

Madison Historical: The Online Encyclopedia and Digital Archive for Madison County, Illinois

Bob Gibson Oral History Interview

Jeff Manuel, Interviewer

Edwardsville, Illinois

March 11, 2017

Editor's Note: This transcript was lightly edited by Bob Gibson for clarity. It may vary somewhat from the original audio recording.

Jeff Manuel (JM): This is Jeff Manuel. I am interviewing Robert Gibson or Bob Gibson in his home in Edwardsville, Illinois. It is March 11, 2017, uh and I am interviewing Bob for the Madison Historical Online Encyclopedia and Digital Archive of Madison County, Illinois. Uh good morning Bob and you do prefer to go by Bob correct?

Bob Gibson (BG): Yes I do. Mm-hmm.

JM: Okay. Uh, so Bob if we could start from uh the beginning I guess, just you could quickly give me uh are you from the Madison County area originally or were you born outside the region?

BG: Born outside the region. I moved here in '77 to go to graduate school at SIU Edwardsville um and I have been here ever since [laughs].

JM: Where did you grow up?

BG: Rockford, Illinois. Uh it was my growing up years when I was a kid. And uh moved to Western Illinois University for my undergraduate work and then uh came down here luckily.

JM: Now did your family have any connection to mining prior to you getting this job or is it something that kind of came out of the job?

BG: Serendipity worked in terms of getting the job uh no my family had no history to it uh if you go to Indiana you'll see that there's uh Gibson Coal Mines there in Gibson County but no relation.

JM: Uh so you said you, did your undergraduate degree at Western Illinois University?

BG: Yes I did.

JM: Okay, and then came down to uh Edwardsville or Southern Illinois University Edwardsville?

BG: Yes I moved here actually on New Year's Day 1977 so

JM: And what program brought you to SIUE?

BG: Back at that time there was, they had earth science, geography, and planning. That was one group

area and that intrigued me, the earth sciences were my background. I have a geology and engineering background as well as earth sciences and so the idea of looking at land use and the problems caused by adverse geology intrigued me and that, that got me down here.

JM: Had you been planning on a career tied in with mining or extraction industries prior to that or was it like you said more serendipity?

BG: Serendipity. I was, I always wanted to work with the Illinois State Geological Survey that was where I really wanted to work. Umm and as I came down here I got fortunate and I got hired under contract to do some research for them uh involving some backfilling operations that were taking place in Maryville, Illinois, as well as two others in Belleville. And part of the work that I was doing at the time was learning how to distinguish subsidence damages from damages caused by some kind of soil problem because there were a number of homes being damaged. At that time period we just didn't understand what was characteristic to subsidence and so uh that was part of the work that I did. Now I mentioned that there was backfilling projects. The US Bureau of Mines had what they called demonstration area wide backfilling projects. They conduct backfilling projects in neighborhood having coal mine subsidence problems by drilling holes from the surface to mine level and then fill the mine by injecting materials with the intent of preventing subsidence. They were more optimistic than they should [laughs] have been uh they put a lot of work effort into it but the results were not good in my mind.

JM: Was the US Bureau of Mines, now defunct of course, was that, were they pretty active here in Southern Illinois at the time?

BG: No not really. Um at the time they were, they were pretty active nationwide and so they were doing a lot of backfilling out East and I think Illinois recognized that we have a large history of mining and that subsidence was a problem and would likely continue to be a problem into the future. The reasoning was if something could be done to help the citizens out, protect them, we should look into it. And so I think it was more of an active grant process that was done cooperatively between the Illinois State Geological Survey and the US Bureau of Mines. I specifically was hired, like I said, as a research assistant and what we did was we surveyed a number of homes that were having problems uh and measured the ground movements, again with the intent of trying to better understand the mechanism of subsidence ~~and~~ we could ~~we~~ use that information to a) define exactly that it is coal mine subsidence and b) uh learn more about it so that when remediation efforts were put forward that they would be effective in controlling damages to keep people safe and to help them out by limiting damages.

JM: Now in these years and maybe prior to this I know there'd been a lot of nationwide talk about sort of the problems of uh, some problems of mining, erosion, concern about strip mining, things like that, had that been something that was on your radar prior to this or was it something that kind of came once you started doing the research work?

BG: Everything kind of came together in the, I will say, middle seventies. Um there was a lot of, I think careful thought starting to go into the environment, in that it is finite, and that we need to look after and protect it, so I think as a result of that, mining was one issue. There will, in my opinion always be a tension between mineral development and environmental protection. The tension is that, you need the mineral resources in order to grow an economy and to have a lifestyle that people want to live in, but by

the same token, here in Illinois in particular, we've got uh phenomenal farmland and so you need to protect that resource as well and so the idea was is that if you just throw enough money at it and enough research into it, then you can overcome just about any problem. I think that was the mentality at that time period. And to a degree it was the correct assessment in that you can do an awful lot with replacement of soils and strip mining operations to make the land productive again at least for crop production. I have concerns with other aspects of developing over surface-type mining but we can discuss those later if you wish.

JM: Okay. Um just to return a little bit to your own career trajectory, so you're, were you, you were doing the research work while you were still getting your Master's degree at SIUE?

BG: Yes. While in grad school I was working for the Illinois State Geological Survey Monroe Flynn who was a local legislator and uh um by golly I can't think of her name right now, I didn't think I'd ever forget it (Celeste Stiehl), when their constituents voiced complaints about having sudden damages occurring to their homes, they would contact us and we would make an inspection of the damages to determine the cause and origin of damages. It turns out that Belleville and Maryville were experiencing frequent subsidence problems at that time and we learned a lot from our inspections about coal mine subsidence and soil problems. Mr. Flynn and Ms. Steihl, were two local state representatives from the Belleville area and they were instrumental um in trying to establish the mine subsidence reinsurance fund in Illinois and uh they did a lot of work with that. There was a person in particular, Dr. Tom Stubblefield that lived in, in Belleville who was very active citizen and because of him and these legislators we now have mine subsidence insurance that was mandated by law. We wouldn't have it otherwise uh they were remarkable people. But in terms of my work and profession we would be contacted by them and we would investigate homes that were being damaged and we would see first of all figure out if the damages were due to subsidence, then try to help them understand what to expect, what things could be done to make their house safe. At that time there was no mechanism in place, if you were unfortunate enough to have subsidence problem you were pretty much on your own in terms of figuring out what was causing damages to your home, dealing with the economic impact associated with damages caused by subsidence, and keeping yourself safe. As part of my graduate school studies, I wrote my thesis on the strength of loess. Loess is a wind blown silt deposited during glacial times and is about 90 feet thick on the west side of Madison County and thins to 40 or so feet on the east side. A researcher named Dr. Richard Handy was studying the collapsibility of loess in Iowa. My thesis attempted to replicate his research in Illinois to determine if the homes in Madison County were being damaged by loess collapse. At the same time, my work with the geological survey was geared towards trying to figure out and document the mechanics of coal mine subsidence. Turns out that I was unable to find evidence supporting loess collapse but was able to contribute to our understanding of coal mine subsidence and related damages.

JM: So right at the time that you were getting your Master's Degree working on these things is right when the Illinois law first kind of comes about?

BG: Yes, starts kind of about then, that time period, like I say I was working for the geological survey and we were preparing on getting the basic information about the problem, trying to assess it, how big a problem was it, how common, what were the kinds of problems, what could be done to alleviate some of those symptoms. That information was aggregated and then brought to our local legislator, as supporting information for the legislature in proposing, passing and implementing a subsidence insurance bill. The

AML program was in existence and it was only a two-person operation, an executive director and he had a secretary. Allen Grosball was the, was the executive director at the time and if you are driving north on Interstate 55 near Staunton look up, there is a railroad bridge overpass and on the left hand side (west) there is an old coal mine and that was reclaimed as part of the science foundation study. The National Science Foundation came in and studied how to best take care of that problem (reclaim mine acidic mine spoils) and Al was probably one of the guys pushing that one along getting the, the funding for that. That was one of the first projects done in Illinois in terms of reclamation. (09:22)

JM: For, just to return to the Illinois state uh, uh subsidence insurance program, for anybody who might not be familiar with it or just for sort of posterity's sake, what is that? I mean as it was put in place at first.

BG: Okay, Illinois was the second state to offer subsidence insurance. The Illinois subsidence insurance law went into effect in 1979 and at the time subsidence insurance was not available, so if you had subsidence problem, like I said before, you were economically on your own. Well, the Illinois subsidence insurance was modeled after and much like a fire insurance, you could purchase if you wanted to. What made the Illinois program kind of unique from subsidence insurance offered in Pennsylvania, was that we decided as a state to spread the risk in order to keep the cost of insurance low. In Pennsylvania, the only people who buy subsidence insurance were the people living next to somebody whose home was being damaged by coal mine subsidence. The cost of insurance was very high compared to that offered in Illinois. So if you look at the coal regions in Illinois, there are 32 counties where 2 percent or more of the land surface is underlain by old underground coal mines. In these 32 counties coal mine subsidence insurance is automatically included when you purchase your homeowners insurance. So you make an homeowner insurance payment there's a fee taken out for subsidence insurance. Part of the rationale behind that, besides keeping the fees low, was we have had over 5,000 mines in Illinois and we've got maps for roughly 2,500 of those, of the mines. So we know where some of the mines are at but we don't know where they're all at, and so what we didn't want happening is for people say, "Well I'm not undermined, you know we've checked that maps," and then we have subsidence problem. So the rationale was to keep the fees low enough so that people maybe wouldn't question it and keep their insurance. Now, in those 32 counties you can sign a waiver saying you don't wish to pay that insurance and in which case you would be taken off. And that makes sense if you on the Mississippi River bottom say down in Granite City you don't want mine subsidence insurance, there's no coal there, um there are a few other areas uniquely like that. But in the remaining counties where there's mining, you can request subsidence insurance. By the passing of that law in 1979, it made it mandatory for the insurance industry to provide that coverage. Prior to that it was an act, considered an act of God and, and you weren't insured. (11:34)

JM: In your opinion uh what caused that to change in that 1970s, late 1970s period like you said there had been of course subsidence before then so what, what do you think sort of pushed that to the point where, you know, it was passed into law at that time?

