Library Research for Energy, Mineral, and Uranium Resources

Stand by for realtime captioning.

Welcome. We have another typical webinar for you today. Entitled, library research for energy, minerals, and uranium resources. With us today is our multiple webinar presenting, Emily Wiles. Emily works at Princeton University library as the chemistry geosciences and environmental studies library in September 2018. Emily has a bachelors of arts and a Master of Library and information studies. From 2008-2018, Emily was a librarian, physical scientists at U.S. geological service Denver library where she help users find and use science and legislative materials. Provided science and government outreach information, bibliographic instruction and map instruction as well as develop and present online and in person training sessions on topics such as chemical visible properties of the atmosphere, rock, sentiment and water. Geochemistry and geophysics, organic and inorganic chemistry and trends in use and availability of mineral energy and water resources. For generating a 6 to 2008, she was U.S. geologic survey hydrologist in New England states were she enjoyed fieldwork, modeling, report writing and stem outreach. Awesome letting us academic reference librarian. Purchase include library instruction, reference, citation, Datamation data management and physical and laboratory sampling methods.

We have to go to our usual housekeeping reminders. If you have questions you would like to ask or technical issues, filled re-to use the chat box which for people on desktop computers or laptops is located in the bottom right-hand corner of your screen. I'll keep track of the questions that come in and at the end of the presentation, Emily will respond to each. We are recording today's session and we will email a link to recording sized everyone who register for this webinar. We will send you a certificate of participation. If multiple people watch a webinar with you, and you need additional, please contact me and include the title of today's webinar along with names of email addresses of those certificates. Desktop computer or laptop users may zoom in on the slides being presented. Click on the full-screen button in the bottom right side of your screen. And exit full screen mode, mouse over the blue bar at the top so expanse and click on the return button to get back. Finally come at the end of the session, we will be sharing webinar satisfactions survey with you and we would much appreciate your feedback after the session including comments on the presentation style and value of the webinar. If Emily happens to screen share visitations, I should've checked but anyway, if she does that and when she starts talking you will be able to see the chat box but if you want to ask questions or just watch the traffic, if she is screen sharing, just mouse over the blue bar at the top and when the menu drops down click on chat to enable the chat box. With that I will handle the virtual microphone over to Emily and we will take it from here.

I will not be using the screen chair. There is no worries there. Thank you for joining. This is a busy time of your site I appreciate your time and I'll try to go through it enough. I put in the chat box, I realize to the images on the first slide I didn't provide the links. A lot of times people think of oil and gas as wells and pump jacks here on the left. One of the things I like to let students know and there's a lot of products made from petroleum. In that link it has different

everyday items that have been petroleum products. Likewise, the cell phones a lot of people don't realize how many minerals are being used for that technology. Imagine everybody has a computer or a cell phone to be viewing this presentation. This is what's making it all work which is that presentation that makes it connect and fund. There is also information about wind energy and the other aspects of wind energy even though it's renewable, it still made out of metal and so there is a mineral component. Then, when you look at the mining resources whether different aspects of mining that are historical and this is an example of the gold King mine blowout in 2015. I was at the U.S. geologic survey back helped let people understand what happens and the water quality aspects and sediment aspects etc. I think I have those in previous presentations so, if you have a chance to look at the same or similar presentation I did when I was at the geologic survey, I will necessarily be repeating everything in that presentation because it still online through the GPO program. It's here. These are on my webinar so I have all the ones I did when I was at the U.S. geologic survey to have the current one I've been doing this year in 2020 at Princeton Princeton University. I have a couple upcoming once it might be of interest, the natural hazard fund will be in October. I realize there's a natural hazards, several going on now. I wanted to show the link in case anybody hasn't seen it. It's for the USGS tracking flooding. Even though this is not the topic, I want to put it out there in case anybody was looking for that information today since the hurricane is hitting today.

Another presentation I will be doing is using art sources to teach chemistry geosciences environmental studies. My colleague are looking to do from the rocks to the stocks, library research with librarian in the finance librarian.

Most of the time when people meet me, they want to know what type what was that demographic of types of people that asked me questions. I put this slide together. I don't think I have included in previous presentations. There's not too much of a difference from the people I help from and I was working at the U.S. geologic survey and working here at Princeton University in the library.

The reason why, Princeton and the service of humanity, when I first came here, I said is to help the public allots. They said you can keep doing that as well as your undergraduate and graduate students and professors. I still continue to help other librarians, postdocs University, federal science agencies, scientists and the private sector, finance industry and national government institution, city, county, state, natural resource managers and anyone that needs a refresher on how to find information. U.S. government especially in the interior department has updated a lot of the webpages, specifically the U.S. geologic survey so they went through in January 2020 into some of the links that were previous presentations, they should work. If they don't, please let me know and I can show you how to find them.

