NATIONAL RADIO ASTRONOMY OBSERVATORY

(GREEN BANK OBSERVATORY)

EIS PUBLIC SCOPING MEETING - NUMBER 2

HELD AT THE

GREEN BANK SCIENCE CENTER

155 Observatory Road

Arbovale, West Virginia 24915

Wednesday, November 9, 2016

6:30 p.m.

IN ATTENDANCE:

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I N D E X

P R O C E E D I N G S

Whereupon,

MS. BLANCO: Dr. Ajhar.

DR. EDWARD AJHAR: Thank you. Thank you for coming to our Environmental Impact Statement Public Scoping Meeting, and I want to thank the entire staff of Green Bank Observatory and Karen O'Neil may have just stepped out, our director here. They've been very supportive of all logistics that we have to do.

I want to again thank you all for coming and just start out letting everybody know that a lot of times there's things that are published, things that are discussed, they're not always accurate so we want to try to get some of those points there, and fundamentally, it's very important that you understand that we have made no decision to close Green Bank Observatory. We are here as a part of a process looking at different things but there's been no decision at this point.

What we really need today are your comments and your input in the beginning of this process considering the different alternatives so that's our main purpose for being here today.

I'm going to start by introducing myself and the rest of the team members and then we're going to talk about some

background information and why we're here, what's the background for -- that brought us here today and we will talk about the preliminary proposed alternatives that you've seen published and the resource areas to be studied and that's what we're seeking input on. We will talk about the Environmental Impact Statement process, and once our brief presentation is over, we will open the floor to public comments.

So my name is Edward Ajhar. I am an astronomer in the Division of Astronomical Sciences at the National Science Foundation, and I'm the program officer for Green Bank Observatory.

Joining me today in our Division of Astronomical Sciences is Liz Pentecost. She's back there. She will be helping to direct the people making comments today.

From our Office of General Counsel we have Caroline Blanco and Christin Hamilton.

In our Office of Legislative and Public Affairs, Karen Pearce and Ivy Kupec.

We have some contractors that are helping us from CH 2 M Hill, Michelle Rouwe and Chris McDonough. I don't know if they're in the room. Back here is one. Thank you.

So what is the role of the National Science Foundation. We at NSF are the federal stewards of ground-

based astronomy and astrophysics. We provide funding for national and international telescopes and facilities, and we provide funding for research grants that allow individuals and groups to conduct specific science investigations.

As the stewards of the National Science Foundation's Astronomy Portfolio we get a lot of input. Over the past decade the NSF has received advice from external review committees made up of the astronomical community and the 2010 decadal survey which is titled New Worlds, New Horizons in Astronomy and Astrophysics stated the following: "NSF Astronomy should complete its next senior review so as to determine which, if any, facilities should Astronomy cease to support in order to release funds for one, the construction and ongoing operation of new telescopes and instruments, and two, the science analysis needed to capitalize on the results from existing and future facilities."

So the 2010 reports recommended review that I just mentioned of the NSF Astronomical Sciences Portfolio was completed in 2012 and that portfolio review report is titled Advancing Astronomy in the Coming Decade: Opportunities and Challenges. So regarding the Green Bank Telescope the 2012 review recommended divestment and stated

the following: "The GBT is the world's most sensitive single-dish radio telescope at wavelengths shorter than 10 centimeters; however, its capabilities are not as critical to the decadal survey science goals as the higher-ranked facilities."

In August of this year, 2016, the National Academies of Sciences, Engineering, and Medicine published their mid-term assessment of the 2010 decadal survey and reaffirmed the 2012 portfolio review's recommendation for the divestment of these astronomy facilities. The quote is "The NSF should proceed with divestment from ground-based facilities that have a lower scientific impact implementing the recommendations of the NSF Portfolio Review which is essential to sustain the scientific vitality of the U.S. ground-based astronomy program as new facilities come into operation."

So as a result of that input we received from several committees over the last few years I want to kind of go over the resulting developments at Green Bank Observatory. Starting in FY 2012, fiscal year 2012, the NSF provided 95 percent of this site's funding. On March 22nd, 2013, the NSF published a Dear Colleague Letter, and there's the number 13-074, and in that letter NSF announced that the Green Bank Telescope would be separated from the National

Radio Astronomy Observatory competition and requested at that time ideas for collaborations involving the Green Bank Telescope, and we will say more about that in a moment.

On October 1st, 2016, just last month, following the path published in that Dear Colleague Letter, 13-074, the National Science Foundation separated NRAO Green Bank from NRAO and the site was renamed the Green Bank Observatory, and Associated Universities, Incorporated, AUI, continues to manage Green Bank Observatory under a cooperative agreement with the National Science Foundation.

I was here and many of you I'm sure were for the inauguration ceremony last month and very nice ceremony kicking off the new Green Bank Observatory.

So the current status then again to clarify what are the budget levels and things, in the current fiscal year, FY 2017, the President's Request Budget for other astronomical facilities asked for $11.5 million total for Green Bank Observatory and Long Baseline Observatory and the fiscal year 2017 President's Request Budget also shows an increase to $11.85 million in the following fiscal year 2018 for planning purposes.

Following a review of AUI's proposal that provides the exact division between Green Bank Observatory and Long Baseline Observatory for the current fiscal year 2017 and

following year fiscal year 2018, NSF allocated $8.2 million in fiscal year 2017 should the President's Request Budget be appropriated, and as many of you know, we're operating under continuing resolution. There is no fiscal year 2017 budget yet but that's so you know what the plan is.

This $8.2 million level represents approximately 75 percent of the base budget for Green Bank Observatory that was part of the previous appropriations to NRAO.

The collaborations that I talked about a few slides ago, Green Bank Observatory has established collaborations with Breakthrough Listen, West Virginia University, and North American Nanohertz Observatory for Gravitational Waves known as NANOGrav. Green Bank Observatory continues seeking new funding sources so that's where we are today as far as the budgets go.

Now what are NSF's plans moving forward? Well, given the previous astronomical community recommendations that I quickly summarized combined with current budget constraints, NSF has a need to reduce funding for a number of astronomical telescopes and facilities and because of that the NSF is initiating the Environmental Impact Statement, Section 106 consultation process for the Green Bank Observatory as it already has with Arecibo Observatory and the Sacramento Peak Observatory. So this is why we're

here today to start that process as part of beginning of this process.

You've seen these Environmental Impact Statement preliminary proposed alternatives that have been published as part of the notification of these meetings and the comment period. So we are interested in knowing comments about these is this the right step of alternatives, are there other suggestions so that's a part of the comments.

These proposed -- preliminary proposed alternatives are the first is continued NSF investment for science-focused operations. That's a no action alternative. That's where we are today.

Number two is the collaboration with interested parties for science- and education-focused operations with reduced NSF funded scope.

The third, collaborations with interested parties for operation as a technology and education park.

The fourth is mothballing of facilities, and by that we mean a suspension of operations in a manner such that operations could resume efficiently at some future date.

Finally, the last alternative being considered here is deconstruction and site restoration.

So that's where we are with -- that's how we got to the point we are today and that's why we're here to hear

your comments and a very important part of this process is to hear directly written and oral comments from the public on these alternatives so I'm going to turn over the rest of the presentation to Christin Hamilton from our Office of General Counsel. Christin.

CHRISTIN HAMILTON: Hello. Good evening. Thank you for attending. We had a 3 p.m. meeting as well that was very well attended. Your voices are important to the environmental review process so we appreciate you taking the time this evening to be here.

As Dr. Ajhar said, I am from the Office of General Counsel, but I like to clarify that I'm actually not an attorney. I'm an environmental compliance officer and I'm here to walk you through the Environmental Impact Statement process as I suspect a lot of you are unfamiliar with that process.

It's dictated by the National Environmental Policy Act or what we call NEPA which requires federal agencies to consider the potential environmental consequences of proposed actions on the environment prior to making final decisions so we do this very early on in a decision-making process.

There are three levels of investigation that occur under NEPA and for this particular proposal because of the

nature of potential impacts we're taking the most in-depth look which is the Environmental Impact Statement. We intend to prepare one of these statements to evaluate the potential environmental effects, proposed operational changes due to funding constraints for the Green Bank Observatory. We will do a draft and final EIS.

We announced the beginning of this process which is very public on October 19th. That began the scoping process for the development of this EIS.

So what is scoping? The purpose of scoping is to seek public input regarding relevant issues that will influence the scope of that environmental analysis. So what you say here today and what you submit in written comments will inform that Environmental Impact Statement -- will be addressed in it.

We invite your input regarding all of the issues to be evaluated including the identification of viable alternatives and the resource areas which I will get to in a minute.