BG: You know, I was a young person and, and I don't know if I fully appreciated all the things that were going on but from my perspective now I think we went from a period of, of you kept your problems to yourself in the '40s, '50s, and '60s. During the late '60s and '70s you have people speaking out at all kinds of issues and problems and talking about subject matters that was never discussed in public before

and so if you looked at the homes here say in Belleville and Maryville that were having problems, these people were still in their youth and they were having issues and they saw this as something that the public needed to be protected from. They, they experienced a bad problem and so they spoke out and I think that was as big as anything. Overall there was a social conscience and awareness of environmental problems and the need for people looking after people were greater at that point in time something that seems to be disappearing from today's world. (12:54)

JM: So, I'd like to next maybe uh shift a little bit from sort of you go from receiving your Master's Degree and then did you start right away at the Illinois Department of Natural Resources?

BG: Yes I did. Initially, I was hired under contract by the Abandoned Mine Lands Reclamation Council which was just starting up. We created an emergency program within the AML to respond to suddenly occurring and life threatening hazards caused by past coal mining activities. And, and I was hired on to start that group up, write the rules, implement the program, and, and get it started. So we were seeking grant monies from the federal government to address mine related problems. At that time, there was transitioning from how the funding for abating mine related problems was achieved, how mine problems were address. uh the US Bureau of Mines was being torn apart and was subsumed by what was called the Office of Surface Mining Reclamation and Enforcement and what they did is for every ton of coal that's mined in the United States there is a tax levied on it. For underground mining as well as strip mining at different rates. That money's collected by the federal government and then redistributed back to the states in order to take care of mine problems. Half the money goes back based on a formula that is based on the history of mining in the particular state. So if you had a lot of mining a lot of coal mines a lot of production you got a larger slice of that pie. Early on the federal government reserved twenty percent to run their operations, office of surface mining, and to fund emergency work. Emergencies were by definition, unexpected mine problems, immediately occurring and life threatening, we the Illinois Emergency Section would make the initial inspection. If the mine problem was severe enough, we'd call the feds, they could come, make their inspection and confirm our assessment as to whether the problem was mine related and dangerous enough to qualify for federal funding. If so, they would allow us to tap into part of that 20 percent OSM set aside federal money to be used in remediating the problem. My job was to make that inspection, make the case for why the problem qualifies as an Emergency, do all the paperwork, and then we'd come up with a design to solve mine problem. When the AML Emergency first started off, like I said, I was under contract to the AML as a project coordinator and I had a subcontract with uh the University of Illinois um engineering department and they provided me the engineering services that I needed to make those structural decisions um and I would do the geology aspect of things and so we worked as a team and, and many of the problems that are mine related end up being a combination of engineering and geology problems and so I, I thought the approach we implemented was uh effective. Typically within 24 hours of receiving complaint of a suspected mine problem, we would make an inspection and if needed be we would work the night through collecting data and drawing up plans to eliminate the hazard. In the early days uh a lot of our designs for the extremely dangerous problems were drawn on paper towels. We would be sitting at a local Hardee's restaurant at two o'clock in the morning and drawing on napkins and then we would have contractors show up in the morning and then we would start work uh we would shake hands and say, we can't spend more than this [laughs] much money, uh this is what we want to do, can you do it, and will you do it? And uh that's the way business was handled early on. Like everything, it gets codified [laughs], and so uh through the years we became much more uh structured, we now prepare formal bids and formal specifications and those kinds of

things. When Illinois received complete authority to administer the AML Emergency Program in June, 1984 We insisted and always did retain the authority that if push came to shove and something was really serious and really going down fast we would solve the problem first and then paperwork afterwards and that still, that, that um thought and practice is still in place today. (16:22)

JM: So, uh, when you first started on it under contract with abandoned mine lands were you based out of your home or did you have an office here in Edwardsville or ...?

BG: I maintained office space on SIUE campus that I had when I was working for the geological survey. The Illinois AML Program provides the rent money for office space and necessary accommodation such as phone, copying and mail service. What really worked out nice in my mind uh was that we were always able to tap into the graduate students there and we've maintained that philosophy. A practice that was started when I was under contract with the Illinois State Geological Survey. I was hired by the ISGS by a guy named Paul DuMontelle who was a program manager for geotechnical division of the geological survey. The ISGS is based at the University of Illinois campus and uh they hired a lot of students and like I said I was appreciative of that opportunity and I learned a lot as a graduate student, things I wouldn't have learned otherwise and so I always tried to keep that practice alive by staying on campus and hiring students to help collect data. I saw this as a mutually beneficial practice that was good for the State. I had ready access to a talented student pool, that I could train them in the specifics for what needs to be done to abate mine hazards, and they the students can use that as part of their degree work and then uh go on to careers elsewhere. Um this practice is still happening today and that's something that I guess I'm proud of I take great joy in that. We've had probably 300 or more students that have worked for us through the years and uh you know uh it's been a good symbiotic relationship (17:47)

JM: Was it just you in the office at the time or was there a couple people?

BG: Just me. Yeah it's kind of scary [laughs] uh to think about you know at the time I'm 24 years old and uh it's just me going out making these inspections and then I would call in and get the engineers' help when I needed it. But like I said I was establishing the program for Illinois um and we later applied for and received authority in 1984 from the federal government to administer and operate the abandoned mine lands program and an emergency program. Programmatically the advantages were mostly associated with economics. Instead of requesting money from the federal government, on a case by case need be basis, once the State received program authority grant money was provided on an annual basis. At that point in time, uh in the early '80s to about 1998 maybe 2000 um, all money for emergency projects was discretionary federal money that was kind of doled out when needed and in addition to the AML funds that were provided to take care of the large-scale environmental reclamation projects. The logic was that the number of emergencies and the amount of money necessary to abate such hazards could not be predicted and therefore budgeted. If the discretionary money was expended, OSM would make an appeal to the US Congress for additional appropriations. Um if I'm losing you please jump in, um but we would, like I said, initially we would turn in a budget estimate that guessed how many emergencies would occur and about how much it would cost to take care of the problem. After a few years, I would look at the number of cases we had and the kind of problems we encountered and money that was spent and then turn that in budget based on statistical analysis. We usually got most of the money we requested but what was nice about it back then was we did have a couple of projects, one was a major gas leak in Benton, Illinois, and that ended up costing us a million dollars way beyond the money

we had available in our budget request. When you're 26, that's a lot of money [laughs] and having that kind of responsibility was kind of um, um unnerving um more importantly is you always thought that this is pretty serious problem there's going to be an expert out there that could come if I needed, you know if I needed technical help or tweak a problem and that they're going to rescue the day for us if need be. In a way I guess they did. By working with University trained engineers and geologist, there was a lot of science knowledge available and you applied that theoretical science and understanding to solving an actual real world problem and that's the beauty of the Illinois Emergency Program and that's what kept me involved and intrigued with my work. You always had a different kind of problem you, you really didn't have a firm solution but you used science and you rationalize it out and you worked as a team. We sat down and we talked and we argued and discussed points and, and my logic there was you're going to make a mistake somewhere along the line and if you have enough people voicing differences, um versus following the law and rubber stamping you're going to minimize the chances of making mistakes and that is crucial. The repercussion is if we make a big enough mistake somebody gets harmed as a result of an oversight or just not understanding it. So we spent a lot of time studying the problems and thinking of different ways to take firm data measurements that we could use to prove or disprove our thoughts and, and, and we still maintain that even today um we're always trying to figure out what did we do right what did we do wrong and, and one of the things that I think I have discovered through the years is there was a great emphasis in the '80s and '90s you always had to be right on everything. I think researchers seeking grant money chose projects that they knew could be done and it was of course always effective. But I am not so sure it advanced our understanding as much as research with uncertain outcomes would have provided. Well you learn more from your mistakes and I think acknowledging those and, and really trying to understand what went wrong provides better and more information. I think in many instances the AML emergency section was forced in applying science principals to problems with uncertain outcomes, while hoping for successful outcomes we continued to collect as much data as we could to further our understanding. We did do that I think more often than I would like to admit but uh we've published our mistakes and we've published [laughs] our successes as well. (21:41)

JM: Uh rewinding just a bit uh do you remember the first time that you sort of saw a case of mine subsidence?

