Combined Sewer Overflow Long-Term Control Plan Basics

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Jim Collins: Good afternoon and welcome to today's webcast on Combined Sewer Overflow Long-Term Control Plan Basics. This webcast is sponsored by EPA's Office of Wastewater Management. My name is Jim Collins, I'm with Tetra Tech and I will be moderating today's session. Thank you for joining us today.

We will begin in a few moments. While we wait for others to join I would like to cover a few housekeeping items. The materials in this webcast have been reviewed by EPA's staff for technical accuracy. However, the views of the speakers and the speakers' organizations are their own and do not necessarily reflect those of EPA. Mention of any commercial enterprise, product or publication does not mean that EPA endorses them. We have posted the speakers' contact information in case you would like to contract them directly following today's webcast.

There is a comprehensive list of relevant resources available by pressing the Resources button on your screen. You will need Adobe Acrobat Reader to view this document.

For those of you new to EPA's NPDES webcasts, I would like to briefly summarize some of the webcast features. First, if you have any technical difficulties you can call 1-800-833-2812, or just click the Help button on your screen to receive technical support from ON24, the webcast contractor. You may also use the Ask a Question area of your screen to post any technical issues that you are experiencing. Please indicate a telephone number where you can be reached and we will help to trouble shoot your problem.

There will be several question and answer sessions during this webcast. To ask a question simply type your question in the text box located in the lower left hand corner of the screen, then click on the Submit Question button. You don't need to wait until the question and answer periods to submit your questions; in fact you are encouraged to submit them early.

We will try to answer as many questions as possible, but due to the number of participants, all questions may not be answered. However, today's speakers' contact information is provided on the screen if you have any questions following the webcast.

There will also be several occasions when our presenters will ask you questions. And the presenter will post the questions in the slide window. Please submit your answers in that same slide window, not in the Ask a Question box. To see closed captioning, click on the closed captioning button on the lower left corner of your screen. At the end of the webcast you will be asked to complete an evaluation survey. This survey will appear in a pop-up window so please turn off your pop-up blocker at this time.

As a reminder, this webcast will be archived indefinitely so you may be able to access it after today's live presentation. The archived webcast will be posted within a couple of weeks on this same website.

We are now ready to begin today's session. The speakers today are Mohammed Billah and Nikos Singelis of EPA and Mike Sullivan and Tim Schmitt of LimnoTech Incorporated. Mohammed Billah works as an environmental engineer with EPA. His responsibilities include coordinating combined sewer overflow and sanitary sewer overflow issues. Previously Mohammed worked with the New York State Department of Environmental Conservation as an environmental engineer and with the State of Maryland Department of Environment as a public health engineer.

Nikos Singelis is a Senior Program Analyst with the EPA's NPDES Stormwater Program. Nikos has been with EPA's Stormwater Program for the past seven years and works on many projects aimed at helping communities implement the stormwater program.

Mike Sullivan is a Vice President at LimnoTech and manages the regional office in Washington, DC. His experience includes CSO studies and compliance and he has served a variety of municipal clients as well as EPA in evaluating CSO control programs.

Tim Schmitt is a Senior Environmental Scientist with LimnoTech who currently serves as LimnoTech's project manager for support of EPA's CSO program. Tim has supported EPA by reviewing long-term control plans and developing tools to make the review process easier and more consistent, including the LTCP-EZ, a tool to make it easier for small communities to write compliant LTCPs.

Nikos will now introduce today's topic.

Nikos Singelis: Thanks, Jim. Welcome everybody to today's webcast. This is Nikos Singelis with EPA's Office of Wastewater Management. And for those of you who might be wondering either who I am or what I am doing in this webcast, those of you who know who I am, I'm a stormwater guy. And so I am just sitting in, kind of pinch hitting today with the CSO program, which is co-located right next to us in the stormwater area. And we in the stormwater program have been doing webcasts for the last 2.5 years and have quite a bit of experience in this, and so Mo was nice enough to invite me to join you today to kibbitz and say a few things here and there, so that is what I will try to do.

And so we are going to get today's webcast started here and so we are going to go through – the purpose of the webcast today is really to talk about the 9 minimum controls and those are the main elements that go in to developing a long-term control plan for CSO. And so our purpose today is really we are going to try to touch on each one of those 9 areas. We have broken them down into three distinct parts as you can see from the slide ahead of you, so we are going to start with those first 3, characterization, monitoring , modeling, public participation and sensitive areas first, and then we are going to work our way through the rest of them.

So today's intent is to give you kind of a broad brush of the whole thing as to what we expect to see in a long-term control plan. We know a lot of the communities out there are currently developing them, so we hope that this will give you some information. As Jim mentioned there is a resource list attached to your console there that you can click onto to get more detailed information, so if any of these particular topics you want to know more about we hope we that we can provide you with more detailed things there that you can look at after the webcast.

So I think Mike is going to be our first speaker. And I think actually before we get into the next session he is just going to just for those who need a little quick review here we have just a couple of slides to go over some of the basics of CSO technical information and definitions and that sort of stuff.

Mike Sullivan: Thanks Nikos. I just wanted to say that I like to think of these 9 elements of the long-term control plan as more or less as chapters in a book. And the elements are interrelated and they tend to build upon one another. So we are going to cover the first 3 in Session I, but as Nikos said we are going to have a quick review of the few important terms and concepts contained in a CSO control policy.

To begin with a combined sewer system is a wastewater collection system owned by a state or a municipality as defined in the Clean Water Act which convey sanitary wastewaters, that's domestic,

commercial and industrial wastewaters and stormwater through a single pipe system to a publicly-owned treatment works, or what we typically refer to as a Wastewater Treatment Plant.

Most of you are probably very familiar with CSOs and a CSO is defined as a discharge from a combined sewer system at a point prior to the Publicly-owned Treatment Works. And during precipitation events, that is rain fall or in some cases even snow melt or a mixture of the two, the systems are designed to overflow when collection system capacity is exceeded. This results in a combined sewer overflow that discharges directly to surface waters.

And CSOs are also considered point sources subject to NPDES permit requirements including both technology-based and water quality-based requirements of the Clean Water Act. CSOs are not subject to secondary treatment requirements applicable to POTWs. So this distinction becomes very important when we discuss the control of CSO discharges later in the presentation.

There is one more review item to cover, that is if small systems or small CSO communities are given some special treatment under the CSO control policy. The policy states that at the discretion of the NPDES Authority, jurisdictions with populations under 75,000 may not need to complete each of the formal steps outlined in the CSO Control Policy. So what is the exception for small communities? Well all communities, whether they are small or large, are required to implement the 9 minimum controls. So everyone with a combined sewer system has to do that. But the policy specifically calls out the following elements for small communities: Public participation, consideration of sensitive areas, the evaluation of alternatives and post-construction compliance monitoring.

Now small communities do not always have to do all 9 elements, sometimes just these 4, but this is often negotiated with the regulatory authority. I think as a general rule communities preparing a long-term control plan, whether they are large communities or small communities should make sure that they discuss the scope of the long-term control plan with the permitting authority and the Water Quality Standards authority in advance to make sure that they will have sufficient information to identify the appropriate level of control in the plan and that the people who will be reviewing the plan will be getting the information that they are expecting.

Nikos Singelis: Okay, thank you Mike. Now that was CSOs in two second or less, wasn't it folks?

Mike Sullivan: It was.

Nikos Singelis: Okay, so now Jim mentioned that we are going to be asking you questions from time to time, and those of you who are new to webcasts, this is something that we do pretty frequently throughout our stormwater webcasts. And so we have our first poll question here for you. And so we want to know, just to get a better sense of the number of people attending, how many people are you? Are you by yourself, for instance, stuck in a cube like many of us are these days now? Or are you in a small group and we have given you a range of options to choose there. And so to submit the answers to these poll questions you just click on the little circle, the radio button for the answer that best meets your needs and then hit the submit answer button, the black button there at the bottom of the screen to give us a sense of what is going on.

And while we are waiting for you to do that, Mike, I have a question for you. You mentioned the CSO policy, which if I remember right, was developed in 1994. But it is not really quite just the policy anymore because Congress acted on that, and I don't remember what year that was.

Mike Sullivan: Well, actually it was 2001 when there was a congressional amendment to the Clean Water Act, and the policy became part of the Clean Water Act at that time.

Nikos Singelis: Oh, so it started as a policy and now it is a requirement.

Mike Sullivan: That's correct.

Nikos Singelis: Alright, now we are going to show you the results from this poll question here, if I can get my computer to do that. Let's see. So, very typical, 70% are by themselves stuck in their cubes like all good workers today. But we do have a range of groups. Mostly small groups, 2 to 5 people. So that is great and this will help us calculate the number of people that are actually attending and we will actually later on give you an update with the total number of attendees today.

In the same line we have one more question here before we get on to the rest of our presentation. And this we would just like to know what organization you represent, whether you are with a municipality or a utility, whether you are a consultant. Whether you are with the federal or state level of government, or just an interested citizen who has signed in today.

So again, just choose the radio button to the left of the answer there and hit the black Submit Answer button. And we will take a look at those results in just one second. Let's see, we've got some responses here coming up. Let's see. And later on we are going to be asking you some questions about CSO issues in your communities specifically.

Okay, so now this is kind of interesting. We have a pretty even split here between the first three categories. So about 34% municipality or utility. 30% consultants, roughly. And 34% federal and state government, probably mostly in the state areas.

Alright? And we will have a little more commentary on some of those later. But in the interest of time I think I am going to turn it back to Mike and we will launch into the first element here which is characterization, monitoring and modeling.

