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PRESENTER #1: CHRIS AVERY, INTERIM DEPUTY DIRECTOR TUCSON WATER: POTABLE WATER AND RECLAIMED WATER DELIVERY SYSTEMS AND SYSTEM CONDITIONS

MR AVERY: I’ve been asked to respond to two questions from previous presentations at this time. The first question is about the story of the MUM, which is the Metropolitan Utilities Management Group that began in the mid 1970s and effectively terminated about the time that the 1979 IGA was entered into between the City and the County and also to talk a little about the history of 1979 IGA. MUM was an initial cooperative effort between Pima County and the City of Tucson for basically joint operations of water and wastewater, operations that existed at the time. In early 1970s, the Pima County Hydro Treatment Plant facility was in the development stages and most of the wastewater that was being treated in the region was being treated by the City of Tucson at the Roger Road Plant.

The director of MUM was the director of Tucson Water at the time who was Frank Brooks and there was a Board of Directors at MUM that was comprised of citizens from the community including some citizens as well as politicians. The Board and the MUM process seemed to work well for a while, until toward the end of the process seemed to break down based on some disputes about where water would be provided and whether the County had the authority to provide water, to tell the City where it could and how it could provide water, because there was no statutory authority at the time for the County to be in the water business. The MUM process was effectively ended by the 1979 IGA between the City of Tucson and Pima County and that IGA, which I’ll talk about now, gave the Roger Road wastewater treatment plant, and essentially the City’s entire sewage system, to Pima County and the City obtained in return a share of the effluent from all of Pima County’s wastewater treatment plants.

The 1979 IGA, this is probably the linchpin of water and wastewater management in this region at this time, was entered into between the City and the County in the summer of 1979 largely as a consequence of fresher, and there may be other factors here that other folks think are important and at this point I’m not here to give you a factual answer, I’m going to give you what I think is going to be more of an opinion than a factual answer, and that is that it’s my opinion that the primary driving force for the combination of the water and wastewater systems was pressure from the EPA and from the EPA funding process which essentially identified and wanted one agency in order to obtain federal funding for wastewater projects so it’s my opinion, and there may be other factors that were important and that were important to people at the time for a consolidation, but it seems in retrospect that the primary guiding force was the federal funding and the apparent belief and probably the reality that the EPA wanted a joint operation, a joint wastewater operation in the region and that it was only going to fund one single entity.

Anyway, whatever the reasons were, there were probably more than just one, by the summer of 1979 the City and the County entered into the 1979 Intergovernmental Agreement and that agreement was a landmark agreement in several ways. One of the factors of that agreement was that the City’s entire wastewater operation was transferred, including employees and you can imagine how difficult that must have been, was transferred to Pima County. So Pima County became the sole wastewater operation in the region and in return for transferring the investment and sewer operations to Pima County, the City obtained essentially the rights to all of the effluent that was produced by the Pima County wastewater treatment plants. There was, at that time, a division between non-metropolitan facilities and those that generate the outlying facilities that we have talked about up until this point, and the metropolitan facilities which are and were the Randolph Wastewater Treatment Plant, Roger Road Plant, and Ina Road Plant. After the City obtained all of the effluent by version of the 1979 IGA, it granted 10 percent of the effluent back to Pima County so that’s the other source of the 90/10 split. The City, at that point, was also . . .

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. . . to settle pending Tohono O'odham Nation litigation. In addition to that the City and the County granted each other reciprocal rights-of-way and easements so that those reciprocal rights-of-way and easements allowed the City of Tucson's water systems to be installed in any Pima County right-of-way outside the City of Tucson and allowed the County to install wastewater equipment and infrastructure in the City of Tucson's right-of-way property inside the City of Tucson. After the 1979 IGAs and right-of-entries that followed in 1982, there was not much that happened for the next decade or so and in 1995 the Randolph Wastewater Treatment Plant was taken off line as a consequence of the reconstruction of the new golf course you see out the back window, and that in addition to some other pressures lead to a lawsuit that the City of Tucson filed against Pima County in 1999 alleging some violations of the 1979 IGA. That lawsuit was settled by the City of Tucson and Pima County in the spring of 2000 and that settlement, in addition to setting up some definitions of metropolitan and non-metropolitan facilities, also got the effect of creating the federal conservation effort that you see here.

Most recently the City and County have amended the 1979 IGAs and the 1982 license agreements to provide some additional clarity about how the cost of water and wastewater should be paid for in those respected right-of-ways and up until now there are some current proposals that are going back and forth between the City of Tucson and Pima County about how to further refine the 1979 IGAs to take care of some current issues.

QUESTION: Chris, could you further explain a little about the concept of the conservation effluent pool and what is intended for the use of that 10,000?

ANSWER: Sure, the conservation effluent pool came out of the settlement discussions from the 1999 lawsuit between the City and the County and one of the primary issues that was affecting the region at that time was the designation of the cactus ferruginous pigmy owl as an endangered species and so the conservation effluent pool was established as a way for parties in the region first to obtain water that might be necessary to conduct habitat mitigation under a Section 10 permit with the US Department of Fish and Wildlife Service. Tina, correct me if I'm wrong here because I know you know more about this than I do, but the whole point of the conservation effluent pool was to establish water that would be available if municipalities or other entities in the region needed it to comply with the Section 10 permitting under the endangered species act. The effluent pool, or conservation effluent pool act is, if the City and County have leftover water after the Section 10 permitting was established, then the City and the County could agree that or designate particular projects as riparian projects and use conservation effluent pool water for those particular projects. One of the really important things about the conservation effluent pool agreement in the 2000 IGA between the City and the County was that it also adopted a relay rate for environmental purposes and that rate has been used by the City and the County to move water around in other respects not necessarily the conservation effluent pool water but the relay rate for effluent under the conservation effluent pool agreement was a way to get that water to projects through the reclaimed systems at lesser costs and is being paid by golf course use and other consumers of the reclaimed system and essentially what it does through a very complicated formula is it takes out the capital repayment costs of the effluent and reclaimed system and the treatment process and asks users to pay only for the operation and maintenance cost on the systems. At this point the conservation effluent pool water or environmental rate for effluent is about $300 an acre foot and the price that is paid by most users on the reclaimed system is about $710 an acre foot. So from that math you can see that in terms of reclaimed water that borrowed debt or capital repayment obligations for reclaimed is about $400 an acre foot and the operations and maintenance costs is about $300 an acre foot.

QUESTION (unintelligible):

ANSWER: Well, the Indian Tribes in Arizona and across the west have substantial rights to water. . .

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. . .but it’s based on a 1909 lawsuit that was accepted by the United States Supreme Court that recognized that the Indian Tribes were created, with, as part of their treaties with the United States, the tribes also obtained a reserve right for water that was necessary to supply the reservation and in the case of the Tohono O'odham tribe there is some history of agricultural use in the area prior to their creation of supply and prior to the treaties that they signed with the United States. So, they had substantial claims to water in the region and its no secret that groundwater pumping from the Sahuarita area, as well as the Tucson area, dried up the Santa Cruz River by the 1940s or so. So, the Tohono O'odham nation had substantial claims to water in the region and the fact that they had substantial claims to water in the region is illustrated by the fact that the Gila River Indian community, the Salt River Pimas and other tribes that were similarly situated in this area, only resolved their claims as of about 2006, 2007 for substantial CAP water rights. So, the fact that in Tucson we were able, and, I'm going to take a little diversion here and credit Morris Udall for this but I think that Morris Udall deserves a lot of the credit for helping to implement a settlement between entities in the Tucson region and the Tohono O'odham nation in 1983, which was, you know, 25 years before some of the other tribes in Arizona settled their cases. In fact, the San Carlos Apache Tribe has still not settled its reserve rights claim. So, there were substantial claims to water and the 28,200 acre feet of effluent was a way of settling those substantial claims and there are still some provisions and settlement agreements that allow Tucson Water some priorities in terms of obtaining rights to CAP water that the tribes, the Tohono O'odham Nation obtained in settlement should they decide to release it or otherwise put it to use outside the reservation. So, it's a difficult case but I can say from a legal perspective that, without commenting exactly on their case, that their claims were substantial.