This is me. I've been working at home now since March 13 and I'll be working at home, I believe, until next June. Unless things change. I am available virtually. If you are a Princeton University student staff or faculty, you can may click to make a research consultation online. Please feel free to reach out any more questions I'll be happy to help you.

I was a bowling billet have any all minerals. This is the group and resources I used pretty much every day and I still use today. When I help people here. So if you have any other questions on how to use these or more information is needed, please let me know. You can reach out to the U.S. geologic survey, they are working from home as well. They are trying to have a say people working remotely during this time. When I say it was a hydrologist, a lot of times people are surprised I can find all the energies of mineral information. I was embedded with energy and minerals while it was in Denver for 10 years. It's part of geology is an entity when you receive a geology degree and also water overlaps with a lot of rocks. There's a lot of difference information available. I come from as a water cycle, the water cycle moves through the rock cycle as well and also it's part of comments from the sun as it goes through the different family within uranium, it rings the radio nuclei it's through the groundwater, watershed. That information I can help you find. There's also water is a huge component within deposition and creation of petroleum and coal. These are different outreach activities and educational information sources from the North Dakota studies.

Princeton I held similar to when I worked at the U.S. geologic survey, help a lot of different groups at Princeton part of the Purdue University library. Liaison to the Department of chemistry geosciences and the environmental Institute but I also overlap with my colleague and engineering. We share information requests with students that are in chemical and biological engineering, civil and and marital but edgy engineering and a set of engineering and environment and with the present school of Public and international affairs. The downtime for finance and the operations research and financial engineering. And so, there are three of us that one of my colleagues is a finance librarian and so she works closely with downtime and Willow is engineering librarian and she works with others and the school of engineering. The three of us, I overlap with both of them so sometimes the three of us will have the same students or faculty. If you go to my website, and has the links to the subject died. I'll put that in my chat here.

If you click on the subject will have different databases and research sources. You can go to energy environment you will see we are both on energy and environment and it's just me for chemistry and geosciences.

I will be showing other resources as well. They are available for free. Third different guides for research help as well.

The different types of questions I receive, there basically questions United States, Canada and worldwide. Sometimes they are specific countries but, most of the time people look for an assessment of everything in the world. There is different information sources they look for where they want to understand the earth processes that create the oil, gas, coal and uranium. And where those located. How is available energy made. Meeting how are the actual things created, not how it operates.

A lot of students, faculty, public staff are looking for repeat photography. There is some areas in Texas, Wyoming and Colorado that used to be heavily used in oilfield production and now it's a

neighborhood. That's something you're interested in looking at that landscape is how it is used to be used to extract the oil and gas and now it's a neighborhood. That's just one example.

I put this in here because a lot of students are interested in this. Some of the information that gets astonished, they didn't realize they were the ones I tends to explain to them the most each semester.

When they doing the papers and doing the period. One is that the national Park boundaries exists for the rocks are not economically viable. There areas in Arches national Park. There are extraction areas just outside or on the line, likewise with the Grand Canyon, there is uranium proposals that are right on the edge of the Parkland. But not necessarily in the park but nearby. There are different issues going on with that from in the environmental side, the industry side and there is some legal activities going on. Another item that comes up, not everyone realizes if you drive a hybrid car, that means your energy is renewable when you use it period this is an example that came up a lot when I was living in Colorado. If you had an electric car, it could be possible you are receiving the electricity from the coal industry so is a coal-fired plant that was what you are hooking up to to get the electricity for your electronic car. They have this in each states you can look to see where your missions are coming from.

That is an eye-opener and there's this new paper that came out earlier. July 8. About electronic vehicles being more polluting than gas cards in some states that's worth reading if that's something you're interested in. The third topic when a stew meat students now, it's mostly virtual. They didn't realize there some petroleum products in daily products they are using. One example is petroleum jelly which is that way. That was an aha moment for several students I was hoping them a couple semesters ago. The fourth information nugget is that when I was helping a couple people in Denver, we are talking about how the climate changing climate change deniers and different aspects of the oil and gas industry, this one geologist said to me, by the way, they actually believe climate change is happening but they okay with it because from a business standpoint, it's going to be easy to extract the oil because you wouldn't be, you'd be in the open ocean instead of on ice and other aspects is, if the channels open it's easier to ship. This article is what we were talking about at the time. I know there is other research and information out there but this sums it up well. About that topic so I thought it said that. This is actually some thing I recently put together because somebody asked me to just draw it out. One of the things that happens when somebody comes or context me and says I need everything in this location, that's energy and mineral related. I kind of broke it up to show different sources and this is just an example of the place to get started. It's not necessarily everything.