Mike Sullivan: Thank Nikos. This element is like the introduction to a book. And in some ways it is a repository of information that is known about the combined sewer system and the waters that receive CSO discharges. So the two chief things for CSO communities to consider are developing a detailed understanding of the current conditions of the combined sewer system and receiving waters and then learning how the combined sewer system responds to rainfall.

So now we introduce Springfield, USA. This is our example community. And characterization begins with documenting the extent of the combined sewer systems and the number of CSOs that we have in our community, where those CSOs are located, what water bodies are affected by CSOs and who is involved. Do we have just one municipality or do we have satellite communities and a number of people involved in the solution.

So as you can see in our example, Springfield, we have a combined sewer system that is delineated. It has 4 outfalls. They discharge to 2 separate receiving waters. And Springfield also has a separate sewer area and a satellite community. So this is a pretty typical situation in many communities.

The physical characterization can add a lot of detail on drainage areas that contribute to the CSO discharges. Some CSO outfalls are much greater than others and have larger drainage areas. Some go off more frequently than others. In this case the combined sewer area, CSO area in Springfield has 3 CSO sheds, each with its own discharge, and there is also a fourth CSO outfall as a pump station. This is sort of a relief at the pump station which we find in many communities.

Physical characterization can also include the provision of information on key hydraulic control points. In this map we see the layout of the major pipes and interceptors and other key facilities including the CSO regulators. They have a pump station triangle; we have a wastewater treatment plant as a rectangle. So as shown, the wastewater plant here is receiving flows from the combined sewer overflow area which is in blue, the separate sewer area which is in green, and the satellite community which is tan. And the CSO regulators are structures usually positioned at interceptors that split flow and they split it, send some to the wastewater plant and some becomes their combined sewer overflow. And these regulators can be dams, weirs, orifices or other hydraulic structures.

So one would expect that the system characterization component of the long-term control plan submitted to EPA or to a state would contain good maps, graphs and charts that show much of this crucial information.

Nikos Singelis: So Mike, I'm just kind of curious. In the stormwater area a lot of our communities are doing a lot of sort of reconnaissance if you will to go and figure out where their systems are because their mapping is not so good. Is that roughly the same thing that you are seeing in some of the CSO communities that they are going to have to go and figure out sort of where their systems are going?

Mike Sullivan: It is exactly the same. And as a matter of fact, the technology is great nowadays. Everyone is using GPS and hand held devices and then gathering lots of great information and putting into Geo databases. And I shouldn't say everyone, but that is the majority of medium to large size communities. Smaller communities, they are still relying on older technology.

Nikos Singelis: And it is interesting too in stormwater too we find these technologies, the prices of them are coming down and that there is more sort of prepackaged things that you can make use of. So hopefully this is more available now to some of the smaller communities.

Mike Sullivan: Yes. So the previous series of maps shows the location of these key facilities and their interrelationships. Hydraulic analysis should show how the combined sewer system operates. It describes what happens when it rains. So the hydraulic analysis should establish the capacities of these hydraulic control features like the CSO regulators, the pump stations. And I want to make a particular point about CSO regulators here. Knowing the capacity is extremely important to hydraulic analysis.

We have a little diagram on the bottom right of this slide. And as you can see combined sewage flows into the CSO regulator and we have a dam or some type of a device in there that diverts part of it to the wastewater plant. The reset of it becomes combined sewer overflow. So knowing the capacity of those regulators is very important.

Flow data in general can be very useful in developing your plan. It is used to identify the dry weather flow or the sanitary flow that is there on non-rainy days. It also can be useful in identifying the wet weather flow which is what is happening when it rains in your combined sewer system. And this little map here shows what we call like a problem area. We are concerned about problem areas and bottlenecks. And this map identifies a neighborhood with building footprints and based on hydraulic analysis it is a problem area because basement flooding has been identified in that spot.

So simple calculations can help you gain a really good understanding of the combined sewer system and if you document that in the plan you can convey it to readers. In this example we have a flow balance diagram. And as you can see across the top we have CSO areas 1, 2 and 3. We have a dry weather flow identified in each of these areas. If we are using a design storm or some kind of a rainfall event we can generate runoff with a simple model and then add that to the dry weather flow so we have a total flow coming out of each of the CSO areas. And then that flow is then conveyed down through the system to the CSO regulator. And each regulator has a specific capacity. Now in this case the flow in all three CSO areas is greater than the hydraulic capacity of the regulator. So what happens is that we have a CSO generated. You can see those arrows shooting down towards the bottom of the picture.

Some flow is diverted to the interceptor. And also on the left hand side here we have flow coming in from a separate sewer area to the same interceptor and that is all conveyed down to the pump station.

The second diagram here is another flow balance, a little further down stream. And it shows what happens at the pump station and at the wastewater plant. Now the pump station has a capacity of 6 million gallons per day. And we have 7.5 million gallons per day delivered. So something has got to give in situations like this and that happens to be a CSO occurring. We have 1.5 milligrams a day becomes a CSO at the relief outflow point. And then we can do a similar flow balance at the wastewater treatment plant. Here we have capacities of a 6 MGD for a secondary and 12 MGD for primary. They also have flow coming in from the separate sanitary sewer area and also from the satellite community. So putting this all together we are using up all 6 MGD at the secondary capacity but we are only using up less than the full capacity of the 12 that is available at the primary part of the plant.

So this is a problem because of the CSO control policy wants us to maximize treatment at the wastewater plant. And what we have here is a bottleneck at the pump station and we just can't get all of the combined sewage to the plant. So this is something that would be obviously a chief thing to focus on in the long-term control plan.

Now we move from physical characterization of the combined sewer system to characterization of the combined sewage that is discharged to receiving waters. The main pollutants of concern in CSO discharges are bacteria, BOD and total suspended solids. These three pollutants account for most of the impairment in urban water bodies associated and affected by CSOs and CSO controls are generally focused on reducing the discharge of these three pollutants. Other pollutants like nutrients, toxics and metals can also be present, but in general they are a secondary concern in CSO discharges to bacteria, BOD and TSS.

There are many existing sources of information that can be used to characterize CSOs. We have monitoring data, we have discharge DMRs, we have pretreatment data, facility planning studies and other sources. The most important thing for a person preparing a long-term plan is to document some of thins information and show some understanding of the characteristics of the CSO discharges themselves.

EPA compiled some information on bacteria, BOD and TSS from earlier reports. Data collected from across the US. The median concentrations for these pollutants is shown on this table, and compared with urban stormwater. So if you look at fecal coliform here you can see that the median concentration for CSOs is 215,000 mpn/100ml. Quite a bit higher than stormwater concentration. And that is true for BOD and TSS. Interestingly these concentrations are less than raw sewage but they are causing serious water quality problems.

Nikos Singelis: And of course it is probably worth mentioning Mike right that both of these numbers, whether it is stormwater or CSOs are way above most typical water quality standards.

Mike Sullivan: That is correct. Very correct. So the long-term control plan should show some understanding of receiving waters too. These are the waters affected by CSO discharges. The EPA and the states have actually found that this is one of several weaknesses they have identified in long-term plans that are submitted. So the community preparing the long-term control plan should document that they are aware of water quality standards, they know the designated uses of the receiving waters and the criteria that protect these uses and to be effective, the long-term control plan should really identify

as much information as possible about the receiving waters. That could include sensitive areas and TMDL activities and other studies.

Nikos Singelis: Mike, I'm just curious, do you have any sense of how many waters are impaired for CSO sources across the country?

Mike Sullivan: Nikos, not off of the top of my head, but it is most, almost every CSO community is probably associated with an impaired water body as part of the problem. CSOs are –

Nikos Singelis: Not the full problem, obviously. So there is something like almost 900 CSO communities, right Mo?

Mohammed Billah: Nikos, the number right now that we have in 2008 is 853 CSO communities. And I support Mike that almost like the CSO is like most of the time the cause of the impairment of the water bodies.

Mike Sullivan: Okay, thanks. Well much of system characterization is built on existing data. Monitoring is often used by communities to fill in data gaps. And before one would go into a monitoring plan you could ask a few simple questions, for example do I have sufficient information about the combined sewer system. Do I know how it works when it rains? Do I understand the designs, the designated uses and the water quality criteria? Do I know what impacts CSOs have on water quality? These questions and other questions like them can outline what is known and unknown and lead to targeted monitoring to obtain crucial missing data. Monitoring is not collecting data for the sake of collecting data. I think most of us know that monitoring can be very expensive. It has to be targeted to meet specific goals and objectives.

The typical objectives are to define the hydraulic response of the combined sewer system to rainfall. That would involve monitoring rainfall as well as monitoring some of the larger CSO outfalls at the end-of-the-pipe situation or below the regulator. Like to determine the impacts on receiving waters. This could involve monitoring above the CSO-impacted area within the CSO-impacted area and perhaps downstream just to see the extent of that area.

Another important thing is to use monitoring where needed to establish baseline conditions so we'll have some basis for comparison when we are looking at potential control alternatives.

Modeling in some form is used in most long-term control plans. It can be simple flow balance modeling like the example we looked at a few moments ago or it can be more detailed hydrology and hydraulic for water quality modeling. Modeling essentially builds on system characterization; it allows prediction across areas that are not monitored so this essentially lets us maximize the data we have collected; and it allows for comparative evaluation of CSO control alternatives in a systematic way that is very useful.

So the next two slides we will go over show simple examples of a combined sewer system and water quality models. In this first illustration, this is a very simple schematic of a combined sewer system model with a storage unit in the center used for control purposes. Now the elements here are that we have rain falling onto an urban area. That generates runoff; that runoff is transported towards the treatment plant. There is perhaps a regulator or some kind of a control there that would divert it to become a CSO discharge. In this case we are putting a storage element in the center there to attempt to see how much storage is required so that we can minimize or completely eliminate that CSO discharge.

