. We put some conditions for RWM. Clearly, we wanted the National Park removed from the process both above and below the National Park, but we were comfortable to put the inshore area out to 22 kilometres in which actually gave us some new search areas that have not been looked at, at this stage.

I think it's a potted history of 30-odd years of working with it and you can't really compress it into this short a time, but I think that's enabled us to get to a process where we are today that I think I've got some confidence that we can take through to delivery. Thank you.

Nick Gardham: Thank you very much, Councillor Moore. I'm going to also bring in another member of the working group, Andy Ross. Andy, I can see you on my screen now, brilliant. Just to say, Andy, you mentioned to me you weren't involved previously so what inspired you to get involved this time round and do you want to say a little bit about who you are and a bit of background as well.

Andy Ross: Yep, thanks. Good evening, everybody. Yeah, my name is Andy Ross. I'm a resident of Cumbria and a resident of the Lake District National Park. I have business interests in the area. I represent a company called Genr8 Group which is a property company. We have had business in the area for the last 15 to 20 years and therefore we have an interest in the success of the economy of the area and in particular West Cumbria because we've had an involvement with West Cumbria and indirectly in the nuclear industry on and off for the last 10 years or so.

I wasn't involved in MRWS or Nirex, but I was aware of those processes and kind of watched from the outside just to see how they went. When the opportunity – it will be nearly two years ago now – for a call for Interested Parties – capital I, capital P – came up to nominate a particular area for the potential for siting a GDF, we had a look at it as a company and thought, well, it might help

the economy for two reasons. (1) We were aware that the material we stored there – something like, as Councillor Moore said, 75 to 80 per cent of the UK's high-level nuclear waste is already stored in the area in not necessarily a satisfactory manner long-term.

We thought, well, we do need to deal with it on a long-term basis and it made sense that we dealt with it here because that would potentially give us an opportunity to take advantage economically from that opportunity. We also didn't want to see that opportunity disappearing out of the county, so we jumped at the chance of nominating Copeland as an area to look at the potential of it. We joined the working group along with several other Interested Parties. The local council is an Interested Party and there are two other private sector Interested Parties and together we are looking at helping the process move along.

Nick Gardham: Thanks, Andy. There's a question in the box which I might come back to in a minute unless you can answer it succinctly now. The question was just what's in it for you Andy? I mean, you touched a little bit about your interest in the economic development of Copeland as an entire county, but I mean, what is in it for you?

Andy Ross: Well, there isn't anything of interest to us as a company. We're interested in helping the economy of Cumbria. I mean, this is a long-term project. I'll be – I'm 55 now. I'll be well retired by the time the project actually starts so we're not – we don't have any actual fiduciary or financial interests in it. It's we care about the local economy. We see decommissioning in Sellafield starting to decline therefore – I mean, that's a huge employer in the area and that needs to be replaced by something. Obviously, it would be replaced by indirect industries, but we think having a multi-billion-pound project such as a GDF will help replace the jobs that potentially in the long-term might be lost from the Sellafield project.

Nick Gardham: Thanks Andy. That's really helpful for that. I'm going to move us very quickly into some of our speakers on this session and try to move our conversation flow. It's great to see the chat coming in already which is brilliant. I want to say hello to Cherry who we've got. Cherry, do you just want to say hello to everyone?

- Cherry Tweed: Hello, everybody. I'm Cherry Tweed. I'm RWM's chief scientist. My background is in natural sciences and then I've been working on geological disposal in the UK and supporting overseas programmes since 1985. Initially, I worked in the supply chain providing technical support and I've been the chief scientist at RWM since 2011.
- Nick Gardham: Brilliant, thank you Cherry. Also, we're joined by Richard Griffin. Richard, are you there?
- Richard Griffin: Yeah, thank you, Nick. Good evening. I'm Richard Griffin. I'm the senior policy advisor with RWM. I joined in February. For the previous 10 years I've been working in local government both for the County Council and Allerdale Borough Council as a nuclear policy officer.
- Nick Gardham: Great. Thank you, Richard. We're also joined by Candida Lean. Candida, you're on the line. I've seen you earlier. There you are.
- Candida Lean: Yeah, good evening, everyone. I'm Candida Lean, nuclear waste assessor with the Environment Agency and I lead our support to [GTSI2] project. I'm a geoscientist by background and 24 years' experience or so working in the industry. It's important to mention at the outset that the Environment Agency as an independent regulator isn't formally a member of the working group and we will not be involved in decisions to select a potential site for GDF. However, we are available to provide support and information to communities who might be interested in hosting a geological disposal facility. For example, about how we would regulate one and ensure protection of people and the environment.
- Nick Gardham: Thanks, Candida. That's great. Straight to the questions then and I'm going to take it from the top which is – I'm guessing SOS means Secretary of State. I make an assumption there. I got my acronyms wrong this morning so I might get them wrong again. I'm going to start straight – I think this one's for Richard. Did the Secretary of State give a reason as to why he didn't take it forward, the Nirex RCF? Or is that one for Cherry? I don't know.