Basically, when you look at data publication services, there's a lot available from different interiors department bureaus and EPA. A lot of students don't realize, the USGS is hired by the EPA to collect a lot of data for the different aspects. And so a lot of times the publications and data are available from USGS even though they are for the EPA. These are just a couple of examples for the water sediment soil. Oil and gas. Minerals, coal and contamination. This is just a step, place to start. Another aspect is when they look at the environment aspects, they don't

realize is not just air so it isn't just the air pollution for any industry that people are assessing. You can have some things that could be good for the air in the long run but actually bad for the water. One example that was put in gasoline ended up causing a huge pollution problem within the water supplies for communities across the United States. When I was working as a hydrologist, that was anytime anybody mentioned gasoline or oil, that's the first thing that came up is MTBE issue. That is something you can look into and back and found from an historical perspective. Even though it helps with the mission, it hurts the water and the landscape as well.

I guess, usually to help students, I connect to the whole aspects, not just one part. That's why end up working with a lot of policy people. A lot of times people say how do you know all of this and how do you have so many information sources available so quickly? This, these are my colleagues from down the hall when I worked in Denver. And I worked in one of the buildings. High premature saw a lot of these scientists every day so we would chat about different projects and they would ask for help about finding sources. I observed a lot of information of the projects they were working on and also just the history of the USGS and the other bureaus within the interior. I didn't necessarily find all these sources and the knowledge nuggets on my own, it was kind of sharing of information for 10 years when I was in Denver. They are part of energy and minerals and used to be the crystal group which is the geology, geophysics center now.

Okay. Just to give a quick overview of energy and minerals, one of the crates aspects as it keeps the light on. Even though we have to mine and extract out of the earth, it's so that we can see at night. We have energy sources. I'm going to go through a little bit of the history, some examples from University research, energy sources that are not necessarily easy to find for oil or gas, coal, geothermal, uranium and garbage. This comes up a lot here. About being used. I didn't necessarily have enough time to put in the ocean lining a space but I want to let you know I can help you if you have more information. There's a lot more about space timing and his love information available now on ocean lining. So, I also have information that I will go through today on resources and will interject if an environmental issue that comes about.

This is a quick overview of the pre-USGS which is, these publications included are the go to places to get started.

The catalog and index as the publication itself, that's 10 222 so those all this was used to establish the USGS. I didn't necessarily exist yet but that is where people have been trying to find the most, whenever I am helping them. It's the old information that pre-USGS but is responsible for.

So, they came to be on March 30, 1879, this is something that everyone realizes. Legislation renames the coast survey and transferred it to the Department of Interior and was established as a geologic survey which is why they have all the old coast and survey records and maintains that database.

These are the four reports. A lot of times people call them the rabbit reports it's confusing about what that means. If the author name. It goes to the whole break. The whole history. Most was founded because energy and specifically oil and gas. That's something a lot of history students look for about the United States are in some of these publications. That's what I came to Princeton, Jesse's nuggets of information that you can't just search necessarily and find it in Google. Their rights in these reports and explains the whole economic aspects of mining and petroleum, oil and gas. The other aspects is the geologic atlas. There are over 200 of them. These are the first 10 in this example which is actually the most popular when I worked at the geologic survey. This is the folio of pikes Peak so this gives you, quick overview of what is in one of them. There is topographic map, structural geology and economic geology map. The economic geology map for all of these, these are the most used I would say in the last 10 or 15 years. For technology changes. People look to find these older reports and information and then.

Another aspect of what they are looking for, and research is oil, gas, uranium, coal and other aspects. This is an example of that repeat photography. USGS library has historical photos and allots have been scanned and on lines. There is an index, if you go to this link, I'll try to grab this. Library, USGS photo. When you go to this link, you will see there is categories already ready for you on the side and one of the ones I show people the most is the mines. There's 1542 of them. This is an example of one of them. A lot of times, if students look for pictures for their posters and publications, everything in here is open access and public domain. You can use this pretty freely and find a lot of great historical information. This is an example of this Oklahoma oil field. Those are all the pumps going on there. This is uranium or which I think I showed this several years ago and several people have asked me for that photo. To find the original or another version. It all comes out of this historical photos.

It's a great resource for them. The link to the report. If you find a photo in a USGS report or anterior report, often they will be higher resolution in this database here.

A lot of times,

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A lot of times especially with oil and gas, the original of 1910, 1996, all of that information is from the Bureau of mines that they spun off out of USGS and came back. Meaning, the responsibility of the money reports came back to USGS for them. Another split was the mineral judgment service thousand and into-2010 because it was split up after renamed in 2010 after Deepwater Horizon. Than officially, it was no longer in 2011 so it split into these three. The Bureau of Ocean energy management and environmental enforcement, they have tons of information as well and I highly recommend you contact their librarians. There a are information professionals. Use offices natural resources revenue a lot. So, they actually have the many cultures. This is that website. Honor is what is called. They have a lot of information about how much money comes in and is collected and dispersed within the entire program of the oil and gas and mineral rights on federal lands. Is a whole bunch of information on that as

well. At Princeton, there's a junior papers and is also graduate research. These are just the last 10 years in this example. If you're interested in seeing what our students have been doing in the different topics related to minerals and mining or oil and gas through time, let me know. I didn't have the tricks to finding the whole database. We have all the PhD in their since going way back. A lot of the earlier stuff from legal the late 1800s and early 1900s was related to oil, gas and mining. The faculty research, we have a lot with minerals and these are just some quick minerals from our gem and mineral collection online. These are for New Jersey. There one of the things from the public within New Jersey or the Northeast period this is what I received the most information about is the florescent rocks. From a mineral standpoint.