Nikos Singelis: And Mike, certainly any different kind of control practice could be stuck in there in addition to storage and there are many other alternatives as well, right?

Mike Sullivan: That is correct. Ones that have a similar schematic for sewer separation or the whole variety of CSO control options that are available.

The next schematic is an illustration of a simple water quality model. And here we have two receiving waters in blue, one vertical and one horizontal, and they do intersect.

Nikos Singelis: And Mike, your waters look like pipes to me. Certainly the engineering guys must have done this diagram, right?

Mike Sullivan: I think they probably did. That's a good point, Nikos. But it is what it is, and they do represent water bodies. And you can see here we have the upstream flow and load contributing to both of these water bodies. And that consists of the other sources of pollutants, agriculture, stormwater and other non-point sources that are upstream. We also then have the CSO loads coming in to the receiving

waters when it rains. They are point source discharging. And in the model we would have model processes, dilution, dispersion, transformation, decay, degradation. And we have noted output points in impacted areas at A, B and C.

And so what one would do with this water quality model, you would look at reductions in a CSO load, see how much control would be required to commit to compliance of water quality standards.

So now at this point I am going to pass the presentation on to my colleague Tim Schmitt. And Tim is going to take the remainder of the first session.

Tim Schmitt: Thanks, Mike. We are going to move on to element 2 of long-term control plan, which is public participation. And I want to start out by seeing what the CSO control policy says about public participation. And the policy says that in developing its long-term control plan, the permittee will employ a public participation program that actively involves the affected public in the decision making to select CSO controls. Please note the emphasis on the active involvement of the public. That, is the key here to make a genuine effort to engage the public.

One other important point is that the permitting authority may ask more questions about the long-term control plan if the permittee doesn't show that the public has been involved in the development of that plan. So it is really important to involve the public in the plan and also to document it.

So who are the public that we are talking about here? The affected public includes residents, rate payers, industrial users, recreational interests or really any other interest groups that are affected by CSOs.

There are a number of ways that you can get the public involved in the long-term control planning process, including setting up public meetings, forming advisory committees, sending out press releases on CSO issues or LTCP progress, sending direct mailings, putting inserts into bills, developing newsletters or even developing a CSO website, whatever is most appropriate for your community to give the public the chance to get involved.

What are some of the expectations for public involvement? Well first of all, did the public participation process work? Did it get the right payers and/or users of the receiving water involved in a long-term

control planning process? Was the public briefed on characterization of CSO impacts, control alternatives and costs? And last, was the process documented? This doesn't have to be an expensive documentation effort. You can see here we have got an example of the long-term control plan for the city of Macon, Missouri, and up on the screen we have their section on public participation. And you can see that it is two paragraphs long, but it does document what the city has done with respect to public participation and that is the important part – make sure that you document it.

The other thing I want to note here is that people often get confused between public participation and public notification, which is notifying the public about CSOs such as posting signs at outfalls, etc. These are two different things so make sure that you document your public participation process in your long-term control plan. And so to sum up the public participation process, here we have Homer Simpson, and it looks like it might be hard to get him involved in anything, let alone long-term control plan for CSOs. But the permittee must at least show effort in doing this and document it.

Nikos Singelis: Certainly, good observation Jim. One thing I was thinking of while you were talking about that is a resource that EPA has that we use in the stormwater program is the Getting in Step method to doing a public outreach campaign. And all of that information, the Getting in Step manual and all kinds of other resources are available on the stormwater website. So here is a place where the stormwater and the CSO communities can share some of this information. And that method goes into a lot of the things that you just mentioned about how to do public meetings, how to organize an advisory group, how to do effective direct mailing to really get, I think, what you are looking for is that real active involvement which we know is often hard to do.

Tim Schmitt: Right, and that sounds like a great resource. And one thing that I forgot to mention is that in our resources document we have actually included a couple of example websites that communities have done to educate their public on the long-term control process, long-term control planning process. So take a look at that document and you should see some good examples.

Now we want to move on to element 3 of the long-term control plan which is consideration of sensitive areas. The CSO control policy gives high priority to controlling CSO discharges to sensitive areas. So the first thing you want to do is determine whether there are any sensitive areas that could be impacted by CSOs. The CSO control policy defines sensitive areas as outstanding national resource waters, national marine sanctuaries, waters with threatened or endangered species or their habitat, waters with primary contact recreation, public drinking water intakes, shellfish beds. Some of these you might be able to rule out for your community pretty quickly. For example, if you are not located near the coast, certainly you don't have to worry about national marine sanctuaries. But for others you may need to do a little

research. And again, I will go back to our resource document. We have included some good information on places you can go to try to get some of this information.

For example, you can get information on threatened or endangered species from NOAA. National Marine Fishery Service or from the US Fish and Wildlife Service. Nikos and I had a conversation yesterday and he suggested that maybe just browsing the website might not be the best way, but that can get you started, and then a call to one of those outfits can get you more site specific data.

Nikos Singelis: Yes, we found that some state websites are really up-to-date and good, and other ones not so great. And so sometimes that phone call is useful.

Tim Schmitt: Okay, after you have identified sensitive areas, the next thing is to determine whether these areas could be impacted by CSO discharges. For example, we see a beach here. So we would want to know if CSOs if they were in the area, if they could actually impact the beach. Well maybe they are far enough upstream so that they don't actually impact the beach.

But if the sensitive area is present and impacted by CSOs, the LTCP should look at a couple of options including prohibiting new or significantly increased overflows, eliminating or relocating overflows where possible, treating overflows where necessary, or reassessing their impacts each permit cycle to see whether you might need to focus more effort on trying to eliminate those discharges to sensitive areas. And that is going to conclude our first session. And so now I think we are going to be ready to answer some questions.

Nikos Singelis: Yes, I think we are out to our first question break here, and I would imagine we probably have some questions. And by the way we encourage you to type in your questions and submit them at any time and we will have a chance of kind of screening those and prioritizing them because I think we have quite a few, right Jim?

Jim Collins: That is correct Nikos. And yes, we would like to mention that, I want to give a reminder first that if you are having any technical difficulties, call the number 1-800-833-2812 or just click the Help button on your screen to receive technical support from ON24. And again, you can ask a question by just clicking anywhere on your screen at any time to post technical issues you are experiencing. Please include your phone number and we will try to get your problem trouble shooted.

Okay, the first question we have is from Dan. And that question is, when developing a model of the combined sewer system, should monitoring in advance or in preparation of that model development include the entire collection system rather than just the outfalls? Mike?

Mike Sullivan: Yes, that is an excellent question. Usually the monitoring involves locations where you can get information on quite a bit of the flow. So if you had 4 or 5 overflows, you certainly want to monitor the largest of them at the overflows itself and not necessarily all 5 or 6 of them. Also, people tend to monitor at other key locations in a collection system, getting some information on flows as they approach the regulators as well flow after the regulators. So it is a combination of things. And then flow at the wastewater plant is always very important to keep your – get a good assessment as well.

Mohammed Billah: Mike, I just want to add something. We did a small – Dan, thank you for your question because that is a very good question and most of the time when we review the LTCP we find, our staff department, that most of the permittees are lacking, and modeling is actually knowing yourself, that is the system, and whatever needs to be done, it depends on the system itself. So it can be modeling for your outfall or it can be modeling for your particular one big outfall or it can be modeling for your all 10 outfalls. It depends on the system itself. And it is always better as much as information you can collect during the modeling and monitoring process that we can predict what is your actual overflow during the precipitation events, what you need to do.

I usually say that modeling and monitoring is like knowing yourself, that is the system. Thanks.

Jim Collins: Great. Thank you. Okay, the next question comes from Nancy, and she is wondering to what extent might the impact of combined sewer overflows and the LTCP differ for a CSO system or a combined sewer system where there are numerous indirect industrial discharges rather than CSO systems that largely transport domestic wastewater plus urban runoff?

Mohammed Billah: I can take that question. Actually this is a very good question because you are in a complex system of developing
the long-term control plan. The CSO policy says that if you have a complex system that you have different contributor into the CSS and if your plant is treating the flow from the CSS everybody needs to be involved during the development process of the long-term control plan. And they also need to share information between themselves for a better implementation of the long-term control plan.

Answering to your question, if there is a big satellite industrial discharger that contributes to the CSO or CSS, they need to be involved in the long-term control plan development process and also need to share their information with the treatment plant about what kind of discharge they will have into the CSS because treatment plants need to know what they need to correct.

Jim Collins: So, Mo, could that include special local limits under the pretreatment programs for those industrial users?

Mohammed Billah: You are absolutely right. If this is an industrial discharger into the wastewater sewer line, they need to have some kind of pretreatment program before the discharge. And treatment plant and the local authority can set it up that what they can discharge and what amount into the wastewater systems. So there is some requirement of the pretreatment but at the same time you need to be careful that pretreatment program is only for the industrial discharger. It is not for the domestic and other kinds of discharger. So there is a gray area there that people need to walk around. And that situation actually needs to be handled as per policy and the pretreatment program.

Jim Collins: Okay, thanks Mo. Okay, the next question is from Robert in Philadelphia. And Robert wonders can you consider any body of water a sensitive area due to the potential for fishing or swimming, etc. And I guess Tim, please.

Tim Schmitt: I'll take this one. That is a great question, and I think the answer to this is that while the CSO control policy does define sensitive areas as specific types of areas, and you wouldn't necessarily define it as the potential for fishing or swimming, but a lot of communities will look at their own priority areas, they wouldn't necessarily be considered sensitive areas but they certainly any individual community can prioritize their own areas to look at in their long-term control planning process.

Jim Collins: Thanks, Tim. Okay, we have time for one more question. And Sean asks, can we delineate or identify which steps, and I'm assuming this means in an LTCP development process, which steps if any do not necessarily apply to the communities with populations less than 75,000? Mike?

