

# EIGHTH E.V. KOMAREK, SR. MEMORIAL FIRE ECOLOGY LECTURER

## PRESCRIBED FIRE IN OUR WILDLANDS: OUR INCREASING CHALLENGE

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Thank you. I am truly honored to be here today, and those aren't just words. I really appreciate having the opportunity to be the keynote speaker here. Some of you got to meet Ed Komarek. I met him in a very interesting way. It was at a Fire Ecology Conference in Missoula, Montana, in 1972. I was working at the State Air Quality Bureau and went over with my boss, a guy by the name of Ben Wake. We met with about 200 other pyromaniacs, as far as we could tell at the time, and my boss was invited to speak. He said, "You know, there's really no need for you folks to be doing any prescribed burning in Montana. We're going after all of the power plants and smelters and you'll need to get rid of that practice!" He got in a very heated discussion with Ed Komarek in front of everybody. We came out of there not real happy, especially my boss. He told me to write a

regulation to take care of those folks, and I did. I went back, and I can say I wrote probably one of the poorest air quality regulations relative to fire ever written in the country. I took it to the Air Quality Control Commission and it passed. Fortunately, the Regional Fire Director for the Forest Service at the time, Ed Heilman, took me into the field to show me how they were using fire. I learned more about fire in that week than I picked up anywhere, and I came back as a real convert for prescribed fire. The rest is history. But had I not had a chance to be in that room with Ed Komarek, I would not be here today. I probably would have been focusing on a different area of air quality, so I appreciate it.

What I want to talk about today is some of the air quality challenges we have relative to prescribed fire. I did just retire, but there's a chance I'll be coming back to work half

time, although probably not until next week. We'll see. Two weeks of retirement is more than I can handle, I think.

You know, as the friendly flame wafts through the pine needles it makes a lot of smoke, although when I first started, the Forest Service told me that smoke is all water vapor. In fact, there are a lot of interesting things in that column of smoke out there. We do have a lot of concerns about effects of smoke on our air quality. We put a lot of stuff in the atmosphere out there and we are worried about a couple of those things, particularly particulate matter,  $PM_{2.5}$  and  $PM_{10}$ . We do put quite a bit of particulate matter in the air. It is one of the things EPA has classified as a criteria pollutant. They must develop ambient air quality standards to regulate it, and there are concerns as far as health, visibility, and firefighter safety. Unfortunately, what we do put up is in the size range that can cause real health problems, the particles less than 2.5 microns in diameter. And there are a lot of other effects out there. I'm going to go through this pretty quick. I assume if I talk fast you can listen fast.

Okay. Again, it's the small particles that get taken deep in the lungs. Seventy percent of everything we put up is 2.5 microns in diameter, by mass of particles, and those are the ones that really get trapped deep in the respiratory system. By number of particles, 90 percent are less than 1 micron in diameter, and those are the ones that really get taken deep in the respiratory system. This is one of my favorite slides. It shows your lungs. When you breathe those real small particulates, your lungs pick up about half of those. So actually when you're in a smoke column when it's very dry, the air you breathe out is about twice as clean as the air you breathe in. Is this a good thing? But you are leaving the air just a little bit cleaner out there.

Okay, as far as hydrocarbons, we do put some of these in the air. There are no standards out there because they are too difficult to measure. You cannot write a standard for something you cannot monitor. But hydrocarbons are an ozone precursor as are nitrogen oxides. In fact, some air regulators in this part of the country had pushed to limit prescribed fire because of our nitrogen oxide emissions because they might contribute to ozone production. If you put hydrocarbons and nitrogen oxide in the atmosphere in the presence of sunlight, then you can produce ozone. Are we in a real problem? Do we cause significant ozone problems with prescribed fire? Probably not. Are we getting blamed for it? Yes, we are. Is there a chance we'll be regulated because of it? Yes, there is. Who needs to keep watch on that? That wasn't supposed to be a rhetorical question. Who is supposed to be watching to make sure we don't get regulated for problems we don't cause? We're going to talk about that.