This is where my world overlaps. When I first came here, so asked me about the PhD dissertation I knew had already read it. It is exactly the same so PhD dissertation is exactly the same USGS report and is available online. I checked it word for word. This is the one in my office and this is the online version. That was doubly published as a USGS publication on uranium in South Dakota.

Okay. This is more of his. He published more on uranium deposits. He went to Princeton and worked for USGS and then he worked at the University of Colorado Boulder. He also published this structure from federal mineral zoning. This is something is one of the, if you work in geology library or know someone or know anybody interested in minerals and mining, this is one of the most popular serious progress a decade of American geology. If you're Princeton we have access to this online. When I was USGS we didn't have access online really had the full print but I think we had three or four sets. It's one of the most used serious for any type of mineral research.

That might be helpful. If you have seen some phrases or terminologies you're not quite sure, one of the things I recommend that these are the two essential books I use every day. Somebody was cleaning out their office and they had extra copies. They gave into me. This is an older version of the glossary of geology and its illicit publications issued by the Bureau of mines from 1910-1960. It's a print book. An eye to, I take a photo of pages if they need it. I have this resource with me physically if anybody has a question or needs me to look something up. It's something I have been doing since we have been home in March. If you have, if you don't have access to the glossary of geology, their different ways you can get it through a Kindle or undock. There's also, if you're part of Princeton University, you have access to it using this link and this is the quick search. I searched groundwater because of the example he used. I always use hydrology examples. One of the reasons why is because there was a point a few years ago where groundwater was two words and now it's one. This older book on my chair, in that glossary of geology is two words. Everything is two words on this newer version is one word. That's something I point out to researchers, any students just learning how to search in databases because you have to make sure to search for both of them when you're in the different databases. There's other terminologies that you can compare the before and after. That is how it is involved in the field.

Going more into the energy resources, specifically coal, gas and gas hedges, these are some example sources that I use pretty much every day here at Princeton I use them every single day. This is the conventional oil and gas assessment and the continuous oil and gas assessments. There are also unconventional so these are two different versions of the world resources. When I do my senior students or researchers come to me is because I'm the one that helps them find where it is on earth and where it is naturally to be extracted out or if it's part of an assessment. It's always the original in the rock form that I look at. And the location. Likewise, sometimes people ask me if they live in a different part of the country if there's an issue with cold. I just show them quickly this coal mats. There's also one aspect is that there 70 different types and so there's quality because there's different grades.'s data for that as well. There still asked about even though I am here at Princeton because that goes into the quality when it's being burned. And other information.

What are gas hydrates? That comes up a lot. Especially since this new report came out about these surveys nearby here in New Jersey. This is southern New Jersey here and Delaware. And the Chesapeake Bay. This is information about the gas hydrant project. And so, there's geothermal energy and information. User a basic overview of any type of information. It's a good publication if you're looking for an example of clean power. It has very competence of literature reviews and that also you can go in and see who has authored within its and check to see what they are working on currently. That's another trip. With wind energy, I don't know if everyone is aware of this wind turbine database. This came out when I was still at the USGS and I actually use this all the time because here New Jersey, this comes up a lot. There are so many wind turbines on land in in the ocean nearby. Just within the Northeast. So, one aspect I remind people is, wind turbines come from mineral so you have to extract more natural resources to create a wind turbine video thing that came up recently, I think it was on the news was, up in the northern part of New Jersey, there are a lot of turbine blades that are visible going to the dump. People are interested, they didn't realize they had to be replaced so often. Even though they are renewable resources, they have to be replaced. They are not just made and they are there for a while.

That is something to consider. Another topic is, uranium. The reason I will pull uranium out, it's not as part of the discussion of energy or minerals. Is because it is both. You have to understand the history of uranium as an entity. It was discovered in 1789. It wasn't found to be radioactive until 1896. The first atomic bomb was 1945 in the first energy resource was in 51. USGS has the information through that whole time so they have resource information going back to late 1800s and to the present. Regardless of how it was being used, the resources information is available. At something that gets confusing because people are looking for information from the 1930s but it isn't it wouldn't be energy at. As part of the mineral resources program. The data is still collected and still there. To demonstrate, when I was, we always knew we see the slides, it will be clear. If the national renewable energy Lab. That's the one that has its the natural resource connections so they assess extractive part of what's happening with the natural resource in Earth. It's the technology side, the engineered component of everything that's why it's just down the street. Sometimes, when I was working in the library in Denver, I would say, you have to go down the street, it's just a few miles away and I think I know you are

looking for a week give them the contact. Sometimes it's confusing but what is the natural resource extraction, the others you said that.