Cherry Tweed: I think that's probably one for me, thank you Nick. Actually, the answer has been posted in the chat by Mark Kirkbride who's one of the attendees. The planning inspector recommended that the application was turned down on standard planning grounds and also some environmental factors. That was the main reason given in a letter from the Secretary of State to the Government Office of the North West in March 1997. Perhaps behind that, I think you can see some of the failings in the old process that Councillor David Moore actually alluded to.

If a project in a community between the developer and the community couldn't even reach agreement on things such as the actual layout of the surface buildings and how to make them blend in, that's just a reflection of the lack of engagement, the lack of joint working that was at the time. That's something that we really want to be different this time. Very much of a joint delivery working in partnership and a much more open style of sharing information.

Nick Gardham: Thank you Cherry. Do you want to flow through because there's the point there on hydro – not on hydrogeology then. Is that – so I mean, you made the point, but do you want to – is there something – an additional point that needs to be made?

Cherry Tweed: I think, yeah, in terms of the other questions that have been in the chat, and I don't know if everybody is following it? There was also a comment at the time around scientific uncertainties in the Nirex proposal at the time. I think there it's really important to actually turn the clock back and think that that planning application – which wasn't for a disposal facility, it was for a research facility to understand the rock – did include some early scientific work and at that time, then there were uncertainties and technical deficiencies. Since then, then there's been more than 25 years of research into geological disposal, not just in the UK but overseas. I think particularly important in building confidence in the solution was that just over 10 years ago, both the International Atomic Energy Agency and then the nuclear part of the Organisation for Economic Cooperation and Development both publicly gave their backing

that geological disposal around the world was the best practicable solution for managing these wastes.

Nick Gardham: Thanks Cherry. We're going to come onto some of that later on, but I want to pull us back onto some of the questions that came up in the prior conversations as well. If no one's got their hand up, I will move it to that. One of the things that came up in the conversation I had before – and I know, Councillor Moore, you've touched on this as well. It also came up in the last session at lunchtime – was that – the question was, didn't the government change the law to make this happen and remove the council's power of veto?

I think what they were saying by that – and you know, it came up earlier – was this sense of well, we've tried. We failed. Let's just change the law and we'll make it happen regardless. I mean, what – and there was a sense, an intimation of that again this morning. What was your response to that? Primarily, I think that one was for Richard. I think, Richard you answered that one earlier.

Richard Griffin: Yep. I think the right of withdrawal is there. It's in the new process. It's slightly different than last time. Councillor Moore referred to these three traffic lights system last time. It's still there in the current process. Indeed, if Councillor Moore and his colleagues are not happy with what comes out of the working group, they don't have to join the community partnership and in which case it would stop. The process would stop in Copeland. They retain a right of withdrawal right up until the test of public support very late on in the process so it's still there.

It's still within the control of the principal local authority which in this case is Copeland Borough Council but could be the County Council and Copeland Borough Council or a unitary authority if we changed the style of government in Cumbria at some point.

Nick Gardham: Thank you very much. The other question that I have which came up as well, and one for Cherry I think, is there was this sense that in the Nirex programme there was this high-level waste was not going to be stored underground but this time round there's the potential I believe. That's what we're hearing for it to be stored

there. Yeah, is there going to be high-level waste stored underground or not, I think?

Cherry Tweed: I think the answer is yes. I mean, that one important point that you made was even back in the 1980s the key point is waste exists and it needs to be managed. Certainly, the policy in the 1980s was to tackle the intermediate-level waste, the less radioactive waste first with the view that the waste that was sufficiently radioactive that it would generate heat would be stored for 50 years and then disposed of. I think this time, and it's part of the whole approach of openness and transparency, it's important that everybody starts with a full understanding of what the inventory that is going to be disposed of will be. We have all of these radioactive wastes, and they all need to be managed by disposal underground.

Nick Gardham: Thank you Cherry. We're going to move onto some of the science questions in a bit as well around that. I'm going to move us on. One of the key things that came out in all the conversations was around suitability of geology and dare I say, what's best and what's not best. I know that there'll be a conversation around that, but I'm going to – as we talk about geology, I've got Jonathan Turner. Jonathan Turner, are you with us? Do you want to say hello?

Jonathan Turner: I am. Is my [microphone] switched on? I can't see the unmuting button. Can you hear me, Nick?

Nick Gardham: I can fine, yep.

Jonathan Turner: Great, super. Good evening everyone. It's Jonathan Turner. I'm Jonathan Turner. I'm chief geologist at Radioactive Waste Management where I've been for just over four years since 2017. Most of my career has been in the oil and gas industry so I've got lots of experience of describing and analysing deep, subsurface geology, so geophysics, deep borehole drilling and that sort of thing. Now I'm applying those same skills to the challenge of deep geologic disposal of radioactive waste.