BG: Yeah, [laughs] I have a couple of them that basically scared me. We were in one place in Herrin, Illinois, uh where we were called in uh and I got there, it was a winter day about 6 o'clock at night so it was dark and there was police department and a fire department with their lights flashing uh there was a water tower uh where the water line had ruptured so we had a fountain of water shooting up maybe 20 or 30 feet into the air and creating a mist over the area so this flashing lights would shine and flash on the fountaining water in a surreal way. Then we walked into one of the homes and went down into the basement and, and you could see the doors bending in front of you kind of like an old horror movie uh that house dropped three and a half feet across its length that night uh and uh we, wrote our design specifications on paper towel napkins. Fortunately, we were able to contract with a house mover and had them pick up and support the three homes that were subsiding that night. Because of the work we did that night, the homes didn't collapse and all three of the homes have since been put back on new foundations and repaired. That's one example where the AML Emergency Program and the Subsidence Insurance Program dovetailed in to provide the homeowners the help they need in cases of severe subsidence. I didn't explain this earlier when the AML program was created, uh the laws were established limiting how federal funds could be used to abate mine related problems and one of the limitations is that they can be

used to prevent mine problems but cannot be used to make repair. Congress established SMCRA and President Jimmy Carter signed it into law in, 1977. When Congress established the Surface Mining Control Reclamation Act (SMCRA) – they were very specific in that they realized that there were too many mine related problems nationwide to fix so it was set up to be a program of last resort as a means of keeping federal funding to a minimum. So SMCRA was created in such a way to keep people safe and do only what was necessary to remediate that hazard, but we couldn't effect a repair. So with Illinois, um we decided that a homeowner insurance program was necessary to provide the resources for making the actual repair to the damaged home. It doesn't do a homeowner much good to put a house up on bracing and leave it there when their foundation's totally destroyed. To replace a damaged foundation with a new foundation on a typical house you're talking 20, 30, 40 thousand dollars depending on size of the house it could even be more and so the two programs worked kind of hand in hand. There was tension early on, I think the insurance industry was concerned that uh we (the State AML Program) would be looking over their decisions and fighting them on different things. But that was resolved early on um and both programs learned to work together collaboratively. I think it works pretty well now, there are areas which I wish could be improved but I don't know how we would do that necessarily. For instance, if you have a sag type subsidence problem a type of mine problem we can discuss later if you wish, um but they're long term problems that can last 15, 20 years and while ground movements are active um any repairs you do such as replacing a foundation will simply break back up requiring repeated attempts at repair which drives up costs. So there is a long time period where repairs cannot be economically made during which the homeowner is faced with living in a home that continues to crack up. I know I am jumping around and I apologize...

JM: Totally fine...

BG: But when a person has a subsidence problem there are really, I think, three factors that go into making decisions about what to do. First, you have the emotional aspect of it. You know this is someone's major economic investment and they may have an emotional attachment to the house as well. You know my family has been living here for generations and I'm living here, so there's that part of it. You also have the economic aspect of it, how am I going to afford to repair this, do I sell and take a loss, can I afford to buy another house when I owe on this house and having to live with the problems in the meantime. And then the third thing is, what do I do? How do I fix it? And um so whenever you walk into a house or a situation like that people are experiencing a severe problem they're under great emotional stress and I am amazed at how human people become in that situation. Ah, people become so gracious at the time and they are going through a tough time and that always amazes me um if you walk in the same neighborhood, the people who aren't having problems in the neighborhood they're less gracious uh so that, that was kind of another of the joy besides wearing a white hat when you know you can help people out. (25:51)

JM: Yeah that's great. Um how would those calls reach your office I mean what was kind of the process for that?

BG: Good question. Um what happens normally is, let me back up, I ran the emergency section through the Abandoned Mine Lands program, which is part of mines and minerals, which was a part of the Department of Natural Resources so you have this long name no one remembers. What happens is people have a problem they usually call police or the fire department, so one of the first things that I did when

we started creating this program was we sent letters to every city and to the mayors as well as the police department saying, here we are, this is who we are um you can reach us at this number if these kind of problems come up. So that was one thing that was done. We also worked with a State agency that at the time was called, uh Illinois Emergency Service Disaster Agency. And we let them know, gave them our personal information so if there was any kind of ah mine problem out they would know to call us. Typically, people contacted either the fire or police department when they first realized they were having major damage to their home. They in turn would call the disaster agency which would get a hold of us um some people were savvy enough at that time to remember our agency and call us directly because they saw a newspaper article a mine problem or our agency, um not like today's world where we are on the Internet and you simply type in the word subsidence who do I contact. Overall I think the process worked well and like I said we had a mission and that mission was we would respond to any complaint within 24 hours and if we had to work the night though to solve that problem we would and, and we did do that.

JM: So a call would come in and you'd get into the car and head out to wherever it was in southern Illinois?

BG: One of the things we did right when phone calls came in we would keep very copious notes, as well as taking notes when we got there. So we learned to ask questions from people and get a better sense of how serious a problem was and could better prepare ourselves in making sure we had what we needed to make a thorough inspection. Um yeah every once in a while you get fooled, some people, will understate the problem and when you walk onto their property you say holy smokes you know [laughs] this is crazy [laughs] but uh, uh learned to conduct a better phone interview so when they called in you ask what is the problem, and have them explain what they see. We would also ask them about details of how their house was built again so that we have a better idea of what of problem we were getting into. And then we would go make an inspection. Now mine information back then was hard to get to, the maps themselves where stored on microfiche and we had only one microfiche reader which was in Springfield and it took a long time to get that kind of information. Copies of maps would arrive at our office a week or so later by U.S. mail. So one of the things we did right I think in the AML program was we always assumed that it was undermined and when we would go to a site it was going to be a mine-related problem that we would have to deal with. And then we would go there with the idea we were gonna prove ourselves wrong. You know we're a safety program so we, we wanted to make sure uh we did everything right and that we were prove to ourselves that we were doing things right. So we, we spent a lot of time studying the mechanics of subsidence so we know what mine subsidence damages look like and how the house is positioned relative to the ground movements and from that information we can pretty much tell how severe damages were likely to become, so that's how we made our basis on whether it's an emergency or not an emergency. Programmatically, if it's not an emergency it's strictly an insurance problem we continue to survey damages to make sure that we're not wrong in our assessment. By surveying, I mean we're taking actual elevation measurements on the house and on the ground and what we've learned is that as the ground moves so does the structure. It's, it's almost one to one um, um again we can talk more on that if that becomes a point of interest um but I know that's kinda getting into the weeds [laughs].

JM: No that's okay, uh I mean just big picture, what was, you already touched on this a little bit, but what was your relationship with the insurance companies like?

BG: Early on I sat in on some of the technical talks that were going on behind the scenes that helped

established insurance policy. Now most of that technical work that helped shape and establish the subsidence insurance law was being done by my boss Paul DuMontelle at the geological survey. Later in my job with the AML, I was asked to testify on a couple Senate committee hearings where I would answer technical and programmatic questions about subsidence to the legislature so they could change or alter parts of the law uh for the insurance law. When the insurance law was first started there wasn't any actuarial data so there were a lot of questions such as, how does an insurance group afford this? What rates do they charge? How many homes are being damaged and what are typical repair costs? And so the State of Illinois established a pool that I think was something like three million dollars if I remember correctly and that was a pool of money that legislatures put out there saying, okay the insurance industry you're going to charge such-and-such rate uh you can collect against this pool to pay your claims. And if need be we can adjust the insurance rates or the pool to keep you solid until we can get the data um the idea was that this would last for a few years the insurance industry would uh pay back that money that they borrowed from that pool and that pool would be dissolved and it was. So not it's strictly uh a fee-based you know rate structure. Um the insurance coverage at the time was limited to fifty thousand dollars that was the maximum you could get up to the value of the home and there was a deductible of, of, of uh not to exceed 2 percent of the loss or five hundred dollars, okay. Well with today's extremely large homes that coverage now is up to \$750,000 is available but again it's tied to the value of your home so if your house is \$100,000 home and it's a total loss the most you could collect would be \$100,000. I do know my recommendation to people would be uh to have replacement value on insurance uh because subsidence can last a long time and inflation is part of it so uh if you had \$100,000 coverage on a \$100,000 home it might cost you \$125,000 to replace that home by the time repairs could safely be made. The end result being that you have inadequate coverage at that point in time. So for that reason, having replacement insurance covers the entire cost of repair and that would be my advice for most people I think. (32:20)

JM: Um, I guess what I would like to talk about if we could is just some memorable cases of mine subsidence here in Madison County. Uh if any that you specifically remember, I know one that I had noted just in going through some notes was uh I believe there was an Illinois State police district headquarters that had a major issue or had to be abandoned?