QUESTION (unintelligible):
ANSWER: Without making it too complicated, the 28,200, we talked a little about shortages and we talked a little bit about what happened along the Colorado River in those times two weeks ago, the 28,200 acre feet of effluent that was given to the tribe and was held in trust by the Secretary of the Juries to be used for firming the CAP operation for those times. So, the use of that water is for assuring that those tribes have

access to their allocations during the time of shortages on the Colorado River.

QUESTION: I just have a question about the chart here. What is the significance of the larger number in parenthesis?

ANSWER: The larger number in parenthesis is if the conservation pool is used then you have the smaller number, there's 30,000 acre feet left. If the conservation effluent pool is not used, then you have the larger number in parenthesis, the 40,000 acre feet that's available. The conservation effluent pool of water is a year to year allocation, it's basically a use it or lose it allocation that will build up over time. Currently it's not being used so the larger numbers are what's actually in effect at this time.

QUESTION: So are you telling us the conservation pool currently being zero that, there is currently no effluent being used for conservation purposes?

ANSWER: Well, what I'm saying is that there is a pool of water that has been established for that purpose and there is some use on the reclaimed system, for example, the linear parks along the Santa Cruz and Rillito were almost all on the reclaimed system. That's not designated as conservation effluent pool water and one of the reasons for that is that the initial designation for conservation effluent pool was based on obtaining the Section 10 permit, it's a long history, but basically the cactus ferruginous pygmy owl was D-listed although there were some Section 10 permit processes that were started. It is my understanding that to this date no one has obtained a Section 10 permit yet from the Fish and Wildlife Service as a consequence of that process and I know that the City of Tucson has some applications pending. The County has a conservation plan that has some Section 10 permit processes in it and I know that the Town of Marana is also working on a Section 10 permit process. If the outcome of those processes is to obtain some of this water for riparian that would be available, otherwise the City and County will have to agree on riparian projects, designate them mutually, in other words, the City and County each have a veto vote on what a riparian project is or is not, and they'll have to agree on what is a riparian project and its water use.

QUESTION: I'm looking at this intergovernmental agreement and you're talking about modification and we've invited all kinds of entities (unintelligible).

ANSWER: I'd like to point out really quickly that after the 2000 IGA the City of Tucson entered into some subsequent agreements with the Metropolitan Domestic Water Improvement District and Oro Valley that transferred effluent rights based on the 1979-2000 IGA respectively and are shown up on the screen here. So, there have been some modifications as a consequence of those agreements to transfer effluent out to other water providers.

CHRIS AVERY CONTINUES: Two weeks ago we talked about our customers, we talked about the water resources that are available to the City of Tucson and to Pima County and this morning it's a privilege to talk about the infrastructure that connects our water resources to our customers. Lets start with this slide that you've seen now a couple of different times.

This is the Tucson Water's service area. These blue lines are Tucson's water pipes. These purple lines are Tucson's water reclaimed system. The recharge facilities are located generally out in Avra Valley and south of Tucson and we are going to talk today about the potable water and reclaimed water infrastructure that delivers the resources that Tucson has available to its customers.

Lets go back to this one. This is a three-dimensional view of the Tucson basin and the cross section is essentially along 22nd Street. As you can see the Tucson basin is relatively flat in the middle, it starts getting pretty steep around the sides. This is some exaggeration, and this is Tumamoc Hill and the original Tucson water system that started back in the 1880s, was located primarily along the Santa Cruz River within this general area and this is called the A Zone. Each 100 foot of vertical rise in the Tucson basin creates about 50 pounds of water pressure difference so as it moves through the basin, Tucson Water in fact operates about 25 different water systems that are connected to each other. This is a plan view of what those separate water systems look like distributed throughout the basin. I guess one thing I'd like to note is that these pressure zones are also generally used by other water providers in the area, Oro Valley, Metro, and they generally follow Tucson Water's elevation and pressure differences. The pressure difference means that at the bottom of one of Tucson's water pressure zones you are still going to get pressure that's within the recommended engineering specifications and at the top you'll get water that also meets those specifications without exceeding them. If we were to break the system up into larger sections to make it less complicated we would end up with places in town where it would be very difficult to take a shower and places in town where pipes would continue to burst with the pressure. As you can see generally the system stays relatively flat and then it starts to get a little more complex as we get more toward edges of town and there are still some areas where Tucson Water actually reacts to local conditions based on the topography.

Ok, lets talk about the potable water infrastructure now for just a second. Basically, the potable water assets that are available to the City at this point consist of the storage and recovery project in Avra Valley, transfers through the Hayden-Udall treatment plant up to the Clearwell reservoir and delivered to the City through a series of large diameter pipelines in the Tucson region as well as the existing well fields that were developed essentially from the beginning of Tucson Water's existence and that continue even today as an important back up supply for the City. Those well fields are essentially located here on this map. The central well field that was the original source of supply for Tucson Water's customers, as the resource began to be depleted in the central well field, Tucson also developed some well fields on the south side as well as the Santa Cruz well field and Avra Valley well field originally as independent sources of supply and then the recently developed CAVSARP well field as a recovery well field for the recharge operations that are out in Avra Valley.

Now, as you can see by the total number of these well fields that are prevalent – let me interrupt for a minute – as a consequence of the TCE contamination on the south side here we also operate the TARP facility, the Tucson Airport Mediation Project. That consists of nine wells with a total capacity of 6.5 million gallons a day and the water from those wells is pumped to the Tucson Airport Remediation Project treatment plant located along the freeway down near I-19 and Irvington where the water is basically stripped and cleaned and used for potable purposes. The total number of wells in the well fields is about 216 wells depending on whether the recent one just got equipped or not and the total capacity of those wells, if the were all operational, is 212 million gallons a day. Another thing that I would like to show you here is that in recent years the department has been able to start taking advantage of some continuity to scale.

You can see that in the central well field we have 120 wells with a total capacity of about 90 million gallons a day. In CAVSARP, 33 wells have a capacity of 70 million gallons a day. Most wells are large diameter high-capacity wells that are drilled very deeply and have essentially duplicated the entire capacity of the central well field in some respects with about a quarter of the wells. The number of 212 million gallons a day assumes that all of the wells are in operational condition at one time. That's really never the case given how many wells there are in Tucson. The fact that some of the wells in the central well field are located in close proximity to the Broadway Landfill and that other wells are located along some sensitive riparian areas along the Tanque Verde Wash so, at this point, generally our well field capacity is somewhere around 170 million gallons a day, depending on which wells are in service and out of service and if we were to go ahead and rehabilitate and get every well working and operational, that would be 212 million gallons a day. In addition to the central well field, we also have some isolated wells and generally those wells are serving very small amounts of water to customers that are located fairly remote from the Tucson Water central service area. Those areas include the Diamond Bell area on the southwest side of town, what we call our W Zone customers, west of Marana, the town of Catalina. The well field in the Corona de Tucson area, as a result of recent development pressure down in the Santa Rita valley area, there has been an agreement reached between Tucson Water and developers to extend the pipeline along Houghton Road up to the central distribution system. So, when that pipeline is complete this system here will cease pumping groundwater and start to be part of Tucson Water's integrated system and be pumping renewable supplies.

In addition to the well fields that access Tucson water, its groundwater resources, we have the recharge facilities that are used to put Tucson's Colorado River allocation to use. There are three recharge facilities at this time but the first one that was constructed by Tucson Water in partnership with the Central Arizona Water Conservation District is down at Pima Mine Road. We showed that mound of water at the Pima Mine Road facility two weeks ago and you can see that it's located in relatively close proximity to the Santa Cruz well field. The next recharge facility that Tucson Water constructed was the CAVSARP recharge facility in Avra Valley and that recharge facility has 318 acres of basins, 33 recovery wells. Just last May, basically two months ago, Tucson Water opened the first recharge facility at the SAVSARP recharge basin located about five miles south of the central Avra Valley storage project, and when those basins are complete there will be 220 acres that will be permitted for recharge at about 60,000 acre feet a year. The total recharge capacity that is permitted for Tucson Water at this point is about 170,000 acre feet a year.