Nick Gardham: Thanks Jonathan. We've also got Kirsty Simpson. Kirsty, do you want to say hello?

Kirsty Simpson: Hello, everybody. My name is Kirsty Simpson. I'm the geological technical integrator in the site characterisation team at RWM. I joined last year in November so I'm relatively new to the process. Like Jonathan, I also spent the large part of my former career in oil and gas, so I also specialise in the characterisation of the deep subsurface.

Nick Gardham: Thank you, Kirsty. I'm going to get [unclear] this evening. It's the British Geological Survey. I said Society this morning, I do apologise. We've got Jon and David. Jon...

Jon Ford: Thanks, Nick. Yep, I'm Jon Ford from the British Geological Survey. I'm chief geologist for England. I have a background in mining, but I've spent my career at BGS working on a range of geological mapping and subsurface characterisation projects. I've been involved in contributing to the National Geological Screening exercise.

Nick Gardham: Thank you, and David.

David Schofield: Hi there. I'm David Schofield. I'm a geologist at the British Geological Survey. I'm the director of our national geoscience programme. I've been providing geological advice to RWM for the last six years and led the rock type part of the National Geological Screening process. For those of you that don't know the BGS very well, we're like the EA. A non-departmental government body, but unlike them, we don't have any duties. We instead have a role to provide what's called the national capability in geology and that includes providing independent advice to organisations like RWM as well as the public at large.

Nick Gardham: Thank you, David. I mean, the geology, particularly about rocks. I've learnt an awful amount. New terminology that I've never come across before in speaking to people in Copelands. Anything I do say here, if I get it wrong, I apologise. There is this sense when I talk to people about geology that actually, it was the rocks weren't right last time round. How all of a sudden are they right and how come the rocks have got better, maybe is the phrase to use. I don't know, but Jonathan, are the rocks better this time?

Jonathan Turner: Well, sure. Thanks, I can probably pick up where Councillor Moore left off in his description of the process that took place in the 1990s. We hear this question quite a lot along the lines of, we've been here before. We've rejected it then, so why are we coming back? Several colleagues have answered that question clearly, that the geology – the RWM's predecessor, Nirex hadn't got to the point of forming an opinion on the scientific geological suitability of the deep underground geology before that project was cancelled by the Secretary of State.

As you know, siting of a deep geological disposal facility is a consent-based process and RWM is mandated to evaluate the geology in whichever area of England and Wales a community sticks up its hand and comes forward. We're in this engagement process with the Copeland working group and therefore we're evaluating Copeland geology. Maybe just to say a bit more. One of the big differences between the area that we're looking at now compared to the 1990s – Councillor Moore just briefly mentioned the inshore area, but to emphasise that we're now looking at geology as far as 22 kilometres off the coast so way out into the Irish Sea.

In a nutshell, the onshore geology of Cumbria is really very different to what you see beneath the seabed in the Irish Sea. We're looking at different geology and it's a consent-based process and we're evaluating what we've been provided with by Copeland.

Nick Gardham: Thank you, Jonathan. I'm going to keep an eye on the chat box and the hands up, but there's another – the other thing that came out a lot which is actually I've heard things about aquifers and volcanics and salt rocks and all sorts of things mentioned. Kirsty, you touched on this earlier. What type of rocks are we looking for?

Kirsty Simpson: Potential host rocks fall into three different types of rocks and Copeland actually quite unusually has examples of all three types. A high strength rocks which are things like granites and the Borrowdale volcanic group. There are low strength sedimentary rocks which would be, for example, claystones, mudstones and

shales. Then there are halite's, rock salt intervals. The main difference between them, or the way they are characterised is the way that groundwater flows through them. They are suitable in different ways because of the different ways that groundwater flows through them.

In a high strength rock, groundwater flows through fractures in the rock. Therefore, for a high strength body of rock to be potentially suitable, that groundwater has to be isolated from any aquifers or from the seawater and that sort of thing. In a low strength sedimentary rock, groundwater flows very slowly through it by diffusion and therefore we would be looking to assess and find a body of rock where that path of any groundwater that might have picked up radioactive waste in it is very long so that when it eventually does get to, for example, the ocean, the radioactivity within that groundwater is below the background level of the uranium that is already in seawater.

That's a very simple potted description and as I say, Copeland does have a number of examples of all three of those types of rocks. I don't know if you maybe want the – BGS could expand a bit more on the different types of rocks.

Nick Gardham: Please feel free. Yeah, absolutely if you could add to that, that would be great. Jon, you might want to do that.

Jon Ford: Thanks very much, Kirsty, for outlining the different potential rock types of interest. Absolutely, within the Copeland area, as you said, examples of all three of the types of rock that you described do exist at different levels below the ground with different thicknesses and different extents. A large part of the work that BGS has been involved with is looking at a national scale to understand in a general sense where these different rock types of these different three categories may be expected to be found within the depth range of interest.