BG: Yeah, uh that was one of the earliest, I think that was our first., When Illinois took over the emergency program from the federal government in '84, um and assumed full responsibility of the program, that was our first emergency case I believe. And uh the Illinois State Police located in Maryville and also the Department of Transportation facility was right next door to it uh to the south. Both buildings started having subsidence problems now what made this case somewhat unique is that uh it was a district headquarters and what that meant was all the police communication for eleven counties came through the Maryville state police building's 350 foot tower receiver/transmitter that was located on the edge of the subsidence event and um, uh subsidence events can expand outwards so that was a major concern because if that tower went down the guy-wire supports would slice through the building and, you know, kill people as well as knocking out communication for eleven counties. The building itself was kind of small for the State Policy needs and they were thinking about expanding the building by building additions when the subsidence occurred. So what you had take place there was kind of a perfect storm. They needed more space for their existing operations and room to grow into. When subsidence started causing problems, they couldn't make repair, and they couldn't go through with plans for the addition, and they had the concerns with the tower and possible loss of communication. So the reason why the state

moved the State Police from that facility wasn't so much that the building was going to collapse and kill everybody other than like I mentioned the guy-wire was, that was a concern but rather due to expediency and cutting their losses. Um that day of investigation was a memorable one. They held a big press conference at the facility and I've never saw such a sight again. A couple of our guys were on top of the roof [laughs] making inspections and before you know it, there was a group photo with all these dignitaries up on a roof which is pretty funny I thought, I'm sitting down there on the ground snickering but anyhow it was kind of fun. (34:42)

JM: Uh another one I noted was the uh the Dorris School in Collinville...

BG: I forgot about that one...

JM: Yeah

BG: That, that was a very important case. Um like you said Dorris Elementary School in Collinsville started subsiding when the school was closed for I think it was Easter vacation and they left there Friday everything was fine and they came back and they noticed that there was damages occurring to the building on a Monday morning.

JM: What kind of damages, do you know?

BG: Uh, cracks were forming in the brick work and in the floors, doors were sticking and in general things looked anomalous to them. We got a call asking us to take a look at it. Sag- type subsidence is a bowl-shaped depression that's gonna be something on the order of 350 to 500 feet in diameter in most instances and as you go from the outer edges to the center you get more and more dropping that takes place. So it will drop roughly one-third the coal seam thickness in this case the coal seam was a little over six feet so we're expecting two feet of subsidence. The school was a T-shaped building and the center of that sag was where the T meets, okay? So you have this building that's kind of folding in on itself and taking that shape of the ground. Um as a result of that, the one-story portion of the building was being thrust into the gymnasium which is multiple-story high and it's a concrete block wall and so collapse of the gym was within the realm of possibility. The school district now has, I think 600 kids in the school if I remember correctly and there, you know there's a lot of concern with the parents as you would imagine, cause you walk in there and you see these large cracks and things are actively moving uh and they're very concerned about it, well so are we [laughs] uh and so we, we were addressing the problems as they popped up. Uh part of what we learned to do was, like I said, anticipate how the ground's gonna move, we anticipate the kind of structural damage that will take place and then we, we concentrate our thoughts and efforts there to keep, keep it safe. So part, part of the question we had there was how do you assure the public that we're keeping their kids safe, so we had a lot of public meetings to keep them well informed and to answer their questions and concerns. At the same time we were trying to keep up with the technical aspects of what we had to do to keep parts of the building from collapsing and then you had the incidental things which you can't rule out make everything entirely safe that would be, you know, ceiling tile that maybe would come down, or since the building is used by the public, high heels become a trip hazard if you get a crack in the floor, just those kinds of issues that you have to worry about. But uh to make a long story short the school district wanted to know, do they need to evacuate the building, and they were making plans that if they had to, to move the kids out to other schools but they wanted to try to

make it through the year if they could. And that was where we learned to predict how much subsidence is going to take place over a certain time period and uh that, that was one of the things we developed that was unique to anywhere else in the, in the country and uh we're pretty good at that we, we can tell you how much subsidence will take place um and where you are in that subsidence curve in terms of time settlement. And, uh, we used it to, to our great advantage in that case. They did make it the school year through as our calculations predicted, no one got hurt, we did do emergency work, we had to replace certain wall segments, uh we put bracings in we, we worked with their engineer on various issues. You know part of any problem there is that of establishing credibility. At that time period you know there was a perception that you can't just trust the state, so they bring in, and we recommended that they bring in their own engineering people to look at it uh because we didn't design that building so you have a lot of forensic engineering going on. When you have to work with people who are not used to subsidence and who are engineers, there's a learning curve for them and so you get to kind of work with them, teach them and give your experience and uh there's a period of trust building uh that takes place that's, what I find is an interesting dynamic uh hard to put into words but it is interesting nonetheless to me. (38:53)

JM: Were there uh other cases specific to Madison County or kind of the Metro-East region that really stand out to you and you reflect back on that time with the uh Illinois?

BG: Yeah there's two more cases I maybe could bring up that I think would be interesting. I'll go with the shaft first, um the Madison County number 4 mine which was called the Thermal Mine, uh it was, it was a initially a Donk Brothers mine which was a major producer in Madison County. Um, the shaft that they had was a rectangle in shape, uh the shaft it was 24 feet by 16 feet wide and when the mine was abandoned it became a foundry. Or a foundry was placed on there and they had a night watchman and this vertical shaft is 220 feet deep I just gave you the plan dimensions of it. He had a piece of plywood laying across that opening, and the shaft itself was enclosed by a little building in which he stayed. And he had a refrigerator um a TV set, a cot that he slept on at night, all of that on that piece of plywood. Nothing between him and, and down below uh when we were notified of that [laughs] we couldn't believe it but uh, uh Keller's since then bought the property so uh they have a lot of heavy equipment and, and machinery that they use to make pre-stressed concrete. And so bottom line, we filled the shaft, using AML funds. We filled the shaft from mine level with rock up to uh about 30 feet and we put a large concrete plug in there by filling the remainder with concrete. To seal it off so that they could carry equipment on there. Um I, I'll come back to this later on because it is not Madison County specific, but there are mine gasses that are a big problem that we come across that maybe something worth discussing. Um, so that was kind of neat, it was just huge and it's just the circumstances of being local and, and somebody living that way over it was pretty remarkable at the time. Um the other case I wanted to bring up was in 1926 in the Edwardsville Glen Carbon area. Madison County had what a was tuberculosis sanitarium, it was built in 1926 and it uh was open for two weeks when it started having subsidence problems and if you look in the literature and read on it, it's fascinating in that, you know the coal company was blaming the county for the construction of a heavy building that was causing damage to their mine. In a countersuit the county was saying, hey you are damaging our new building, to the point they moved all the patients out of that building because it was getting so heavily damaged. They borrowed tents from the navy from out of Chicago and the people lived in the tents at least two or three years, um and when you read some of the doctors reports, well you know they're doing great, you know, they're even more robust than they were in, in the sanitarium uh but what was neat about that place is they hired an architect out, out of the University of Illinois to come and help them with some designs and

they got a contractor out of Alton and what they did as a solution was they cut out pockets within the foundation wall and they put in these wood screw jacks, eighteen hundred of them and they severed the foundation from the superstructure and then they tightened these eighteen hundred jacks up and they leveled the building, raised it leveled it off the foundation, so as the ground would continue to drop they simply increased the height of the individual jacks so that the damage to the superstructure was minimized and it will, like I said, was in the place for a couple, 2 or 3 years I. I was unable to find out when they went back and made the actual repair. But I was able to secure some of the plans that they had and some of the damage measurements and I came across them again serendipitously and, all that information is now at the Madison County History Museum and you can take a look at and study them. After awhile, they put it back down and fixed the foundation back up and it was of course used as a sanitarium for a number of years and then it became the Madison County nursing home and health facility I believe which was abandoned circa 2000. I did go back in 1996 while it was still being used and I got permission, to survey the floor in the basement and I do know for a fact that it dropped 1.3 feet across the length of that structure so the North end of the building dropped 1.3 relative to its south side which was the solarium, sun room for the patients. It had lots of windows to open up for fresh air and sunshine. I spent a lot of time just observing and making careful inspection of all the floors and walls within the building. It was a three-story building, made of brick, and I looked to find any of the repairs they made. I wanted to know, did subsidence reactivate and cause more damages after building repair or after later additions? You know, one of the questions we, we still haven't resolved is, is that when subsidence occurs we believe it comes to completion. From a physics point of view I can make an argument that unless it, the mine, pancakes it could reactive sometime in the future, I don't know for sure if or when but it could. But that was one of the things that I wanted to find out. Here was one instance where we knew when subsidence took place, we basically knew when they made the repair and we had roughly 90 years of lapse and we didn't see any re-triggering of subsidence. When they tore that sanitarium down in order to build the Dierbergs shopping mall complex now apparently the screw jacks were left in place when they made repairs and they, they had faced over the foundation with a concrete mix. And I wish I could get, could have grabbed one of those screw jacks when they tore it down because that was just a neat case. (45:00)

JM: Interesting, so fairly recently just to kind of touch on some other stuff but just to wrap up your time with the Illinois Department of Natural Resources and Abandoned Mine Lands, you then, you have retired from there fairly recently, correct?

BG: Yes, I retired in June of 2016.

JM: Okay. Was that, what prompted that, was it just time or things changed?

BG: There was a number of reasons for it. I, I think part of the reason for retiring was that the goals and objectives that I wanted to accomplish I, I think I accomplished those. The Mine mapping was a major goal, protection of that program and making mine maps publicly available in the future was something that was very near and dear to me. I wanted to get that through the big hurdles in terms of being able to build the AML program and, and, and innovate things I was kind of running out of ideas and so my job became more maintenance, now I still, I still like my job, I love my job, but an opportunity came up to get new experiences and new perspectives and so I, I jumped on the opportunity and took the federal position and so that was one of the reasons that I was looking for, for new challenges. Also I had hired a

couple of people that were in place and are just really good and capable people and it's time for them to kind of grow and to, to take on and, and maybe take the AML Emergency Program to whole new and better direction and, and these are capable people so it worked out well.