We are seeing higher rates of recharge from the CAVSARP basins than was originally anticipated under our current conditions and we're also seeing what we would consider to be highly productive results from our new recharge basins in SAVSARP. There's an allocation pending to increase the recharge capacity of the CAVSARP facility to 100,000 acre feet a year. If the SAVSARP facility continues to operate at the slightly higher recharge rates that we're seeing in practice today, that facility might also increase substantially and we think its reasonable to assume that without constructing any new recharge basins that the City of Tucson will have the ability to recharge as much as 200,000 acre feet of water a year in its existing facilities and that's about one and a half times our current Colorado River allocation and that's about one and a half times our annual demand for Tucson at this time. As you can see from the SAVSARP facility and Pima Mine Road facilities that we still don't have as much recharge capacity as we do at CAVSARP and that's because we haven't constructed the well fields and distribution pipelines to bring the water back to Tucson yet. But we will talk about those future facilities in two weeks when we talk about future infrastructure.

Once the water from the recharge facilities or from the well fields is distributed into Tucson Water's distribution system it next goes to storage reservoirs where it's allocated for storage before it goes out to customers. Tucson Water has about 37 storage reservoirs and the capacity of those reservoirs is 296 million gallons, that's about twice Tucson Water's peak day deliveries. So, what that means is that we have about two days of storage in our reservoirs on a peak day. In addition to the reservoirs, we have 145 boosters. The boosters are basically what allow us to ship water uphill either from reservoirs to higher reservoirs, or from well fields to recharge facilities to reservoirs where it's stored and distributed to our customers. Many of our booster facilities are located next to reservoirs so you can see here, and here, and other places. There are some booster facilities that are located outside the reservoir, but generally the reservoirs and boosters go together to store the water and then you're going to be able to take the water out the reservoir and lift it up and out to some other place where it should go. Once the water is put into the system, it's distributed out to customers through what we commonly think of as Tucson Water's distribution structure of pipelines.

Tucson Water has about 4,500 miles of pipeline in its system. Of that pipeline, we consider 400 miles of it to be large diameter or what we call transmission veins. You can think of those as the arteries and then the other remaining small 12 inches in diameter you can think of as the capillary distribution veins and you can see that the ratio of large diameter veins to smaller diameter veins is about one in ten. So, run of the mill distribution is about 4,100 miles on a large scale. Really important, really expensive pipelines are about 400 miles. We have about 90,000 valves on the system. Valves are the operation and maintenance crew's best friend. They allow us to get in to work on an isolated part of the system and they're helpful and they're very costly but they're a very important compliment to the system. They allow us to work on the system, they allow us to shut off the water in an emergency, they allow us to be flexible in ways that we probably wouldn't be able to do if the valves weren't working properly.

This is actually my neighborhood. It's located near Tucson Boulevard and Broadway and as the water in my neighborhood essentially comes from a reservoir that's located down near 22nd Street and Craycroft in the V Zone and it probably flows on most days through a large diameter pipeline in 22nd Street. From there it hits a 12-inch main and then an 8-inch main going up Tucson Boulevard and comes into the neighborhood through a series of 4-inch and 6-inch mains and you can also see all of the fire hydrants and the valves in this system that are located in this area. In addition to the physical infrastructure, Tucson Water and any modern water utility also has what I like to think of as electronic infrastructure that's equally important in operating, maintaining, and just running the utility and one of the ways to think of this is that through modern technology and remote telemetry, Tucson Water from central location, can control, depending on how well the system is working and whether all the valves are open and not stuck and whether all of the radio transmitters are actually working, we can essentially control the system from one central location and move water throughout the system on a remote basis rather than sending field crews out into the areas exercising valves or turning pumps on or off on a manual basis. That electronic infrastructure is very costly but it allows the system to be run more quickly and more responsibly and able to deal with situations on more of an immediate basis.

One of the most important functions of the control room operations at Tucson Water operating at the Tucson Water Airport Mediation Plant, is a fairly complex system and the parameters of that system have to be monitored continuously to ensure that all of the systems are operating and that there's no possible contamination to the water that's coming into the City of Tucson. There are some other places where Tucson Water is able to operate facilities in order to bring in water in order to meet Drinking Water Quality of Standards, and that's all possible through this electronic infrastructure that really wasn't in place 20 or 30 years ago. This is a graph that shows Tucson Water's daily demand on an annual scale so you can see in the wintertime Tucson Water's distribution system runs at a relatively low rate and peaks in the summer and then falls off again in the winter. This large blue graph is essentially an average of the maximum daily demand over the period between 2003 and 2007 and should show us the variation that we see in the system. This is the average of those maps during those previous four years and again you can see that you have about 98 to 99 million gallons of water per clear day and goes up to 150 to 160 million gallons a day and then back down again.

Two weeks ago we talked about the fact that Tucson Water's deliveries on an annual volume metric basis have remained essentially flat over the last four years even though the number of customers has increased. This is what our water delivery look like in 2007. You can see that there are relatively few places where deliveries in 2007 were above average and a lot of the places where the deliveries in 2007 were below average and this is this year and as you can see that there are a lot of places where Tucson Water deliveries are at average or below. There are not too many places where they are above. There are some interesting things going on on this chart that would be interesting to point out. This is that nice cold front that came through during the Memorial Day weekend and you can see a dramatic decline in water as the temperatures go from 103 to 70 in one day, and this is the recent monsoon activity, this is last Sunday. This is the daily diurnal curve and this is the actually the diurnal curve on one of Tucson Water's peak days so you can see that on a peak day Tucson Water's deliveries are in the neighborhood of 150 million gallons a day when everyone, all of Tucson Water's customers, start to use water in the morning. We actually have to pump 250 million gallons a day to keep up with that morning demand and then there's another small peak in the afternoon and evening.

Essentially what this means is that during a peak day Tucson Water's reservoirs are draining during the morning, they drain again mid-evening, and we use the night time lull in demand to refill our reservoirs and start over again the next day. Let me just go back to this slide. One of the, the points that I think we need to understand and what I'm talking about Tucson's Water infrastructure is that basically all of Tucson Water's infrastructure is sized and planned in order to meet this peak demand period and so it's those three weeks or so in June that cause the large scale infrastructure investments to be made, pipelines to be sized, reservoirs to be constructed, etc. And generally what Tucson Water tries to do is do a general maintenance and repair work during the off season or shoulder months and have systems ready to go again in the summer time. This is the graph of Pima County's diurnal flows into the wastewater treatment plants and you can see that their peaks fall. Tucson Water delivery peaks fall every few hours and their sewer shed essentially attenuates some of but not all the peaks in the diurnal demand.

OK, lets talk about water mains and what we have in the ground at this point. This is a fairly complex graph and you have to have three or more advanced engineering degrees than I have just to understand it but essentially what it shows is the miles of main that were constructed in the Tucson Water system, the decades during which they were constructed, and the materials that were used. So you can see, this is - about a month ago we talked about pre-war and post-war boom in Tucson, you can see that boom right here.

This is 1930, we constructed not very many mains between 1930-1940, not a whole lot between 1940-1950. In the beginnings of the 1950s and the 1960s we started to install a lot of pipe. You can also see that the kind of pipe that the Tucson Water has installed over the years has changed through time. So, beginning in the 1930s and 1940s a lot of the pipe that was used at that time was cast iron. Beginning in the 1950s a pipe-type called cement asbestos became dominant. In the 1980s and 1990s we started to use more ductile iron pipe in the system and PVC started to become the material of choice. One of the complicating factors in the Tucson Water maintenance operations is that we have so many different kinds of pipe in our system from so many years and so we start in two weeks to talk about future infrastructure needs. One of the things to keep in mind is that it is sort of the general rule of thumb that most large scale public infrastructure has a useful life of about 50 years and that's not an exact number. A lot of it depends on installation, a lot of it depends on local conditions when pipes were installed and where they were installed.