Some of the health standards are focused on limiting particulate concentrations. If you're standing in polluted air with a seven-year-old child, your son or daughter, they are breathing in two and a half times more air pollutant than you are, because they breathe so much more air per unit of body mass. As a result, many of the air quality standards are based on impacts on children. Air pollution concentrations that might not cause you a problem might cause a healthy child a problem.

Switching gears, what about safety? A number of you have seen these slides I have shown before. This interstate pileup was the result of a six-acre prescribed burn that caused

five fatalities. They figured that the smoke column wafted across a curve on the interstate for roughly 10 seconds. Have any of you put smoke across the highway for more than 10 seconds? I think we all have.

Let's switch gears again. Visibility. That's another air quality issue that is coming up right away. Congress passed the Clean Air Act of 1977. How many of you have read that? It was the longest piece of legislation at that time ever passed by Congress, except for one, the revised tax codes. Which is easier to get through? I'll take the tax codes. It is truly a lawyer's delight. Anyway, in 1977, when Congress amended the Clean Air Act, they identified certain areas of the country that they wanted to keep very pristine as Class I Areas, those parks and wilderness areas over a certain size range. Congress also passed a national visibility goal: "The prevention of any future, and the remedying of any existing, impairment of visibility in Federal Class I Areas, which impairment results from manmade air pollution." Numerically speaking, how much is any? Is prescribed fire looked at? In a lot of areas it is, but not in all areas. And we'll talk about that.

Class I areas again are managed by the Park Service, Fish and Wildlife Service, and Forest Service, but these are the areas that Congress wanted to be kept most pristine in this country. Is visibility important? Why do people go to parks and see wilderness? To buy rubber tomahawks? Maybe not. When the Forest Service tried to learn more about wilderness areas, they did a number of studies. Two of the studies indicate the number one priority of wilderness visitors is to view the scenery. Is there any link between viewing the scenery and good visibility? Well, I think so. They did another study where they interviewed over 600 wilderness users and gave them a list of 73 different wilderness attributes to rate as to their importance. On one end of this list of attributes were clean flowing streams, open spacious meadows, etc. On the other end were crowds, mosquitoes, bears, rock slides, dirty campgrounds. People were supposed to rate those as increasing or decreasing their wilderness experience. The thing that came out most important for people was clean fresh air. How do you tell if there is clean fresh air when you're out? How many of you usually check the  $PM_{2.5}$  before you go out? Okay, not many. Then what do you go by, what you see, or by what you smell? Does it take a lot of mental effort to see the need for visibility? Visibility is important out there. The public does want it. People want to see the fantastic scenery that we do have out there.

How about the Park Service? Why do people come to the Grand Canyon? To see our erosion problems? Does that have anything to do with viewing the scenery? We think it does.

So, viewing the scenery is important to park and wilderness users. And what causes most visibility problems? Recollecting your high school physics, they are the particles with approximately the same diameter as the wavelength of visible light, and the wavelength of visible light is about 400 to 700 nanometers. You were going to say it, but you just haven't had enough coffee yet. Very good. If you can keep your smoke particles under three-tenths of a micron, they will be invisible.

Okay. Here is a map and graph that shows what is causing visibility impairment in different parts of the country. Notice that the size of the pie graph shows how much visual impairment there is. The color has to do with what's causing

the problem. Yellow is sulfate. Green is organic carbon. Black is elemental carbon ash. Notice that most of the problems in the east are from sulfate. How much of that is natural? Roughly two to five percent. Where does all the rest of it come from? Fossil fuel combustion. As far as visibility goes, what would happen if you eliminated all wildfire and prescribed fire in this region? What would that do to your annual visibility levels? Nothing. Is there a real chance that fire can be regulated because of visibility regulations? Absolutely. If it is regulated will it make any difference until the power plants are cleaned up? Absolutely not. But will there be some people trying to obscure the issue and shift the blame to fire? Yes, there will.