We mentioned previously the National Geological Screening. One of the core activities that BGS was involved with to contribute to the [unclear] National Geological Screening was essentially

identifying the areas across the whole country including within this region, of where those different rock types are expected to occur.

Nick Gardham: Thank you. You mentioned depths. What are the depths that we go down to when this is happening?

Jonathan Turner: Shall I take that?

Nick Gardham: Please.

Jonathan Turner: Jon mentioned the National Geological Screening. The depth interval of interest that we're looking at is 200 metres to 1000 metres. Now, the 200 metres is very much a shallow cut-off. It definitely couldn't be constructed more shallow than that particularly because of the potential for interference from deep glacial valleys. The 1000 metres is a sort of arbitrary cut-off in that obviously the deeper you go, everything gets more complicated and more expensive. When you look at other facilities that either operating or being designed around the world in other countries, you tend to find that they are between about 400 and 600 metres.

Nick Gardham: Thank you, Jonathan. I'm aware – I'm going to jump the questions about a bit because there is a question about looking at [longer stuff], but I'll come back to that on – so I may as well go straight back to Jonathan and David from the BGS. There's a question there about the Allerdale 2010 geological report. We are in the Copeland working group, I'm not sure that's relevant to this session, but if you can just answer it within about 20 seconds, that would be great if you've got an answer. If not, we can take it offline if it's easier to take it offline.

David Schofield: I am uncertain as to why that is. I mean, I wasn't involved in that exercise, but we can confirm that for you offline.

Nick Gardham: Yeah, that would be great. I want to try and keep the conversation as focused as possible on Copeland, but we'll get back to you on that one. Let's pick up the earlier question on proposition of area. We talked – well, Councillor Moore talked a bit about the exclusion of the National Park above ground and underground. A key condition of, I believe, Copeland Borough Council. You touched on that, but also you talked about this – and I always get it wrong –

the inshore – the bit out to sea. I think inshore is the correct phrase. What's this about Longlands Farm? Do you propose to take a look at Longlands Farm again?

Jonathan Turner: Okay, I'll start with that. Councillor Moore talked about this progression from what are called Interested Parties to working groups where we now are, and hopefully the Copeland working group will progress onto a community partnership. Now, the main function – the principal task given to the working group is to define what's called the search area. Therefore, in looking at Copeland, including that 22-kilometre inshore area, we are essentially evaluating everything that falls out with the National Park and we're nothing like yet at the stage of evaluating individual potential sites for a GDF.

Longlands Farm, in case people on the call don't know, was the area that was proposed for the rock characterisation facility in the 1990s. It's underlain mainly by higher strength rocks; a particular sequence of rocks called the Borrowdale volcanics. If you've ever been up the Old Man of Coniston, that's what you see beneath your feet there. It may fall within the area of interest that we look, but we haven't yet defined the search area and therefore we're carrying out in a very high-level reconnaissance if you like.

Nick Gardham: Councillor Moore, [unclear] from the work you are expecting – Andy Ross, have you got anything to add to that?

Councillor Moore: No, I mean we totally agree with that. I mean, what we've put in was the whole area except the National Park. That area will be reviewed like the rest of it, and I think it will all just be looked, and it's decided on due to the information that we'll receive from RWM and the geologists around the geology, but it's also two parts to this process. It's not just the geology and having the right geology, it's about, is there an interested community in that same area? The two have to come together so it isn't just about – RWM will rule out areas which are not geologically sound, but it's also, is there a community in that area that wish to take that forward.

The answer is that area of Longlands – it is like the rest of Copeland that is within the area outside the National Park and out to sea to 22 kilometres – is all still under investigation.

Nick Gardham: Thank you very much. This might be an easy one, I don't know. How long does this whole assessment process of geology take? I mean, that was one of the questions that came up earlier as well in the conversations I'd had. How long does this whole process take?

Jonathan Turner: So, ballpark figure, 10 to 15 years. What I mean by 10 to 15 years – bear in mind that evaluation process has begun now. Because Copeland working group has now formed, we're beginning to use publicly available data and information that are available to us to evaluate at a very high level, so a fairly low level of detail, the geology of Copeland. When you're asking how long does the process take, I think what you're talking about is what we call – a little bit of jargon – site characterisation.

Now, site characterisation involves geophysics, particularly acquisition of seismic data and then subsequently the drilling of deep boreholes and that process continues to the point where we – RWM - are satisfied that we understand the subsurface geology sufficiently well to be able to produce a really robust safety case. We think that that process is likely – that combination of geophysics and deep boreholes is likely to take between 10 and 15 years.

Nick Gardham: Thank you, Jonathan. On the geology point, I'm going to [inaudible] over – there's just a question coming in. I'm just going to have a quick read. Yeah, is there already a map? Do you know, that question – that was funny, I was thinking something similar to that. How much knowledge do we have and what does it look like? I'm just going to read out Paul's question. I don't have any background in the Nirex work and previous reports and geological surveys done. Is there already a map or plan that details provisional suitable rock types and locations in Copeland that could site the GDF?