This is what we have for New Jersey. The landfill gas to energy and wastewater to energy information. This has been in the news from time to time and they are talking about the positive aspects of it. That's just little local news from here in New Jersey.

The other aspects, it gets confusing is the oil and gas downstream. I've always been upstream. Whenever people come to me, I help them find the upstream the low because that's what most people are looking to either purchase land or try to find out how much of the natural resources is in this one area because of policy or something else is happening so that's the part I help people with. It's mostly just the upstream. And so I went to show, one of the groups that I have held is BP. This is an example of their upstream operation. I have a colleague that works here. This is what she shows and she's giving group talks. This is an upstream link and there's a downstream or midstream. That is something I should also say, there's a group of us that are information librarians. Or professionals. We are all part of the geoscience information Society. That I get to meet a lot of librarians across the country and internationally that are looking for geology and especially oil and gas. And uranium type information. If arts within the honest sorority, one of the things I would recommend is to sign up for our listserv. This is something I should say I'm also the GSI as moderator of the listserv. You receive an email from me. It's through instant. If you have questions or an email address, let me know and I'll be happy to help you with that. I am usually available quite often, especially now that I am home often. If you have an email address or problems, let me know. That is something that helps because if you are stuck trying to find something, especially oil and gas related, their people within industry that are on this list the source of it just as academic and government librarians, it's other people from industry, it's a location from society, it's a good group of people. The idea is to just help. I have relied on it as well professionally. When you're stacking you define publication it doesn't seem like it exists but you know it does. Deftly send an email to us or talk to your librarian and we would be happy to get that question answered for you.

When it comes to the upstream oil and gas, one of the things I help with most is that everyone realizes that this exists. When I work I so say I worked at the book library. People thought that was odd and I said, there are so many libraries, there's an ice core collection and their semi-different collections so this is kind of the core library. There notches USGS when you go out with you can do an assessment, isn't just USGS information that's in here, it's from anybody. People in industry donate and so depending on what company therefrom, they need to put it somewhere. If so many wants to do a chemical analysis on any of the pieces of this they could take a sample and run it. Likewise, if they have taken a sample, the data is available. From the business side, this is hugely important. This is used a lot. When people fly and, they also go to another building on campus. He would see the core library and make an appointment with those people to try to find information about the specific call Rick or oil and gas. In some cases, as either roads or neighborhoods over where these other wells used to be so if they're trying to do a geologic assessment, it's something they still have access to this physical library. This is an example when I was in Colorado, every was always asking about weld County so this is an

example and it's Rocky Mountain fuel's e- three. Me see if I can grab the link directly. So you can follow. This is why with all the webpages, that is the database. I recommend if you know where you look for to get information to use a textbased search because it's easier if you're doing a lot it's easy to get textbased rather than map-based version.

There are people that are available. All types of people look to do companies or purchase or governments are looking for information, they want to look at the world oil and gas assessments. The most common three countries I'm asked about the most even now. Those are three different examples of how to find the information. Afghanistan is one of the most mapped countries in the world. It was done by the USGS as part of this long-term program. There is a lot of information on mining and other natural resources. Once you start looking around you will see everything is available on that website, it's easy to find why the country for gas at least where a lot of the Saudi Arabia research was done in the 70s and 80s. That search if you click on it will bring up all of the Saudi Arabia reports that were done with USGS.

Another aspect is the produced water aspect of it. This is another part that the oil and gas industry researchers and hydrology side are looking for. This is an interactive map you may go to.

And so, for the midstream and downstream racially and part of that. Only because once it's taken out of the ground, they usually go to another library or agency and get another chunk of information. The reason why is because this is where sometimes people mix those apples and oranges that not everyone realizes once you pump some out of the grounds, doesn't mean that is going into the actual vehicles. As gasoline or jet fuel so their semi-different products used with their petroleum products. This is why I don't necessarily see that very much. I go back and help another person looking for upstream information. I'm always helping the person looking for where it is on earth and how much is there. That's what the USGS does. That is usually when people within geology, chemistry or infirmity studies try to find how much oil and gas or how much where is that formation that has the goal or uranium and that's the type of information I help people with the most.

This is where you can go for other aspects. After it's processed, they have information from the EIA and so, this has been pumped out of the ground, this is all the information people are looking for and where it goes, how much it cost but this, I know how to find. Especially investors, they are not looking for what already happens, they looking for the next place to purchase the land and drill the well.