The more specific your comment, the more helpful to the development of the EIS. I also want to clarify that this evaluation is to look at environmental impacts. The that's what the focus is. It's not to provide an analysis on the state of the science, for example.

So there's two sort of pieces of information that we have developed at this early date and that is the list of preliminarily identified proposed alternatives that Dr. Ajhar presented and it is also in your fact sheet. That's one piece of information that we do have at this point, and the other is this list of preliminary resource areas that we expect to evaluate in that Environmental Impact Statement.

These are our diverse range of aspects of the environment from air quality to biological and cultural resources to socioeconomics, traffic, and groundwater resources.

Concurrent to the NEPA process we will also be doing consultation under what we call Section 106 of the National Historic Preservation Act. This requires federal agencies to consult with interested parties and the state historic preservation officer regarding potential effects of their proposed actions on nationally significant historic properties.

So there are four basic steps outlined here to this process: Initiation, identification of the historic properties within the area of potential effects, an assessment as to what are their adverse effects on the historic properties, and then resolution which is often a

form of a memorandum of agreement.

This process will occur in coordination with a NEPA process, and the way that works is the information that's developed through this 106 process you will also see that same information in the draft EIS, for example, and the final EIS as well so they will track each other.

We invite consulting parties to participate in this and we've asked you to sort of self-identify if you're interested in participating as a consulting party on the sign-in sheets so you had the opportunity to check if you're interested and we will follow up with you via e-mail to confirm your interest in participating in 106 consultation as a consulting party.

One more statutory obligation that I wanted to mention today is the Endangered Species Act. We need to consider whether the proposal's activities might affect a listed threatened or endangered species or their habitat, and if this potential exist, we would consult with the U.S. Fish and Wildlife Service. Again, that same information that we gain from the consultation will be seen in our draft and final EIS.

I want to go through target dates and the opportunities for comments. As I mentioned, October 19th we began the public scoping process. There's a 30-day

comment period. We delayed a little bit due to an issue with e-mail so we wanted to make sure we had the full 30 days when you can e-mail in comments. We're having these two public meetings today.

We will take that input, we will be preparing a draft Environmental Impact Statement. We're targeting spring to release that. Everybody who is on our e-mail list and if you signed in today you will be on our e-mail list will get notification when that is released and it will be on our website as well.

Following that release we will have a 45-day comment period and, again, we will have two public meetings, a daytime and an evening to try to accommodate people's schedules. Those times again will inform the final Environmental Impact Statement which we're targeting for sometime around fall.

Concurrent to those processes we will be doing, as I mentioned, a National Historic Preservation Act consultation and potentially Endangered Species Act consultation as well.

We're required by regulation to wait at least 30 days following the release of the final EIS before making any agency decision. The agency decision is recorded in what we call the Record of Decision which we're targeting for

early 2018. That considers not only the environmental considerations and any mitigation measures that are identified in the final Environmental Impact Statement, but also any other factor that is of importance to the National Science Foundation and that could be science priorities or budgetary constraints.

As for how to submit comments, you can provide verbal comments today. We will have a full transcript of this meeting attached to the draft Environmental Impact Statement. You can submit written comments today. We have written comment forms out at the tables where you signed in. Give your comments to anybody with a name tag and we will make sure that they get on the record.

You can also mail or e-mail your comments to NSF by these two methods which are also on your fact sheet if you want to refer to it later and it's also at our website which I will get to in a moment.

So at any point along the way if you need information on the process or if you need to review documents, please see our website www.NSF.gov/AST, that's for Astronomical Sciences Division.

The fact sheet, the copies of the informational boards that are out there and this presentation itself will be posted there, and as we move forward, for example,

documents relevant to that 106 consultation will also be posted there.

So at this point we're ready to move into the public comment period. We will be having my colleague Liz Pentecost will be announcing according to how people signed up.

Because of the number of people who are interested in speaking today we really want to make sure that everybody who wants to speak can speak. So much as we hate to set a time limit we're going to try to keep comments to three minutes each and if we have more time at the end and you didn't get to complete your comments we will invite you to come back up so I know when I'm speaking I never know how much time has gone by so what I will do is I will time it. I will be sitting right there and when I get to two minutes I will stand up so that you know you have one minute more to sort of wrap things up. Thank you for your participation.

ELIZABETH PENTECOST: The first person Kathryn Williamson.

DR. KATHRYN WILLIAMSON: Hi. I used to work here as the public education specialist. My name is Kathryn Williamson. I worked here until this past December and it was a few years that I was here and it was transformative

for me. The Observatory helped me finish my dissertation. I started working here before I got my degree. It was inspiring.

I mean, I had all these degrees in physics, but I had no practical skills so I came here and I learned about real true STEM based education and I saw firsthand how inspired students can be so I worked with the 40-foot telescope and also the 20-meter telescope through Skynet online.

I know you've heard a lot of comments from people that have used the 40-foot educational telescope so I won't repeat how that can be.

Now I teach at WVU in Morgantown and I use the 20-meter online with my students and you can do the same types of experiments. We can detect hydrogen gas in the Milky Way, map our solar systems rotation around the Galactic Center, and even find information about the presence of dark matter. All of this with like the hundreds of students who take my class each semester, college students from all kinds of backgrounds that are non-science majors and they're getting this authentic experience in large numbers.

In my letter that I wrote, you can see many of their comments how transformative it was, how it made them feel

like real scientists, and how they realized it's actually not that hard to do science. Many of my students have wanted to continue in astronomy or science after taking my class and using the 20-meter because there's no other way to give them that kind of authentic radio astronomy experience.

You know, a lot of astronomy labs around the country use regular optical telescopes but you can only do basic astronomy with those. You can't find evidence of dark matter with those especially not in cities like Morgantown where the light pollution is really bad so not only are my students getting this like really different authentic science experience, they're having this pride that is in West Virginia and they collected their own data and it's different. It's different than anything they've ever done before and so I just -- I hope you consider the impact of all the telescopes on site, not just the GBT, for its educational and inspirational impact. So thank you.

ELIZABETH PENTECOST: Dave McLaughlin.

DAVE MCLAUGHLIN: I promise you I will be short. A few comments I thought about today that came up. My name is Dave McLaughlin, and I would like to thank National Science Foundation for providing this time for public input concerning the future of the GBO.

First things, as Pocahontas County Commissioner, you would expect me to address the economic impact GBO has on the local economy. Well, with 100 to 140 jobs, depending on the GBO, I'm quite sure that is what is on top of most folk's minds here today. That paycheck they earn is spread throughout our county and communities. So every business in the county is affected when that doesn't happen. Very important for any small county like ours.

Secondly, I ask why if the NSF would continue to pursue scientific research like what is done at the GBO, why would they even consider defunding this site? Most companies and businesses would do a cost-benefit ratio process when they consider downsizing or realigning their company. We know what the cost is of the GBO, but how is it possible to put a dollar figure on the benefit side at the GBO?

Discovering a new galaxy, a new planet, or even extraterrestrial beings are priceless to a scientist and that is what is happening here.

I don't know exactly how the NSF is funded, but I did read in your pamphlet some of that so I understand a little bit now. But I do know that millions of tax dollars are invested at this site. I believe that NSF has to have a very good argument if they plan on walking away from this

investment made by all taxpayers in the United States.

With the GBT being the largest fully steerable satellite in the world is being used by several students, scientists around the world. Shame on all of us if we let it be taken out of service. It is one of the greatest also -- it is one of the greatest resource -- research tools ever built by man. Also, where else in the world or U.S. can a radio free zone be established like the one at Green Bank?

One final thought. The Green Bank Observatory the last 50 years has become a great community partner. We have help with our schools, emergency services, fire service, and always willing to help with any community activity when asked.

The GBO isn't some big secret site where the general public isn't welcome. They always extend a hearty welcome and a helping hand so please consider very carefully what is at stake and what will be lost if defunding continues at the GBO. Thank you again.

ELIZABETH PENTECOST: Dennis Egan.

DENNIS EGAN: Hi. I'm here to speak for the BFD Fire and Rescue, the fire department that's served this area. I'm also indirectly going to speak for the two just south of here where we also get service.

The GBO is a significant supporter of the fire and rescue in this end of the county. Oftentimes when we have to have someone air evaced we use the airstrip down here as an air evacuation landing zone and it's one of the better ones we have because it is actually an airstrip.

The GBO site here is also our certified Red Cross emergency evacuation area so it can be used for when we have disaster in the county to bring people here. When we had the storm in this area, a significant area here was out of power and this was one of the few places where people who were on oxygen could come and plug their oxygen generators in and things like that so that's very significant for this county. When we have floods, when we have power outages especially in the wintertime we have heat and electricity here.