But you can see that these post-war boom years are starting to come up on 50 years old, just like the baby boomers are. Tucson Water's installation of new pipes is largely dictated by a set of standard and custom specifications. Most specifications are largely driven by experience such as what materials will work, what installations work. Once the pipe is in the ground and accepted by Tucson Water, there isn't a lot we can do in order to make sure that we can access it and fix it so we learn from experience and have adopted a design standards manual. A lot of the specifications in the design standards manual are driven by departments and we talked about that a little bit a couple of months ago.

Why is all this stuff important? Because, we have to have folks go out and fix it, maintain it and keep the system operational. One of the things that changed over the last couple years with maintenance operations is that in addition to having the truck full of generators and welders and cranes and other equipment, Tucson Water's field crews are now using laptops and asset management computer programs in order to keep track of maintenance activities. This again links with the importance of electronic infrastructure as well as physical infrastructure as we move forward. One of the things that we have with maintenance is that during the summer monsoon season, we have a lot of floods in the area that tend to wash up pipes and so we have our crews busy. This however isn't a monsoon, this is a pipe break. This is a pipe break on a 96-inch main that happened in the spring of 1999 coming from Clearwell reservoir down to Tucson Water's service area.

Luckily for Tucson Water, this break happened about one-half hour after some school children were waiting up here for the bus and it happened in February. It didn't happen during Tucson Water's peak demand season. One of the reasons for this large-scale break is that this is a 6-foot diameter pipe with a 6-foot diameter valve. The casting on this pipe is about 6 to 8-inches thick so, when it was closed in order to try and stop this leak, it broke and this is the hole that resulted in the pipe as a consequence of that pressure. This is what a more ordinary day to day leak on the water system looks like. Here is a spectacular geyser. This is more, the kind of leaks that folks aren't going to notice but this is actually the most common situation that Tucson Water crews encounter. This is a leak and it has to be fixed just like the other leaks and they happen fairly regularly in Tucson Water's systems and we have a whole series of operation maintenance crews whose job it is to go out there and isolate the system, repair the leaks and put the system back into service.

One of the consequences of the 96-inch main break in 1999 was that Tucson Water became a lot more active in trying to diagnose areas of weakness in those large scale and large diameter pipes before they happen. And it is interesting to see the evolution of the technology just in the last decade or so. One of the first ways that Tucson Water crews began to detect leaks was through actual physical sound. I don't know how well you can see this picture but essentially sounding was a system where you essentially walk through the pipes and pound them with a stick and listen to the sound and the sound of the concrete steel vibrating would tell experienced crews what was going on with the structural integrity of the pipe. In addition, we were also using some field currents and other methods to try and detect issues in the pipes before the weakness became so severe that they led to leaks. These days, things are getting a little more sophisticated than just merely walking through pipes and beating on them with sticks. We are using electromagnetic surveys, we are using some solar-powered equipment that runs through the pipes, and holding pipe phones to the pipes and sounding them that way.

One of the things we are doing with new pipes is installing basically fiber optic cables and acoustic monitoring devices and those electronic systems deliver a signal to the Tucson Water Operations Room. I am told that the sound of the water hitting one of the pipes essentially makes a pinging sound and once a certain number of pings are detected in a certain place on the pipeline, then Tucson Water crews generally go out and investigate and try to see what happened. And sometimes we find that folks have played mischief with our pipes. This is a damaged, this is a pipeline of 66-inch diameter, a piece of transition main. You can see how large this pipeline is by this photograph here and our best guess is that someone with a backhoe, that didn't call for a blue stake, heard a large cracking noise and quickly buried the pipe and disappeared and once the corrosion set in, the reinforcing rods in the pipe started to break and Tucson Water was able to detect the area of weakness in the pipe and go and fix it.

So you can see, the repair being done down here and the recoating of the pipe. I don't know if we're the only water utility in the region that has backhoe mischief as a major cause of … one of the things that happens with backhoe mischief is that if the pipe is hit with a backhoe, if there is no immediate spewing of water that flies up in the air, that hole gets covered and then a couple of years later the corrosion starts to set in. It's a consequence of that original breech and then we've got an issue. Here are some more photos that just show corrosion and one of the things that happens when you put pipes in soil is that metals are dissimilar. Some metals attract electrons and some metals are more than happy to send electrons to the other metals so you get greedy brass taking electrons from steel and you get corrosion. It also happens when the concrete exteriors of some of our large diameter pipes are cracked and then corrosion is able to come in and attack the wires. One of the ways that we try to attack this problem is to use what is called cathotic and anotic protection and essentially what you're doing is setting up a current that goes through the pipe, and through the steel in the pipe and then you set up a sacrificial anode and the sacrificial anode, this is an example of what happens in the well installation, using current and sacrificial anodes so that the corrosion occurs on discreet pieces of metal that you can check and maintain rather than on the pipe. Here is the photograph of installation. I think this is about 40 pound sacrificial anode that is going to be installed on the top of one of Tucson Water's large diameter pipes.

Let's talk a little about energy. This is the graph we showed about a month ago. This is a 20-20 and you can see how much energy Tucson Water will be using. Basically when you lift water from one elevation to another, it takes energy and the 20-20, there is going to be a substantial energy component as we move forward from CAP as well as water that we've delivered within our own system. Essentially today we are upgrading relatively small scale lifts here and in this area from our groundwater wells up to our surface of the water and through boosters and up to reservoirs. This is how it looks. In 2007, we used 120 kilowatt hours of electricity, five million therms of natural gas. The total cost for both of those electrical sources was somewhere in the neighborhood of 14 million dollars. One of the things that we are trying to do is to become more energy independent and that is in the case of Tucson Water largely taken of the guys who have solar projects. We have some small scale solar projects that we are currently filing. This is the roof of the Thornydale Reservoir located on the northwest side. It generates about 120,000 kilowatts hours per year and it is funded through the City of Tucson's solar funded rebates.

This is a solar bridge located out at the Hayden-Udall treatment plant. This is one of the more interesting uses of solar electricity. In this case, just to send data to our control center and that prevents the cost of installing ______________to the small scale location. The reason I have to show this is because it is such a cool picture and essentially this is a camel that is using solar-heated refrigeration systems to deliver vaccines in Africa. So the applications in solar are interesting and we are trying to be involved in that.
Some of our future solar projects, we are planning to install some solar panels at the Sweetwater Reclaimed Plant which is the reclaimed reservoir and increase the size of the facility at Hayden-Udall. Both of those facilities are funded through clean renewable energy bonds and I'll get on my high horse here and say that there is some thought that those bonds might disappear as a consequence of federal funding. They are important, they allow basically interest free loans to develop solar energy and we are using them in Tucson Water to develop relatively, in terms of our overall demand, relatively small scale projects. The larger scale project is CAVSARP. We have just put in a request for proposal for a 1 to 5 megawatt facility out at

CAVSARP. We estimate that the total cost of that facility will be somewhere between $6 million and $30 million dollars. That will be private developer financed.

Let's talk a little about the reclaimed system now. This is the graph that basically the cartoon character of the reclaimed system delivers water from the wastewater treatment plant through the reclaimed system to our customers. I'd like to give you just a little primer on effluent classifications. Basically, as wastewater is treated it goes through a variety of different processes. All of the water in the Tucson area that today is essentially secondary treatment and that requires biological and total solids removal and disinfections. At that point from the Roger Road Treatment Plant, the Silverbell Golf Course takes Class B effluent and uses it to irrigate the golf course. One of the things that we tried to show here is how much the costs change when you try to treat effluent to higher-quality standards. In order to take that Class B effluent from Roger Road and deliver it to Tucson Water's reclaim system, which is also a use for open access irrigations of schools and parks, the effluent still has to be treated. to receive the treatment which is essentially filtration and that allows open access for use on school yards, golf courses, fire protection and residential irrigation.

