Oral History Interview Transcript

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TARA KALIA: OK, so I feel like I probably didn't do a great job explaining what this is for. I'm in a history class for UChicago's core, and it's covering energy history, so I figured you're a geologist. You have an interesting perspective, especially in the oil department. Plus, you've made some jokes about there not being any oil jobs when you were like looking for work as an undergrad. So I thought it could be a little fun to talk about it.

ROGER BRYANT: Yeah, let's do it.

TARA KALIA: But yeah, so I guess we're going to start with some background. Oh, I can't minimize Zoom. My notes are in a Word document. OK, this is fine. I got this. So let's start with some background questions. Where are you from and what's your background?

ROGER BRYANT: I'm from the United Kingdom, specifically a town called Wilmslow, which is a very small suburb of the city of Manchester in northern England. And, so I guess, my background is from there. I went to the University of St. Andrews in Scotland to do an undergraduate degree in earth science/geology, whatever you want to call it. And I spent four years there, graduated from there in 2014, and then I did five years as a PhD student in the Earth and Planetary Sciences Department at Washington University in Saint Louis. So I jumped from Scotland to the Midwest. So that was kind of a fun transition. And then after that in 2019, I moved to University of Chicago as a postdoc, working with Clara. Clara Blättler. Yeah, still doing earth science research. So yeah, the one theme that has maintained throughout all of this is earth science. Yeah, and I think originally, I had hoped to be doing research that was more sort of climate science related. But then, as my career sort of unfolded, that didn't happen, and I instead ended up studying rocks. So that's, yeah, that's my background.

TARA KALIA: Wait, how did that transition happen exactly? Like, how did you go from wanting to study climate related science to rocks?

ROGER BRYANT: Well, so I arrived at my undergrad wanting to study climate science, but more from the perspective of policy. I had a plan to do all these different courses and then figure out what my major was going to be. But a few of the courses I wanted to do, I wasn't able to get into because they were full. And so I ended up doing geology which was, I think, maybe my sixth choice major. But then it ended up being my most fun class. Or at least I found it the most fun. What I had wanted to do was like international relations, sustainable development, lots of things that sort of sounded more like they could lead to policy careers. But, you know, I think it worked out well in the end because I think looking back, I don't think I was very suited to policy. I hate paperwork.

TARA KALIA: This is true.

ROGER BRYANT: And I also hate--I don't want to say hate--but I'm not suited to talking with large groups of people and negotiating and doing things that policy people do so yeah.

TARA KALIA: Yeah. It's interesting that you wanted to go into international relations because I wanted to ask you what your experiences of energy are. In a broad field, this can mean cost,

sources, perceptions of energy and like, limitless energy and renewable energy, how they differed in the UK and in the US.

ROGER BRYANT: Yeah. Well, it's kind of weird because the UK is not just one entity. It's split up into all these different countries and Scotland itself is sort of very impressive in terms of its energy portfolio because, you know, there's all these offshore oil and gas reserves off of the coast of Scotland, sort of off to the east which is, I guess, going towards Scandinavia, all that stuff. There's already a lot of oil and gas, but then despite that, Scotland makes most of its energy from renewable sources. So like, I think there's some statistic that every river in Scotland is dammed and is generating hydroelectric power. I don't know if that's true, but that's what I heard when I was studying in Scotland. So Scotland is really leading the way in terms of the UK's push towards renewables, but partly because of having so many rivers and so much topography whereas England is kind of like mostly flat and does not have the ability to generate all this energy with renewables. I guess they could do more with offshore wind and things like that, but that doesn't exist yet. That was sort of my impression of the UK's energy usage or energy production. But then yeah, moving to the US, I think my expectation was that it would be really oil focused because oil and gas focused. I think it is, except that a lot of the oil and gas reserves in the US have already been used up. So like, obviously there's the offshore stuff in the Gulf of Mexico. But I actually grew up for a time in Oklahoma and I vividly remember--so this is when I was a really small kid. Like, I vividly remember there being these things called nodding donkeys everywhere. Which are these, which is basically like an oil well. The nodding donkey part is basically a pump for bringing up the oil. And everywhere you drive in Oklahoma, you see these nodding donkeys. So my impression of the US was that basically they were just drilling everywhere, bringing up oil everywhere until it was exhausted, kind of in the spirit of the gold rush. Basically like finding and using all the resources as quickly as possible to make the American dream happen. I don't know if that's fair or not, but yeah. Certainly there are no nodding donkeys in the UK. But I think that's partly because the deposits of the fossil fuels are different. Maybe there were nodding donkey type things, but, like, way back in the Industrial Revolution. I feel like I could talk for hours on this, but I should probably stop and let you ask something else.