That's the part I deal with oil and gas companies differently.

Even here at Prince in. Minerals, this is the mineral and Chris Tiller put in close because it's what used to be called and sometimes people still call it that. The mineral program and the crystal programs are similar but they have different audiences. The minerals, statistics and commodities that is usually economic geologists and finance Thai people looking for that. They are looking for the crossover. One is the business side of minerals and the other is to research

geology side. I worked with both of them intertwined. I will show you the highlights. This is for the commodity side for this is what most people are always looking for is this page, it's the commodities or information by commodity or by country. Is the national information center. Most popular product that I've how people with that they realize what it is, sometimes they have a hard time finding its is the mineral commodity summary. These usually are published every February or March. I was know when it's coming even now because it's the same. It has all information that students are looking for, especially with a right papers. They just don't know yet. I'll give you a couple examples.

This is a quick citation that is the role of Knoxville minerals and the economy. A lot of times, they will try to find this but they cannot quite figure out how to grab it so these are available for every year. It's something you can see the difference changes from year to year. The other one is import reliance. This is something economic finance and policy since are always looking for. Make an appointment with Emily because she can show you how to find them. This is published but it doesn't hit the news if you're looking to look out for,

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You can receive it immediately and read through it and figure out what they're looking for. Purchasing Landor

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Another aspect, they have been following premature every day for over 10 years. Every warning and every evening. It has information about climate, every aspect of energy and it keeps up with the political side of what's going on. Is to read this to find it was going on in the interior. And how the USGS was portrayed in the user what was happening. I still follow because it's pretty informative and they're fast. Usually, news hits here usually days, sometimes weeks before his other news outlets. For Princeton University students, faculty and staff, we have a subscription you can click on that link and I believe a lot of government agencies also have access to it. I know I did when I wasn't USGS I believe other interior employees did as well. You can check with your librarian or your institution and see if you have access to that.

This is something that came up which is very interesting. We asked often about the uranium aspect and groundwater and other aspects of what USGS did in partnership with the DOD and other projects. I met Emmett, I was of long because what he was talking about, he is a photographer and retired faculty here at Princeton University. He was describing everything I had read about for 20 years is working at the USGS. We have a lot, did a lot of research when I wasn't USGS comics out there collecting the data and here he was with his people book he had photographed the area. This is something that kind of puts, there are several things that have happened since I've been here at Princeton that emerge my USGS life with my new Princeton life. This, if you're looking for the research that was done in this area, this is the link. I just searched the public warehouse putting in Nevada testing clear about their hundreds of publications. It's very interesting to see he documented, he was allowed to go in and take

photographs. It's amazing that there have been so many nuclear bombs in the United States. I believe there more in the United States and outside of the United States. This goes through water quality aspects of when it was detonated, what was happening with groundwater. The service side is in his photography book. Which is really fascinating.

Yes I think that a little early. Thank you and this is just a quick overview again of some of the Princeton University research groups that I help people with and also if you're looking for information, the Princeton University collaborates with a lot of other industry and academic and government's groups as well. I want to show a picture of my library because I haven't been in it since March so, if you're interested in learning about the building, it's one is really beautiful. If you are new to camp, and happened to be visiting Princeton New Jersey and you see construction, I also want to include this campus plan. We are having a bunch of buildings being built several islets of all, there may be a detour because Princeton is a small community. And so, just a heads up. That plan explains all the new buildings will be coming up which includes a new building for the Princeton environmental Institute and the school of engineering. I'm excited about that because that's going to be across the street from the science Library. It will be more of a fun science engineering hub area. If you are familiar with the campus. Then, just, someone asked me this, I was giving a presentation at the end if that was your favorite mineral and it's Garnet because I grew up in the Adirondacks and Garnet is everywhere. If one has it. They where it, it's kind of a fun thing. I finished quite early. I am happy to help with any other questions.

Thank you. Another great webinar, fantastic information. It's fascinating about the Frank area library as well. That's very interesting.

Let's see, we have a question from Nadine, if someone uses the photos in the photo question, do they require separate copyright permissions?

No. They are public domain because the photography was taken as part of the federal project.

Great.

There is a part, I'm no longer with USGS, however, USGS always prefers a least a citation of that this was from that collection.

Okay. Thank you. J has the comment, glossary of geology, how comprehensive the coverage of geology is.

It's the same book, it's just a different way to access it. We have the fifth edition so it's just, it's the same time I checked page page because I like to look at that. It is company and so.

They put some good links in the chat, some upstream information.

I don't know what she meant by Hess. Is that?

I hit enter before hit the link. Put the website and there.

Okay. Thank you.

More links by Emily in the chat. Please give those look and is a shot up by Carl for GSI S and Emily put a link for that group. Here is J, what does midstream and downstream industry do? How are they different from upstream industry? I answered that. I don't think we had come I think that was asked before I had gotten the slides.