The Clean Air Act requires EPA to set national ambient air quality standards for pollutants like particulates. Regarding some of the new PM<sub>2.5</sub> standards, I don't think they are going to remain as standards for too long because we've switched administrations. When the EPA sets a standard, they must set that standard to protect the most sensitive part of the population with an adequate margin of safety, and they cannot, by law, look at economics. EPA changed the PM<sub>2.5</sub> standards on October 17th of 2006, for a number of reasons. They left the annual standard the same, but the 24-hour standard went down to 35 µg/m<sup>3</sup>, and that is a real challenge for us. At the previous level of 65 µg/m<sup>3</sup>, we didn't have that much of a problem with prescribed fire, but that has changed with the 35 µg/m<sup>3</sup> standard. There are a number of reasons that the EPA did come up with that new standard, including an anticipated reduction of 2,500 to 5,700 premature deaths in people with heart or lung disease, 2,600 cases of chronic bronchitis, 1,200 emergency room visits for asthma, etc.

This map shows most of our areas of non-attainment in the country, and we have a lot of new areas. This map is not quite correct because it just shows the counties where there is non-attainment, and those areas will become much bigger as they monitor, but here is the kicker for us right now. When EPA proposed the new standards, the Clean Air Scientific Advisory Committee, CASAC, who has always been the final reviewer of air quality standards before they go to the White House, basically said, "Hey, that standard you just picked is not adequate to protect the public." And the standard actually did come out of the White House. That's where they usually come from. There's usually a lot of wrangling, but this was the first time that CASAC had ever come out twice saying the standard you picked is not adequate to protect public health. Well, guess what? We've just had a change in administration, and that standard has to be reviewed every five years, so it will be reviewed during this next four-year administration, and odds are that the standards we must comply with will get lower. If the annual PM<sub>2.5</sub> standard goes from 15 µg/m<sup>3</sup> down to 13, it will double non-attainment areas. This map shows the non-attainment areas we've monitored in which we're not meeting the health standard and protecting the public. So the states are required to write regulations and prove that they will control enough air pollution sources to meet those standards out there.

Okay, this is the ozone standard that just came out this last March. And the result is that there will be many more areas of the country in non-attainment. When CASAC gets its say, will that standard probably go lower? I think it will. Look at Georgia. It is already in non-attainment in several counties surrounding Atlanta. Well, in this map the Park

Service put together, they show anything that's yellow or orange will probably be non-attainment, which is pretty much the whole southern and eastern halves of the country.

States are required to submit reports to EPA to prove how they will meet those standards. Okay, but states can also develop more stringent standards. Well, fortunately I worked for the federal government and we don't have to be concerned with state standards, right? What's the other answer? Wrong. Take a look at that. That's a check for \$25,000 to the San Joaquin Valley Air Pollution District from the Park Service for burning one day without an air quality permit. Have any of you ever forgotten to get a permit before beginning a burn? Those are not supposed to be rhetorical questions.

Something that did help us out is that Congress recently changed the Clean Air Act. How does Congress usually change a big piece of controversial legislation? They include the changes in some other bill that is going to pass, like the Transportation Bill. So in the Transportation Bill a couple of years ago, Congress did tell EPA to develop a policy for what had been called "exceptional and natural events." Let's say you had a big wildfire that caused standards in an area to be exceeded. Should a state or EPA be required to designate that area as non-attainment, and develop regulations to bring the area under the health standards? No. Or what about a volcano or windblown dust or something like that? So EPA did put these in the form of a rule and got everyone's attention. In fact, all 50 states commented against it. Was it a political decision? Surely. Now, I did say earlier that it's the small particles that can cause health problems. That's not always the case. This particulate would cause some problems if caught in your upper respiratory system. This boulder was actually found several miles from the St. Augustine volcano.

Wildfire and wildland use fires are considered as natural events. There can be a lot of differences between what the states think and what some of us think. You know, the Forest Service continually pushes that wildland fire use is a response to emergency action and should not be regulated. State air quality folks say, hey, if as a consequence of a decision air pollution will be allowed to occur, then air regulatory agencies should be involved in that decision. And a number of states have required permits for wildland fire use and charged fees.

What is going to happen with the "appropriate management response"? AMR for those of you working in it. We don't know. I know that the air quality folks in California are just waiting for us to implement that. They are not happy.

Okay, prescribed fires can be an exceptional event if it is unlikely to reoccur at a particular location, not reasonably controllable, preventable, so on and so forth. How often does it reoccur at a particular location? That's a good question because, fortunately, back in this part of the country, you never burn anything more than every 30 or 40 years, right? I hope not.