Mike Sullivan: Yes, the answer is there is no definitive answer to that question. I think it is a case by case basis and as you can imagine there is quite a difference in the very small communities with a few thousand people to communities of 70,000 or 75,000. So generally the larger the community the more elements of the long-term control plan that are required. And there were those 4 that we mentioned earlier, which were the minimum, and those would be the expectation for the very smallest of the small communities.

Mohammed Billah: Thank you, Mike. I just want to add something with Mike. The sensitive area will be defined, what the small systems need to do is to define into your NPDES permit. This permit will give you the direction that what you need to do when you are developing a long-term control plan. So if the varies like you suggest sensitive, like what about the CSO community you are located at, and your permit says you need to do that one for the small community.

Nikos Singelis: Okay, I think we will move on, just in the interest of time Jim.

Jim Collins: Great.

Nikos Singelis: Thank you all for those questions and keep those questions coming. And feel free to submit new questions based on the material that we are about to go over. So we are moving into the next session here, Session II which will cover minimum control measures 4, 5 and 6. But before we get there we have a question for you. And this is our first CSO related question. So the question is, if you were involved in developing a long-term control plan, what is its status? So if you know what is going on in your community, let us know.

So we have given you five choices here, starting at the top here – Submitted and Approved, which would be great; submitted but not approved yet is another option; in preparation, you are still working on it would be a third option; required but you really haven't quite gotten started yet; and then lastly, not required. So take a couple of seconds there and click the radio button that more or less describes what is happening in your community. Now I will tell you that this is all anonymous so feel free to be honest about what exactly where you are. We will not turn this over to any enforcement authorities or anything like that. So give us the real scoop and not the best answer, please.

Alright, we will see what we got here from folks. Looks like we have got a few answers here. A couple of people so far being honest and I will show you these results. Okay, so it looks like, interestingly, about 15%, 16% are already in the submitted and approved category, which is great, already managed to get through the entire system. 10% or so, 10% or 11% there have submitted and are awaiting apparently for a permitting authority review. 32% are in preparation which is what we, I think, expected, that there would be quite a few in preparation there. And then we have just a couple of people, only 3%, they are being very honest and saying they haven't quite gotten to it yet. And then another 38% are saying not required. So any comments on those results, guys?

Mohammed Billah: Nikos, it's a great survey result that I got here, because I am a little surprised because by the water safe (inaudible) right now, for 2008, I'm expecting 71% communities should have some kind of CSO control, either LTCP or other CSO control policy, 99% is the control policy within their permit or enforcement order.

So here I can see that submitted and approved is only 15.5%. That is surprising to me. Maybe the reason that I can understand is like most of the participants that are attending today they have not developed an LTCP. They are participating here to learn how to develop the LTCP. Mike, do you have any comments on that, on this unexpected 71% is here.

Nikos Singelis: Okay, so Mo got a really high expectation here. But I think probably what is right is that the people who need this are on the webcast today, don't you think.

Mike Sullivan: I totally agree with that. I think that many of the people who have submitted them and they were approved, there is really not that much need for them to be participating in this lecture or seminar.

Nikos Singelis: Yes, this is kind of the 101s of LTCPs, right. Alright, so moving on I think Tim has the next section and we are going to go through the control measures 4, 5 and 6, evaluation of alternatives, some of the cost and performance considerations there, and operational plan. So I will turn it over to Tim for the next round.

Tim Schmitt: Thanks Nikos. We are going to start with element 4, evaluation of alternatives. The overall goal of this over the long-term control plan is to evaluate potential options for controlling CSOs in order to meet water quality standards and protect designated uses. One of the keys here is that the evaluation of alternatives should be a reasonable assessment that looks at controls with respect both to their benefits and to their cost.

We should also note that the evaluation of alternatives may be less extensive for small communities.

There are four general types of CSO controls that are typically evaluated, including O&M practices, collection system controls, storage options and treatment technologies. And I am going to go through those here, starting with O&M practices. Many O&M practices are source controls, and they can include sewer inspection and testing, such as CCTV, sewer cleaning, pollution prevention programs and source controls, such as green infrastructure or low impact development practices.

Nikos Singelis: I'm sorry, Tim, what was that? CCTV?

Tim Schmitt: I'm sorry, closed circuit television. When you put a camera down a sewer just to take a look and see whether your sewer is intact.

Mohammed Billah: Good catch, Nikos.

Nikos Singelis: That's what I thought it was, but I just wanted to make sure.

Tim Schmitt: Okay, moving on to collection system controls, these might include inflow reduction, for example, disconnecting roof drains, sewer or service lateral or manhole rehabilitation, maximizing flow to the wastewater treatment plant which we will talk more about very soon, monitoring and real-time control to maximize flow in the CSS, and sewer separation, which is probably the most commonly used practice for CSO control.

CSO storage control, storage is a good option because stored flows can be sent to the wastewater treatment plant for treatment after the wet weather event. And some permittees have the ability to store a flow in under or unused infrastructure. Some options include in-line storage such as parallel relief sewers or in-line tanks, off-line storage, like the tunnels seen in the bottom right hand photo, or on-site storage such as the retention basin in the upper right.

The last type of CSO controls are treatment technologies which can include screening, supplemental treatments such as high rate treatment like Densadeg and Actiflo systems, disinfection such as chlorine or UV disinfection, and floatables' controls such as netting. I also want to let people know that we have put some technology or some information on technology discussion in our resources document so you can go to that and that will give you more information on some of these CSO control types.

And now I want to turn things back over to Mike Sullivan to continue this discussion and introduce the specific methods for evaluating alternatives in the LTCP.

Mike Sullivan: Thanks, Tim. Well there are two approaches to developing the long-term control plan. And one is the presumption approach and the other is the demonstration approach. And there are

many interpretations to these two approaches but I am not the final word on this and I think you probably find that not everyone agrees in all the permitting authorities in what they mean. But both provide a target for CSO control and an end point. And I am going to try to use the language in the CSO control policy and a few examples to show the differences between the two approaches to give you some insight on what might be the best for your community.

Now the presumption approach relies on specific performance criteria. Under the presumption approach the long-term control plan has to satisfy one of the three criteria shown here. These are: No more than an average of four overflows per year, on average, with discretion to add 2 additional overflows, and that discretion is usually the permitting authorities discretion; number 2 is elimination or capture for treatment of a minimum of 85% of the volume of combined sewage in combined sewer system during precipitation events on a system wide annual average basis; and number 3 is elimination or capture for treatment of a minimum of 85% of the mass of pollutants in the combined sewer system during precipitation events on a system-wide basis.

Now my experience has been that the first one, four overflows per year, is widely used. The second option here, 85% capture is used but less widely used than 4 per year. And the third option is not used that much. I would like to note that all three have to be verified following implementation of the controls.

You might remember it was stated in Session I that CSOs are not subject to secondary treatment requirements applicable at wastewater treatment plants. Well this is very important for planning purposes. We don't have to build secondary treatment facilities to handle combined sewage. Less treatment is required. And the minimum level of treatment for criterion 1, which is the four per year and criterion 2, 85% capture of flow, is primary clarification, that is the removal of floatables and settleable solids may be achieved by any combination of treatment technologies or methods that are shown to be equivalent to primary clarification, includes solids and floatable disposal, and it includes disinfection of effluent if necessary to meet water quality standards and protect designated uses in public health.

So the next few slides show an example under the presumption approach. Criterion 1 says no more than an average of 4 overflows per year on average with discretion to add 2 additional overflows. So this bar chart provides an example using model results geared towards this criterion of 4 overflows per year. We have got the number of overflow events on the vertical axis. On the horizontal axis we are looking at scenarios with no control being a typical situation for communities in the northeastern US, overflows occurring 45 to 50 or more times per year. In this case they are looking at a scenario A, scenario B and finally the long-term control plan which gets down to 4 per year. And so the long-term

control plan in this case would satisfy that first criteria. I would like to note that the 4 times per year is not an exact number every year, but has to be met on average over multiple years.

Next I will describe an example of a calculation method used to address the second criterion for 85% capture of volume. Now criterion 2 says the elimination or capture for treatment of a minimum of 85% of the volume of combined sewage in the combined sewer systems during precipitation events on a system-wide annual average basis. That is kind of a mouthful. But the target here is the volume of combined sewage in the CSS during precipitation events. And the volume is the sum of runoff + sanitary sewage. So the components are runoff can be modeled, measured or calculated flow entering the combined sewer system when it rains. And the sanitary sewage is the metered or a portion of sanitary sewage in the system during precipitation events. So the calculation must isolate and quantify these different component parts.

So the term, during precipitation events is not well defined. However, runoff is highly correlated with rainfall. And the period is considered to be the period of rainfall producing runoff plus the period for the combined sewer system to drain. And similarly the period for the combined sewer system to drain is not that well defined either, but it is generally calculated as an observed time for runoff to pass through the combined sewer system, and that can be approximately 6 to 12 hours, or the time until the flow in the sewer system returns to some more normal value, that is maybe the time until it reaches 110% or 120% of average dry weather flow.

So I will be going through the following example which will hopefully show how the volume of combined sewage in the combined sewer system during rainfall is calculated. The calculation starts with identification of the sanitary flow or the dry weather flow. This is flow that comes from homes, businesses and industry. Now on this graph we are looking at flow in MGD on the vertical axis and time across 0 to 96 hours on the horizontal axis. Now the flow is usually a diagonal pattern to sanitary flow. And flows may have a lot of infiltration and a distinct seasonal pattern. But what we have to do is identify this dry weather flow to make this calculation work.