Okay.

Upstream is dealing directly with the natural resource extraction and finding it. Finding it and taking it out. Then, it becomes midstream and downstream.

Let's see if we have any more questions. Nadine says, here is a brief overview and she gives a link in the chat.

That the link I was describing. Thank you.

And Bert, one of our other great webinar presenters said, he gives a link to DOD industrial policy office but also interested in defense indications of mineral policy and collects an annual report on defense industry capabilities. That's an interesting little bit of information. We have time, please get those questions in. Emily, had a couple of very basic questions, far simpler than this group is talking. Roughly, you may have covered this, in terms of oil and gas and coal, how much is estimated we know where that is in the world? Is most of it known?

No. Not at all. That is a good question. That's why I didn't have a chance to add more info the ocean because one of the things, most of Earth is covered by the ocean and there's ocean lighting becoming more of interest to people but there's also different environmental aspects to it. There are a lot of minerals on the floor of the ocean. That is another, there are two things going on in the geology world. Some are looking to go into the space to minor asteroids and planets and etc. Other people are looking to go down into the ocean and do ocean lighting. That's, I realize that is to be its own presentation at some point by someone. It's strange thing.

Most is not known?

Most is not known, correct. They have an idea but one of the things my colleagues do energy, they constantly are updating the estimates with new data and finding new wells for the lithology to map out the where is the oil and gas. They're constantly updating and finding more. There is one in Texas come I think was still at USGS there was huge news. They publish fact sheets, it's part of that link their undiscovered oil and gas. Their updated information so it's for the entire world so one that came out recently was making in December for the Saudi Arabia area. It was partly, partly the part ocean solidify the new pockets. When of the reason I

mentioned the core library is because there was a gas company that came to look at some of these cores and they found this sliver of data. They did the geochemical analysis and they went back and did more test and they were using the course on the USGS, they ended up finding a new pockets of oil. It's amazing what information is available on that's why I encourage the use of the core library because with civilization kind of fanning out from into the suburbs in the rural areas, you may be covering up where they used to be a well by the technology was it may have been drilled back in the 30s or 40s and we still have the cores for maybe even the 70s or 80s. The technology hasn't caught up with how to get it out of the earth yet. That's why it's an interesting research topic.

It's there but we are not advanced enough to figure out.

That's what happens with hydraulic fracturing. Hydraulic fracturing isn't a new technology. But how they apply it now is new. They're doing it horizontally. They been doing when they see it's you, it's not. It's from before the 40s. It's the other part of the process that has changed because of the technology.

Wonderful presentation, a wealth of information. Mike says, are you familiar with MASN IL this, is that the data updated regularly? I find perhaps it is now.

Yes. The question about updating regularly, is asking about, do you about that?

It's not all at once but it is a something is happening.

Icy. If there's a new department somewhere. It goes back to the aspect of unfriended mandates and that is why I like doing these presentations should people was available because coming from the other side, when I was at the USGS we were always fighting to get funding. One example with they want to do close I was asked to write a letter about how people use this rock library. I wrote a very long extensive letter because it's huge and it's very important to the oil and gas committee and the core community. To just get rid of it and not fund it, it's part of the society and it's something there is lots of products out there and a lot of services that are not necessarily funded because they're trying to downsize government.

Maybe this was mentioned before, the MAS LAS, maybe mention when was that, what is a sample? I have to look it up because I know it is but I don't always know the acronym.

That's okay.

I'm used to using the acronyms.

Jake makes a comment, outer space and ocean space. Keep the questions coming. We have time. The wind solar geothermal. They been rising and falling popularity over the years. What is a brief summary of where we are with those energy sources? Are they good, economical? I know they're out there and being used. Don't know if you have any comments on that.

Are you asking that comment or is that in there?? I am asking.

Can you repeat the question?

Let me read, he puts it in the chat. I was, I was a database person so used edits information. They are not discs anymore so you go to Mr. dated@USGS.gov, that's how you get all of mineral data. I think my student Jessica is on the phone and I have been working with her because she is working on a nuclear Princeton project. She is working with me on that exposure project. She when I showed her Mr. dated she said, there's so much in here.

There is no Mrs. data is just mineral resources data. That's what I got from one of the students I was helping last year. Where is Mrs. data.

I think I left out part of the link. That is Mr. dated. This is in there and there's other, anything from the mass Mills was inputted into it and for example, the database we updated when the gold King mine is happening. Anytime there's any other big thing that happens, it's updated even though it's not necessarily there are people still updating things.

Jake had the comment, about the next frontiers of money which you have to do a presentation in the future period just a suggestion.

The new director, his background, he started when I was on my way coming out here. His background is mining and space. I think that new space force that the president wanted to create, I think it was part of that. It's weird. I did the government have those conversations with people about space mining and ocean mining.