Also, it's an emergency staging area. When we had a helicopter go down from the Army National Guard, I guess the National Guard, this is the area where everybody comes to coordinate and there's facilities here to feed large numbers of people and there's facilities here that they can get warm and get rested so it's very important to this area. It is a very rugged area. It's hard to get to another place where you can do something like that.

The GBO also supports us with emergency equipment

repair sometimes if we have something that is -- that we need fixed right away for the emergency services we can bring it here and the facilities here can do that.

One of the biggest things that the Green Bank Observatory provides is water. We have nowhere right nearby here where we can get water in any kind of a fire so we would have to draft out of the stream. The Green Bank Observatory here provides us with water which is one of the major things that helps us with our ISO rating which is an insurance rating so you talk about -- you talk about economic impact, the insurance -- fire insurance for this area would go up 15 to 20 percent within about six miles of here which is most of the Green Bank area. Would be about 15 to 20 percent if we didn't have the water here with GBO so that's a significant impact.

We also have indirect benefits here. The people here who work for the Green Bank Observatory are people who have technical abilities that help us a lot. Radio and any kind of -- a lot of mechanical things they can help out with maintenance and with getting things set up so it's very important that if those people were to go away -- if the technical people were to go away that are here only for the science if they were to leave we would have a very difficult time from about halfway to Durbin down to about

Dunmore serving this area at all.

CHRISTIN HAMILTON: I'm going to have to stop you there, sir. If there's more time afterwards you can come back.

ELIZABETH PENTECOST: Alex Bryant. The next person after Mr. Bryant is Ruth Blond or is it Bland?

RUTH BLAND: Bland.

ELIZABETH PENTECOST: Sorry.

RUTH BLAND: That's okay.

ELIZABETH PENTECOST: Mr. Bryant. Is Mr. Bryant here? I guess not.

RUTH BLAND: Good evening, and thank you very much for affording me the opportunity to speak concerning the GBO. I am Ruth Bland, and I am the Director of Student Support Services Transportation and Technology for the Pocahontas County Board of Education.

The Pocahontas County Board of Education supports total funding from the NSF for the Green Bank Observatory. I have been an employee here in Pocahontas County schools for 34 years and spent ten years as a principal at Green Bank Elementary-Middle School.

The National Radio Astronomy Observatory at the time provided many services for Green Bank school and when the Internet first came to Pocahontas County, the technicians

here at the Observatory wired that school. We now have over ten miles of hardwiring in that school that the Observatory has helped us purchase, to maintain, and to continue to grow the network. Even though it isn't wireless it is growing throughout the building. We just had a major upgrade over $41,000 from our E-Rate and the help that we received from the Green Bank Observatory to do that is instrumental in being able to keep that system functioning.

The other thing is as a principal we live in a laboratory here, not only with the stars, but with the environment in general, and the wetlands, and the opportunity to have a Golden Eagle station on this property for our students to observe the Golden Eagle in their natural habitat was just absolutely phenomenal.

I'm going to put aside my profession and I'm going to talk to you as a mother. My youngest daughter is now a new first-year teacher teaching biology and earth science at Pocahontas County High School. She has a biology degree, not earth science, but this summer in a cooperative program with Fairmont State University she was able to take two weeks of classes here to prepare her to be a better teacher for those kids at Pocahontas County High School so those type of programs are instrumental for us as a community and

as families. My daughter has come back to live in Pocahontas County because of this opportunity. Thank you very much.

ELIZABETH PENTECOST: Next is Joe Gonzalez and then Alan Balogh.

JOE GONZALEZ: Thank you. I don't think I've ever been restricted to three minutes but I'm going give it a try.

First of all, I would like to thank all of you for coming and giving us all an opportunity to participate.

The Green Bank Observatory is the community in Northern Pocahontas County, every aspect of it, all the employees, all the support that's given.

I'm the president of the Central Appalachian Astronomy Club that we co-sponsor the Green Bank Star Quest as you've heard earlier testimony. I'm the former communications director for the state emergency medical service so we've had for many, many years the opportunity to work with the Observatory in maintaining a healthy radio quiet zone so everybody can work together because our interest was in public safety and without communications people can die. It's just that simple.

The important thing is option four and five are not even to be considered. It's ludicrous to think that you've

got nearly a one billion dollar facility of taxpayers' money that's invested in this area to even think of ever closing it.

The amount of science that has been created here, the new technologies that's been created here is an ongoing thing. You can put the GBO up against any other facility in this country and they are number one in their accomplishments.

The science alone, the things that we do with the Green Bank Star Quest we've been very fortunate to have Alan Bean, fourth man to walk on the moon; the Rocket Boys; Carolyn Shoemaker; Seth Shostak, all those folks come here and it's the only facility that's available that you can collaborate with the general public, anybody, and to be able to learn science.

We've got a new administration and maybe I ought to knock on some doors and see how we can restructure to refund science because in the past decade we have not had science in the United States. We wish you well. Let us know what we can do for you to help keep the facility open. Thank you.

ALAN BALOGH: Thank you. My name is Alan Balogh. I'm the Mountain Party's candidate for the 43rd District House of Delegates this year.

I would urge the National Science Foundation to continue funding the facility here for a number of reasons. One, the Observatory it's a historic site at this point. I mean, it does pretty much define Green Bank. It does important work here, and like it's been said before, there aren't many places in the Eastern United States that are quiet zones like this. I mean, I've driven a truck, retired earlier this year, been to 48 states and six Provinces of Canada, and I'm keenly aware of what a rare area this is for this type of thing.

It's also a tourist attraction. When we moved here, my family and I 27 years ago, this was one of the attractions. It's just really cool having this here in this county. Many of my friends and relatives that have visited this is where they wanted to come and visit.

Also, the facility is used by local groups. My wife is real prominent in the Pocahontas Nature Club and they've used the facilities here to hold meetings. It's in this end of the county, it's a great place to do that.

The other thing is Pocahontas County, it's, you know, a lot of farming and timbering, and if you're a kid it isn't oriented toward that type of thing. The facility here, the scientists and the technicians and their families, it's a great opportunity for other students to

spark an interest in different careers that they wouldn't normally have.

This is a general comment. I know you're not really looking for that but I think we need to think about it. What we're really talking about is economic man versus culture man. Science, art, music, literature, these are the things that separate us from animals. I mean, animals have economies; ants, beavers, but what makes us special is places -- science and art and so forth, and if you put everything on just a profitability basis, it's not going to work. Some things are worth sacrificing for.

I think the money is out there. We spend like a budget probably every day and somewhere overseas and the next day they rebuild it so the money is there. But if our governor-elect would pay his taxes it would probably be funded for a third of the year or so, but what we really need to do in the long run is to elect people to office who put people in culture ahead of just profits; otherwise, we're going to sacrifice everything like this. Thank you.

ELIZABETH PENTECOST: Loren Anderson, and I know I'm going to mispronounce your name. Kaustubh Rajwade.

KAUSTUBH RAJWADE: Rajwade.

ELIZABETH PENTECOST: Rajwade. Okay. Sorry.

DR. LOREN ANDERSON: All right. My name is Loren Anderson. I'm a faculty member at West Virginia University. Fifteen years ago WVU only had one astronomer. Today we have seven including Kathryn who spoke earlier.

The Department at that time 15 years ago had zero graduate students. We currently have over 20, many of whom are in the audience today. We have accounted eight post-docs and hundreds of undergraduates at WVU, many of whom are from the local area, so as our Department has grown, our scope has grown and we're able to educate a much larger number of students now today.

All of this growth is due to our connection with the GBT so we bring many students down here for training. All of us faculty members come down here and stay for a couple of weeks each year and this is where we train our students. This gives our students hands-on experience doing science that is not available for most departments in the country.

If the NSF decides to remove funding for the telescope entirely or even decrease funding to a level where it is difficult for us scientists to get telescope time, all of those gains would go away.

Our connection with the telescope is so strong that it

has brought all of us faculty members here to West Virginia, and if the connection were reversed all of us faculty members, I'm convinced, would leave and that would have serious detrimental effects on our ability to educate West Virginia students. Thanks.

KAUSTUBH RAJWADE: Good evening, everyone. My name is Kaustubh Rajwade. So I'm a graduate student in the Department of Astronomy at West Virginia University and I come from India so when I started applying for graduate schools WVU was one of my top choices and the reason was that I always wanted to do radio astronomy when I was looking for grad schools. The only reason I came here was for so that I could use the Green Bank Telescope. It has been the only reason that I was able to do research in the last three years at grad school.

When I say this, I believe I say this for all the other international graduate students that are there in the Department that this has been one of the major factors that has attracted so many international students to WVU especially the Department of Astronomy. If this facility is closed it is going to have a severe impact on the international reputation of not only the Department but also at the university in general. So I hope the NSF takes that it into account when they take a decision on GBO.

Thank you.