The next step is to quantify runoff. And runoff is the response to rainfall across the sewer sheds. It could be quantified with a simple calculation or with hydrology and hydraulic model like the stormwater management model, or SWMM. And here we have three events occurring in this 96 hour period. They are relatively short duration events, 4 to 6 hours of runoff that is generated in the combined sewer system. Now adding the sanitary flow to the runoff provides us with a real hydrograph of flow in the combined sewer system. The shaded area represents the volume collected during precipitation events. So it is not everyday and it does not include dry periods, just those wet periods when we have runoff occurring and when that runoff is working its way through the combined sewer system.

So, this value that is shaded represents the volume of combined sewage during precipitation that has to be controlled. And we have to control 85% of it. You might imagine stretching this graph out over 365 days instead of 96 hours, and the sum of all of that volume during rainfall events, that is the target 85% or more that would have to be controlled.

So I hope that is understandable. The same example can be tabulated and documented for an entire year. So the fist row here, we are looking at the volume of combined sewage during precipitation events for the full year. The second row we are looking at the volume that is captured. You can see under the no control option we are capturing 756 MGD or only 62%, but under the long-term control plan the expectation would be to capture 85%. So the important thing is that this table of documents that the criterion has been met. I want to note, interesting fact here, is that in many communities we are starting at a relatively high percentage, around 60% or so. And then they obviously need facilities to get that up to 85%. But it is not the most difficult thing in many instances.

The third criterion under presumption approach is the elimination of capture for treatment of a minimum of 85% of the mass of pollutants in a combined sewer system during precipitation events and again on a system wide annual average basis. So this could be calculated in a manner that is similar to the calculation for 85% of the volume. But you need to have a pollution concentration associated with all of the flow values, the dry weather flow, and the runoff in order to change the flow into a mass floating.

So the challenge here is assigning realistic concentration values. In reality concentration changes vary quickly over time during runoff events. And it is not so easy to characterize. This criterion might be most applicable in situations where the first flush effect is very dominant and that first flush can be captured. That is, the concentration of pollutants is highest at the beginning of storms, and a treatment plan, or treatment facilities can accept that first flush for treatment.

So next we move to the demonstration approach. And I think the best way to start is to describe exactly what is stated in the CSO control policy about the demonstration approach. And it states that permittees must demonstrate compliance with the following criteria, with all of these criteria, not just one. Planned control program is adequate to meet water quality standards. Remaining CSO discharges will not preclude attainment of water quality standards. The planned control program will provide the maximum pollution reduction benefits reasonably attainable. And the planned control program is designed to allow cosst-effective expansion or retrofitting if needed.

You can probably see that this option is opened to different interpretations. I do know that when the CSO control policy was developed back in 1994 it was thought that the demonstration approach would be a lower hurdle than the presumption approach. But I am not sure if everyone is fully aware of that at the moment. So as you might imagine, there is a great deal of monitoring that goes into the demonstration approach. CSO communities that take this approach should demonstrate that the CSO controls are providing the level of control described in the plan. And they should be documenting that the remaining CSO discharges are adequate to meet water quality standards and that they don't preclude attainment of water quality standards. So a lot of monitoring goes into this demonstration.

This next simple table provides an example of what the demonstration approach might look like in practice. Here we have an example with the E. coli bacteria standard in place, and this is a standard that most states are moving towards. The water quality standard in this case is a monthly Geo-mean not to exceed 126 counts per 100ml. We are looking August conditions, Geo-mean conditions at 3 stations, station 1,2 and 3. In the Pre-CSO control situation, we had violations of a Geo-mean standard at all three stations.

However, with the long-term plan implemented in 2003 and 2004 you can see that the Geo-mean values are all below 126. This is kind of a simple example, but it does provide a demonstration of what a community might be expected to provide and what kind of monitoring might be required to demonstrate this.

So earlier Tim went over a short list of CSO controls during this session. Most communities do a screening of a large group of controls. And I am going to just describe that process a little bit. So in Springfield, our demonstration city, we have 3 CSOs here where we are looking for, I should say 3 CSOs plus a pump station where we have a CSO. And the community went through a screening process and maybe screened a whole variety of controls based upon public acceptance, socioeconomic issues, availability of land, other considerations. And they ended up with three CSO control alternatives, A, B and C.

So letter A here is full separation. That means they would just try to eliminate the combined sewer system entirely by separating it, and having separate combined and storm systems. Under control alternative B they would be testing the implementation of storage for CSO 1, storage for CSO 2 and vortex technology for CSO 3, plus a pump station upgrade.

And for alternative C it would involve separation in CSO area 1, storage in number 2, Vortex in 3, and then again, the common pump station upgrade.

So, I guess this is a typical representation of the process that communities go through and they identify the best scenarios to be tested, often in the modeling context and that should be described in the long-term control plan in some detail.

Nikos Singelis: Thank you Mike, and now we have a poll question to ask. And this relates to just what we were talking about a second ago. If you have worked on a long-term control plan, did you use the presumptive approach, which Mike described or the demonstration approach or some combination of both, or you are just not sure, haven't quite gotten there yet.

So, again, same thing as before, same drill, just click on the radio button that represents your best answer there and submit your answer and we will take a look at that in just a second. And I'm just kind of curious Mike, going backwards while we are waiting for people to answer this poll question, when you were talking about this sort of modeling approach there, and using a certain design storm, and are people using kind of the average rainfall for their area as kind of the basis? And then what happens in a wet year or a dry year, particularly in a wet year I guess where you might end up having a lot more overflow?

Mike Sullivan: Yes, that is a good question, Nikos. What happens when people use continuous simulation models they usually choose an average year or a group of years that represent average conditions. And that is important. And then you might run one year as your average year, or three years, or even five years and see what the results are and average them out for an annual solution.

So when you get a really wet year, yes you might have six or eight overflows. But on average it should be four over a long-term period. And that is why long-term monitoring is important. But to answer the other part of that question is the design storm. One of the tools that EPA recently developed, LTCP EZ is based upon the design storm approach. And that looks at a storm that occurs 4 times per year, and the idea being that dedicated to the 4 overflow per year solution, and that is a new alternative way of going about this, a simpler calculation. You don't need a continuous simulation model.

Nikos Singelis: Right. Let's go back to our poll question and see what the results are here. So, wow, it looks like 31% have used the presumptive approach, and just 11% using demonstration. 20% report some of both, and 37% are unsure or haven't quite gotten there yet. Now what do you guys make, particularly of the split between presumption and demonstration. Does that look like something that you would expect?

Mike Sullivan: From my standpoint I think that is probably what I would expect. I think that many times people just go ahead and they are not even certain whether they are in a demonstration or a presumption and they don't document it that well in their plan. But actually I have seen other communities where they are using demonstration for one water body and presumption for another water body. So this result doesn't surprise me at all.

Nikos Singelis: Okay, alright, and let's see, Mike I believe you continue into the next section.

Mike Sullivan: Yes I do. Element 5 of the long-term control plan is the cost performance consideration. I don't have a lot to say on this one. But it is expected that the long-term control plan will have some discussion of cost and performance of the control plan and the Knee of the Curve analysis is an analysis that is typically used, so I will just kind of describe this example here where we are looking at cost in millions of dollars on the vertical axis and we have the number of overflows per year on the horizontal axis.

In this case, moving from right to left, we are going from 15 overflows per year down to the target, which is 4. And that 4 overflows per year is associated with a cost of $2 million and if you were to go to a higher level of control, one or two or less overflows per year, you could see for each increasing increment you are adding like $1 million or more. So it gets to be a point where it becomes, it is not cost effective to go beyond that, and that is the knee of the curve, an inflection point. And many communities use this as a basis for their final selection of a control.

Then element 6 is an operational plan, and similarly, I don't have much to say about this, but the objective is to ensure that the CSO community has a program well thought out, has plans to put measures and interactions into place to ensure that the long-term control plan is implemented and operated correctly. So the operational plan documents, programs your operating and maintaining facilities and various components of the system. It can be added to an existing O&M plan. It should definitely include some elements on staffing, how the plan will be staffed, training, responsibilities of individuals, inspections and procedures. It doesn't have to be that extensive but it should demonstrate that some thought is given to this as the community is looking ahead.

So next Nikos we are going to move to a case study from a very nice CSO control plan in the city of Richmond, VA. And what we are looking at here is a map of Richmond. This is a city of just less than 250,000 people. They have roughly 40 or so CSO outfalls, James River flows through the center of the city from left to right and then heads south in the center of the city. And the left hand horizontal part of the river is actually free flowing, the lower end is the tidal part of the Chesapeake Bay System actually.

And Richmond has been working on CSO controls very steadily since the 1980s and they have implemented a fair number of controls. When we look at the river as it goes through the city, it is a very sensitive area. This is the falls of the James area. It is a scenic river. It has lots of recreation activities going on, canoeing, boating, people love to go out there and on the rocks and picnic and wade. So it is a very excellent use of a river right as it flows through a downtown area. And it is identified as a sensitive area and priority was given to it when the original controls were developed in the early 1980s into the 1990s.

And that led to development of controls that were put in place probably around by the year 2000 or earlier into this century. In that case, the city concentrated its efforts on the left or western side of the city. They used the interceptors, tunnels, expanded some capacity and they tried to get as much of that combined sewage, keep it from discharging through the sensitive area in the falls of James. They moved it essentially down to the wastewater treatment plant which was expanded and just kind of moved it downstream. This is very, very successful. However the job wasn't completely done and the city remained diligent in trying to solve the rest of the CSO problem they had in the city.

So they went through a series of alternatives, on the left here we have got the various control technologies that we use, including source controls, sewer separation, conveyance, disinfection. They had criteria for each of these controls, socioeconomic impacts, public acceptance, short- and long-term impacts, etc. And they had a whole series of scenarios on the right that were investigated. And that starts with the background A1, which is essentially the city as it may have looked as an open field before it was developed. Then they have the city prior to CSO controls when they were all discharging as designed. And then the last one there is background B which is after their Phase II improvements.