In order to ____________the effluent, which is substantially more expensive than simple filtration, you would either get Class B effluent or Class A plus effluent and that can be used for more uses then Class A or Class B effluent. So what Tucson Water's reclaimed system does, at this time, is turn Class B effluent into Class A effluent. Let's talk a little about how that process works. Basically, in order to use reclaimed water, in addition to the infrastructure issues, there are a variety of regulatory issues involved. Reclaimed water can't just be used willy nilly in a system like global water. It has specific regulations, signage requirements, usage requirements, backflow requirements, etc. and this is an example of basically a sign that Tucson Water requires its customers to post on the reclaimed sites.

The reclaimed water treatment plant is located next door to the Roger Road Treatment plant. The original filtration facility is located here and it's essentially a 10 million gallon a day pool filter. These are the large diameter sand filtration vessels that treat the Class B reclaimed water, and turns it into Class A reclaimed water, that we can deliver to our customers. The capacity of this plant is permitted at 10 million gallons a day so once Tucson Water begins delivery of reclaimed water to it's customers, it knew that it would have to find a secondary source of treatment and that secondary source of treatment is recharge and recovery. Long before Tucson Water was using recharge and recovery as a method of using its Colorado River allocation, it used recharge and recovery as a method of producing reclaimed water from Class B effluent. These facilities here at Roger Road, this is the Roger Road Treatment plant, Tucson Water's reclaimed plant, and the Sweetwater plant, and associated recharge facilities. These facilities were permitted starting in 1984-1985 essentially upon the completion of the filtration plant, Tucson Water began permitting recharge and recovery and Class B effluent is delivered directly to the recharge basins where it flows through an aquifer for treatment, down to the local aquifer, and is pumped up through a series of recovery wells and delivered into the reclaimed system.

Tucson Water uses its recharge operations in the reclaimed system as a way of meeting peak summer demand. So, the recharge facilities are operated on a relatively costly basis. There is a surplus of water that builds up during the wintertime and during the summer increasing amounts of water are pumped and delivered to Tucson Water's customers to meet golf course irrigation needs. ____________in the beginning as well as the Starr Pass Golf Course on the southwest side and then began to progress more to the courses that were eventually going to be built at Dove Mountain. Beginning between 2000 – let's go back here, you can see that the system was originally constructed essentially just to serve these golf courses and other users. Beginning, just recently, between 2000 and 2004 we were finally able to start moving the system so that if there was an issue, some place out in the system, for example, here, the water could be, this part of the system could be valved off and isolated and water could still be distributed out to customers through a redundant or loop system.

And here is a recent addition to the reclaim system that shows in a smaller scale, more additional moving and some small-scale extensions. As of today, Tucson Water delivers water to 18 of the 21 golf courses that are located within its service area. There are two golf courses, Rolling Hills and El Dorado Golf Courses, that have groundwater wells that existed prior to 1980 so they have grandfathered water rights under the Groundwater Management Act. There is a Tucson Estates golf course located on the far southwest side in this general area here, located far away from a reclaimed system that is still a Tucson Water customer. In addition, in recent years we've been able to provide water to Pima County's former Arthur Pack Golf Course and also to deliver water into the Town of Oro Valley where it's used to supply golf courses in the Town of Oro Valley that also used to be on groundwater. Pima County's Arthur Pack

Golf Course was on secondary effluent for a while, and it's now on the reclaimed system also.

I'd also like to highlight the long extension that goes out to the Forty-Niners Golf Course. That was a relatively expensive extension that it took a golf course, that was located in a shallow riparian in the Tanque Verde Wash and took that golf course off of groundwater and put it on the reclaimed system. The reclaimed system has about 190 miles worth of mains. Again as opposed to the global water distribution system which is relatively small diameter pipelines, the reclaimed system is about half large diameter pipelines and half smaller pipelines. It has a relatively small number of reservoirs and a relatively small storage capacity and that's because we ask golf courses to use their lakes as storage to attenuate some of those daily fluctuations in the system. This is annual reclaimed demand and you can see that opposed to the potable demand curve, the reclaimed system is much more peaked. It's much more variable, almost no demand during the wintertime and demands are, as you know, five to six times the winter demands in the summer. This is a graph from 2000, what is it? Is this the average? This is an average demand. Actually this year we reached a new peak on the reclaimed system about 31.6 million gallons a day. In addition to the primary customers of the reclaimed system that are golf courses, Tucson Water's reclaimed system is also being extended out to serve parks. About 66% of the City of Tucson parks are on the reclaimed system. And you can see some are isolated areas for example, "A" Mountain is not on the reclaimed system, but there's not a lot of water use up there either.

And in addition to the parks, the reclaimed system is also becoming extended to more and more schools. It's not always easy to extend the reclaimed system to new customers. One of the things that we try to do is look at customers that are within a half-mile of the existing system because it becomes expensive to extend large-scale diameter transmission mains for relatively small uses. In fact, let's go back to my neighborhood. The reclaimed system is currently available at this is the University of Arizona Complex on South Tucson Blvd, this is the track field, soccer field, some general fields, and Howenstine School. St. Ambrose School is located about 1,000 feet north of those facilities, and recently we've investigated the possibility of bringing in reclaimed water from another school. St. Ambrose School uses probably less than ten acre feet. . .

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. . . Because this pipeline crosses the Arroyo Chico wash, which is in itself about $50,000 cost, the cost of getting water from the existing reclaimed system to St. Ambrose school is about $250,000. So, basically for $1,000 dollars in water savings you are investing about $250,000 dollars worth of infrastructure. About 1/5 of the cost is the ______________about another 1/5 of the cost is pavement replacing, and about 1/5 of the cost…

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We do this on a more or less continuous basis to try to ensure that we can add additional customers every year. Now, the agreement with the TUSD where we use the difference in cost between reclaimed water and global water and finance the changes that need to be made on the individual sprinkler systems to use reclaimed water. What that means though is that as we move forward in time, we will be able to attract new customers on to the reclaimed system. But, those customers would probably be on a relatively small scale because most of the golf courses in the area are probably on the reclaimed system and will have to take advantage of opportunities as they arise. So, let's go to the year 2020. In the year 2020, we've seen this pie chart before. We are going to use a lot of Colorado River Water, groundwater supply and effluent. The infrastructure that Tucson Water has today, the well fields, the recharge facilities, the basins, the pipelines and the reclaimed system, will allow us to meet these demands in the future. In addition, the additional capacity of the water scale of the recharge basins and the large diameters of the pipelines that we installed will also allow us to use some of the water supplies that we don't anticipate needing by 2020 by groundwater credits, unused effluent, and perhaps some other sources supply that may come down the CAP canal. So, the infrastructure that Tucson Water has today is relatively robust. It's large scale and it directly accesses all of Tucson Water's resources, Colorado River Water, effluent, and groundwater. Thank you very much.

QUESTION (unintelligible):
ANSWER: Well that's a great question. You actually hit on what we are just starting to see as a relatively interesting phenomena down in Pima Mine Road and that is that this mound of groundwater that has been recharged in the Pima Mine Road over the last decade is now, we think, starting to move toward the Santa Cruz well field. The original concept of Pima Mine Road would be that is would be a storage-only facility. But, we are starting to see some

preliminary indications of groundwater quality changes from the water that we recover from the Santa Cruz well field that would indicate that perhaps water from Pima Mine Road is coming into the Santa Cruz well field. But that's a good thing. That means that we are starting to recharge an existing well field and we are not necessarily going to have to build additional recovery infrastructure in order to recover it. So, one of the things that's happened, particularly in the case of the Avra Valley well field, that well field was originally designed as an extraction-only well field. But, because of the location of SAVSARP, we know that the wells that are located out here will be pumping Colorado River water in the future.