JM: When you think about the state of Illinois's handling of these issues versus other states, I am just wondering what stands out to you? Were you in contact with you know other equivalent agencies in other states that have a lot of mining in them or...?

BG: Yeah, I always made contact, there's a group, Abandoned Mine Lands Association that meets annually and the whole idea is to share techniques in abating subsidence or any kind of mine problem and reclamation problems and, and it's where everybody gets together and, and, and discusses and cusses all the ideas. And that's always a good thing to go to. We did things in Illinois a lot different than anywhere else, like I said, we took a science-based approach and, and tried to use that to our advantage. The other states treat the symptoms and in my position as a fed with AML and Regulatory program oversight responsibilities some of the things I see, I question. I wonder about the logic being used particularly in instances where you have an abnormally high rate of failure. What I find frustrating, is they have absolutely no idea why the remediation failed and steps are not taken to figure out why. Instead they just keep going back in and, and top dressing whatever the issues may be. I look at it somewhat differently and my perspective is the Abandoned Mine Lands program is a sunset program. What that means is, it is designed by Congress that after the certain amount of time the program simply shuts down and they don't fund it unless of course they decide to extend funding for AML reclamation. And they have extended it several times, originally it was to run through, oh boy, I shouldn't even guess those numbers, but several times, but anyways most recent one was done in 2006 and it will, it will end in 2021 unless it's carried through by Congress again. So what that means is, if you, if you do not abate the problem totally and completely then when the problem redevelops again in the future there won't be a mechanism in place to take care of that issue. So what have you gained? In my mind, in such instances you've wasted money or you achieved a slight temporary reprieve at best. Equally important, is, say for instance, it's a shaft and you fill it with material and it, and it fails in the future, well someone's going to be building over there potentially and they're going to be in a, a world of hurt real quick and that's why the AML programs exist today. And so it doesn't make sense not to solve the problem totally. If you can't then you need to take steps to ensure that that property is well known and what the limitations are so that people who get it can, can work around it. But, it's like an earthquake engineering studies, it's always gonna get better and better as long as you have a, a vehicle in place to carry it going forward, if that makes sense. (49:29)

JM: We touched on the relationship with insurance companies but did you have any relationship with the mining companies?

BG: Indirectly

JM: I know in many cases you are dealing with companies that are long defunct but in other places probably with some active mining

BG: Right, yeah, like I said, the Abandoned Mine Lands program, was designed to take care of all the problems associated with mining that took place prior to 1977. So it was after that date modern mines would be in place, and the mining companies would operate under the laws established under the Surface

Mining Control and Reclamation Act (SMCRA). In Illinois, it is the Department of Mines and Minerals that have regulatory authority and they issue mine permits and, and make certain that laws governing mining established under SMCRA are followed. So the coal company is on the hook for post mining reclamation and any problems that should pop up. But yes there's a number of instances where subsidence took place and they the coal companies would call us and ask us for, for help and/or our perspective, put it that way. One time there was subsidence affecting a commercial chicken coop [laughs]. The mine also had overhead coal conveyor systems being impacted that they wanted us to look at. But if you have ever been under a commercial chicken farm structure that's subsidizing and looking up at the structural various structural elements to see how they are being affected by subsidence, it's not a pleasant place to be [laughs]. Hard hats don't do it [laughs]. I am sorry I got sidetracked.

JM: [laughs] No that's fine, and I know you have only been there for a little bit but tell me a little bit about your current position with the feds.

BG: My current position, I'm an, AML (Abandoned Mined Lands) and a Regulatory Program Specialist. Part of my responsibilities is that I oversee the states' handling of the mining laws governing active mines, and are they making the coal companies doing the post mining reclamation work that they're supposed to be doing? We provide evaluation of the overall program and try to help them improve areas of weaknesses, if there is a limitation in the laws that needs to be changed then we would make those adjustments but mostly it's just an oversight to make sure the public and the environment is protected and that the regulatory authority, the state, are doing their job. We also evaluate their Abandoned Mine Land program, that they are using the monies efficiently so we look at the on the ground reclamation that is being done and make an assessment as to whether the grant awards and reclamation that is taking place are appropriate. There are a lot of legal issues that pop up from time to time that OSMRE has to deal with. I am sure you have seen in the news by now where Peabody is getting ready to come out of bankruptcy and part of what was is being done in post mining reclamation by some of the major coal companies has guaranteed funding in case of default, called self-bonding and they are allowed to use the company's assets as a means of providing surety that the area will be reclaimed to standards established under SMCRA. We (OSMRE), we've spent an inordinate amount of time on these kinds of cases right now trying to establish better policy and to make certain that the law and intent of the law is being upheld during the bankruptcy transition and that complete reclamation of mined lands is accomplished. If not, you have environmental groups that are ready to bring legal suit on one side, State Regulatory programs ready to protect their legal interests and the coal company has yet another legal and programmatic opinion. Very interesting perspectives and challenges that can be gleaned from the place I am currently observing from.

JM: Are you willing to share any of those or would you prefer not to?

BG: I can share [pause] I think I best not at this point and time since, since it's an emerging issue. But I think what I can say is that the criticisms that were leveled against self-bonding, I understand what they're saying and some of their perspectives. But I can also say that as the three major coal companies have gone into bankruptcy and emerged all of them have replaced their self-bonds with surety bonds, meaning go to commercial bonding capability. So the system did work and it did not fail. I wasn't sure if it was going to work for a while, but it did work and in today's corporate world I don't know if those companies that are providing surety bonds, what keeps them from toppling, you know you had Lehman

Brother go down, so if you're depending on the companies that on paper are solvent and guaranteeing that there will be sufficient money to accomplish complete reclamation, if they go down where's your recourse? With self-bonding, the coal companies that want to continue mining in the United States they would have to make good on reclaiming mined lands otherwise they wouldn't be allowed to continue mining. Now, who knows? You know, coal companies are now off the hook, because they, they are following the laws and they bought the insurance to guarantee that reclamation takes place and then what happens if they the insurance companies potentially go bad, so I don't know if there are any answers there, other than what we had in place worked. (53:57)

JM: So, maybe shifting gears a little bit to just thinking more broadly about coal mining in Madison County and I know, you know, the geology doesn't exactly match up to the county boundaries, there's obviously some overlap, but what were what were the basic types of coal mining that happened in Madison County?

BG: Good question. First on the geology aspect of it, Illinois is a structural basin, a bowl-shaped basin and that the southeast part of the state is the center and deepest part of that basin. The outer edges are closer to the surface, so the coal mines here in Madison County are near the outer edge of the Illinois basin. If you go along Route 157 down around Caseyville you can actually see the coal exposed in, in, in the bluff there. If you go towards Troy, Illinois, the coal is 350 feet below ground surface so it steepens fairly quickly across Madison County. Most of the mining took place where coal is for the most part shallow and easy to get to. When the coal, was very shallow, let's say either exposed or say 20, 30, 40, 50, 60 feet deep in the early days they could use a shovel to scrape off the dirt and mine the coal. There was only one mine in, in Madison County that really did that and that was up in the Moro area and operated from like 1930 to 1935. Almost all the coal mining in Madison County was underground mining, which means they'd either started mining at locations where coal was exposed or they sunk a shaft to get to that coal reserve. Then they would mine the coal and leave some coal behind as support., For those listening to this interview, the coal seam is basically a layer, think of a stack of pancakes, and one of that pancakes is coal seam, and when they come in from the surface they will either sink a shaft that's vertical opening that taps into the coal and then work their way outwards if it's deep, or if it's shallow they can "drift" into it by digging a shaft on a shallow angle if the coal is below surface. But anyhow once they get to the coal seam they mine the coal and in Madison they did what is called room-and-pillar mining and all that is, is that they would make a cut, remove the coal, and that leaves a void called the room and the coal remnants in place are called pillars and so you end up with a checker-board type pattern overall. Now in the early days that mining pattern was very irregular, the geometries of the coal pillars were different size shapes and they just kinda went willy nilly all over the place and it really wasted a lot of the coal reserve. But that tended to be smaller mines. Larger coal companies came in you had people coming in from different countries and they would bring their experiences in and they would start mining the coal and if they had developed problems in the mine, by that I mean stability problems, if they started having subsidence taking place in the mine, what they were concerned about is a) maintain their air quality to whatever standard was law at that time, b) getting the coal out. In early mines, the coal was hauled in carts by mules. The mentality of the coal mine operators was to protect the mules at all cost. People to mine the coal they can always get, okay, so that was kind of the mentality in the early days. But room-and-pillar mining was what was how mining was done in Madison County. It became though the years, became much more mechanized and coal extraction more regular in geometries and so you get a little bit better recovery of the coal itself while achieving short term stability while coal is being

mined.

JM: I know this might get fairly technical but so, so in laymen's terms how does the room-and-pillar mining techniques that were used in Madison County affect the way subsidence has happened and how, like you said, the early days maybe 19th-century mining was pretty irregular, so how accurate are the maps that we have from that era?