Jonathan Turner: Well, sure there is. I mean, actually the science of geology began in Britain. William Smith in the early 19th century produced the first

national geological map and so the geology of Cumbria has been mapped in increasing details by the British Geological Survey and its predecessor for over 100 years. Yes, there are maps and there are cross-sections that exist if you Google it that exist for the Cumbria area and indeed for the inshore area – the seabed beneath the Irish Sea.

None of those maps and existing information provide an anything like enough detail for what we will need in order to produce these, as I referred to them before, robust safety cases in order to pass muster with the regulators. Yes, there is information available at the moment. It will be probably by the time we've finished that 10-to-15-year site characterisation process, whichever areas we're characterising, they will present the most detailed descriptions of subsurface deep geology anywhere in the UK including the North Sea.

Nick Gardham: Thank you.

Kirsty Simpson: Sorry, I was just going to say...

Nick Gardham: Go ahead Kirsty.

Kirsty Simpson: If it's possible to just add to what Jonathan said. Paul, a really good place to start have understanding what the work that's already been done and to get a bit of a feel for the geology and the potential host rocks would be to read the Northern area product for the National Geological Screening. There are a number of additional reports on that for different areas within Cumbria as well as for the whole of Northern England and they should all be linked from the working group website, if I'm correct. That would be a really good place to start just getting a feel for the information that the BGS put together for RWM and that we're starting this process with.

Nick Gardham: Thank you, Kirsty. I'm just going to wrap this one up on this section, but before I wrap it up, I'm just going to ask the – [unclear] yes, no answer. Do you still have the Nirex borehole results data for Longlands Farm? I think – I don't know the answer, but yeah...

Kirsty Simpson: Yes, we do.

Nick Gardham: [They're there]. Thank you very much. That's great, Kirsty, thank you for that. Brilliant, so I'm going to move us on now into another topic which was hot on the agenda for conversation. Can somebody make a note to follow that onto Colin as well. Just make sure we do that at the end. We're looking at the ensuring safety of a GDF. There's an awful lot of questions on science and technology as well. I'm going to move us now to Rob Winsley. Rob, are you on the line?

Rob Winsley: Yes, I am, Nick. Hopefully, everyone can hear me. Good evening everybody. My name is Robert Winsley. I'm senior scientific advisor at RWM. I'm a material scientist by training. I've been working on the UK geological disposal programme and other international programmes since about 2007 so for about 14 years or so now. Yeah, and I look forward to hopefully making some positive contributions to your working group discussions.

Nick Gardham: Thank you, Rob. A new person who – Sarah Vines.

Sarah Vines: Hello, I'm Sarah Vines. I'm also a material scientist and I've been working at RWM for about 20 years. I work on the long-term safety case and also on the scientific underpinning.

Nick Gardham: Thank you, Sarah. Also joined in this bit by Peter Howden. Peter, are you there?

Peter Howden: Yeah, hello, everyone. I'm Peter Howden, a nuclear safety inspector at ONR. I've worked in ONR for well over 10 years now. I work primarily in a team specialising in radioactive waste management and decommissioning and I'm leading ONR's work providing support to the GDF siting process. I'll just reiterate what Candida said about EA earlier on, that ONR provides advise on the regulatory requirements to RWM and the communities, but we're not actually part of the siting process and we won't play any role in the decision on siting of a GDF. Thank you.

Nick Gardham: Thank you, Peter. The question on the tip of everyone's tongue, I spoke to about this – well, not everyone perhaps but a good number of people – was, is this actually safe? Is subterranean burial safe? Before we move onto some subsequent questions

around that, Sarah or Rob, I might move to yourselves. Is this actually even safe?

Rob Winsley: Well, I'm happy to start us off on that one Nick and Sarah, please do feel free to contribute as well. I think it's a really important question and it's a really good question because it gets right to the heart of why geological disposal is the preferred solution for these challenging radioactive wastes. This – a small proportion of our inventory – a few percent of it – will indeed be hazardous for the timeframe that is tens of thousands of years plus. That's a fact so it's a challenge to contain that hazard of course.

What we're not trying to do with geological disposal is claim that one single barrier can contain that hazard for that kind of timeframe on its own. Geological disposal is all about developing a multi-barrier system where a range of engineered or manmade barriers work together with a substantial natural barrier of host rock – 200 metres plus of host rock that we site the facility in. We're not claiming a single barrier would contain the waste for that timeframe, we're claiming that the – well, we can demonstrate, I should say sorry, that the multiple barrier system in its totality will.