QUESTION: You mentioned the Green Valley area, are you going to have interactions with either your storage or your pumping?

ANSWER: I think the answer is yes. This is more of a prediction than a fact. So let's be clear about that. But, I think that there are some discussions that are beginning between the City of Tucson and the other water providers. There is some discussion that has been going on for a very long time about how to use the existing infrastructure that we have in the region in order to prevent groundwater pumping elsewhere. One of the ways we've been able to do that is on the reclaimed system where the Town of Oro Valley is getting water from the reclaimed system that's replacing groundwater pumping that they were otherwise using for their golf courses. We think that there will be more possibilities for doing that in the future.

COMMENT: I understand that it gets more acute in the future but thank you.

QUESTION: Could you just physically explain what you meant by "reservoirs"?

ANSWER: Yes, reservoirs, you know any of you who have driven through the Midwest have seen the large storage space, you know large storage tank sitting up on generally three poles 100 feet or so in the air. That is a reservoir and that is how those water utilities in Kansas are developing their water pressure is by lifting water 100 feet up into the air and then dropping it back down to their customers. In Tucson, our topography allows us to essentially do that by sitting reservoirs at the correct elevation and then delivering water downhill to our customers. So, reservoirs are essentially huge storage tanks located above our future customers and use that pressure drop between the reservoir and the customer in order to build water pressure.

QUESTION: Those great big tanks?
ANSWER: In the Tucson area most reservoirs are either on the ground or halfway, the reservoir might be 20 feet deep, 10 feet above the ground, and 10 feet below the ground.

QUESTION (unintelligible):
ANSWER: Yeah, again, the important thing about the reservoirs is not necessarily whether it is above ground, below the ground, it's what elevation they are, it's which elevation they are located so that you can deliver water downhill to your customers.

QUESTION: Is there backup to be able to supplement an area if for some reason storage in that settlement is depleting faster than other areas?
ANSWER: Mark, I can answer that question for most of the system and say yes. As we get out toward the edges of the system it becomes harder and harder to have redundant supplies. But the fact is that with all the elevation changes in topography and boosters, and the network of pipelines that connects the system, we think that we are redundant in most places. There may be, there are some places out near the edges of the Catalina Foothills out near the edges of the Rincon Mountains and so with isolated systems, where we are redundant. Jim, you said you had two questions.

QUESTION: On the daily demand curve, I understand going up in June but then it comes down in August and September and goes back up again and that is also what you show for reclaimed? I just don't understand.
ANSWER: Ok, well, I think there are two reasons for that. First of all, we have a nice Indian summer in Tucson so generally September and October can be fairly warm and fairly dry, so people are starting to irrigate their lawns again. And another thing that the phenomenon really shows up on the reclaimed system is over-seeding. The golf courses have a secondary

demand period in September and October when they change their Bermuda Grass to Winter Rye and put a lot of water on those golf courses for a couple of weeks in order to establish the grass and based on my experience in the _________ in October and November, and I think that happens on the residential side as well.

QUESTION (unintelligible):
ANSWER: John, I'm going to let Pima County really address that question.

QUESTION: I'd probably known that but I thought I'd get some new information (laughter).
ANSWER: I think they need to answer the question. I know that we are working together with Pima County and with the City on looking at what the future demands are going to be down here on the Southeast side and what we call the Houghton Road Corridor, Houghton Road Planning area, and there may be some opportunities that come forward.

QUESTION: The Clearwell Reservoir, that's the one in the Tucson Mountains correct?
ANSWER: Yes.

QUESTION: And that's a significant part of the reservoir system. Is that right?
ANSWER: It's significant for a couple of reasons, but there are two reasons why Clearwell is important. Let's go back there. This is the Clearwell Reservoir located in the Tucson Mountains. There are a couple reasons why Clearwell is a really important facility for us. First of all , ________________but it's at high elevation. It's essentially, I think at 2,900 feet and so from Clearwell Reservoir we can serve almost all of the Tucson area. Basically, out here on the pressure zone map you can serve from Clearwell Reservoir- go ahead and show them. From Clearwell Reservoir 2,900 feet up you can essentially serve all the way out into Tucson. So you are basically able from Clearwater Reservoir, to serve water out into the Tucson Water system all the way out to essentially this orange boundary. The other thing that is great about Clearwell is that the width from Hayden-Udall treatment plant to Clearwell Reservoir is paid by Central Arizona Water Conservation District as part of

the CAP allocation and that was part of the deal that was struck a long time ago to bring water into Tucson. So, the water is lifted uphill to Clearwell Reservoir and from there we can serve a great majority of the Tucson Water area through gravity storage once the water gets there.

QUESTION: Does the name Clearwell have any significance or is that just what it's called?

ANSWER: It does have some significance. The reason it is called Clearwell Reservoir is because it is a potable water reservoir on the CAP system, it's not CAP water. So there is, I don't know all the terminology, but there is the Snyder Hill pumping station and four bays that are located down in the Hayden-Udall treatment plant and it pumps up to the Clearwell Reservoir for which is really, it's the Tucson Water's facility but is essentially, from my understanding, the only point on the CAP Canal or the CAP facility where there is potable water being distributed that is not CAP water.

QUESTION: When there is a problem with the Clearwater Facility is there another pipe that can get that water into the system?

ANSWER: Do you mean the Clearwell Reservoir or the Clearwater Facility?

QUESTION: I'm sorry, the Clearwell Reservoir and the associated pipelines, where the 96-inch main broke. How did you reroute the water?

ANSWER: When the 96-inch vein broke we have a 42-inch pipeline that comes in from Avra Valley. In addition, we have got, depending on how many wells are on or off, we've got about 90 million gallons of capacity in the central well field. So, you know, its not a perfect solution and on a peak day there is definitely going to be some issues but the central well field itself, the south side wells, and the 42-inch line out in Avra Valley can in combination meet Tucson Water's demands most of the time. When you get into the peak days, you know, essentially we're running the system on a pretty close to maximum capacity but if we are in April or September or any of those periods, then there is good coverage. One of the future infrastructure projects that we are going to talk about in two weeks is a way to first build storage and recovery facilities from SAVSARP that connect in, and second to build a third pipeline in from Avra Valley that would be redundant so that if anything happens on any one of those three pipelines, we have the capacity to use the other two pipelines to deliver water.

QUESTION: When you were talking about building a water system, I'm getting the perception that a lot of that system was driven by water needed for golf courses. So, two questions: Is that perception accurate, are we paying for that infrastructure to be installed, and is there any kind of comparison about golf courses within this region and their uses and demands for groundwater and effluent versus other uses?

ANSWER: I can answer your first question, you are exactly correct, the reclaimed systems was driven by golf courses. Those large __________points at the end of the reclaimed system allowed us to construct it in the first place. Without those large-scale customers it would have been economically infeasible to build a reclaimed system to deliver water just to a school or just to a park because the infrastructure costs are so high and constructing that 10 million gallon a day treatment plant and constructing 42-inch diameter pipelines to extend throughout that system. So, it is absolutely correct that the first customers on the reclaimed system were golf courses and then we catch as catch can with parks and schools and other reclaimed users and take advantage of their proximity to the reclaimed system in order to make those connections economically feasible. In terms of golf courses and their use of effluent and groundwater compared to other places, I don't know the answer to that question. I do know that ADWR, Jeff, is Jeff here? He can help me out. ADWR has some standards for golf course usage, and especially when they're on groundwater, that they can't exceed certain quotas.

STAFF ANSWERING PART OF QUESTION: Approximately half of the golf courses in Tucson are on groundwater and about half of those have grandfathered groundwater rights because they were using water between 75 to 80, half of them. The other half of the golf courses using groundwater are being served by ________________that don't have a reclaimed system.