ELIZABETH PENTECOST: Nick Pingel and Pete is it Gentile?

PETE GENTILE: Gentile.

ELIZABETH PENTECOST: Gentile. Close.

NICK PINGEL: Thank you. My name is Nick Pingel and I'm also a graduate student at WVU. I come from one of the smaller kind of research groups where it's just myself, my advisor, and two other grad students.

Since when I started here in 2013 we collectively have observed on the GBO 600 hours and that 600 hours is translated to $1.5 million in grant money using that research so I only say this to point out that you are getting a return in your investment when you fund the science for this telescope, and I hope you consider that when -- if you would close it, the economic effects that it would have on the state level and, of course, the local level as well so thank you.

PETE GENTILE: Hi. We are so lucky to be here, right here in West Virginia. Over the past couple of years I've had the opportunity to say those exact words in middle school and high school classrooms to prospective and current West Virginia University students and to amateur astronomers at their club meetings across the state and

then I get to tell them why. Because their state, their home is home to the largest fully steerable telescope that man has ever built.

Space is inspiring. It touches us. Apollo 11, the Hubbell Deep Field Image, the Pale Blue Dot, they all have this uncanny way of exercising that universal feeling of awe in connection to nature. The Green Bank Telescope makes that connection with astronomy a two-way connection.

Perhaps more than any other telescope it lets students touch space. In programs like the one I work with, the Pulsar Search Collaboratory, kids can come to Green Bank, literally touch the telescope, go to the control room, sit behind the computer, and with a guide in hand students can control the Green Bank Telescope. It shows these students that science and astronomy isn't reserved for some academic inner circle but if you like this crazy cool sciencey stuff then it's for you.

This isn't some ideal version of what we as people who are trying to connect students with science hope will happen here. This is what has happened here. This is what is happening here.

We keep in touch with these students and astounding numbers of them tell us how their experiences at Green Bank have changed the path through high school and college,

through life, and they want to share these experiences that have inspired them here at Green Bank with their fellow students back home so in the age of Pokemon GO, I kid you not, these kids go back home and start pulsar clubs. How nerdy and awesome is that.

It's all because the Green Bank Observatory does what a thousand Petes or a thousand Kathryns could never do. It lets students make their own connection with science and lets them know that they can go as far as their curiosity will take them, and so I urge you to consider funding the Green Bank Observatory because it's simply too unique and too important not to. Thank you.

ELIZABETH PENTECOST: Ryan Lynch and then Will Armentrout.

DR. RYAN LYNCH: Hello again. The last time I talked as the summer student program coordinator. I'm going to put my science hat on today and talk as a member of the NANOGrav collaboration and just as a user of the GBT from the pulsar astronomy community.

I know you said in the beginning the scientific merits are not in consideration here, but I really think the impact on the scientific community at large needs to be a part of the Environmental Impact Statement because science is the primary reason that this telescope exists in the

first place. So in that vein I just want to mention a few keep points.

The first is that you mentioned earlier that the community has recommended that lower impact facilities might be divested from, but the GBT is not a low-impact facility. Frankly, the portfolio review that recommended closure is outdated. It's been eclipsed by the science that has occurred in the last four years.

We in NANOGrav are on the verge of discovering low frequency gravitational waves from black holes throughout the universe. Gravitation wave astronomy has been highlighted by the NSF, the whole NSF, not just the astronomy division as one of five big idea areas that NSF would like to invest in in the future. It's also been highlighted by the decadal survey reviews as a key science frontier discovery area for astronomy in particular.

The other thing I want to mention is that reading the Arecibo draft report I was struck by how limited the scope was in terms of the bigger picture, the bigger context. The NSF is really talking about shutting down potentially or severely reducing the amount of time available for science on its two large single-dish radio telescopes. You can't really look at one without looking at the impact of the other because if we lose both of those then we

effectively see U.S. leadership in low frequently radio astronomy just at a time when we are on the verge of making some of the biggest discoveries in the field really in history.

There is a lot of talk about using other facilities like the VLA as a fill-in for that. The Very Large Array is a fantastic facility but it cannot make up for the GBT or Arecibo.

There's been a lot of talk about international facilities that are coming online in the future such as FAST in China and MeerKAT in South Africa, but these facilities are not yet completed. We don't yet know whether or not they're actually going to work as advertised, and we don't yet know what U.S. astronomers will have in terms of access and time on these facilities so we could be losing our leadership at a time when the rest of the world is investing. That is going to cause astronomers to leave the U.S. and take their expertise elsewhere and basically leave us without that core community.

That has a huge socioeconomic and cultural impact as well because these people give back to the communities that they're in as we've heard time and time again here today and they contribute to the types of things that Pete just

talked about in terms of building a culture that appreciates science and takes pride in what it does.

The only other thing I want to say is that we've heard a lot, rightly so, about how options four and five really are just unacceptable and I reiterate that, but really any cut in the amount of open-skies science time that is available for the wider astronomical community is going to severely impact the large community at Green Bank.

The facility -- the people who are here if we cannot continue to do high-impact science some of them are going to consider going elsewhere. There are other impacts that will propagate throughout the community even if it is -- we do stay open under options one through three, and that's why I would strongly urge you to recommend option one. Thank you.

WILL ARMENTROUT: Hello. My name is Will Armentrout and I'm a doctoral student at West Virginia University. I will reiterate a bit of what you've heard from other Ph.D. students at the university, but kind of lay it out in a three-tier process.

I would like to talk about the educational impact on students, the public, and professionals from around the West Virginia area and from the international community.

If you can imagine this pure middle structure where at

the bottom we have public outreach, the middle we have students, and at the top we have professional astronomers coming here to work and to interface at meetings.

Now the Pulsar Search Collaboratory as Pete mentioned is a way to engage very heavily students for weeks at a time in the summer in learning pulsar astronomy, understanding the basics of science, but the outreach at the Observatory, the public museum, and outreach efforts that the Observatory does is important in engaging tens of thousands of people throughout the community to draw them here maybe to spark their interest in science or in technology for years to come in the future. That's a very important stage or step we have in West Virginia to really engage the next generation of scientists.

I will move from the base structure then to kind of this middle section, and the middle section, like I said, is engagement with students at the university. This is a huge draw for graduate students attending West Virginia University. If you are a graduate student in the audience from West Virginia University could you raise your hand? You can see we have dozens here. We have dozens back at home who couldn't make it. They get the chance to interface with the telescope from day one becoming technical astronomers that use not only the Green Bank

Observatory but observatories from all around the world and they're really honing those skills here.

The last stop that I would like to talk about is the importance of the Green Bank Observatory and the professional community. So every few years the Green Bank Observatory has a single-dish observing school that brings astronomers here, students, and professionals from all around the world to really hone their skills as a technical astronomer and they have other meetings throughout the year that highlight many different high-impact areas of science, but it is a way to connect professional astronomers and student astronomers and the public at all three of these very important levels to give you the full path of science in America and science in West Virginia. Thank you very much, and I urge you to consider options one through three.

ELIZABETH PENTECOST: Robert Wilson and Paul Baker.

ROBERT WILSON: Hi. I'm Robert Wilson. I would like to thank you for allowing me to speak here on behalf of the GBM, GBT. I'm an undergraduate at West Virginia University. I'm an aerospace engineering major, not physics or astronomy, but I have been involved in things in the past where -- that have brought me to the Green Bank Observatory. It has had a profound impact on my life.

I remember being six or seven years old and coming here with my dad when it just opened up. I will talk about when I first started at WVU back in 2014 I joined something that Kathryn Williamson who is in the audience started which is the Space Public Outreach team for West Virginia.

What the Space Public Outreach team does is it fosters the spreading of the word of science kind of to the K through 12 students and I guess students in the state of West Virginia.

What we do in the Space Public Outreach team is we go to students in West Virginia and we try to communicate science to them in a way that's understandable to them.

When you try to talk to students about science sometimes things can get abstract. When you want to talk about pulsars these are things that are out in space that these students will never see in their lives. It's very easy to just make these things kind of seem very detached from what these students usually go through in their day-to-day lives.

When you have something like the Green Bank Observatory and something that they can physically link these students to the kind of things that are out there, it's a great tool for me when I'm trying to explain to these kids what these things are. It's a really great tool

and it's something that is really profound that we have here in West Virginia.

The low income areas in the state it's very difficult for some of those students to actually you know just understand -- not understand, but be informed of kind of some of the science that's going on. Essentially -- sorry. I'm blanking here. It's kind of embarrassing. No, no, it's fine.

It's really important that these kids kind of grow up and are able to, you know, interject themselves into a society and have the ability to become professionals and having the GBT here is a great way to do that. It's very important that these students know this state has a future in science and technology and it's not just coal and natural gas. You can't put a dollar sign on the things that the Green Bank Observatory is doing for the students in the State of West Virginia.