BG: You've asked a couple of good questions there [laughs], if I can get to that. The maps, I'll take that first, the maps are actually, I think very good. I've spent a lot of time studying them. To make a mine map, they have what is called a "room book" and depending on the time period, at least once a year you have surveyors go underground, they would measure all the coal pillars in the room developments, and the entries and they would also survey them in. They would measure elevations and turn angles and write those down and take actual pillar measurements. Certainly pictorially they're spot on. Now the question is, is, you know, are there errors in the measurements and how big is the error in those measurements? The biggest source of error would be when you turn an angle if you look at a survey equipment they'll be graduated into little marks kind like that of a compass, for every distance and elevation measurement they would also write those angles down. Well the nearest you're gonna get in measuring angles with old survey equipment is a half a degree of accuracy. Well if you are surveying over a distance of a mile or two and you make a number of turns that error could compound and, and so you'd be angularly off, okay? But having said that there are number of old mines that operated from 1900 to 1930 that I can verify using subsidence as well as the maps and that's unbelievably accurate, I would say mines that were operating from, in the 1860 to 1880 time period they're within 50 feet of being correct. And that's measured against a USGS topographic map which has an accuracy of, that says, everything that's shown on the map will be within 50 feet, plus or minus, for 92 percent of the recognizable points on the map. So when you make that precision comparison and you think about how they did it and, and to do that underground it's you know it's pretty remarkable. And for the more modern mines in room-and-pillar mines, your accuracy is going to fall to, to say maybe 6 feet or so from being correct. If it's a long wall mine where it's highly mechanized, they're within inches, so it depends on type of mining but in Madison County there is no longwall mining it's only early room and pillar mining. (1:00:00)

JM: There, there was a debate about potentially longwall mining in Madison County, where there not in the 90s or so I believe?

BG: Yeah there was, there was um, I am trying to think of the name of the small community to the East and North of us here, there were looking at bringing some longwall mining there and in many respects it's a good idea in that you have, you recover a coal resource completely so as to your use your energy source completely so you are not wasting half the coal like you do in room and pillar mining. With longwall mining you have subsidence that's immediate and you have a coal company that is solvent to take care and address those problems. So in terms of making repair to the surface or preventing damages or, more importantly in my mind, maintaining the agricultural productivity I see that as a win-win situation in, in those kinds of instances. Now are there geologic conditions where that's a very bad idea? Yeah, absolutely, and, and that's part of the mine planning process that's in place. You know, the state makes those assessments when they receive the plan. Is this a good idea or not? So, again from my perspective I think the process works here in Illinois well. Now you can hear a lot of people argue just the opposite out there but I think if you peel it away it makes a great deal of sense to me. But you asked the

question earlier in terms of what is the mining geometry how does it impact subsidence from the old mines to the new mines? With the old mines you have irregular shaped pillars and spacing throughout the mine. And what we see there, like I said earlier, subsidence events that typically are on the order of 350 feet or thereabouts in diameter and what happens in the older mines is the weak areas will fail but there's usually a large mass of coal that is left around the perimeter of the main extraction area called barrier pillars, that stops that subsidence event. With the modern mines, well let me back up again, I know this is a little bit into the weeds, but there is something, there is a critical dimension of subsidence that will form on the ground's surface. When that critical dimension is achieved, that's when you get the maximum amount subsidence settlement that can take place. If you increase that mined area to a larger plan dimension the amount of subsidence stays constant, so we're saying if three feet of subsidence is going to take place it will be three feet of subsidence across the affected area forming a relatively flat bottom to an otherwise bowl shaped depression. What's important, anything located in this flat bottom the surface sinks uniformly downwards and the structures that are in this area of the sag aren't going to be damaged as much as they will at that critical dimension where you've got tension and compression as well as settlement that takes place. And so that is one key component in the modern mines with the regular coal pillars, your subsidence events now can get extremely large, I've seen cases where they're fifteen hundred feet in diameter, you know just very, very large subsidence's. Now on the outer edges with tension is the pulling apart, if you will, that's where you see the most of the damage is concentrating, the flat bottom that results as a result of that big, large area there'll be some damages to the houses that will tend to be lesser than, than what would occur under a critical subsidence event.

JM: Interesting. Was there anything unique or different about Madison County versus other parts of the state?

BG: Well, yeah it, it again it's another instance of happenstance geologically and geographically.. Geologically, Madison County is located on the outer edge of the bowl shaped Illinois basin, making the coal shallow and provided early, easy access to the coal seam. But also being located to near St. Louis we were supplying the energy needs to St. Louis, um mining in Belleville came in about the same time or perhaps a little later, but they also were a big part of supplying coal to St. Louis. One of the first roads that were built and railroads constructed in Madison County was to bring coal from Madison County to St. Louis. The energy that's given off by coal is roughly two and a half times what you can get from wood which was an important energy source at the time. Forests being depleted for housing as well as energy needs and cooking, so it didn't take much imagination to figure that coal was the way to go. One the other things I find kind of interesting about past mining in Madison County, is that there were ten mines that produced three fourths of the coal produced in Madison County. What makes it interesting to me is that there were over 110 mines that have operated in Madison County but ten, ten individual mines provided that much coal. If you talked about the major companies in Madison County, the Donk Brothers or the Lumaghis would be part of that conversation, another of the big producers was the Madison Coal Company and so was the Mt. Olive and Staunton Coal Mines, um they were the big players. Those four companies provided 81% of the coal in Madison County.

JM: Were the other mines then sort of smaller independent operations, you said of those other...

BG: Much smaller independent mines, and the extent of mining in terms of area mined and the tonnage of coal was altogether smaller. Some of them were ma and pa mines that mined coal by just drifting into

the side of the hill, others were local companies supplying coal for local coal needs. You know Edwardsville needed coal too for home heat and cooking. You look across at my neighbor you can see that they have a coal chute in the house, the house was built in the '20s and they used coal to heat their home. The numbers just in case you are interested in them, the longest operating mine was the New Staunton Coal Company and it became later the Livingston and Mt. Olive Mine. It operated for 59 years. The average years of operation for any mine was roughly 16 years in, in Madison County. Oh, I had one more interesting thing that I thought, to me was interesting, um in Edwardsville there's a nature center and on the north side of that nature center along the railroad track you'll look and see there's a brick house, that house was owned by a guy named Henry Ritter. He opened the first mine in Edwardsville, one of the earliest mines in Madison County in 1855. Uh, like I said, it is right along the railroad track and the shaft to the mine started opening and we got a phone call from the railroad company saying we have a big hole by the railroad track and those trains go through that stretch of track at 60 miles an hour. Sure enough we get there to make an inspection and there's a hole forming and some of the ballast for the railroad track is slipping into this hole. We excavated some of the collapsed fill materials from the sides and base of the hole, after having closed the tracks for train use, and what we found was a 12-sided shaft (dodecahedron) that was 25 feet in diameter. The sides of the shafts were made of, tongue and groove wood planks held together by wooden dowels. Now if you think about it this was quite an accomplishment, the shaft was hand dug, it was 25 feet in diameter with coal's 95 feet below ground surface, the effort that went in to doing that was remarkable and at that time there was uncertainty whether or not they would even hit coal uh they just didn't have a good idea how extensive coal was or at what depths, so part of what went into the early mining to me is fascinating and the ingenuity that went into some of these things. Um, but that was kind of a cool local flavor for me. In Madison County, the last mine in operation was in 1964 and that was the Livingston Mt. Olive Coal I talked about earlier. If you, if you make a scatter plot graph showing the year a mine opened on the X-axis and the duration of mining in years on the Y-axis, here I will show you, you can see it [holding up graph]. And if you look, prior to 1920, now I know this is small, but prior to 1920 there is quite a few mines that operated for a long time, but after 1920 there were fewer mines operating for shorter duration. I think the data plot reflects a number of things. Um you had the Great Depression that brought some of the market down, the steel industry had strikes so coal was not in as much demand, coal is being mined for two things mostly, steel production and for energy needs and that energy need was also tied to the railroad industry, okay? The railroads were wood-burning stove and they went from wood to coal cause the energy efficiency there, but it was still steam-based. Around 1940 the trains started going to diesel and to electric, so uh you lost the need for coal there. And then, like I said, the U.S. steel industry is in decline and if you look at the power plants today, they're starting to close down, so coal mining isn't going to come back to the way it was, you know, it will always be important for a while but not to the degree that it was and most likely will not stage a come back in Madison County.

JM: Yeah I was gonna, I was gonna ask that because there obviously has been a lot of rhetoric ah, over the past year or so especially, tied in with the 2016 presidential election, about a so-called war on coal and I know this a little afield from your expertise but I mean having been part of the, or related to the industry, especially the legacies of the industry, for a long time, uh did you have any thoughts on that or?