TARA KALIA: No, please go ahead. This is really interesting. It's also really helpful because I think I'm going to probably be writing my final paper with a focus on oil and how that's transformed national security and energy security.

ROGER BRYANT: OK. Yeah, cool. I'm sure there's plenty to write about with that. So should I just keep talking about random stuff?

TARA KALIA: Yes, yes, I will interject when I have something to say.

ROGER BRYANT: Also another thing. That I've noticed recently is that fracking is something that's appeared on in all of our minds. I think that's particularly prevalent in the American Midwest. Lots of companies are trying to frack oil shales and things like that. I'm guessing that produces mostly natural gas, but maybe also petroleum products.

TARA KALIA: I think it is mostly natural gas.

ROGER BRYANT: So that is obviously--am I allowed to just interject with opinions into this?

TARA KALIA: Yes, you are. Yes, yes.

ROGER BRYANT: Well, basically I think fracking is potentially bad for several reasons. Yeah, I mean, I don't think people are adequately assessing the risk associated with these kind of things. It's like all profit driven. And you know, there are lots of things in the news about earthquakes shaking people's dinner tables and people being able to set their drinking water on fire and things like that. Clearly, with fracking, there needs to be more safety considerations and I feel like lawmakers are maybe making some progress on making sure that there's more accountability.

TARA KALIA: It's funny you say that because I was reading about a couple of fracking companies encroaching on indigenous land and so these sovereign nations would hold meetings with these companies to get them to either move their operation or just stop entirely and they would just not show up to meetings. So, you know, there really actually isn't that big of an element of accountability. And lawmakers are just bought out by fracking and oil companies anyways, so why would they interject there?

ROGER BRYANT: Yeah, that's a good point. That reminds me of what just happened with that train derailment in East Palestine, Ohio. The train company just didn't turn up to the meeting with the community because of safety concerns. So like, yeah, not much accountability when it comes to environmental protection or the protection of people so that is a bit concerning. It's complex because obviously these operations are somewhat good for the economy. They create jobs. But it's much harder to quantify the negative impacts of them, especially when there's not a lot of research going into some of the harmful effects. I think there's actually quite a lot of research here at Purdue on this. Related to fracking is, "oh, we should be putting things in the subsurface as well as extracting them," and that's another whole minefield because if you put things in the subsurface, you want them to stay there and they don't always stay there. There's a lot of interest in that now. But yeah, I'm just going to start going off on a tangent here, so you should stop me and you should ask me another question.

TARA KALIA: OK. Let me pull up my list. I mean, I feel like you share the perspective that a lot of earth scientists share about oil, fracking, natural gas, and other fossil fuels. Do you know a lot of earth scientists who would be willing to sell out to these types of companies knowing what they know anyways? I feel I wouldn't be able to reconcile that in my head. For me that's just such a huge ethical conundrum that I wouldn't solve. So it's hard for me to imagine that someone would be able to.

ROGER BRYANT: Yeah, well, you know, ethics are important, but money talks. I think that's ultimately what it comes down to. All this discourse is just a battle between money and ethics. They're almost entirely mutually exclusive lot of the time. I think I was open to joining the oil and gas industry when I finished my undergrad, despite having gone in thinking I'm going to fix climate change. Partly, I think the motivation was money. You hear about these jobs in oil and gas paying graduates a lot of money, more than you can get in a lot of other careers. And for me,

that would have been the primary motivation. I don't know if I even would have found the work particularly interesting because most of what it seems to consist of is looking at seismic imaging of the subsurface and trying to look for geological features that could house oil deposits or source rocks or things like that. I did a little bit of in a class, and it was just like really not that interesting to me. Yeah, I guess I've never been much of a treasure hunting kind of person. Also, It didn't really seem like something that required a lot of creativity to do. You find the resource, you tell people about it, they go and extract it. They make money and then you get a little cut for that money. I don't think there's a finder's fee. Maybe there is a finder's fee. Still it all just comes down to money. I think the UK in particular does not pay academics very well. By far, the two best compensated sectors are the financial sector and the energy sector. And maybe lawyers. The original question was about ethics, right? I still almost left academia again after my PhD, before I got my postdoc. And I think, you know, the thing in academia is there are all these break points where you can leave if you want to, or if you find something else. So I did briefly look into oil and gas mining jobs again despite the ethics that can be involved. Academic jobs are hard to find. They don't always pay super well. Also since I started my PhD, I found that you can do research as part of an oil and gas company. Like for example. I'm not sure I should name names, but Clara's post doc adviser's wife works for Exxon. If not Exxon, it's one of these large energy companies. She does exclusively research in geochemistry so you can apply the skills you get in the earth sciences to jobs in oil and gas. But I think these are jobs they don't really advertise. They sort of come after you. If they decide that they want you, and if you want the money, you say yes.