But it also says that if a state has a certified smoke management program, you can basically waive some violations. But there are some words in there, "... or is using basic smoke management practices." And this is the one issue that states and the EPA fought hard against accepting. They say a certified smoke management program like what you've developed in a number of states is fine, but just saying that

you're using basic smoke management techniques shouldn't cut it. States argued against that. EPA staff argued against it. But it did get passed. And that was basically because of pressure from USDA. Now did we make a lot of friends with that? No, we didn't.

Okay. We also have this interim air quality policy that some of you may have seen, but that policy is being revised. It was supposed to have been out last June. Why isn't it out as we speak? Because EPA staff were not happy, and they wanted to delay it until we have a new administration. Guess what? We have a new administration, so we'll see how this policy comes out. And there will be a definite difference between it coming out under the old administration as compared to what we'll probably see now in a few weeks.

Are there a lot of politics tied up in the regulations that we deal with? Absolutely. For ambient air quality standards, where does the final decision always come out of? The White House. Is there any political influence there? Yes, there is. How much influence do we have? Is that something we ought to be thinking about? Is anybody awake out there?

Okay. We do have the regional haze regulations, and the goal is to bring areas like this part of the country back into the natural condition within 60 years. That is a long-term goal. The bottom line is, clean up the 20 percent worst days and make sure that the cleanest days don't get any worse. As far as data that have been looked at so far in this part of the country, is prescribed fire adding to the 20 percent worst days? Very, very few times.

If all of the power plants were cleaned up, would our emissions stick out? Yes, they would, but they don't now. In fact, my guess is, looking at the way the power plants are going to be cleaned up, it's going to be 30 to 40 years before we have to get real serious about visibility impairment and fire. But is there is a good chance tomorrow that somebody will propose a regulation to control our emissions because of visibility? Absolutely.

Okay. For states, this is one of the first times they have been required by federal regulations look at smoke management programs that they have out there. But in view of these new regulations that are done for this first interim period, basically all that states have been asking us for is that we consider Class I areas to be smoke-sensitive areas, and we've considered it. Can we do burning in those areas? What about Okefenokee? Do you ever have fire in Okefenokee? Is that a Class I area? Did any of that count? No, it didn't as far as standard violations, so on and so forth.

And we're also supposed to develop emission inventories. How many of you have a pretty good idea on what you emit on a daily or hourly basis as far as  $PM_{2.5}$ ? Well, we do have a system out there that we've been using, and I know this is tough to read. We start off with very sparse, infrequent observations. We throw in some theoretical misunderstanding, oversimplify some, and we keep getting research to refine, you know, unimportant details, a little confusion and controversy. If we ever get any kind of coincidental agreement between theory and observation, we do publish those.

Management keeps doing what management always does. Is this a good thing? We need good emission inventory data to protect ourselves. There are people out there trying to obscure the issue and shift the blame to us. We need good, solid information to protect ourselves out there. If you're

asked to do more paperwork along that line—I know nobody wants to do more—those data will protect us. It also shows what we don't do.

Okay. EPA is also supposed to look at agriculture emissions, which are just a real political can of worms. Good luck to them on that.

Let's talk more about visibility, though. Is there anything naturally in wilderness that obscures visibility? How about clouds? Now this is what we called a prescribed natural fire at the time, filling the valley with smoke. Is that smoke any more or less natural than a cloud? Does the public understand that? What does the public understand about the naturalness of visibility impairment?

Or how about this situation? I'm going to guess that most of you have stood within a few hundred yards of where this picture was taken, the South Rim of the Grand Canyon, but it's full of clouds. Did the Park Service screw up that day? If you'd just driven for three days with four screaming kids in the back of your minivan to see that, would you be happy?

Is smoke natural? What are we trying to do? Are we trying to provide in park and wilderness a natural condition, or a sparkly clean condition? Are we trying to provide for visitor enjoyment, or visitor experience? In fact, if that smoke in a wilderness or park is from a natural fire and you go put that fire out, have you just screwed up the natural visibility? I think you ought to be cited for that. Think about it.