QUESTION CONTINUES: Well, what I'd like to see at a future meeting is the actual numbers or total number of golf courses within this region and what their actual use and demand is in terms of their use versus all the other uses. I think that would help give me a much clearer picture of what the demand really is and the necessity of that demand versus cost providing the infrastructure. And that is the other part of my question, who pays for the infrastructure for that delivery? Because, I guess I don't see how golf courses really contribute to the outgoing supply at all. So, I would like to see some of those statistics in terms of that use and those demands versus other demands within the region. Not just on a per golf course basis but all of them combined.

CHAIRMAN: Let me interrupt that last question. It's coming on a quarter to nine. We do have another presentation to make. I know there are some other questions out in the audience. So let's try to go through them. Marcelino?

QUESTION: Yes, one question in regard to consistency of water quality in the system. Is the water quality, the make up of the water consistent, just in the example of the Clearwater Facility and 42-inch well. Would there be a difference or reduction, on a different PA?

ANSWER: The water quality in the Tucson Water System is fairly consistent, especially the Colorado River recharge facility is rainwater, water on a relatively large scale and that water mixes in reservoirs and is delivered throughout the system at a fairly uniform rate. So, that as a general rule, customers in central Tucson are getting water that is approximately the same quality. There are some slight variations in some areas of Tucson that are served only by wells and remain being served only by wells and there are some variations in quality. Isolated systems that are also on their own independent well fields, but in all cases the water that we serve meets the regulatory standards and again the fact that there is a large system, a lot of reservoirs, a lot of opportunity for mixing means that the water quality we deliver is fairly consistent throughout the Tucson region.

QUESTION: My understanding is La Paloma and Ventana Canyon as well as Starr Pass receives subsidized water and I'd like that to become public, and I'd like also to know if Dove Mountain received that same tax benefit? I'm also interested in the agreement.

ANSWER: Very quickly the answer is that if we can go to the reclaimed system cycle, the answer is that Dove Mountain, Starr Pass, and La Paloma golf courses receive water under a contract that they entered into with the City of Tucson in 1983. At that time there was a rate established and that rate was indexed against the commercial rate that Tucson Water would adopt over the years. So, as the commercial rate increased, that initial rate that was established by contract with Ventana, La Paloma, and subsequently Starr Pass also increases. After that, those contracts were entered into, the City and as the reclaimed system matured, the City developed a reclaimed rate. That reclaimed rate is independent from the contract made for Ventana Canyon, La Paloma, and Starr Pass and at this time the difference is that the reclaimed rate for La Paloma and Ventana Canyon and . . .

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. . .expenses on the reclaim system were higher. As the reclaim system matured, as it acquired more customers, it has become more independent and today the amount of that subsidy is about 5%. The courses in Dove Mountain today, the standard reclaimed rate, and while that rate was more subsidized in the past, in 2000 and 2001, the amount of "subsidy" for that rate today is a lot less than 5%.

QUESTION: One more point, I'm interested in the agreement between the developers because you did not mention any names, regarding extending the pipeline to Corona de Tucson and I'd like to see that agreement,_________ agreement or what kind of agreement was made?
ANSWER: That agreement is a matter of public record. It's available on the City of Tucson's website and I'll make sure that the link to that agreement is posted to the City ________.

QUESTION: Quick, Quick, right or wrong? I got a _____ If you have a new golf course, you must used reclaimed water, is that right?
ANSWER: That is certainly true in the City of Tucson.

QUESTION: Can I get one clarification? First you said that 18 to 21 golf courses are on reclaimed in Tucson, then she said that half were? I think she is referring to the Metro Area?

ANSWER: Yes, I'm referring to courses in the City.

(Previous person who confused the current speaker) I was referring to the Tucson AMA.

(Current speaker) The AMA?

(Previous speaker) The AMA, yes.

(Current speaker) Ok. Great.

The AMA's are a much larger area than the service area.

CHAIRMAN: It is now ten till nine and we still have 45 minutes worth of presentation to go. If there is anything we have not processed submit any questions that we will get back to if we don't do it today. Let's take a five minute break so you can ask questions directly if you like, then we'll get started again. Thank you. Good job Chris.

PRESENTER #2: ERIC WIEDUWILT, DEPUTY DIRECTOR PIMA COUNTY REGIONAL WASTEWATER RECLAMATION DEPARTMENT: WASTEWATER DELIVERY SYSTEMS AND SYSTEM CONDITIONS

MR. WIEDUWILT: There is good news and bad news. The bad news is that we are only halfway done this morning. The good news is that we get to talk about wastewater now. We have framed this morning's topic on five key issues that we think are take home points. One is that our wastewater system is shaped by the history of geography and climate in a unique area. Both the temperature and the terrain dictate how our sewer system has been constructed and how it operates. We have a complex system that is dependent on new technologies and energy to run the pumps, very similar to Tucson Water's elements. Our treatment facilities are expensive to build and expensive to maintain and operate. It takes a lot of dollars to keep them rehabilitated and up to date. I'll use the analogy later on, the treatment plants are like battleships and you will see that a lot of what we do is very similar to what Navy crews do to keep the battleship operating out in high seas. We are constantly dealing with quantity issues, new development, physical capacities with pipes in the plants as well as the water quality issues. It relates to the regulatory framework of how Tucson Water and Pima County Wastewater is highly regulated. Because of that, we have to be constantly aware of upcoming regulations and what we have to do to adjust our facilities to meet those requirements. We will focus on the aging infrastructures.

If you're involved at all with utilities you will know that every organization in the United States keeps saying that our infrastructure is aging. Most of it was built in the 60s and 70s, past it's useful life. Half a trillion dollars for roads, streets, and water sewers. You are going to hear the same story from us. You've heard it from Tucson Water. We all are going to have to look at what it is going to take to invest into our existing infrastructure to keep it functioning properly. Regulations never stop. We are looking at more federal standards, federal water quality standards, it relates to cost, growth and expansion as well. Let me introduce Pima County's Regional Wastewater Management Department. Our mission is public health. We are very fortunate to be in a society where raw sewage is not running down the streets and you can look to what we do here as something to say that we all as a community_________. Proper infrastructure, water and wastewater keep the health and safety of our kids and of our society. The second largest wastewater facility in the state, second only to our nice neighbors in the City of Phoenix. I said they are nice. We are trying to be friends with everybody. 700 square mile service area, a quarter of a million customers, 3,400 miles of conveyance pipe. That is a lot of pipes. 73 plus manholes and going on down the list, 11 treatment facilities, 3 of them in the metro area, the remaining in the south regional areas outside the metropolitan area. This part is broken into two parts.

We'll talk about the Conveyance System first, that's the pipes and manholes that are out in our community. The second part will be the treatment plant and if everybody really behaves, we are going to go through a virtual tour of our major treatment facilities at the very end. So this will keep you from having to walk around the plant in 110 degrees. Hopefully, this will show you enough about what these plants look like on the ground so that you could get a good idea of their function and operability. The Conveyance System, this slide may look familiar. This is a slide we showed in, I believe, the first presentation. It shows our homes and that we all have house connections, and sewers, public and private that go out to a public main, most of the time in right-of-way, sometimes in alleys and easements. The green lines are the public sewers. This is a rapid new development. The red dots are manholes. Manholes are spaced on an average of 300 feet down every square line and you can see the sewer doesn't always follow the street. It's a ______________system for the most part, so the developer, when they design these are looking for an area that can drain hydraulically, so we do have to fight the challenges of accessing our sewer lines outside of the __________________. The little green dashes are the house connection sewers. Regulations changed a couple of years ago that required us to have to blue stake or be able to identify the private lots and public right-of-way and we are starting that effort by putting them on our maps so in field crews can see.