And they had then additional control alternatives going from C to G that was a lead in to the next phase of CSO control. And they actually selected alternative E which is a Phase III control program. And that control program was generally focused on the eastern half of the city. We had expanded retention basins, putting in disinfection facilities, additional conveyance pipe extension, expansion of the wastewater plant. Looking at an additional $250 million to $350 million adding to the roughly quarter of a billion I should say that was spent on the earlier phases.

So this is a really nice plan and I want to just show one more thing here which is a type of cost performance analysis that the city used. And here we have a capital cost in millions on the vertical axis, and we are looking at percent of the James River miles that are meeting water quality standards on the horizontal axis. So the city moved from left to right under the scenarios out to E here where they have the most cost effective point. As you can see, they are maintaining, achieving water quality compliance on greater than 90% of the time through that option. But if they were to continue to spend money on

alternatives, F, G, etc., they really wouldn't be making much improvement. So they are definitely at the inflection point or the knee of the curve with this type of analysis.

So, we are ending up this session, and I would just say that in conclusion the objective for Richmond is to keep the citizens happy as well as their visitors, safe and happy.

Nikos Singelis: And that looks like Bart Simpson is very happy in this picture. I have a question, I know we are moving into a question break, but I just can't resist asking a question of my own which is you mentioned earlier that full separation is the most common alternative, but where does that really fall when they are looking at alternatives in terms of the sort of cost knee of the curve kind of thing, it would seem to me that the full separation probably is often a very expensive option.

Mike Sullivan: Yes, you are right; it probably is one of the more expensive options. But I think that it is used very widely in two cases. First of all, a lot of small communities think it is the best option; they just like to get rid of the CSO problem because they don't have a big CSO area.

And the other cases in larger communities where they just use it very strategically in smaller sections where if we just do a little bit of a fix here we can eliminate part of this combined sewer area by separation. So those are the two cases where it is most widely used.

Nikos Singelis: So that is sort of site-specific approach to within the greater system, you can mix and match some of these approaches.

Mohammed Billah: Nikos, I just want to add something to Mike actually. The separation is the easiest way to think that if I don't have CSO I do not have the CSO problem. But at the same time, the communities need to make sure that is their best option for the water quality issue, because sometimes to separate the system you can increase either stormwater flow into your water body, and that will decrease your water quality standard. So that is why you need to see the bigger picture that what are the impacts that you may have due to the separation of your system. But that is the one thing that you need to consider also during separation.

Nikos Singelis: Well Mo, I am really glad you said that and we will keep these people reminded that if they do do sewer separation they will have to deal with me.

Mohammed Billah: You are absolutely right, Nikos.

Nikos Singelis: Alright Jim, so do we have any questions from the audience here?

Jim Collins: Yes, Nikos, we do. And actually, I think the first one will probably be answered by Mohammed. And that is Ben from Seattle is asking how do you prioritize CSOs if all CSO basins discharge to sensitive areas?

Mohammed Billah: That is a very good and critical question. That is, if I understand your question correctly, that if you have discharge into the sensitive water bodies all of the CSO, how are you going to characterize the discharge? And you can have separate approach for that one, since you need to find out what is the impact of your discharge as individual discharge that you are having. If you have 10 CSO discharge, and you need to find out what are the impacts for those 10 discharges individually. The second issue that you need to consider is the volume, who generally has the maximum volume discharged into the water body. How do I need to consider the frequency? How often out of those 10 possible CSO outfalls which one is more frequently discharging into the water body? Finally you need to consider is the cost for the control that means you may have different CSO outfalls for how much it is going to cost to you if you do it individually for each of the outfall.

And the next one and the most important one I believe is visible outcome of the controls, because we need to realize the public is paying for these controls and these are very costly controls. If the public sees that for one particular sensitive outfall control they can swim in the river, you need to do that one fast, maybe though you have all of them discharging in the prioritized area, you need to have some kind of justification that which one you need to control first.

Nikos Singelis: I think Mo is saying that there is a whole bunch of factors within that, even if they are all sensitive areas. And cost and some of the characterizations but going back to what Tim was talking about, that sort of public participation can help you guide your choice ultimately if the public is really involved.

Mohammed Billah: Yes, you are absolutely right, Nikos. The LTCP by the CSO policy says that whenever you double up your controls and you measure in the cost, it is always better to coordinate with the public what is their opinion for the controls, how they want to control the CSOs, because they are ultimately paying for the controls.

Jim Collins: Okay, thanks. There were several questions about the presumption approach versus the demonstration approach. One of them specifically Dan in Cincinnati asked, does the presumption approach relieve the permittee from meeting water quality standards.

Mohammed Billah: That is a very important question. Within the CSO policy you would have to see the big picture of the approaches for the CSO control. Your presumption approach if you read it very carefully says up to 4 overflows. That gives you the feeling that if your do not meet the water quality standard, you are not guaranteed for 4 overflows. Because your overflow can go down to meet the water quality standard. At the same time since there is minimum 85% capture by volume. That means if you do not meet the water quality standard, your capture volume may go up and that is a negotiation between you and the set permitting authority.

Now you go back a little bit further down the CSO policy. CSO policy has reopened their costs. During the presumption approach, but I always said there is no presumption approach because end of the day you need to demonstrate that you are meeting the water quality standard. You use the presumption approach to double up your long-term control plan. But that long-term control plan must meet the water quality standard. So that reopened costs may secure that you are meeting the water quality standard. And that is the reason you need to do the post-construction complex monitoring that you are meeting the water quality standard within an LTCP.

Jim Collins: Great. Well, Kevin in Washington State had a specific question. And that is, if a community has 10 CSO outfalls and discharges from 4 of those outfalls occur during a given storm event, have they reached their limit for the year under the presumption approach?

Mike?

Mike Sullivan: Yes, I think that the 4 overflows per years means it would be 4 different rainfall events. So in any given rainfall, heavy rain, many of your CSOs might overflow, and that would still be considered one overflow event per year. And the 4 would refer to 4 events.

Mohammed Billah: Nikos, do we have like a 30 second permitted that I can clarify this question a little bit more?

Nikos Singelis: Sure.

Mohammed Billah: Okay, actually the question was if they have 10 CSO outfalls and discharge from 4, that means you are out 4 overflow events is considered is out the whole system, for the whole system. If you have 10 outfalls and 4 are discharging during an event, that will consider as one event, not 4 events. We are counting the event of the rainfall during that precipitation period how many times do you overflow, not the how many outfalls you overflow. The whole system is considered as one event of overflow.

Jim Collins: So in that example it would be 1?

Mohammed Billah: That would be 1 overflow.

Jim Collins: Okay, thanks. There actually are several other good questions about the presumption approach and demonstration approach, and if we have time at the end we would like to get to those, but I think it is probably time to move on now. So Nikos?

Nikos Singelis: Yeah, okay, so we are going to launch into Session III here which is the last 3 of the control measures: Maximization, Implementation Schedules and as Mo was just mentioning, that important piece of Post-construction Compliance Monitoring. And I think Tim is going to lead us through these with a couple of examples as well.

Tim Schmitt: Thanks Nikos. I'm going to lead us on home here. So as Nikos said, the last 3 of the 9 elements of the long-term control plan that we are going to cover in this section are Maximization of Treatment at the POTW, the Implementation Schedules and then Post-construction Compliance Monitoring.

Element number 7 is Maximization of Treatment at the wastewater treatment plant. Maximizing flows to the wastewater treatment plant takes advantage of any excess treatment and/or storage capacity at the wastewater treatment plant.

Many plants have excess primary treatment capacity, often two times the secondary capacity. And plants can take advantage of this by ensuring that more flow gets to the plant. First, by getting more flow to the plant you ensure that more flow through the CSS receives at least some treatment. Depending on flow volumes, you may be able to get the increased flows through all of your processes or

if you have wet weather treatment through that wet weather treatment which might typically consist of primary treatment and disinfection.

Second, if you increase the amount of flow getting to the treatment plant, you might be able to eliminate or at least minimize overflows that are occurring in sensitive areas.

Some specific methods for maximizing flows to the wastewater treatment plant include expanding the capacity pump stations, such as what we see on the upper left, or expanding other processes that cause hydraulic bottlenecks in the system. Another option is take advantage of the existing storage or to add storage so that hydraulic bottlenecks don't prevent maximization of flow to the plant.

So what types of information should you include in your LTCP? Typically, the expectation is that you discuss your hydraulic analyses within your combined sewer system. These can range from simple flow balance calculations which Mike had shown earlier, to more complex hydraulic calculations if your system warrants it. You would want to identify potential hydraulic bottlenecks within the combined sewer system. And then evaluate potential options for maximizing flow to the wastewater treatment plant.

And here we have a graphic of a section of a combined sewer system with a regulating weir. For example, one of the things you might be able to do is to raise that weir to keep more flow in the combined sewer and get it to the wastewater treatment plant.

I now want to talk a little bit about an example system. This is Ottawa, IL, which is a small community of about 18,000 people. Ottawa had excess treatment capacity at their wastewater treatment plant, but flows to the plant were limited by the capacities of the interceptor sewers and the pumping stations within the system. But the permittee focused on maximizing flows to its wastewater treatment plant and conducted several projects to make that happen, including evaluating manholes and raising weir heights where it wouldn't cause basement backups, increasing maintenance to remove settled solids and regain capacity in the combined sewer system, removing I/I from the system by relining pipes. And adding a new interceptor line to bypass pump station that had become a hydraulic bottleneck.

And they have documented all of this in their LTCP.