Okay. There are a lot of tradeoffs between wildfire and prescribed fire. Does the public really understand all of those and how we do put people at risk, both in the air and on the ground? We do have these kinds of situations, with 50-foot flame lengths from a prescribed fire in the South Canyon in unnatural fuel buildups. Does the public understand that? You know, when the friendly flame comes wafting through your backyard and over the top of your house, you get kind of a different opinion of maybe what some of the impacts or concerns are out there.

One thing that we've been concerned about is children's health, especially asthmatic children, and what happens to them during heavy wildfire smoke concentrations. What we found was that a normally healthy child will exhibit asthmatic reaction in real heavy smoke concentrations. We did not expect that. For years we've said that it's only those people who have chronic obstructive respiratory disease that we're concerned about. That's not the case anymore, as we just found.

Okay. As the wall of fire approaches, what do you think the guy in the cabin is saying? "Hey, Ethel, get the clothes in off the line, it's going to get smoky"? I don't think so. And what happens when we do have fire come through and we have unnatural fuel buildups as compared to when we're doing prescribed burning out there? Does the public understand that?

What about air quality tradeoffs? You know, there's a community under this pall of smoke. We've done a lot of monitoring with wildfire situations using different air quality monitors. This graph shows a monitoring we did 15 miles downwind of a wildfire in Colorado. This line is the old air quality standard for  $PM_{2.5}$ . We were over the standard a lot of the days. Now the standard is half of this. Who is the number one group out there trying to keep that kind of situation from

happening? Power companies? No, it's us. Who is out there treating fuels? The responders to this wildfire have about 20 feet of visibility. Do we produce this kind of mushroom cloud of smoke with prescribed fire? No, we don't. Do we with wildfire? Who is out there reducing fuels? Is it the states and the EPA? What group of individuals is doing the most right now to keep the public from breathing the extremely high concentrations of smoke they do with wildfire? We are.

So what is the number one reason that we're burning? What is the number one reason we treat fuels? Well, of course it's to protect the public from extremely high concentration of fine particulates associated with wildfire, right? And that's the number one objective in your burn plans, right? Is this something that you talk to the public about, yes or no? Should we? Are there huge tradeoffs? Do you have all sorts of good air quality data from this part of the country to prove that? Have you put it together to show the public? Which would you rather have, something very close to the air quality standard, or something that exceeds it by a factor of 20, which we do with wildfire?

Here is a fire where the responders can barely see each other 10 feet away. When you're running into this kind of situation, do we tell the public that if we are able to treat fuels we can keep this from happening? That was just a couple of years ago.

You know, sometimes the most direct approach is not the best. This sign is up in Alaska. The big words, "Caution, this sign has sharp edges," the little words, "Also, the bridge is out." They had a sign just saying the bridge was out. People drive about 15 miles, and do you know what they found? The bridge was out. Apparently people pay more attention to this particular sign. But what about when we talk to the public? Think about smoke. How many of you usually mention it? Should we? Think about it. What does the public understand? That's Missoula, Montana, somewhere under that smoke. Does the public understand that's what we're trying to prevent out there?

You know, facts are facts, but perception is reality. Public perception is our reality. We've been giving the folks a couple of different messages over the years about what fire is about. How much of our work with the public includes smoke in those messages? And what do they think are ecosystems out there? Do they understand that they include processes and are not just objects?

Okay. Bottom line, what are the benefits of working with air quality regulations? Well, first, "He who writes the rules determines how the game is played." And if we help write those, we're better off. And if we lead, we have a much better chance ending up where we want to go.

How many of you right now have taken any kind of leadership role in writing air quality regulations that would impact your burning programs? Three, four—four is not a real good percentage with this group. You know, we'd rather write regulations than fight regulations. Our next speaker up here, Alan Dozier, back a long time ago when he was writing burn plans, didn't have to worry about, you know, smoke and other things like that. You've cleaned up a lot, Alan, thanks!

But, anyway, times have changed. From a federal perspective, we've put together a group that's called the Fire Air Coordination Team, which is a joint operation between the Department of Interior and Department of Agriculture, and

there's a poster on that that Dave Brownlie is going to have later. But we're trying to figure out how to work together in the federal agencies because we've not been doing that. The Park Service, BLM, Fish and Wildlife Service, Forest Service, and others have done things differently. We're trying to link together to develop ways to deal with air quality regulations out there, and I'll let you look at the poster to learn more about that.