BG: I can name a couple, some of them I have to steer clear from, but in terms of employment in the coal mines, my intuition is that's not going to come back to the numbers that they had, if you look at the early days of mining in Illinois there are over 3,000 miners, Or I'm sorry, 3 million miners, coal miners

and now we're at 9,000 or thereabouts. A lot of that is the direct result of mechanization, going from intensive hand labor extraction of coal to coal removal by machines. We have machines now that can be programmed by one person and it takes out more coal than could ever be produced before. Um so the number of jobs even if we increased coal production significantly you're not going to get back to those glory days where many people worked in a mine. The way I see it, jobs in coal mining will only become lesser as, as I think, I think the trend will be towards underground longwall mining which is highly mechanized. I think when it comes to mining coal this trend will continue to take place, and like I said that's a computer job anymore and the amount of coal that can be mined in longwall mines is phenomenal. So I see that as being what may happen, but again you have to create the demand coal and right now we're in a time period where natural gas is abundant and cheaper and that certainly has some environmental a benefits maybe more so than coal. I mean you can do some of the same things with coal but it is more costly to accomplish, so from an economic point of view I don't, I don't see that changing, I really don't. Uh if we can really concentrate on other non-carbon-based fuels, I'm talking wind, solar, whatever, I think that will become more and more important and as renewable energy becomes more important and the industries become more capable in you know supplying your energy and that will happen, that will put the final nail into the coffin and be the demise of the coal industry I think.

JM: Yeah, although in an interesting way your own career is a, I think a reminder that we'll still live with the legacies of, you know the coal mining era even if it has ended at some point in the future [laughing].

BG: Yeah, uh coal mine subsidence in particular if you look at that, that's gonna be here for a long, long, long, time. I mean we are talking centuries. Uh we have mines that are, like I said, mined in the 1800s that are having subsidence today, uh and I know from drilling operations and from mapping subsidence events, I know a large part of the mine is still up and so it, it will fail the question is, is when. Um and the answer to that question, we'll never find the answer to it, I think. Um but yeah, subsidence is one problem that's here to stay. I talked a little bit earlier about some of the gasses that are in the mines, that's another potential problem uh we've had some people drilling holes to install geothermal heat for their homes, they inadvertently drilled into a mine that they didn't know was there and methane gas escaped from the mine through the drill hole only to be trapped near surface by frozen ground. The methane gas flowed into buried utilities and eventually flooded throughout the entire neighborhood and it became an emergency project, we were called at three o'clock in the morning, middle of the winter, but it was certainly an interesting case. We had a shaft in uh Benton, Illinois, and this particular mine was filled with methane gas, at extremely high pressure, it had the energy equivalent of Hiroshima, if it were to be suddenly released due to shaft collapse, there would have been major problems, that's when I got my grey hair and I quit smoking at age 26. [Laughs] Bottom line is there are some real issues that can potentially happen out there that we as a state will have to deal with.

JM: Looking back, how well do you think Madison County and southwestern Illinois in general has deal, has dealt with mine subsidence?

BG: Early on I would say poorly. It's getting better, we the Department of Mines and Minerals, in 1986 prepared document that we called "A land use guide to coal mining" to give guidance to communities for land use development over coal mines so that they could design future land use developments differently to either accommodate or avoid the problems associated with mining, and um not many cities took that up from a planning perspective. Maybe it was too cumbersome for them. I, I there is a lot of forces that go

in, uh in Illinois in particular there seems to be a mentality that this is my land and I can do what I want to do with it, or develop it however I want to and there's great resistance to any kind of planning that a city would put into place. I went to Springfield, Illinois, to talk to their city engineer and say hey here's some problems that we're seeing that you need to think about, and they said Bob we tried to have developers plant a tree and they fought us tooth and nail, so there's a lot of tension out there that, you know, we have to overcome but having just said that it's getting much better what I find happening now is there's more of an awareness that's taking place about the impacts of mining so we have engineering firms that are calling our agency and asking questions and getting some advice from us and I see that as a good, because the more engineering people put thought into the problem the better, like I alluded to earlier, legislation will get passed eventually that maybe will make things more, more sensible and, more appropriate development of the land.

JM: Have any communities in Illinois incorporated these issues into like zoning or you said land use planning?

BG: Fairview Heights is starting to look in that direction uh I was called and asked to go to them, and give a presentation to their, to their city council. I explained to them the kinds of problems they were likely to face and what steps could be done to minimize the future impact of mining on their community. I also spoke to a group of realtors there as well. And so from a city planning point of view I think there's an interest there, they have a lot of malls that are, you know, developed over, over mines and I'm sure they're very much concerned about what will eventually happen and the economic impact that it will have.

JM: I guess related but are there, have there been any changes in say like building codes or construction technology that's responded to this or is that not really an issue?

BG: Uh no there hasn't, to answer your question. There hasn't been any changes in terms of structural design yet. There are things that can be done I think at low cost and that make sense and we put that out there in various publications, that just haven't been widely read or perceived as an important enough problem to spend the money necessary to incorporate in building design in order to minimize problems. I guess in order for it to be common place, something bad has to happen involving loss of life or great expense. But what I do see happening is that many more of the larger companies are being a little bit more proactive in their site developments. For instance, the Sam's Club, which is part of the Walmart chain, that was built in Glen Carbon, Goshen Road and Highway 159, they were proactive and they, they drilled that site and they filled the mine with a cemented backfill material, with the idea that they would prevent or keep subsidence from happening. So I do see that happening more and more and that is something that's changed during my, my tenure. Early on in the '70s I mentioned that a U.S. Bureau of Mines backfilling project in Maryville, they used two types of material that they tried to pneumatically stow, meaning using air pressure to blow in fly ash, the idea is you take a lot of fly ash that has pozzolanic characteristics or in other words, cementitious properties. That if you blow it in mines it will take the moisture up and it will set up, you get rid of the waste and it provides some strength and stability to the mine. Well, they tried that and they basically have a dust cloud in most of the mine with a pile of flyash at the bottom of the injection hole is what they ended up with in, in that particular case. Then they tried pneumatically using air, compressed air to push coarse mine refuse into the mine, so now they've got little cones of debris at the bottom of the bore hole, so that wasn't effective. But what was learned from

doing these sorts of projects, and what's happening now is that you can mix sand and coal waste, such as flyash and that kind of stuff, and enough cement that you can pump it underground as a semi- fluid and/or paste and then you, you can do a good job filling up the mine. It will have strengths depending on your engineering design that will prevent subsidence or stop subsidence. That was one thing that we eventually did do, that we, I learned first-hand, when we, if I could jump back to my early days in the Abandoned Mine Lands when we were formulating the Emergency Program and how to respond to problems caused by coal mining, part of the decision was, we decided that we were going to treat the symptom versus trying to prevent subsidence. We've got over a million acres of land mined in Illinois. It costs about a million dollars per acre for backfilling, it was unproven technology at the time when we were starting the Emergency Program, so I decided we were going to provide bracing and direct structural support to severely damaged buildings and help people that way. We did however attempt to stop subsidence by backfilling the mine with cementitious material. We had a bridge in two thousand [pauses] nine, ten between Springfield and Champagne, Interstate 72, that bridge started to subside. We did go into that project with the intent of backfilling and stopping subsidence. However, we didn't know for sure that we could stop it because it wasn't proven yet, that it could be done. Even assuming subsidence can be stopped we didn't know if we could get enough grout in the ground quick enough to prevent collapse of the bridge. But to make a long story short we, were able to do it, we actually stopped the subsidence and we got the data to prove that we stopped it. And so, that was a situation where 800 foot bridge would likely have collapsed had we not been successful in our backfilling efforts. Besides the obvious safety implications, collapse of the bridge would have been economically very serious to the state cause it's a major thoroughfare.

JM: Have individual homeowners or individual people's responses to subsidence changed over time or is it always sort of a constant, like you outlined before, you know, concern?

BG: Yeah, in the early days people were very quiet about it and they wouldn't mention it, only a few spoke out. Now I think with the insurance being available people do speak out more, certain neighborhoods where there has been a number of, you know, subsidences having taken place, I am thinking of in Springfield in particular, they spoke out early but then people would drive by and, and gawk to see the damages and stuff, so people started being quiet just to maintain some peace within the community. But that's, that's the homeowners decision whether to make their subsidence damages public information. For the most part maybe people are becoming a little bit more aware of subsidence because of the people who speak out. As a result, we do get a number of phone calls asking whether their home is located over mine. We'll check into it or we will direct them where to find the coal maps online-, So, one big change is how easy it is today to determine whether your house is undermined as compared to what it was prior to the 2000.. All I can tell you is when I bought my house, you know, back in the old days you couldn't do that, and I didn't bother looking to see if I was over a mine until a little after the fact and, cause the chance of an individual having a problem is small. Look at your insurance premium compared to what you are paying for fire insurance, you're more likely to have a fire then you are subsidence but if you do have a mine subsidence problem it's no fun.

JM: You'd mentioned the maps and I know that's another thing that you've worked on over the years, could you just share a little bit about that story, how that came about?