The thing that's important to appreciate, I think, is as we go into very long timeframes, our safety arguments will increasingly rely on the natural barrier and focus less on the engineered barriers. I always take a lot of comfort from the fact that we know we have geological settings in this country that are tens of millions of years old so whilst it's challenging to claim a steel or a titanium or a particular material can last tens of millions of years, we know our geological barrier is tens of millions of years old. We know it's been stable for that time and we're very confident it would remain so for the timeframe we need it to help us contain this hazardous waste.

Nick Gardham: Thanks Rob. Sarah, have you got anything to add to that?

Sarah Vines: I think what I'd add to that is how – echo what Rob said. The how the safety is really important and that we need to satisfy ourselves and we also need to satisfy the regulators that it's going to be safe.

That's a process that's going to take quite a bit of time so certainly working on that safety case is part of what we're looking to do.

Nick Gardham: Thank you, Sarah. That is – actually, that does neatly segue into another question I had which is, who decides? Who decides on the criteria for the site as being suitable and safe? I don't know if that's one for Peter or for yourselves.

Peter Howden: ONR doesn't define the criteria for a GDF as such. It defines the criteria that we will use to assess the safety of a submission about the GDF. ONR – ultimately RWM will submit a submission to ONR with their safety case and justification that the GDF is safe and then ONR's technical experts and specialist inspectors will assess that justification against the regulatory expectations and technical requirements to make a judgement on whether it is safe and ultimately whether we can grant it a nuclear site licence to operate and receive waste.

ONR's standards that we'll use in that assessment are documented and publicly available in documents such as our safety assessment principles – the SAPS, technical assessment guides and other good practice guidance. Through the engagement with RWM at this stage, we communicate the regulatory expectations to RWM so that they can take those into account when they are developing their designs for the GDF and generating the sort of information that they need to underpin their justification for the safety.

Nick Gardham: Thank you, Peter. I see a question has just come in. This question came in to me as well in the conversations I had and came up this morning. It looks to me a little bit two-fold that question coming in, so I'm going to pick it up in two ways. First of all, Rob, I asked you earlier this afternoon as well, about the radiation leaking out of containers. The second point relates to the monitoring of this beyond the lifespan of a GDF. Actually, how does that all take – you know, fundamentally the waste goes underground. We talked about the retrievability of this when it goes under there, but then actually, once it's full, how is it actually monitored? How do we ensure that it's all okay under there?

Sarah Vines: Okay, yeah that's...

Rob Winsley: Okay, so – sorry Sarah, go on.

Sarah Vines: No, you go, Rob.

Rob Winsley: Yeah, I was going to say there's quite a lot in that question so maybe if I take the monitoring part of it first of all and then maybe you can remind me, Nick, what the other aspects were if I've overlooked them. I think the first thing I would say is the long-term safety of a geological disposal facility will not rely on a monitoring programme to demonstrate that safety. The facility will be designed, as I think is mentioned in Colin's question in the text – just skimming while I speak. It's designed to be passively safe, so it won't require monitoring after we've filled, sealed and closed the geological disposal facility.

Having said that, it will take us probably 100 years to construct and fill this facility – maybe 150 even. During that long operational period – very long period, 150 years or so – we absolutely will be monitoring the facility to make sure it is behaving as expected and consistent with our safety case, and we will have the ability of course to respond to that monitoring during that 150-year window. We'll have a good confidence that we know what's happening because we will have been monitoring parts of the waste that have been disposed that kind of timeframe.

The other point I made this morning, so I'll say it again because I think it's highly relevant is, this is a consent -based siting process. Whilst we don't need from a regulatory perspective to monitor the facility after it's been closed up, it's quite possible I would imagine, that a community might have a view on this issue and obviously Colin has a view on it as a member of the community. It's possible we could work with the community to understand what monitoring requirements they may have and then of course look at if we can incorporate them into our designs because clearly the community being confident in the facility is required for them to give their community consent. If we don't have their confidence, it's unlikely they'd give their consent, and the process wouldn't continue.

Hopefully that covers the monitoring part of it. What were the other bits that were part of the question?

Nick Gardham: Thanks, Rob. The other bits were the retrievability and whether or not the radiation can leak out. Maybe Sarah can pick up on those ones?

Sarah Vines: I think this goes back to wanting the multi-barrier approach so that we've got multiple barriers that can contain the waste and protect the environment and the public from that waste. Over the very long timeframe that we're considering, which is hundreds of thousands of years, you would expect that some of the engineered barrier systems will evolve and degrade over that time and that so some aspects about the container itself will start to corrode. Really the design of the engineered barrier system will be all about building those different barriers up so that not only do we have the role played by the engineered barrier system, but we also recognise that the geology itself plays a role within that as well.

That can give us some confidence that even when we're looking at timeframes over hundreds of thousands of years, that we wouldn't get harmful quantities of the radioactive waste in the environment.