TARA KALIA: Yeah, I was going to say does Exxon actually publish a lot of their research in the first place? I mean, if it's like oil and gas deposit research, they're probably going to keep that under wraps so they can tap into those reserves. But if it's the effects of using the oil and gas reserves, they do kind of actively suppress that information.

ROGER BRYANT: Yeah, I don't think they publish. Anything that could be related to money, it's all under wraps. But it's funny because you see people from these companies at conferences. So they're still trying to learn about stuff and doing research, but it's all under wraps. It's sort of interesting because, in my mind, it's often hard to make connections between curiosity-driven research and oil and gas. Although saying that, I am currently actually applying for a grant from the Petroleum Research Foundation of the American Chemical Society. They have a habit of funding applied research in geochemistry and the earth sciences. Even if the research doesn't sound super relevant to petroleum, as long as it has something to do with a sedimentary rock that might be either a source or a reservoir rock for oil and gas, they're interested. It's interesting, the breadth of things they seem to be interested in. Even though you think it's just resource extraction, they've got some of the cleverest people in the nation working for them and they do keep an eye on research. More than an eye, probably whole departments. Occasionally you do hear stories of people who leave academia. People are just like whispering like, "oh, yeah, they went to oil and gas, and they just did their PhD, published one science paper and then were never seen again."

TARA KALIA: You had mentioned that there was some minerals that might be useful for solar cell engineering. Since we're on the top of topic of extraction and I was briefly interested in materials chemistry, I would love to know about those minerals.

ROGER BRYANT: Oh yeah.

TARA KALIA: Also, I am concerned about extracting those minerals. Things like lithium are not usually found in places where we want them to be found. They're often found in extremely unstable countries and we just tend to make them more unstable.

ROGER BRYANT: Yeah, that's true, I think. There's a horrible statistic. Well, not horrible. There is an interesting statistic about how much of the world's rare earth elements come from different places. I think it's over 90% from China. The US did have some of the largest rare earth element deposits but has used up most of them. I think they were mostly in California and Nevada. I think a problem with a lot of these renewable technologies is that they themselves require some nonrenewable parts or resources. Solar is a good example because the main thing you need is a semiconductor? I'm not sure if that is the right term.

TARA KALIA: Pretty sure it is a semiconductor, yeah.

ROGER BRYANT: Yeah, one of the main components of a photovoltaic cell is the semiconductor and it just so happens that some of these semiconductors are natural materials. Some of our best semiconductors are natural materials, which is interesting, and these things underpin almost every aspect of our lives, but I don't want to make a list or anything. So solar cells are just one thing that you can do with semiconductors. I found out about this because during my PhD, I was doing some research on iron sulfide minerals like pyrite. And pyrite is actually a surprisingly good semiconductor. So much so that lots of material science groups have tried to synthesize pyrite in the perfect shape or size to use it as a natural semiconductor in solar panels. It can work, it's just not quite as efficient as some other materials out there and a lot of the most efficient materials tend to be alloys and compounds that people make in the lab. They don't tend to be naturally occurring minerals, but you mentioned lithium. I can't remember the exact compounds they use that contain lithium. But yes, we have to mine that from rare earth deposits. We have a finite supply and we're mining it a lot. The reason why I even found out about this is because I was using a tool called Raman spectroscopy.

TARA KALIA: Oh yeah, I love spectroscopy.

ROGER BRYANT: Yeah! I was using that tool to basically study the structure of different iron sulfide minerals. In doing this, I came across a bunch of studies in the material science community and they were using Raman spectroscopy to basically analyze their synthetic iron sulfides that they were creating the lab. When I published my first paper on Raman spectroscopy of sulfide minerals, it got cited a lot by the material science community and not the earth science community. I think it still is my most cited paper, just because there's so much material science research happening. I think that just sort of opened my eyes to realizing there must be a lot of money in photovoltaics and solar technology. In fact, one of my undergrad classmates now works for a solar voltaic company in Germany. I think it is now becoming a more common pathway for earth science graduates to just go into renewables because a lot of this technology is based on earth materials. That wasn't very eloquent, but do you have any follow up questions?