Now we want to move on to element 8, which is the implementation schedule. And I want to start out by talking about what the CSO control policy says about implementation schedules. And the policy says

that schedules for implementation of the CSO controls may be phased based on the relative importance of adverse impacts upon water quality and designated uses, priority projects identified in the LTCP, and on a permittee's financial capability. And it is that financial capability that I want to talk about a little bit more.

Determination of financial capability is a two-step process. Phase I is the residential indicator which evaluates a financial impact of a long-term control plan on community residents through things like impact or looking at median household income and unemployment rate. And then Phase II looks at the financial capability of the permittee through things like bond rating or community debt.

And then going into a little bit more detail here about how to determine the residential indicator and then the permittee financial indicator. How do you determine the residential indicator? Well first you need to add up all the current and future costs for current and planned wastewater, CSO and stormwater operations. You want to determine the residential share of these costs versus the share that is paid by your commercial or industrial clients. Then you want to calculate the average cost per household. Then you want to get the median household income for your area, and this is something that should be relatively easy to come by. There are a number of websites where you can get this information. I believe the census bureau has it, and if you go to our resource page I think we have got some information there about where to get that information.

After you get all of that information together you divide the average cost per household by the median household income to come up with a score for this indicator. And as I said, most of the data for this indicator should be readily available but we do have information on how to get this in our resources document.

Moving on to the financial indicator, this is a pretty complicated chart. But most of this data should be available relatively easily as well, however I would suggest that you might want to get somebody involved from the financial side of your utility to help get some of this information, which includes things like bond rating, net debt, unemployment rate, etc. And after you compile all of this information you look at all of these, you score them, and you come up with an average permitting financial indicator. And then you put those two together in this financial capability matrix. I'm not going to go into detail here, but you can see that the matrix has the permittee financial capability indicator scores along the left hand axis, ranging from weak to strong, and then along the top, the residential indicator ranging from low to high. And when you cross reference those two you get an overall burden on your community which could be low, medium or high.

I also want to point out that if you have a high burden, you can often talk to your permitting authority about putting together a phased implementation schedule for your CSO controls so that you don't have to absorb all the cost of those controls at one time.

Nikos Singelis: Alright Tim, now we have a poll question just right on this. And so here we would like to know if you have an idea in your community generally how you would rate the affordability of CSO controls with respect to the financial capability in your community.

So using the same chart that Tim just went over, do you think it is a low, medium or high burden or are you uncertain?

So again, we will give you a couple of seconds there to decide the answer. And we will show you those results in a second.

Okay, and here we go. Looks like very few here admitted a low burden, which I guess wouldn't come to any surprise, and we have a range of answers here. 18% at medium, 31% at high, and 50% uncertain, probably not familiar with that calculation or haven't done it yet at this point.

Mike, you had a comment there?

Mike Sullivan: Yes I did. This matrix is not the final word all the time. It is used for negotiations and it is one way of calculating it. But I have seen situations where a community came up with a low burden, but they were really very economically depressed for one reason or another, they just came up with a low burden. But they would hardly have, well they might need more time to implement their program. So it is not their final word but I think it is one of the tools that is available and it can be added to the long-term control plan.

Tim Schmitt: Okay, in our next slide we actually see an example of how a community has used a phased approach to achieve 4 overflows per year. And in this case, they might have used their financial capability analysis to talk to their permitting authority about implementing a phased approach. But this slide shows how at the beginning before the long-term control plan was implemented you have got an existing situation where you have something around the order of 35 overflows per year, but then as you phase in your long-term control plan you go from 35 down to less than 25 in Phase I, down to between 5

and 10 with Phase II, and then once you have implemented Phase III you are down to your goal of 4 overflows per year.

Nikos Singelis: So Tim, I have a question for you here, and this may be stepping into a thicket of weeds here, but when you talk about phasing how long can this phasing process go on?

Tim Schmitt: Well I think we have an example coming up that shows that it can go over a long period of time, and again, one of the things about the financial capability or the affordability analysis is that it is one of the tools in the toolbox for the permittee to talk to their regulatory authority about how long they can phase in their CSO controls particularly if it is going to be a disruptive or costly process. and as we know, a lot of these are.

Nikos Singelis: So it can be more than a 5-year permit cycle is what you are telling me?

Tim Schmitt: Right, it can be. But again, we have emphasized several times over the webcast that this is something where you want to be talking to your permitting authority to make sure that you have got the buy-in and that you have the backup information to show why that is an appropriate timetable for your community.

Nikos Singelis: Gotcha.

Tim Schmitt: Okay, and here is our example community. This is Seaford, DE. It is a small community, population under 7,000; and this is actually according to their city seal, the nylon capital of the United States. And evidently during WWII these folks produced a lot of nylon for the troops. I don't know whether we have the City of Seaford on today, but if so you can send us a little message and let us know you are on.

But as we were just taking about, Seaford chose to go through a sewer separation process and they completed 8 phases of sewer separation over 18 years. So obviously a long time. But one of the issues with sewer separation is that it is costly and also very disruptive. So they wanted to make sure that they could phase this in and try to minimize the impact both to their budget and to their community. And strangely enough, we now get back to something that was brought up a little while ago, because now that Seaford has separated its sewers, their efforts are now directed at controlling the stormwater discharges that have resulted from their sewer separation process.

Nikos Singelis: I'm sure they are thrilled to be dealing with yet another regulatory program.

Tim Schmitt: You've heard from Seaford?

Now we are indeed in the home stretch here. We want to move on to element 9 which is Post-construction compliance monitoring. Post-construction compliance monitoring is an important mechanism for reporting progress as well as for determining compliance with long-term control plan and the water quality standards. Permittees should make sure that their Post-construction monitoring plan is consistent with the goals of their long-term control plan and that it includes performance measures so that the permittee knows that it has achieved its goals.

Some of the specifics that may be included in Post-construction monitoring plan include monitoring rainfall and monitoring or modeling the collection system to document changes in CSO volume or the frequency of CSOs over time due to CSO control efforts.

Monitoring water quality during wet and dry weather events and comparing the post-construction water quality with pre-construction data. Monitoring water quality upstream and downstream of outfalls to evaluate changes in water quality due to CSOs.

And here we have an example from Minneapolis, MN, and this is a chart looking at the volume of CSOs into the Mississippi River over time. And you can see in 2001 they started with something like 40 million gallons per year of CSOs being discharged. But over time they have monitored their CSOs and they are now, last reported in 2007, they have met their target which is 0 gallons of overflow into the Mississippi.

Now we are going to have Bart and Homer demonstrate to us how to respond to specific permit requirements with specific performance measures in the post-construction compliance monitoring phase. Suppose your permit said that "*The permittee shall discharge no more than an average of four overflow events per year not receiving minimum treatment*." We've had some discussion about this earlier in the webcast. So what you do here, how would you demonstrate this?

Well, compliance monitoring could require either monitoring at the outfalls to record the number of overflows per year if you are a simple system. Or, if the system is more complex it might require hydrologic or hydraulic modeling to predict the number of overflows with a proposed CSO control that was not something that could be easily monitored.

And here we have a chart showing the number of overflows per year. And what you can see is at the base you have got about between 45 and 50 overflows per year. And then these have been, I think this was a modeled graph here, but from 2002 through 2007 the model predicted the number of CSO events per year, and you can see that it didn't predict that every year was going to be under 4 events. In 2003 it looks like we got five or six events. But the point here is that the annual average number of overflows is less than 4 which meets the target.

Another example of permit specific language might be "*The permittee shall monitor for E. coli and dissolved oxygen from April through October according to the attached schedule.*" If you've got permit language that mentions specific parameters such as here, then you develop your compliance monitoring program on a site-specific basis to address the specific water quality impairment for designated uses that have been mentioned in your permit language.

And here we show an example of monitoring for E. coli and DO at several different locations, including above CSOs. At two locations the Water Street and the Canal Street Bridges that are within the CSO impacted area, and then below the CSOs.

The monitoring for E. coli is shown to be at 8 times per month and that will give you sufficient information so that you can calculate a Geo-mean and the water quality standard is typically given in a Geo-mean. And then the DO monitoring is continuous because there may be an instantaneous minimum standard that needs to be met.

One other thing to note here is that by maybe using a routine schedule, for example monitoring every Monday and Thursday, you will get a mix of wet and dry weather samples over time and this is valuable for demonstrating compliance for a wet weather monitoring program.

There are a number of different challenges for post-construction compliance monitoring. One of the big challenges is that CSOs occur at the same time as other wet weather generated events, such as stormwater discharges, SSOs, agricultural runoff, etc. These sources may have differing effects relative to each other in different watersheds, so it is important to try to distinguish the different impacts that are occurring at the same time.

One of the other challenges is rainfall. The differences in rainfall from year to year will result in different responses by the combined sewer system. In addition, there are no two events which will be identical due to the differences in conditions on the ground before the rain and the differences in rain intensity,

duration, etc. You can see an example of the differences in rainfall intensity over a pretty small area in the graphic on the right. The red areas are areas of more intense rain. And the greener, yellow and green is showing areas of lighter rain. And so this is a pretty small area but if you could actually read that chart it would show you that the differences in rainfall intensity are very different over that small area.

There are a number of other challenges to conducting monitoring during wet weather, access is often limited to your monitoring locations. Safety is often an issue. You typically will put your equipment to extreme tests. Expenses can certainly be substantial. And wet weather often can occur at inconvenient times such as in the middle of the night or if you are in a major metropolitan area maybe it occurs at rush hour, something like that. So doing wet weather monitoring is always a challenge.

And here I have an example of a post-construction monitoring program from the town of Goshen, IN, again a small community with a population under 30,000. Goshen attained state approval of its monitoring plan and I want to go back and reemphasize the fact that we have stated several times that conferring with your permitting authorities is always a good idea to try to make sure that you guys are on the same page with how you are going to do your planning, and in this case how you are going to do your post-construction monitoring.