Nick Gardham: Thank you, Sarah. On that point, about the site and the waste and getting it there as well, this came up in my conversations about how is waste imported to the site? Will it be – I'll read it of the sheet because I'll get it correct. Will it be shipped to the depository and if it is inland – I think that means – I'll just get my terminology right – what about the road conditions? I've heard that the road conditions in Copeland aren't necessarily the greatest for shipping this. That's what I heard.

If it's at sea, what about the shipment of waste from A to B to the final depository? I think what they meant there is do you put it on a boat and then move it across and then drop it down? In short, how much is there and how often will it be transported? I think there's a genuine fear around people just watching radioactive waste go past their window.

Rob Winsley: Yes, so I can start us off on that one if it's helpful Nick. I think in terms of transporting waste to the eventual GDF site, we have a strong preference to try and minimise road transport of course. That will obviously depend where the site is so if it is an inshore disposal facility with a coastal located surface facility, we will of course try and maximise marine transport and minimise road transport. That of course will depend where the facility is sited.

Other parts of the question. In terms of numbers of shipments, it's probably not as much as people would expect. I mean, we're talking a few packages a day would be arriving at the facility so we're not talking hundreds of shipments and of course packages are already transported around, if we think about the Copeland area, so it wouldn't really be a significant change in terms of radioactive waste package transport, but there would of course be the associated construction transport [facility].

Nick Gardham: Thank you. On that note then, another subsequent question that came up was, is this GDF – regardless of where it's built – assuming to say it built in the Copeland area, is it just for the nuclear waste we've got or is it actually for future waste?

Rob Winsley: Okay, so I'll kick us off on this and others please do contribute. I mean, I think the policy is quite clear, Nick. It does, as Cherry mentioned earlier on actually, go to quite some level to try and envelope the maximum waste inventory. The inventory for disposal is the legacy waste we currently have, an estimate of waste that would arise from the facilities we currently have in this country – so it's the waste part. It also makes an estimate of waste that would arise from a nuclear new build programme in the UK which is of course is government policy as people may be aware, but that's an estimate so it's based on a nuclear new build programme of a certain amount that is stated in the policy – 16 to 18 gigawatts I believe.

Then the inventory for disposal also includes some nuclear materials that aren't yet classified as waste so that decision hasn't yet been made, but RWM's planning assumption – so the designs for the facility – will allow us to accommodate that material if it's

classified as waste in the future. That's things like spent fuels that haven't been reprocessed now that reprocessing facilities are closed and closing imminently, and also some nuclear materials like plutonium and uranium, but again they are not yet classified as waste. That decision hasn't been made, but our planning, we'll be able to accommodate them if they are classified as waste in the future.

Nick Gardham: Thank you Rob. I'm going – on a side note, but an important question because this is about people making a decision and being able to be confident the safety et cetera on this. I'm going to move to Andy Ross actually and Councillor Moore because I think there is a role here for the working group. I think should and if and when, for the potential for a community partnership be formed and there is no guarantees in any of this stuff around forming the community partnership.

It says here, an informed decision is vital in how can a community give informed consent if it is uneducated. I know Andy Ross and Councillor Moore; you've been advocates for ensuring we get the information to the people so do you want to share the work we've been trying to do?

Andy Ross: Yeah, can do. Obviously, part of the job of the working group is to engage with the local community or at least start that conversation and we're working very hard to enable that process to happen by just using all forms of communication and engagement with all parts of the local community. I mean, our job isn't to finish that engagement job. Our job as a working group is to start that job and then if and when a community partnership then we pass the baton on to them to continue that engagement process.

Absolutely, one of the reasons we became involved was to ensure that not only do the public need to be informed about why a GDF might a good solution, but also what the current position is with regard to the storage of high-level nuclear waste. There is an assumption in Copeland that everybody knows about it, but my personal view is that they don't, and they need to know what the

current position is in order for them to start the process of being informed about what a potential alternative would be.

Nick Gardham: Thank you Andy. Councillor Moore...

Councillor Moore: I think following on what Andy said – supporting everything he's said there. There is an assumption that lots of people know a lot about it. As we've engaged, we know that varies and I think it's right to start at the beginning. We have to bring everybody along in this process and that community needs to be fully informed because at the final decision point, the community will go to what is a – there would need to be a local referendum or something like that because what it says before the final decision is taken, there must be a test of that community support.

It is really clear that that community will need to understand fully all the implications of what they're taking on because that entire community has to accept it. That is the ultimate test and if we can't get the correct information to them or can't satisfy that community about the safety or there is an issue around that, that community will not take it onboard. It has to be really clear that the information that goes to those communities is clear. That those communities have to be educated.

As we've said, this could be a 10, 15-year, 20-year process that the community partnership's going. The early bit that we're doing now – the working group – is just to get those community partnerships set up so that they can engage in the process and take it forward. At any time, that can be stopped and at any time at the end of that process, if it's not for that community [repeals], it's ill-informed or not comfortable with it, the community will make their ultimate decision to walk away.