BG: Yeah, when coal is mined they make maps showing the layout of coal remnants left in place for

support. A blueprint copy is made and that gets stored in the state archives or in the county court houses, that law came into being that require mine maps to be made, I want to say around 1910, so some of your earlier mines weren't done. Um, anyhow those maps were subsequently photographed, and stored on microfiche and you would print maps out on demand when people wanted to know if they were undermined or not, and it wasn't very easy and was time consuming. In the '70s, when computer technology started picking up, late '70s early '80s, and the microfiche reading machines were old and starting to breaking down, they were costly to repair, only one person can make the maps, the whole process with making maps using microfiche, it's just time consuming, and expensive to do it. The idea was to take those microfiche scan them in and put them on CDs, now you make them more available, you don't have to touch the blueprint maps which were crumbling and, and you know just through use and age, so you had a permanent archive on that. Well I was using the map collection stored on CD's locating a subsidence case here in Madison County and I noticed that the map was incomplete, I knew the area was undermined but when I looked at the map you could not tell on the CD collection that it was undermined so that kind of scared me. So I went back to my boss and I had a great boss named Al Clayborne and I said this is what we've gotten for our scanning efforts, we have created another problem here, we need to go back to the original mine maps, scan them in and create the visual equivalent, so now that, that map can be reproduced and printed off on demand and you've protected the host source for a long time, and you make it more readily available by going online for downloading copies. And, and we did that and we had a contract with SIU Edwardsville geography department, Randy, Dr. Randy Pearson was the head person there and we went through and we scanned all the mine maps in our, our state archives. I applied for a grant from MSHA, Mine Safety Health Administration, they gave us \$50,000 to go and try to find mine maps elsewhere, so I funneled that money to SIU and had students go to various libraries and, and historic societies and everywhere they possibly could looking for mine maps. Newspaper articles, notifying the public that we want mine maps, and to let borrow the maps they might have so scan them and add to the State's mine map collection. And I also got lucky, I got access into Peabody Coal Company's mine map collection. Now they've been in Illinois from the get go and they did a great deal mining in our State, and the maps they had are master (original) mines maps of course but they also collected maps from adjacent mines and had their maps on file as well, so that they could plan their developments and avoid hitting those other mines. They granted me access to their files graciously and I scanned all their maps in. We dropped everything to do that and that work was added onto our contract with SIU to do that. But where this went to is now that we have an image, the next step that we took was to geo-rectify it and what that means is, a scanned image of a mine map is nothing more than a series of dots you pick a point, say at the map corners, four corners, the coordinates of where that dot is located at in the real world, is assigned to that dot and it then mathematically assigns coordinate values to all other dots making up the image. So all those points now are measured in relative to each other, so what you have is, you have one layer which is a mine map which you can superimpose with Google maps or city maps or air photography, anything you want to. And so you represent it, how the mine is located relative to the ground surface. I spoke earlier how, you asked me how accurate the maps were, that's how I know they are accurate, because I can physically take a GPS device, go find a bore hole, or shaft, check it against what we did on the mine map. When subsidence takes place I told you before it grew to where there's a large mass of coal, and it would stop. You could find those, where the edge of the subsidence event is relative to the panel and, and by making the mine map see through and superimposing it on the air photography, so you can confirm, that a mine map is accurate. And then when we do our surveying of the event itself we, we have crisscross pattern survey monument points located on the ground that we

measure the change in elevation through time, the edges of the subsidence event will match up with the mine maps. So bottom line if the outer edge of the subsidence event matches the mine map that's how I, I know that a given mine map is accurate and that the mine map is being geo-rectified correctly. We've got to that point where the mine maps have been scanned and georectified, so now the next step is we're going to make that information available online, and so that's the next part of the contract that's being currently being done. Now I envision in the future that anybody can type in, uh like Google maps, type in an address, they could zoom in to see the actual mining beneath their property, I also envision tutorials on how to interpret mine maps. Having the information and making the correct decisions based on that information are two different things. So I, I think there needs to be a smart system in place that can help people make the right decisions that they are trying to solve at the time. So that's, that's kind of being developed and now that I am with the federal Office of Surface Mining, Mid-continent region, I am part of a team that oversees the mining in Missouri, Iowa, Indiana, Illinois, I will encourage the other States to make mine maps available, they'll be doing something similar probably. So that's one of my goals among others I have in my current position.

JM: That's great. I guess the last question, specific question I had for you is just to reflect a little bit on, I mean having worked related to the industry now and dealt with the legacies of coal mining in the area for a long time, many decades, what are some of the legacies of coal mining that you see in southwestern Illinois, specifically in Madison County?

BG: Many of the mines that were set up initially, the coal companies were developing lands that were considered you know out there in the boonies, you know, no one is ever going to be developing out there and through time our cities have grown outwards onto the mines and that's why we're having a lot of the problems we are facing today. And as this continued growth takes place, the risk increases as a result of that proportionally, so the, the take away I see there is that we have a long term problem and I, I think that's where land use planning can come in to be useful and that's why I encourage cities to really look at it carefully, for instance I had mentioned subsidence, depending on the age of the mine it may be 350 feet in diameter some maybe as much as 1,000. If you decrease the density of development over mines so that when subsidence does take place you're only impacting a few structures makes sense. Building important facilities, hospitals, schools, you know, if you have an emergency because of, of earthquake or tornado where do people go? You put them in schools. Now if your schools are over mines and they are subject to subsidence besides losing a lot of money in fixing school damage assuming it can be repaired, you also increase the risk potential of people being injured. So those simple things can be done, keeping buildings under two or three stories make sense to me. When you build a foundation have opposable windows so if you're talking about a house, have opposable windows that way if you have subsidence you can slide beams, pick the house up and carry it that way and, and just limit the damage to the foundation. So there, you know there is a lot low cost, no cost things that can be implemented as part of a city development plan that I think should and could be done. I think knowing where all the coal mine shafts are at and taking that property totally off the market makes a great deal of sense to me.

JM: Are there structures that have been built over shafts other than the shack you had mentioned?

BG: Well, just here in Edwardsville, if you go to the Voge softball fields, you know the concession stand, that's built over the air shaft of the Henrietta Mine. The main shaft located on the left field foul line on the men's softball diamond near the outfield fence. If you go there and look carefully, you will see a

depression in the ground, that's where the shaft was. That shaft was filled in by the WPA back in the '40s. So, yes, to make a long story short [laughing], there is a lot, a lot of things around here, behind Market Basket there's the shaft is there for the Madison County #3 mine. So we're building over and around and near these things and what we have as land use now won't be the land use we have in the future. And we don't know what will be developed on them later. Like I said, gas potentially is a problem, collapse is a possibility, so these are things to avoid.

JM: Is there a difference or has there been a difference between communities like those here in the Metro East where a) there is no active coal mining anymore and hasn't been for several decades and is now like you said kind of become part of the suburban metropolitan area versus those areas that still have some active coal mining or maybe more recently did and are more rural isolated kind of classic coal company towns?

BG: In terms of being aware of mining?

JM: In terms of aware of and just sort of attitudes towards some of these issues.

BG: It depends on the individual, obviously, if you're a coal miner particularly from Southern Illinois, you know, there's a great deal of pride there, and it's evident in their lifestyle and talking to them, but they tend to be more accepting of mine related problems. A person living in southern Illinois that is not a coal miner or who doesn't have a family that were coal miners and they have a subsidence problem, their attitude is just like anyone else living in Madison County or in Springfield, Illinois, or anywhere else in the state. You know it's why unplanned and uncontrolled urban development of mines is being allowed and until you hear loud and clear from many people we will continue to do so. So [laughs] that's what it is., The State will continue to hear people voice complaints saying "well why doesn't someone tell us, we are undermined and that our homes could be damaged", well that's kind of the idea behind making the mine maps available on the internet and, and the driving force by having it geo-rectified is to tell people about it earlier and so that people can have access to that information and if, if we can do it responsibly, we can help them make good decisions and communities make good decisions.

JM: Well that covers all the questions I had for you but is there any topics that you'd want to share that we haven't gotten to?

BG: No I think, I have just been talking for so long that I don't know what I said anymore to tell you the truth, but overall, as being part of it going through time, and seeing some of the problems that can take place, as well as what's being done by the government to protect the citizens and environment, I am I guess proud and privileged to have been a part of it and, and more confident in the inherent goodness of, of institutions attempt to be or can be. I know right now we're in a time period where the perception is that government can absolutely do nothing right, and that big business is going to take care of everything if government gets out of the way. But if you look at the cities and look at the old decayed structures that are still up, old foundries and factories left standing for others to clean-up, that's gonna continue to happen in the future. It wasn't that long ago that there was little or no environmental regulations controlling the amount of pollution we could put into streams and the air and we had rivers catching on fire, smog so dense city street lights had to turned on during the day and acid raining destroying our lakes and forests. Because of government regulations there has been environmental improvements to the point,

that many of these issues are no longer remembered or are of concern. I also think, you know in the case of modern mining laws and the insurance law that was put into place, the abandoned mine lands programs put in place to repair the environmental damages caused by past coal mining activities are examples of government programs, that are being done responsibly, you have people doing their absolute best and trying to solve these complex problems. Whether the government employees end up doing the job as good as could be done, or should been done is open to argument, but I think it's more of, people having to learn on the fly in solving unknown problems while trying to do what's right according to the various laws that are in place, and that gives me, gives me hope and, and confidence, you know, that it's not all bad. Can it be improved? Sure. You know like anything else, the system can be improved. So how's that? My soap box [laughing].

JM: That's great. Did you have anything else you wanted to mention?

BG: No I, I think, I think we've pretty much covered it I think.

JM: Okay, well if there's nothing else, mostly I just wanted to wrap by saying thank you so much this has been fascinating and I really appreciate you sharing your thoughts and experiences with the Madison County, Madison Historical project.

BG: I appreciate it and thank you for the opportunity.