DR. PAUL BAKER: Hello. I'm Paul Baker. I'm a postdoctoral fellow in the Center for Gravitational Waves and Cosmology at West Virginia University. I'm also a member of the NANOGrav Collaboration.

NANOGrav uses the Green Bank Telescope for most of its observing, and seeing the facility close down would be a huge detriment to that effort so NANOGrav is looking to

detect low-frequency gravitational waves and we saw with the recent LIGO detection of gravitational waves it brought up a great deal of public enthusiasm in science and physics and astrophysics. I see using the Green Bank Telescope for NANOGrav to continue on in that as a way to reach out to not just students but the general public in thinking about these fundamental questions of science.

Also, my decision to come to West Virginia to work at West Virginia University hinges on the university's involvement in NANOGrav and this particular project and the Green Bank Telescope, so I think without the Green Bank Telescope, West Virginia University and the State of West Virginia would be missing out on people coming to this state to work on science. Thanks.

ELIZABETH PENTECOST: Navid Motlaghi. Did I pronounce it right? I hope. And Michael Lamb.

DR. MICHAEL LAMB: Hi. So I'm Michael Lamb. I'm a postdoctoral fellow at West Virginia University and I'm also a member of the NANOGrav Physics Frontier Center. I am the NANOGrav PFC post-doc for West Virginia University.

I just wanted to talk about the impact on students from the broader national community. In 2009 I was a member of the NRAO Research Experience for undergraduates in Charlottesville, not at Green Bank, but we came over to

Green Bank to do a lot of training and we met with students here at Green Bank and we used data at Green Bank. We took observations from Charlottesville, and I want to say like what a huge impact this has been for me.

I went to a small teaching college where there was only one astronomer at the time so the astronomy research opportunities were very limited. I ended up working in the pulsar astronomy community. That informed my decision of what I wanted to do for graduate school was to continue working in pulsar astronomy so I attended Cornell University. I finished my dissertation this past year and now I'm at West Virginia continuing to do what I think is really, really amazing forefront science.

Without the Green Bank Telescope I would echo what a number of people have said, I don't think that West Virginia University and I don't think the State of West Virginia would really have a huge impact on science. I think that the amount of people that it brings in both internationally, which has also been mentioned, locally, and nationally, people are coming from all over the place to use the facility to do really, really good science and to really make a difference. Thank you.

ELIZABETH PENTECOST: Paul Brook and Laurel Dilley.

DR. PAUL BROOK: Hi, guys. My name is Paul Brook, and

I'm a postdoctoral researcher at West Virginia University also. I just wanted to add my voice to those who have talked about coming from elsewhere in the world to come and study or work here in West Virginia.

I finished my Ph.D. last year at the University of Oxford in England and when I was looking for the next step in my career the reason I wanted to come to West Virginia University is because as we've heard, there's a great bunch of people in the physics department. It is a growing department and they work on really important and interesting science in areas of particular interest to myself. Also, I've had -- the main reason for all those positives is not in small measure due to the Green Bank Telescope.

There's not many English people in Morgantown, West Virginia. When I'm walking around doing my shopping and speaking to members of the general public and they hear my accent which they initially think is Australian and then eventually they can see that I'm English, it doesn't take very long for the question what the heck are you doing in West Virginia. We have a little conversation about that, but the bottom line is always I'm here because Green Bank Observatory is here.

So if you want to continue to attract people from all

over the world, which I hope you do, then we have to recognize that this is in big part due to the telescope here and the Observatory. Thanks.

ELIZABETH PENTECOST: Lesley Goodall and Adam Kobelski.

UNIDENTIFIED: I think you've got Laurel Dilley still.

ELIZABETH PENTECOST: Oh, I'm sorry.

LAUREL DILLEY: Hello. I'm Laurel Dilley. I have two things I wanted to address tonight. The first is just as a lifelong resident of West Virginia and huge advocate for the state. I grew up in neighboring Pendleton County and the Observatory was always such a cool thing to have right next door. We would be so excited when we could go on field trips over here to Green Bank.

I attended West Virginia University and majored in math and helped out with the governor's school for math and science for several years and I know it was stationed here occasionally. There's just so many cool academic opportunities for kids in this state.

I also think West Virginia suffers from the rural brain drain and this is something that can actually reverse that and get students who want -- are interested in West Virginia and want to come back it gives them something in technology or engineering or science field that they can

actually look forward to and come home.

The second thing I wanted to address is I teach math and computer science at the high school. Computer science was just started about two years ago with the help of a math coach in our county and nobody had any background in computer science. I was one of the math teachers so I volunteered to do it, but I absolutely would not have been brave enough to do that or would not have been possible if it wasn't for the Observatory.

Ray Creager specifically stepped up and he comes to our classroom one day every single week and volunteers his time to teach the kids to code PYTHON.

The NRAO also -- or the GBO hosts the Hour of Code field trip for all the ninth graders every single year so that they can come and see just what coding is all about and learn binary and get to see the machine shop. It's a really, really cool experience for these high school students.

We only had a graduating class of about 62 last year. Ten of those 62 seniors were in the first computer science class, and five of them are now majoring in computer science in college. This year we have 17 students in that class and almost all of them say they either want to major or minor in computer science, so once again, that wouldn't

be possible if not for the collaboration of Green Bank with our schools.

They've also hosted math field day regionally and so many other things. Anything we ask them to do at the high school they are very cooperative and it is a huge inspiration to me as a teacher to know that I have that support. Thank you.

LESLEY GOODALL: I'm Lesley Goodall. I guess what I'm going to say is kind of putsy compared to everybody else. I'm an occupational therapist. I work in the schools. I work in the home health and intervention and the hospital. I know pretty much everybody in the county or at least their child or their grandchild.

Almost every aspect of my life has been touched by the GBO. We need the population to keep our schools and our hospitals going.

Most of what the GBO meant in my life is through my son who is now 20, but he attended the Green Bank school and there was Star Lab, which I was asking somebody, do you all know what that is, the cool thing that the kids get to see? Okay. Yeah. That's such a cool thing and it goes to -- we have five schools in this county. It goes to all the schools and they teach the kids about the universe and all these great things.

Most of the judges for our social studies fair, science fair, if I'm not mistaken, come up from up here. What I'm trying to say is the employees of GBO contribute a lot to our schools and to our communities.

My son was able to become an Eagle Scout because some of the staff up here and their kids all -- we did Boy Scouts up here. We did the overnights. My son and I both became EMTs due to Janet Ghigo because she teaches it up here. She teaches it every year, and her husband works here if I'm not mistaken.

My son got his first paying job painting the satellite dish and is now certified to climb way up in the air which is great because he wants to work in the rain forest.

Also, he's at Virginia Tech. No boos, please. But I am from Virginia. He considers himself from West Virginia, but he's constantly defending West Virginia, and the one thing that he can talk about is yes, the satellite dish. Wow, you got near that. Wow, that's like brain stuff. It's really good for our state. He was actually on the plane to Spain with Ms. Minter whose husband also works here, and he was saying that to some Russian -- some foreign group and he got off the plane and he goes man, he said those guys asked me where I was from. He said you don't know. They were like where. He said West Virginia.

Oh really. He said, yeah, this little place called Green Bank. Oh yeah, it's the telescope. You know, they knew it. But GBO is really a part of our community.

I'm also in the book group that's run by -- where is she? Out there. Yeah. That's run by people that are staffed here.

I think our churches would shut if we didn't have the GBO. It means a lot to the community. The walking trails and the riding trails it's where everybody gets our exercise. Please fund it.

DR. ADAM KOBELSKI: Hi. Thanks for being here. I know this has got to be a long day for you all so I appreciate you taking the time for this. I'm Adam Kobelski. I used to be a post-doc here and I came all the way from Alabama to attend this and be here today so if there's nothing I say here that is relevant, hopefully that carries some weight to it.

One of the things that I think is really important about places like this which there are very few of these places left of real science camps, places where you can come and be cut away and do your science. We all do our work now at our desktops in our offices and we never actually get away and actually connect to the data to what we're trying to do and get our heads out of doing laundry

and connecting all these other chores. This is one of the last facilities left to do that.

On that same note, this is also one of the last facilities where as a scientist you get to see and meet and talk to and know everybody that's involved in doing the science.

I know most of the people in this room. Where I work now I know very few people in the building. But you know everyone in the town, everyone who makes the telescope work, and it's an amazing team that is unrivaled anywhere else at least as these types of facilities and it's not a commonplace thing and it's really gone just because of the state of how we have to do science now and it's real important to at least keep a few of these going.

One of the last things I wanted to talk about is how facilities like this provide the opportunity to train cross-disciplinary science which is something that often is lacking.