TARA KALIA: Yes, sorry, I keep forgetting that I can't minimize my zoom window and I have to switch tabs so there's this weird pause every time I go to find a question on this document. Have you read anything about the renaming-the-Holocene-to-the-Anthropocene debate at all? Do you have any thoughts on that? I know that there are some geological markers that could be used as evidence that maybe we should go ahead and rename the past seventy years of this epoch to the Anthropocene. I've read some conflicting things.

ROGER BRYANT: Yeah, I read a few books on this actually for a class I TA-ed in grad school. Yeah, lots of people have opinions on where the Anthropocene should start. The arguments are normally that it should start wherever, in the rock record, there is some record of humans having actually had some profound effect. That would be the start of the Anthropocene. For example, the onset of nuclear testing is one of the ones. I think that's the one you referenced.

TARA KALIA: Yeah, it's like 1945.

ROGER BRYANT: So I think that one is hard to argue with. But it's only a geochemical signal which maybe that's good enough. But with every other big time interval change in the geologic record, they're not normally defined by a geochemical shift. They're normally defined by something more major like a major extinction event where lots of marine life just disappears and things like that. Like the pre-Cambrian/Cambrian boundary is defined by a particular fossil that occurs…Essentially, from a geologist standpoint and even though I'm also a geochemist, I kind of feel like there should be some physical boundary to define the Anthropocene. Maybe that's microplastics turning up in sedimentary rocks. Or maybe it's, hm. Trying to think of some other good examples that that could work for this. I mean, we are in the midst of a mass extinction. So maybe that's something that will be noticeable in the geologic record, particularly in marine sediments. Or certain species of plankton moving to different latitudes or something like that. I don't think it's a particularly important distinction where we put this Anthropocene. I think it's all just semantics, but I do think we need to draw attention to the fact that humans are having effect on the planet. It's definitely not all good. There's maybe a slight hesitation there for me because if we call it the Anthropocene, I feel like there's a subsection of humanity that will just like the fact that we have affected the planet and be like "yes, we have got a new geological time period named after us because we were so influential." Do humans deserve to name a geological period after themselves? I don't know. I know that that's not really what it's about. Ultimately. I just think we need to draw attention to all the changes we're causing, but definitely not celebrate the changes. That's what it comes down to.

TARA KALIA: I think the renaming debate is like more sociological than anything, to some extent. Just because it's like we're doing this to draw attention to what we've done to the planet. We're doing it less to come up with a well-defined geological epoch and more to say that this is a problem we should talk about it. But yeah, there is going to be one subsection that can claim more responsibility for this than the rest of humanity and then there's also going to be a subsection that's going to be like "this isn't a problem. We're part of nature. We made this change, therefore it's natural."

ROGER BRYANT: I just also thought of something else. Another thing that might happen in the geologic record is we might end up producing something that looks like a bit like the PETM

or the Paleocene-Eocene Thermal Maximum which was not that long ago, like tens of millions of years ago. But it was sort of a short event of rapid warming and rapid ocean acidification. People have said that is the closest analogue to what humans are also doing to the oceans. So if we want to look somewhere that looks similar to what we're doing to the earth system, we can look at the PETM. I don't think the PETM defines the boundary between the Paleocene and Eocene. I might be wrong. Maybe it does. If it does, then so be it. If that really does define the boundary between the Paleocene and Eocene, then maybe the Anthropocene should start now; we are already starting ocean acidification. I think we're in the midst of an event that is much faster than the PETM. Maybe we should come back in a few thousand years and be like say, "did we do a PETM? Let's make it the Anthropocene." Yeah, OK, let's stop talking about that subject.

TARA KALIA: OK. Yeah, I think this is a good stopping point, unless there's anything you want to add.

ROGER BRYANT: There's always more that I can say on everything. So if there's a certain aspect that you think could be fleshed out more, we can talk about it a bit. It's up to you really.

TARA KALIA: When did you grow up in Oklahoma?

ROGER BRYANT: It was just a weird stint from when I was four to when I was six and a half. My dad's job took us to Oklahoma City for a few years, so that's where I started my education. I did kindergarten through first grade and then we left. It was very strange, but I think that was perhaps what planted the seed of "America exists" in my brain. Then I ended up coming to America. It's funny, I think that's also the time when I first became aware of geology because Oklahoma is a great place for geology. Like I said, there's all these nodding donkeys everywhere, but there are salt flats, there are big red rock canyons of sandstone, there are places where you can go look at evaporite minerals. I think the state rock of Oklahoma is rose rock which is basically gypsum, an evaporite mineral, that has formed these rose shapes. It actually looks like roses. I vividly remember most of the rocks I saw as a kid. I don't remember much else.