Nick Gardham: Thank you, Councillor. There's a good recommendation coming through there as well, I see. We may be already on route with this. I don't know if everybody at the working group or within the panellists know the answer to this but to engage the community you need to show how GDF works, timelines et cetera. A multimedia model on a website would be good. That sounds good to me and there's some nodding there from Andy Ross and others.

Are we on the way to doing this or not? Have we started a process of this? Does anyone know?

Male: Yes, we are. Cherry, do you want to take that?

Cherry Tweed: I was going to say yes we are. We've had some goes. I think with all of these things, there's always ways that we can do it better and what works for one person might not work for somebody else. We have got some videos that try and explain how a GDF works, but we're certainly open to suggestions and if people have seen perhaps ones on websites from other countries that they find particularly helpful, it would be really good if they would share that with us.

Nick Gardham: Thank you Cherry. [Unclear 54:56] and something we could maybe look at for the face-to-face exhibitions to start to some videos and multimedia stuff out there. A little plug there for the first of those exhibitions in July that we'll be having so we do hope to see some of you at that session. I will plug it again before the end as well.

Andy Ross: Sorry Nick, is it worth mentioning the virtual exhibition as well?

[Over speaking]

Andy Ross: I mean, we've worked extremely hard on the virtual exhibition and I think as a result of us not being able to get out and actually talk face-to-face with the general public and any other parts of the community – business or otherwise – due to COVID, we've actually worked really hard on a virtual exhibition. We've designed with the help of RWM, a virtual village hall and it just looks like that. It's a web-based exhibition where you can wander in and there are all sorts of different bits of material to have a look at. There are videos, there are conversations, interviews and it's a really helpful piece of software, I guess, to be able to just go in and understand as much as you want.

I mean, there's a stack of material in there. You could spend hours and hours – not that you would want to necessarily, but you could spend hours and hours in there learning everything about what the current position is, what a GDF is all about, how it is designed, how it works, why we regard it as being safe. There's all sorts of

things that you can look at in there so I would strongly recommend that – we recommend that people have a look at that.

Nick Gardham: Thanks Andy. I've just popped a link in the chat box as well so everyone to take a look at it. Absolutely, the importance of interactivity is vital, and I couldn't agree more and particularly, this is generational. We have to start with recognising that we need to engage young people in this process, five, six and upwards. Whatever we do, whatever information is shared – and I say we, but whatever the Copeland working group chooses to do has to engage across all age spectrums and all age ranges and I think that's vital that. If we can inspire young people to get involved and be interested in this, ultimately, they assume, if, should or when a partnership be formed, they'll be the ones voting on it as well. They need to start understanding it from an early age. It's absolutely vital.

We've got two minutes before we move back into that main space and I'm just thinking about what questions and if we've covered most of them. Make another note on Professor Tom Scott, but I'm going to look – final question which we didn't get the chance to ask earlier. Maybe a bit too big for the two minutes, but climate change. I'm sure over the years and years and years, that this thing will be underground for, how will it effect things? That came up in conversations. How will climate change effect the subterranean burial of nuclear waste?

Jonathan Turner: Can I start with that Nick?

Nick Gardham: Whoever. Yeah, Jonathan, fire away.

Jonathan Turner: The two by-words we use for GDF are containment of the radioactive waste and also isolation. Isolation from what? Well, two things really. One is not the concern of this question, and that's isolation from possible future generations or even civilisations inadvertently mining into the facility. Also, secondly, isolation from what we call surface processes and there are two main surface processes that are key here for the UK. One of them is earthquakes and the other is extreme climate change – ice ages, glaciations, that sort of thing.

It seems bizarre to us in our human timescales to think about the idea of the UK being covered by continental ice sheets, but only 12,000 years ago the last ice sheet began to recede from the British landscape. In terms of GDF, yes ice sheets have important effects that we'll need to take account of and include in the engineering designs for the GDF, but there's really good understanding of what the processes are associated with extreme climate change and in particular, like I say, I mean by that, glacial periods and we'll be taking account of those in developing this long-term, hundreds of thousands of years post-closure safety case.

Nick Gardham: Thank you for that. Is there anyone else who wants to add to that or is that – I'll just give – no, some shaking heads. Brilliant, thank you. Great, there are some – I'm conscious that we [unclear]. There's some questions still coming in, so we'll take a note of them and pick up on that later on. Thank you, Sam, for that. [Unclear]. Absolutely, and I will pick up on the in-person element as well. Thank you, everyone, for participating in this so enthusiastically on an evening at twenty to eight as well. It's been a great conversation. I've really enjoyed it. Thank you all to the panellists as well. Thank you to Andy, thank you to Councillor Moore for taking part.

We're going to jump back into the main room where we're going to have just a chance to debrief very quickly, but then also there'll be some polling questions for you just to answer. If we can go over back to the main room. I think there's a button for you all to click so I'm going to say thank you and I'll see you all back in the other side very shortly.

END OF TRANSCRIPT