I'm a solar physicist. I moved here with very little radio astronomy knowledge and I am now somewhat qualified to do radio astronomy. I now am able to use these skills to use other NSF facilities to study the science there at the sun which is the huge benefit to all the other opportunities and things available for NSF so it's really

great to keep places like this alive to train other people like me to be able to use all the facilities that NSF has to offer. Thank you.

ELIZABETH PENTECOST: John Leyzarek.

UNIDENTIFIED: I believe he's out in the other room.

UNIDENTIFIED: He will hear you. You can do the next person.

ELIZABETH PENTECOST: He's the last person.

UNIDENTIFIED: If someone didn't sign up can they speak?

ELIZABETH PENTECOST: Did you sign --

UNIDENTIFIED: I guess also if there's anybody from the last session who didn't have an opportunity to finish their comments if they would like to, I would like to offer them that opportunity as well.

ELIZABETH PENTECOST: Did you sign in to begin with?

UNIDENTIFIED: Yes, but I didn't know how many people would be speaking so --

ELIZABETH PENTECOST: That's fine. You can speak after Mr. Leyzarek.

CHRISTIN HAMILTON: Liz, you had another hand back there as well.

JOHN LEYZAREK: My name is John Leyzarek. Thank you. I'm sorry for the delay. I was going to put this in

writing. I appreciate the opportunity to be here. This is a place I only want to say should be preserved and it has -- it's a unique phenomenon in not only Pocahontas County and West Virginia, but in the country and in the world. It makes an enormous contribution to the cultural environment as well as the scientific world here in Pocahontas County.

Among the alternatives that I've seen discussed are the deconstruction and restoration, and that's kind of in addition to being a dreadful thought it's almost laughable because as far as I can tell this place is already managed with a high degree environmental responsibility and it apparently maintains an enormous deer herd.

I don't want to waste anybody's time. This is a long night, but I want to support very strongly the second alternative that I've seen proposed which is to maintain National Science Foundation involvement and also make the facilities available to and solicit funding from the widest possible range of potential users.

I understand to some extent this is already being done, but I think without being a marketer, without having studied the market for all the different facilities that there are here, I'm sure many more players can be involved and have been so far, and anything I as an individual can

do to promote that, I'm sure there are a lot of other people who would like to do that also.

I think collaboration, privatization is a wonderful thing, the coming thing. We can only look at the transition of physical space exploration out of the exclusive hands of government into partnerships between government and private entities so I strongly support, hopefully the Observatory will stay here and thrive and make its contribution even more widely. Thank you.

UNIDENTIFIED: Liz, if we can just hold on one second. We can go one, two. People who haven't spoken yet. Three, four, five.

ELIZABETH PENTECOST: I think this lady right here first, please. Go ahead.

CHRISTINA CUNNINGHAM: Well, my name is Christina Cunningham, and I wasn't going to speak at first because there's actually so much to talk about. I will be writing a letter and I will be addressing most of the concerns.

I have a unique background in that I wouldn't have been here at Pocahontas County if it wouldn't have been for the Observatory. My dad decided to move us here and give us an opportunity to live in rural West Virginia. I have made friends, I have made people we consider aunts and uncles, I have made all kinds of contacts, and I have been

shown by the Observatory that you can actually live your dreams. It does happen here. You can see it. It's real. You can touch it.

Also, I have a different background from a lot of people that have spoken because I went into forestry. I have had my certified -- arborist certification, and if you want to talk about environmental impact, I know the Observatory is very well maintained. I believe that the sewage system won an award for being very environmental friendly.

You talk about air quality. You can't get any better air quality here. The telescopes would not be emitting anything so I can't see how that would even be an issue. That should be null and void because they listen.

To be honest with you, you can't get any better water. This is the birthplace of seven rivers in West Virginia.

I don't really know what else to say other than I hope that you have listened to everybody and I hope that you will definitely be taking this seriously because it is affecting not just people here but it's worldwide. Even though we are a very tiny state in the nation, we are the third largest land county in the state, but one of the very most rural populated areas, but it would be devastating to

see this place shut down. Thank you.

DI PANG: Hi. My name is Di Pang. I'm a Ph.D. student at WVU. I'm studying computer science there. I'm from China by the way so I'm from some rural area like this. When my friends ask where I am I tell them I'm in West Virginia. They don't know much about West Virginia but they know two things. One is the song, Country Roads, Take Me Home. The other one is the big telescope.

So in the past year, I've been working on algorithms and look for pulsars in single pulse search so pulses are weak and radio frequency interference is strong so you don't know how sweet the words radio quiet zone means to me. I really like those words.

You think of the GBT algorithms that's -- in the past all those parts have to be diagnostically pulsar signal part have to be inspected manually and there are like hundreds of thousands of parts. We were able to reduce this parts that need to be inspected by people by 90 percent and write up all of this so once we finished our algorithm, this algorithm can be used by pulsars researchers, all pulsar researchers, most specifically around the world, at the universities as well.

So I'm also -- I came this summer to camp. I met many talented students. Looking for -- we worked on

this pulsar. It's not we're only inspiring people to study physics. Also inspire people to study computer science, engineering, electronics.

In our department there are several professors who work on the astronomy signal as well. So, okay, we don't -- if you keep -- the students here want to learn astronomy. You don't want to take them to China because it cost a lot.

ELIZABETH PENTECOST: The next person. Anybody else?

JENNIFER NAIL: I want to say something.

UNIDENTIFIED: One, two, three, four.

JENNIFER NAIL: I was three or four. I can't remember.

UNIDENTIFIED: You're a mathematician.

JENNIFER NAIL: I'm here now. They were just pointing.

UNIDENTIFIED: We will come to you as well.

JENNIFER NAIL: Hello. I'm Jennifer Nail. I'm a teacher at Pocahontas County High School. I also teach math. What I want to talk about is the impact that this has on our school systems.

Like Laurel talked about a minute ago, they facilitated the field trip for our freshman class for the last several years and this has been an incredible

opportunity for our students to see over the past few years.

Also, guys, it's really hard to get people to move here. I moved here from Charleston five years ago to teach here because they offered me a contract first. There are at least 20 school employees whose spouses work here. If we lost 20 teachers we would not have qualified teachers in our schools. As it is right now, I am proud to say that I feel like we have a very strong school system and if that happened we wouldn't.

It is so difficult to convince people to move here because you're asking them to move here to the middle of nowhere where your Internet is terrible and where they don't have cellphones, and for people my age that's like living without water so it's very important.

I would also like to talk on a personal note to when I moved here five years ago I was a poor beginning teacher and I needed a second job. So I worked here one summer at the Observatory as a tour guide and I can say that that was one of the best and most welcoming opportunities I've had since moving to Pocahontas County. I met so many people from working here and it made me feel so much more at home than I was when I started here. I can say that if I didn't have that opportunity I might not still be working in

Pocahontas County right now. So thank you.

UNIDENTIFIED: After this gentleman, who else has not spoken before I go in the back of the room? Have you spoken before? And you have not. We're going to take people who haven't spoken first and then we will go back to people who already had an opportunity and if they want to supplement their responses because they ran out of time they will be welcome to do that. We could even stay a little bit later to accommodate that.

So the gentleman in the back will be after this gentleman here. You can be after him. Who else was there that wanted to speak?

UNIDENTIFIED: I was.

UNIDENTIFIED: You did. Okay. So oh do we have another person here who didn't speak before? New speaker? Did you speak already?

UNIDENTIFIED: No.

UNIDENTIFIED: So then you will follow this young woman and then we will go.

BOB VANCE: I'm Bob Vance. First of all, I want to say these people from the University of -- West Virginia University, I was there a long time ago. I had an astronomy class and you had to meet on top of the physics building and we were supposed to look at stars. We

couldn't see anything but fog so when I graduated I graduated with an education degree, math and science.

I had to -- I spent one year teaching high school, went in the service because I had a commission. Came back to the Observatory in 1961 as a telescope operator because we did everything manually at that time. That was the requirement, they wanted math or electronics. So I spent about three years as the operation group, 85 foot, 300 foot, and 140 foot. Then I moved to the computer group.

We didn't have much computer group at that time. Computer science was not even one of the options in Morgantown. From there I worked with all the astronomers that came through. We had people from -- we had astronomers from Russia. We had them from everywhere. The staff was made up of several people from Germany. Well, they just -- all kinds of foreign countries the staff was made up of.

I was working the night that the 300 foot fell down in 1988 in the lab. And from that point Senator Byrd got money to build the GBT and it was put into operation I think in the year 2000 because I retired in 1999.