It seems so futuristic.

Yes. It does. And the cost of at all.

MAS/MI Ellis mineral's availability system, industry location system is location data, latitude, log into, notoriously very rough only good to the section.

That the older system. A newer system is quite accurate. A lot of times, they brought the GPS out with them to verify.

That's interesting.

Time for more questions.

There is a lot of information.

Go ahead.

My basic question earlier, in terms of the things we read about, wind, solar, geothermal, you read about them me read pluses and minuses, there up, down, and use. To have any comments about where those technologies stand currently? Where we are going without is a general,.

It's interesting, what happened with solar and wind and I saw when I was at the USGS and I still see now with the mining component, people are focused so much on the air quality and the climate change that they don't realize how much more mining is happening for rare earth and other countries. Because of the components made to creates a wind turbine and the solar. What I see is, I don't think people realize, when you look at the entire environmental aspect, because oil and gas is such an old industry, they don't want to pollute, they don't want to have an oil spill, they try to use water as sparingly as possible when they use it for high hydraulic fracturing, it's more organize. It's older. From a geology standpoint, that's what I see. Is interesting because a lot of times, people don't realize, lots of the wind turbines, go through them often. You don't just make them in their there. We have a lot in our landfill here and New Jersey. You can actually see them from the highway.

The places where they build them in the ocean, that must be a real chore to replace those.

Yes. That's one of the things when I help students especially policy since they say, I didn't realize that. Have to look at the other side of its times are the blaze the blades being replaced.

Do you know their frequency?

I do not. I know there are a lot of people researching that because they asked me, usually especially here at Princeton, once they find out I worked at USGS, they want to know how to use all the mapping databases and what is that wind turbine mapping database.

That's something.

Could you please put the webinar satisfaction survey in the chat box. And the other information we have. There it is. I will give it my marks. They also have links to our webinar archive. This will be up, Mike colleague is not in today but by Monday or Tuesday next week, this presentation, this will be there and there'll be links to past webinar so they are all terrific. We still have time for questions so please keep them coming in. I will go into my wrap-up comments. Please keep those questions coming.

First, I would like to thank Emily for another terrific webinar. As always, don't forget our upcoming webinar this is the last one for August. We have six more scheduled so far for September. The next one is, Emily has one for September as well. On pharmaceutical research so please check it out. The next is September one entitled for preparing for the ethical, planning for inevitable. That's why Mike colleague preservation my brand David Wallace. Please give that

a look. You will receive notice of Oliver upcoming webinars when they announced if you sign in for news events and email alert service. From the Academy, webpage which is linked to an index at the bottom of the homepage you can view a calendar of upcoming webinars and other events access pass webinars from the archive, you can also use the web form to volunteer to present webinar. Them show their people in this highly expert audience who could do some great webinars. Let's see if we have any other last questions.

There is one more question.

It's hard to compare them. The oil and gas, they reuse a lot of stuff and they also move on. They dump them and move on. Warriors, that's why it's interesting about the wind and the solar because the wind and the solar energy sources are stationary. They are just there. The oil and gas, use it and move on and often there is a lot of the equipment.

The rate of a placement stuff, neither traditional oil and gas, hardware, etc. lasts forever. They all eventually need to be replaced, do you know if they look at those? That's interesting.

That's a great research question.

So they may think about you see the flash, wind is great, solar is great. You don't think about these other issues.

It's definitely interesting because when you talk to judges, they see the entire picture. They are working with the land, air and water. They see the bigger picture.

Okay. Let's see if we have any other good comments. Anymore? Did somebody put something else in there?

There is a book by Princeton press called something about like think like a geologist and save the world.

There are a bunch of thank you's.

Geologists think online skills.

Is a new book the came in a couple years ago. It's called my flows, thinking how how thinking like a geologist can save the world. I'll put the link in.

She was singing older summers would be updated. That is what Emily is doing, am I correct? MRI?

One of the things that happened, the USGS updated every website so some of the content is no longer available. The reason I while I keep an old summers on liens if you go to the Internet

archives, you can find old websites and use the images if you are doing presentations are your help.

Great. It's the way back machine. I don't know if everyone knows how to do that. You take any USGS website and see what used to look like years ago.

One thing I did mention we have a federal depository library conference coming up October 21-23, please register that. They can talk about all those good things.

Great. You get the slide deck and recording will be available Monday or Tuesday of next week.

We were at 330. Great Q&A session.

It looks like that's about it. Another great webinar. More coming up, check your calendar. I would like to thank Emily one last time. We are getting another great webinar. We appreciate it.

I would like to think Corey for keeping everything running smoothly. Please come back for more webinars by Emily and others. Mom back next Tuesday. There's a great one for disaster preparedness with COVID-19 and that's focus mostly on hurricanes and that type of thing. Thank you again and have a great rest of the day.

[Event Concluded]