Goshen included their monitoring protocols in their long-term control plan, the who, what, where, why, when, etc. They monitored after selected rainfall events, after their CSO program was completed. They used the same sample locations as they used for their LTCP development. And they coordinated with their MS4 permitting authority and their MS4 monitoring requirements.

And I want to close with returning to one of the places where we began and one of the things that I just said, which is our key to success. And that again is discussing the scope of everything that you are going to be including in your long-term control plan, all 9 elements that we have gone over today. You want to discuss those with your NPDES and water quality standards authorities in advance to make sure that those authorities are going to have sufficient information to identify the appropriate level of CSO control that you have put in your long-term control plan.

And with that, Nikos, I am going to turn it over to you and I think we are going to take some questions.

Nikos Singelis: Yes, we have 10 minutes left for questions so we have quite a long time and I'm sure people have been sending in their questions, right Jim?

Jim Collins: We haven't really received questions on the session III, but we do have time and we have plenty of questions from earlier in the webcast that we will get to in a few minutes. But first I wanted to remind everyone that the seminar will be archived so that you can access it after today's live presentation. The archived webcast will be posted within a couple of weeks, so revisit EPA's NPDES training website to view the archived presentation.

Again, we have posted the speakers' contract information in case you would like to contact them after today. You can also find the comprehensive resource list by pressing the resources button visible on your screen. You will need Adobe Acrobat Reader to view this document.

Finally, a webcast evaluation survey should soon appear on your screen. Please consider completing this survey to let us know your thoughts. We do appreciate your feedback as we work to improve our webcasts continuously. If you do not see the evaluation survey on your screen, please turn off your pop-up blocker.

Okay, now we have time for some additional questions. One from Brian in West Virginia, who asks, our system has had only one CSO event in two years. There have been no events during the past 16 months. Our system is wanting to get rid of our outlets, we have two outlets, because only 1 of the outlets has not overflowed in three years. Should we keep these outlets or phase them out?

Mohammed Billah: Okay, Mike, I can answer this question.

Nikos Singelis: It sounds like a hard question to answer doesn't it.

Mohammed Billah: It is a petty easy question but there are some policy requirements here in the question. If you have the CSO outfall, if you do not see the outfalls, technically you are a CSO community. Now you make the judgment, do you want to be a CSO community or you do not want to be a CSO community? At the same time, even if you have a discharge like every ten years, it is always safer technically to have an outfall otherwise that will back up into your system.

So now within the LTCP you may have some kind of control but what about the one simple overflow you are having, you can control that one not to have that overflow. It looks like you have a very simple solution for that one. You may have some kind of bottleneck in your system; you can get rid of the

bottlenecking of the system, one overflow may not happen to you. So you can have that one get rid of the CSO overflow, close that outfall, you will be no more a CSO community. Now you make the adjustment.

Nikos Singelis: Mo, I think your point though is very right, as they were saying they have a couple years' data here to deal with that. But if you are looking at a 10-year storm or a 25- year storm or a 50-year storm, maybe that hasn't' happened in the 3-years that you have been watching these things. And so they seem to me very important to really think about what is going to happen in an extreme weather event in that community and in that system.

Mohammed Billah: Yes, Nikos, you're right. You need to make adjustments at what you expected.

Jim Collins: Great. The next question actually going back, I think we will address this one to Mike – it is a modeling question. And this is from Elizabeth in New York. How does a downstream community address the upstream impacts as far as water quality when modeling and deciding on the selected approach to use in their LTCP?

Mike Sullivan: Well, Jim, I think that is typically done in the following way. One would assume two scenarios, one is that the upstream conditions would be as they are, the current conditions, and that assumes no change in upstream water quality.

The second way would be to have another scenario assuming that upstream conditions were improved and meeting water quality as they entered the downstream community. And that way you would get answers, modeling answers, to both situations, and that they were widely apart, differed greatly. That would give you some insight into the importance of the upstream water on the conditions in your own community.

Jim Collins: Great. Thanks. Okay, the next question from Nancy, and that is, how does a community justify implementing green stormwater controls and green infrastructure as part of their LTCP? This was a trick question to try to see if Nikos wanted to respond.

Nikos Singelis: Okay, I'll try to respond and I know Mo will probably have something to say to it there, but we were sort of talking about the alternative to full separation before. And it seems to me that if you are not going to go for full separation, one of the options that you have which is kind of represented by these, if you will, green infrastructure or low impact development kinds of techniques that are sort of

the buzz in the stormwater world right now is that you are reducing the potential flow into the system by capturing that rainfall on the site and using it, infiltrating it into the ground or perhaps using it in a cistern for later use to water plants or things like that so that you have that potential sort of in the landscape to reduce the potential flow in.

Anybody want to chime in on that?

Mike Sullivan: I'll add something there. I think that as a general rule, green infrastructure, LID are good in stormwater areas as well as CSO areas, so they are really good in urban context. And in CSO communities the permittee rarely has the authority over land use because it is a complicated thing and politically in most, but they can encourage the infrastructure, but they don't really have the authority to make sure it is constructed, particularly on private property.

So the challenge then is finding a way for communities to get credit for that as it is put in place over time. And you can't necessarily depend upon green infrastructure as your total solution long-term control plan, but it should have a place.

And one other way to justify it is that in combined sewer areas just reducing the runoff reduces the volume of combined sewage that is generated and that means that you get some cost savings in the cost for storing, pumping and treating that combined sewage. And that can be substantial over time, particularly as you are getting more green infrastructure in place.

So I hope that addresses the question.

Nikos Singelis: One thing I would say though, not quite sure exactly on the authority issue where you are coming from, but communities do have through their own ordinance the ability to require green infrastructure on private land. Now that may not be something that would come down on the heavy from the federal level. But communities certainly can enact ordinances to get these sorts of things to happen. And we have a lot of information in stormwater program about just how to go about doing that if people are interested.

Tim Schmitt: And the one thing that I wanted to add was that the proof is sort of in the pudding and to go back to what Mike had talked about with the flow balance diagram, if you are taking water out of the

system, certainly that is going to show up on your flow balance. And so I think that is going to be one way of showing the impact of green infrastructure, and I think a pretty straightforward way.

Nikos Singelis: I think we have time for a few more questions. We can actually go over a few minutes Jim, so we are okay. And just to remind audiences out there that the survey should be up on your screen right now. And if you don't see that it means your pop-up blocker is on, and so just flip that off and you will be able to complete the survey. And we would certainly like to know what your impressions of this webcast were.

So let's take a couple more questions.

Jim Collins: Sure. Well, there were actually three questions on the distinctions between the demonstration approach and the presumption approach. And I will try to ask them in a related fashion.

One was, and it is specifically addressed to Mike, can you please clarify the presumption approach. Do the 4 to 6 overflows per year require treatment primary and disinfection, for example?

Mike Sullivan: Basically all of the combined sewage up to those 4 per year requires treatment, but those 4 can be untreated combined sewage.

Jim Collins: Okay, thanks. Then there was another question about are there conditions under which a community must use one approach or the other, presumption versus demonstration?

Mike Sullivan: I'm not aware of any condition or any dictators saying that, but there might be.

Jim Collins: Policy is wide open --?

Mohammed Billah: Policy is wide open for the approach. Any community can take any approaches. Even if you want to do separation, that may not be appropriate for you, we can do that one. Policy doesn't dictate what you need to do.

Mike Sullivan: Jim, I can say that some states show a strong preference to 4 overflows per year. So that might be what the question was about.

Jim Collins: And then the final one on this specific topic. Please explain how the demonstration approach can actually be a lower hurdle to achieve than the presumption approach, particularly for example when a CSO discharge is without treatment. And then as a related issue there, please mention in your response about water quality standards maybe being violated for bacteria.

Tim Schmitt: Well I am not the authority on this presumption and demonstration by any means but I think I can address this question. With regard to the demonstration approach, if a community still had more than 4 per year, say they had 10 overflows per year and they were scattered throughout the year evenly, that would be one overflow per month or something like that. And if the water quality standard was a geo-mean, well it might be that the discharge was small relative to the volume of water and the geo-mean would not be violated in any of those months. So that I think is an example of where one could show that the water quality standards were not violated by the remaining CSO discharge.

Jim Collins: Well, another question. How does the permitting authority either allow or what documentation do they need to see for a phased approach? Is there a reasonable limitation in time if the permittee shows that the actions taken will cause a high financial burden?

Mohammed Billah: Answer to that question, this is a negotiation process about what you are planning to do. And at the same time it is always wise to think about what phase will give you maximum impact to the community because people will see that one. So you need to take that one as a priority to do something, like suppose you have a park and there is a CSO going through the park. So everybody is using that one. So if you can get rid of that CSO, public will see and they will be able to use that park. So your approach should be always directed to that one park and timing is like how long the phased approach can be taken depends on the negotiation process between you and the permitting authority.

But we need to realize one thing that most of the time the enforcement people are comfortable for your overall CSO control should be written within between 15 to 20 years max. So that is the maximum period that enforcement people are looking for that, you will have some kind of CSO control for a CSS. So whatever the phased approach you take, you need to break it down in that particular timeframe.

Jim Collins: Thank you, Mohammed. Well at this time I would like to conclude today's webcast. And again I would like to thank Mohammed, Nikos, Mike and Tim for presenting today. And also I would like to thank everyone out there who joined us.

Just as a reminder please check EPA's NPDES training courses, the website for training courses and workshops for the latest information on upcoming CSO webcasts, the URL is: www.epa.gov/npdes/training.

An announcement will also be sent out through the NPDES News, so sign up for this email newsletter if you have not already done so. That concludes the webcast for today. Thanks for joining us.