The telescope was a savior for the Observatory. It was also a savior to the scientific community. The whole

community dearly loves that telescope and the observatory is very -- it's a very economical part of the whole county. There's several people who live in the outskirts. Most of the people retired are still here or somewhere in the neighborhood. It's not a good place to be. The hospital and things are too far away, but they like Green Bank and the Observatory is a very -- it's just a common person for everybody, and I would like to urge the National Science Foundation to do all they can to keep the GBT in operation since it would also be a big morale booster for the community as well.

BUSTER VARNER: I'm Buster Varner from Durbin. I'm the local fire chief, president of the fire department -- rescue squad and fire departments for this area. I've taken classes here for EMT class that Janet Ghigo has taught every year here for several years that supplies the EMTs for all of Pocahontas County. That's a very vital thing here. I met a lot of people that has come here. Got a lot of friends. My assistant chief is Dennis Egan that works here. If we have problems with our trucks ambulances, anything; I'm local business owner, I own several businesses, if I need a special part or something made I can have it made here.

Just I can't -- I've heard everybody talk and I

understand a lot of it, but business wise, how could you take and spend the money you have spent in this area for this telescope and this nice facility here and even for a second think about closing it down? I can't understand how this would happen. I mean, this is everybody's money and we're known worldwide because of this telescope and all the people that come here.

I think you're barking up the wrong tree. You need to look at somewhere else to shut something down because if this facility went out of here this would be a ghost town in this area.

UNIDENTIFIED: Amen.

UNIDENTIFIED: Keep the money in America.

BUSTER VARNER: Yes. But I just want you to seriously consider do not do anything different.

I can ask Mike Holstein for anything. We come here when the helicopter crashed. Whenever the power goes out or we have any kind of catastrophe here I can go to Mike. I know I went to Mike when the power was off. They had a scheduled power outage and a friend of mine had passed away. Wasn't going to have no power at the funeral home that day. I called Mike up. Mike, got a problem, buddy. What is it. I said, well, lady is going to be at the funeral home at two o'clock for a funeral, there's not

going to be any power there. It was really hot that day. I will take care of it. What more can you ask for?

So this is things that goes way beyond what you think. I don't know much about this science or nothing like that. There's a lot of people here that does and that's great. But I do not want to see anything to happen to this facility. Period.

MARY SUE BURNS: My name is Mary Sue Burns, and I moved to Pocahontas County in 1980 because I was offered the job of Green Bank Middle School science teacher. That was when the building was condemned and I had to work in temporary housing down at the high school.

In 1985 I was talked into transferring to Pocahontas County High School. I fought to be the chemistry teacher which was fine and they said oh, by the way, you have to teach the physics class, you're all we've got. You've got enough credits we can get you a permit. Okay.

Teaching physics was the last thing I had ever considered and it so happened that in 1987 -- I kind of struggled along there a couple of years. In 1987 the Investigating the University Workshop for teachers pilot project for West Virginia teachers was held here at at that time NRAO and a group of West Virginia teachers were intensively trained in radio astronomy. We called it radio

astronomy boot camp.

From that I not only learned a lot but I made incredible contacts and realized the tremendous resource I had here and ended up making kind of lifelong collaborative relationships with astronomers and engineers here who then mentored my students and the kind of trickled down effect from that was tremendous.

I was also on the staff for that project that Ms. Bland mentioned, the Earth Space Science Passport grant in collaboration with Fairmont State University. We trained 36 West Virginia teachers in new science standards this summer.

I was on the geology team so even though this is an astronomy facility we were able to find sites within NRAO and Green Bank, NRAO at that time, and Green Bank in order to reconstruct geologic history of this area and give teachers the inquiry experience into that kind of research as well as the astronomy research so I think we have a rich facility here and I would really like to see it maintained.

I just retired from 37 years of teaching science in West Virginia and in a moment of insanity agreed to long-term sub position back at Green Bank Middle School so I will be here for the science fair on December 6th and I

know that a lot of the staff here are going to be serving as judges and hosts for that event, and I want to thank them for that because a lot of them are here right now, and thank you all for coming and listening. I tend to talk really fast so this guy is good here. Thank you very much.

UNIDENTIFIED: And after our next speaker do we have anybody else who has not had the opportunity to speak that would like to?

UNIDENTIFIED: I would like to say something.

UNIDENTIFIED: Anybody else? No. Okay. Then you were first. Did you want to speak?

UNIDENTIFIED: I already spoke but I want to go again.

UNIDENTIFIED: Okay. So we will go after her go to the other new speaker and then you and then you and then you. Thank you, folks.

DIANE SCHOU: My name is Diane Schou. I'm a resident of Green Bank and I did not check the form to talk but I sort of gathered --

UNIDENTIFIED: You're on it now.

DIANE SCHOU: Thank you. I'm coming to about -- want to talk about Green Bank from another direction, another perspective. One, about air quality in Green Bank. This is something that is very rare in the world here to be in

the national quiet zone.

I was injured by a cell tower that was built a third of a mile away from my home. I didn't argue with it all because I'm told that it was safe. Nine months later I got symptoms of radiation sickness. I had a headache. I slept very rarely. I had, what do you call it, chronic fatigue. I had a rash. I thought I was eating something wrong. I lost hair. I thought I was getting older.

My son took a class or was studying for a hand radio license and in that book of learning about getting the hand radio license there was a chapter about the radio -- the hand radio operators what they experience when they stand in front of antennas, and he put two and two together that that sounds like what mother has.

My husband is a scientist so we did some simple experiments. He drove me away from home, my headaches disappeared. I felt much better. Came back home, the headache returned and this happened repeatedly. When I was returning home from the grocery store or from the post office I was driving up top of a hill heading home and as I approached the top I had a headache that was sort of like a sledge hammer hitting me on my head. When I was coming from another direction maybe about ten miles away I had a tiny headache. Just barely discernible but the closer and

closer we got to home the headache grew. Because of that is why I'm living here in Green Bank because I can live -- I'm acute person here. I don't have the health effects.

Am I running out of time?

CHRISTIN HAMILTON: You still have another 30 seconds.

DIANE SCHOU: Oh dear. I want to talk about safety and health. I want to talk about the socioeconomic of being in Green Bank. The historical preservation of needing to keep this as a radio quiet zone and keep it as a safe area because people around the world come here. Their health improves, they go back home, they become ill again. They come here, their health improves. They go back home -- but they have to go back home because their family is important.

From another perspective, instead of just asking for the first preference for the Observatory, I would like to ask for additional funding so that we can have some meters to prove that people like me we are detecting things because why on some days I feel ill, another person feels ill, a third person feels ill, a fourth person had an accident because that person was feeling ill. I even called Virginia. They were feeling ill. I even called Indiana. That person was feeling ill. So why were all

these people at the same hour detecting something. Thank you.

LAURA HEIST: Hi. Most of you all know me. My name is Laura Heist. We've lived in this area for a long time. My husband is a tenth generation Pocahontas County individual. We love this area for how unique it is and it is unique in part because of the National Science Foundation funding this observatory here.

I work for the Forest Service and I'm able to work at home and work for Milwaukee, Wisconsin, and it's great to be able to choose where you want to be and this is a special place.

I would ask that you would look at the direct, indirect, and cumulative impacts of the economic impacts to the local area, to the state, and I'm just really wondering just like they've said before, why are we spending so much money to get this here and to invest in it and then to just walk away with that much money? You may say it is outside of your NEPA scope, but I'm asking you to look at it, and if you're going to dismiss it for consideration, I would like you to explain why you're dismissing it from consideration. We want to know why you would be putting money down in Chile instead of spending money in the United States.

Whether you like him or not, we have a new president who says he wants us to invest in America. I'm asking you to invest in America and this is a great place to do it. You've already put the money here so explain to me why you would want to devest from this area. You can say that your scope of your analysis is just to look at the alternatives of what to do with this facility, but did you ever do the analysis to come to this conclusion? I would just like to understand it more and I think you can provide that information in your response to comments to the public. Thank you.

UNIDENTIFIED: No more new speakers; correct? I think she was first and then you're next.

CARLA BEAUDET: Okay. To pick up where I left off and actually -- Carla Beaudet. I work at the Observatory. To pick up, the previous speaker kind of, you know, pointed to the points I made earlier that the socioeconomic impact needs to be quantified in ways that it has not been done for the EIS at Arecibo.

But to pick up, there are other quantifiable costs to the area that come from losing the many volunteer services of Observatory employees and the sharing of our facilities with the community. Observatory employees volunteer as firefighters and EMTs, as volunteer teachers of aerobics,

yoga, Zumba, Taekwondo, as sound and lighting engineers at the Marlinton Opera House, as soccer, basketball, football coaches and that is by no means an exhaustive list.

The Observatory partners with the parks and rec office to offer swimming and dance lessons at Observatory facilities for minimal cost. This in a place where the nearest municipal swimming pool is at least an hours drive away.