The bottom line is we're going to be able to use fire to the degree that society and politics and science will allow, and we have the opportunity to influence all of those. Having an opportunity and taking advantage of that opportunity are two different things.

What group or groups should be trying to make sure that we don't have problems with air quality regulations and that they are written in a way that we can get our job done and still protect air quality? I'm really happy about the way the prescribed fire councils are taking off, and I hope that they are groups that are going to address that issue in detail.

One thing about air quality regulators is that a lot of times they look at the burners out there as one group. You can have most of us doing a good job and somebody is doing a lousy job and we'll all get blamed. That's why I am glad that we are putting together some organizations to deal with these kinds of things.

What do we need to do? We need to keep aware of the air quality issues in our own area and make sure that we have a good working relationship with the air quality regulators. How many of you know your local air quality regulator on a first-name basis? That is not a very large percentage of the group I'm looking at. We should. Make sure that we're current in smoke management technology, and that technology does keep improving. We need to be trained in smoke management techniques. We also need to take responsibility for our actions.

Air quality regulators are very used to having people trying to obscure the issues and shift the blame to somebody else. If we cause a problem, just say so. If you cause a problem, just admit to it. First, air quality people will be very surprised that you did because most folks don't, but they'll be very willing to work with you.

Summary: Air quality regulations are getting more stringent. We need to be involved in writing those regulations. We must be experts on the impact of our emissions, and we must be leaders rather than followers. If a state starts to develop a prescribed burning regulation or amend the one they have, who should step out to write that first draft? Who is credible enough that the state would allow you to do that? You know, credibility really is our best smoke management tool. Be credible. You can do a lousy job, but if you're credible with the state and the public, you can get away with a lot, right? That's not the best way to look at it, but. . . .

Okay. Challenges, questions. Will we have the people we need to effectively participate in the air regulatory game? We are going to see new air quality regulations. Will we continue to have the science we need to be credible players? Will we have public support? Will we be viewed by rule makers as partners rather than adversaries? And will we be leaders rather than participants? Now there's only one group of folks in this room that can answer that question, and that's you. Where are you going to be? Is your fire program worth the effort out there? You know, we're going to be able to continue to use fire if we're smart. We're going to put up

some smoke occasionally, and that's just the way it works, but we can do that and not cause problems if we're smart.

The bottom line is that it's truly up to us. What do you want your future to be? And who is going to make that future? You will never be able to blame air quality regulators for taking away our ability to use prescribed fire. If we lose that, the only people we can ever blame is ourselves because the opportunity to make sure that doesn't happen is out there.

Okay. I think I've got two minutes for questions. I'm going to move on to a couple of other things in life, but I've been retired now almost six days. I'm getting a little tired of it. There's a chance I'm going to come back to work half time but probably not until next week.

AUDIENCE MEMBER: Dennis, can you speak a little more about the [EPA Air Quality] Interim Policy and, you know, what's the word on the street, the reality of when that might come out for public comment?

MR. HADDOW: Well, I think EPA has had it ready to go for a while. They are just withholding it until the new administration comes in. It's going to be different than what we saw before. I think we're still going to have this three-strikes opportunity. Basically, under the old policy, you could violate the health standard three times before a state had to do anything about it. I think something will be in there about

that. There's a chance, however, that the exceptional events rule will be totally pulled back and they'll get rid of that basic smoke management techniques program, so that we'll have to go to a certified smoke management program.

So EPA is dealing internally with that, but they still have their old leadership and will for not too many more days, and then we'll see what comes out. But they're also having some internal battles. Fortunately, some of these folks that are working on that are good friends. We won't say whose house they come to, where they stay at when they come to Colorado to ski, but I know some of those folks fairly well.

AUDIENCE MEMBER: Will they be effective in rolling in agriculture?

MR. HADDOW: They are trying to roll in agriculture, which is an absolute can of worms, because there are some states, especially in the West, where the state air division, by law, cannot even look at agricultural burning.

I'm getting the idea. I'm done. Thank you very much. I truly appreciate the honor.

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