TARA KALIA: That is really on brand for you.

ROGER BRYANT: Yes, it is.

TARA KALIA: You were saying nodding donkeys are not necessarily the most accurate view of energy in America now. But I would say for the Midwest and West, it actually is very accurate with the exception of like big damming projects that are happening right now. So you know, I don't think that much has actually changed in the past twenty-four years.

ROGER BRYANT: Yeah, I would agree. I'd say there's still an attitude of "if we can extract something and make money, then we're going to do it." That's what it comes down to, especially when the national debt is apparently very, very high.

TARA KALIA: Somewhere in the trillions now.

ROGER BRYANT: Can't they just cancel that?

TARA KALIA: You know, I don't get it either. It's been explained to me a few times. It seems like we're also in debt to ourselves? Just cancel it then.

ROGER BRYANT: Yeah, definitely. Oh, we haven't even talked about coal yet. That is a really big, visible part of energy usage in the US. There's a narrative that coal plants actually cool the climate.

TARA KALIA: Oh, I haven't heard of that one.

ROGER BRYANT: Well, it's because they released so many aerosols, specifically sulfate aerosols, into the atmosphere. Sulfate aerosols actually have a cooling effect on the climate, but it's temporary.

TARA KALIA: And releasing a bunch of aerosols into the atmosphere is still bad for other reasons. You know, I like breathing.

ROGER BRYANT: Yeah, and acid rain. That's a big one. Coal plants actually are a good test for what might happen if we were to geoengineer with aerosols. Big sections of forests die because of acid rain, statues get dissolved, lots of fun stuff. Have you heard of Centralia?

TARA KALIA: I have not.

ROGER BRYANT: It's either in New York or Pennsylvania where there's a coal mine that's on fire. I don't remember exactly how it happened. I think the authorities thought if they set something on fire, it would all burn away and that would solve whatever contamination problem they were having. But actually it's just still burning. If you go to this town of Centralia, they've sealed up the mine now. But you can still see smoke coming out of the ground in places and I think this fire is going to burn forever. I think it's just a good metaphor for this whole problem of energy in the United States. It's a flame that is never going to go out. I don't need to explain the metaphor more. You should look at pictures of Centralia. It's crazy.

TARA KALIA: That is such a mess. I'm also imagining the kinetics of that reaction. That has to be a very fun zero order reaction, probably.

ROGER BRYANT: Well, to me, it's weird that it hasn't burned itself out, isn't it?

TARA KALIA: How big was the reservoir of material that they're burning for it to continue? How long has this fire been burning?

ROGER BRYANT: Many decades. I'm just going to quickly Google it. 1962. It's a coal seam. I guess coal seams can be very, very large and laterally extensive. It sounds like it's at least 8 miles in one dimension. So, it's a very large coal seam, which is why it's still burning. Clearly when they decide to set on fire, they didn't know how big the coal seam was. Wait, did they decide to set it on fire? Yes, OK. There was a landfill. They set landfill on fire and that set the coal seam on fire. That's America right there.

TARA KALIA: It just gets worse and worse.

ROGER BRYANT: It's like the time when they try to blow up those whales. That's the only other thing I can think of that was so poorly executed in terms of a public safety event. Are you aware of the whale thing?

TARA KALIA: No, I'm not aware of the whale thing?

ROGER BRYANT: I'm going to quickly Google that one [exploding whales] too. Normally, whales explode naturally. Sometimes, the authorities want to take it into their own hands. Search "exploding whale" on Wikipedia; you find so much good stuff.

TARA KALIA: Oh, I will. I didn't know whales just exploded.

ROGER BRYANT: Yeah, when they start decaying, it produces a lot of gas and then they end up just getting more and more pressurized until they explode. Because they're so big, it's actually like a pretty big bomb. It's like a ton of TNT. Anyway, yeah, we got it slightly off topic there and I apologize.

TARA KALIA: That's fine. UChicago can just have this forever.

ROGER BRYANT: Yeah, I can't wait for this! Hi, UChicago. After I'm dead, someone can go and see a video of me talking about exploding whales…Do you need anything else?

TARA KALIA: No, this is great. Thank you. There were lots of interesting little rabbit holes we went down.

ROGER BRYANT: Everything's a rabbit hole.

TARA KALIA: Everything *is* a rabbit hole.

ROGER BRYANT: Liz Moyer is someone else in the department at UChicago who knows a lot about this stuff. She made a website about the history of energy production in the United States. That might be something else you can lean on if you need anything else. But yeah, this was fun.

TARA KALIA: Yeah, it's great talking to you again. Thank you.