The impact to the community of losing the pool and the exercise room can only be assessed by considering the cost of a municipal wellness facility to replace those services. Will your EIS consider that?

As my husband and I have been the ones doing sound and lights at the opera house for the past 12 years we've looked into the cost of having an outside sound company come in. About $1500 per show maybe 14 shows a year. These things can be quantified and I want to see them quantified in the Green Bank EIS if only estimated.

I cannot finish without expressing my disbelief that this is even happening. The NSF's recommendation to defund the GBT left a lot of people, particularly a scientific community of users, completely dumbfounded given the recent construction, innovative design, and scientific vitality of this instrument. the GBT's capability has continued to

evolve. It is, in fact, just coming into its own with high-frequency multi-receivers.

This is no dinosaur but rather a cutting edge instrument with sensitivity unattainable by any array of smaller dishes. It's capable and these are absolutely unique in the scientific community. Just not apparently from the majority of scientists selected to serve on the NSF's 2012 Portfolio Review Committee. Thank you.

PEGGY HAWSE: Good evening. I'm Peggy Hawse. I'm Senator Manchin's representative and I work in West Virginia. I represent him in Pocahontas County, and I've already spoken. I've been here since three o'clock and I stayed because I feel it is so important. The senator thought it was so important that he also sent his legislative director from Washington, and unfortunately, he had to leave because he had to go to Charleston so I stayed.

I wanted to add those of you who came in late, don't worry, I'm not going to give my comments again. Just a couple. There were representatives here earlier from Senator Capito's office. Excuse me. Congressman Jenkins was here, Senator Boso was here, and there may have been some other locals that were here so it is important and

certainly your West Virginia delegation recognizes that.

I'm only going to make just a few comments repeated. First, I want to say to the WVU students you have made a tremendous impact by coming tonight. Thank you. I have been privy to sit here and listen to everything and there have been so many great comments made but I have to tell you when you started speaking from your heart and there are others have spoken from their heart, too, but you have come here, you've chosen to come to West Virginia University to further your experience to share your expertise. You made a decision to do that. You're not getting a paycheck at Green Bank Observatory. This isn't a job here for you. You are passionate and that came through, and from a local standpoint from somebody from West Virginia, you have made me so proud and I want to thank you for that.

I want to tell you what the senator is doing tomorrow. Tomorrow -- let me find my note here. Tomorrow afternoon Senator Manchin along with Senator Capito and Congressman Jenkins will speak directly to the Director France Cordova, the director of the National Science Foundation. I hope I'm saying the name right. To ensure that she understands the importance of the Green Bank Observatory to this community, the surrounding region, and the State of West Virginia as well as the USA.

Senator Manchin thanks you for coming, and I want to add one more thing. As a member of the Congress Committee, Senator Manchin will have the responsibility of interviewing and confirming the next director of the National Science Foundation. We would like to do everything we can to ensure your voice and your concerns are held at the highest levels.

Mr. Vance, you called the Green Bank Telescope a person. Well, when I gave my comments earlier I said that the Green Bank Telescope was my friend. When I started coming here I started calling it the Great Big Thing, and I said, you know, you give nicknames to your friends so the Green Bank Telescope has become my friend, and I'm so happy to know that it has friends all over the world. Thank you.

DR. KATHRYN WILLIAMSON: Hi again. My name is Kathryn Williamson. I'm a professor at WVU. I talked about the 20-meter telescope and how my students use it on Skynet They control it online. It kind of worried me I heard that I was the only person who mentioned the 20-meter because it can be used online from anywhere and students from more than WVU, more than just the hundreds the students who take my classes use it. Students from all over the country use it and I, unfortunately, don't know how many but it's in the tens of thousands.

Earlier this year in January I submitted a grant to the NSF to create workshops and activities for college astronomy with the American Astronomical Society, the people who offer the teaching workshops are there so that's with EWAS people, and with other universities around the country, and that grant review did extremely well but was not funded because of the uncertain future of Green Bank and the 20-meter.

Our grant had funding in there for it and it's just -- it blows my mind that the NSF would choose to know best for one facility and ask for amazing educational opportunities and then review those very well and then not fund it because of the NSF's own decision so I just want to reiterate that the 20-meter is an important telescope. Everybody talks about the GBT, it's amazing, the 40-foot telescope is an amazing opportunity, but the 20-meter telescope is connected to the Internet so the possibilities are endless for education. You don't have to come here. It doesn't cost much of any at all to bring that kind of quality science to our students so I just want to reiterate the importance of the 20-meter. Thank you.

UNIDENTIFIED: Promised him first. And then, again, we will have a hard stop at 8:30 if anybody else wants to consider speaking.

DR. RYAN LYNCH: Okay, I will make it quick. I'm Ryan Lynch. I'm a staff scientist here. So I talked earlier about the student program and I want to just mention that there's very, very few places in the world that allow students to come and get a hands-on experience at a telescope like this, but having gone through grad school I came here first as a student back in grad school ten years ago and now I'm here as an employee. It wasn't just because I got to use a telescope which is great for my own personal research. If that was all that this facility offered I wouldn't be back here today as an employee.

Our summer students who come here they don't just leave having had an experience. They learn something. They walk away with the thing that I think I've taken away from every comment here so much which is that this is such an incredible community with such an incredible network of people in every aspect of making this place work and the community around it supports it.

When people come here they recognize that and it inspires them to keep working through a career that can often be very difficult or stressful. It helps get them through those difficult times, and you can't really quantify that easily, but it's a huge, huge, huge cultural impact on the students that come here, on the other

astronomers that come here, and on every single person who comes here to work and be a part of the community so I just wanted to -- that was my time to speak from the heart. Thank you.

UNIDENTIFIED: Anybody else want to speak after him? You do. Okay.

PETE GENTILE: Pete Gentile again. I don't think I mentioned it the first time but I'm a grad student at WVU and I wanted to mention because it might seem a little funny actually for people to have an emotional connection to a telescope or to an observatory, and as hard as it is maybe to understand it's much harder, I think, to quantify that so it struck me tonight how many people said or embodied the phrase I didn't sign up to speak tonight but I wanted to get up and say something.

I think that's really indicative of the emotional connection that this observatory has, not only with this community but with the state and all of us here so I just didn't want it to go without mentioning at least once how emotion plays a part, even tonight. Thank you.

DR. LOREN ANDERSON: Hi. I'm Loren Anderson. Again, WVU professor. One point I didn't think I had time for last time was the amount of grant money that is tied to the GBT so over the last few years we've been very successful

as faculty at WVU in bringing in money that is associated with observation conducted on the GBT and that number is almost $10 million over just the last few years.

Most of that money goes to funding personnel. That's post-docs and grad students and they spend it in the community mostly on pizza and beer as far as I can tell so those are good West Virginia dollars that stay very local when you bring in those monies which we've been very successful doing. Thanks.

UNIDENTIFIED: I believe this is our last speaker.

REBECCA GARVER: My name is Rebecca Garver, and I'm a community member here. I honestly have no idea why I decided to talk, but I just want to voice my concerns. I completely get what everybody is saying but I want to say from my perspective I don't think you understand how devastating this would be to this community without this here. It would be horrific. Buster Varner said it would be a ghost town. He's not kidding.

My husband works at the high school. I'm not so concerned about us not having good schools if this were to close and the teachers were to leave; I worry about us having no school. I worked at the bank across the street. A couple years ago when we were worried this was going to go down we were terrified there we were going to lose our

jobs because of how close we are and all of the community members that we needed for our business. This would trickle down to every single aspect of this community and it would be an absolute nightmare for here and I just don't want to see that happen. I couldn't sit and not say anything.

UNIDENTIFIED: Amen.

UNIDENTIFIED: Thank you all so very much for coming out. I know it's been a long day for many people and I know it's hard to add something like this on at the end of a long day or whatever endeavor you're involved in.

We thank you very, very much. We're going to take the comments back, look at them, and review it, and they will help shape the preparation of the draft of the Environmental Impact Statement which is the next phase of this process.

So, again, that will be -- we expect roughly spring of next year we will be issuing the draft Environmental Impact Statement. Thank you again. Be safe driving home.

(Whereupon, this meeting was concluded at 8:30 p.m.)

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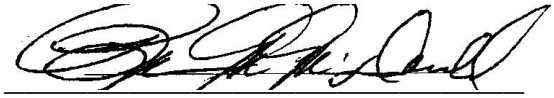
CERTIFICATION OF REPORTER

I do hereby certify that the above and foregoing is a true and complete transcription of my stenotype notes and electronic recording of the meeting held at the time and place aforesaid.

I further certify that I am not interested in the outcome of this case, nor am I related to any of the parties herein.



Brian M. McDonald
Certified Shorthand Reporter

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