A little fancy schematic of the inside of the manhole, these are our maintenance ports. Manholes are the way we get into the public sewer system. It is an infrastructure that is out of sight out of mind. This is how we check to see how it is operating. Any entry requires confined space so there is a lot of risk to the employees. It is a hazardous environment in there. Gases, we do not know what people dump upstream. So, all of our workers that do entries have to be very cautious of what the air quality is going in there as well as the wastewater itself. If we look at this bigger picture, this is just the metropolitan area, the light green lines, I have pressed the wrong button, in these areas are the smaller diameter sewers. It is about 3,000 miles of 8-inch to 15-inch diameter pipe. It's primarily 8-inches are what serves residential neighborhoods and the darker green lines are what we call our truck sewers and interceptors, the larger diameter pipes that collect the small feeders that run into our major treatment plants. I mentioned that most of the fall is gravity. We are very fortunate to have mountains around the town and have enough fall elevation to allow the systems to be operated by gravity. Communities in Florida, where you have very flatlands, end up with thousands of pump stations to service an area the size of ours. We are lucky we have only 31. Our interceptor system is the backbone of our sewer network. We have gotten to where we need to give them acronyms or names, it is our secret language to be able to talk about the interceptors. When you start describing the large pipe along I-10 on the left side of the railroad track, it gets a little difficult for us to communicate.

So, every interceptor's named and that name is referenced for all of our maintenance activities and discussions of capacity constraints. The picture on the right is the construction of, the current construction of our Santa Cruz

Interceptor expansion. It is going into the ________box. So, it’s going underneath our river we have to go through three different pipes ________ but, you can see the diameter compared to the workers, the size of our interceptors. In order for us to feel the pulse of the system because its gravity, we need to monitor the flow. We have permanent meter sites that are connected by a SCADA system to a local control room we are constantly monitoring the flow. SCADA is Supervisory Control of the Data Acquisition. Chris talked about electronic or remote monitoring and SCADA is the terminology that has the signal, wireless signal information back and forth between these elements. The picture on the left is a sample of what a monitoring site looks like. There is a little caliper sensor that fits inside the sewer pipe. All the electronic signals go to the small vault chamber and then usually to an antenna that transfers it to our central system. We have temporary meters also. With 3,400 miles of sewer, we can’t be monitoring in every reach so we have meters that we move around. As new development requests come in, we need to see what the existing capacity to the system is so we place a meter for a couple weeks to get an idea of the flow and move forward.

We have just completed a calibration hydraulic of a model for our interceptor system and we will be moving to calibrate the entire sewer systems in the next couple years. Once that calibration is done we will be able to use a model for the technical placement of a lot of meters. Chris showed you a sample of an _______________. Tucson Water’s flow and ours is quite similar and also varied. You can see the peaks come in the early morning, very big peaks, and another little small peak in the afternoon and a big drop at night. You can see the different days and there is unique characteristics with each day so we can’t predict 100% what it is going to look like the next day. Saturdays and Sundays are different than the weekdays. Superbowl Sunday is much different than any other day. It is also good to point out that this is because its gravity, there is no off button.

If something happens in the sewer system it takes a while to get people mobilized, pumps in place to start pumping the water around to another location____________. That is something that you should really have to have an understanding of, that you can’t just turn off the pump to stop the water from flowing. They’d have to call all the residents and ask them to stop flushing to be able to have any impact.

We have 31 pump stations. Most of them are small but these are variants in the system that require the wastewater to be lifted back up over a ridge and dumped into the gravity system_________. Usually a wet well pump chamber into a valved vault that we call force main. That's our pressure lines, small diameter, it goes and discharges into another gravity manhole. Our largest pump station is the 600 horse power Continental Ranch Regional Pump Station. It was developed in Continental Ranch, uploaded to a large pump station that sends that wastewater to Ina Road. The rest are much smaller than that serving single developments.

The picture on the left here is the Rancho del Lago Pump Station and we have modified our design, without them pumping above ground to keep from having the workers do confined space entries into valve boxes. Again, the SCADA word, all of our pump stations are connected by SCADA, an operator at two of our facilities can watch the screen and monitor the level of the operation of the pumps continuously and there's alarm triggers also, so you reduce the windshield time of operators that we have to have at every plant, with every pump station everyday. Here is a picture of a typical pump station, the developer put in the community. It was on the side of the hills with all the gravity flow to the north. This is far East Speedway and there was not a gravity sewer for them to connect to at this point, so they had to install a pump station and the force main goes all the way back up the street and discharges at the top of the development. Some of the problem with pump stations is odor because we have a long force main the oxygen gets eaten up and starts getting septic. The odor occurs at the discharge manhole so we have a lot of standards in place to try to address the odor problems at the pump stations.

Now we will talk about the Conveyance Division staff. Staff at our Conveyance Division work out of our Richey yard operations facility. They do the preventative scheduled maintenance. They do the pump station maintenance, odor control, and roach control. 180 employees. They were fortunate to recently receive free ISO Certifications. The only municipal organization in the United States to have all three, one on safety, one on quality, and one on environmental. We operate several preventive maintenance programs. The primary concern is to keep wastewater in the pipes and not flowing out on the streets, so they are called Sanitary Stored Overflows. We will go over some statistics about that later, but all of our maintenance activities are directed at keeping the water in the pipes. One of the primary maintenance activities we have is what is called Area Rodder Program for 3,400 miles we want to get every pipe at least once every 5 years and run the rodder through it just to make sure there is no grease or blockages building up at the roots. The picture on the right is our rodder that is the workhorse of the collection system. It is just like a sewer snake, a plumber sewer snake, except the coil is in the back__________ and the very front is an 8-inch saw instead of a little 4 or 2-inch saw that you would usually rent from a store. In addition to the rodder truck, we operate combo units, these are special cleaning and vacuum trucks. They show on the lower left here. The reason we are going to these now is that they do a better job of cleaning. They have a pressure hose that shoots down the pipe and then washes the pipe moving debris back toward the manhole we're operating out of and then a large snorkel vacuum that sucks the debris out of the manhole and puts it into a debris body in the back of the vacuum. The problem with the rodder is that they bring the debris to the manhole and they either have to use long shovels or do manned entries.

So, this technology reduces the wear and tear on our workers, reduces the risk of confined space entry, but has its own challenges given that if you look at the size of that vehicle its like driving a cement truck around. We have to really pay much more attention to accessing manholes where developers put sewer lines and easements, and overgrowing easements, makes it harder to get to and it also requires a CDL commercial drivers license for those operators. For areas where we know we have roots or grease downstream from certain restaurants that reaches a problem and it calls for scheduled maintenance. We go back, define periods are 3 to 48 months, to go back and keep that line clean and keep anything from building up. Of course as I said, you do all this to prevent sanitary sewer overflows. We are not perfect and we do have them occur. We have the emergency response plan that's a very high priority that we get out there immediately, we contain the spill, and we remediate it, we mitigate it. Then there's also the last thing, we have to report it. It's the Clean Water Act, any discharge outside of the __________ discharge is a file that exceeds the Clean Water Act.

You see the guys on the left here they're cleaning up a spill caused by a root blockage. You just screw it off and you pick up the debris that the pipe blocked up. Primary causes are roots, trees and vandalism. On the chart, on the right you see that we make a concerted effort to reduce our sanitary sewer overflows. What we are having a hard time doing is controlling vandalism. Youths pop open the manholes, put in bowling balls, tree trunks, mattresses, you name it. We've had some landscape crews decide to dump their debris into our manholes instead of taking it to a landfill. So when we can identify what has occurred, we have detectives out there trying to find the culprit and we will prosecute them. Because some of the overflows are also caused by grease, we have very pro-active educational programs for the public. Fats, oils and greases are a big cause of blockages and so we want to stop that by developing brochures, “Are You Committing Sewercide?”, slogans like that. For factory sewers we hand out white spatulas, so if you’re at any County event, go find the person handing out the spatulas. They’re really nice, you can use them at home but it also teaches you not to put the grease in the sewer. We have several programs that are just to, to serve the public and our workers from a health perspective. One is our famous roach program. The cockroach of concern is the American Cockroach. We all have samples to carry around with us and we’ve also been trained to separate and identify the American Cockroach from the Russian Cockroach from the German Brown, so the American Cockroach is the only one that lives above the sewer but they also live in wet damp areas around peoples houses so we have started an improvement program the last three years to coat every man hole with a latex based pesticide.

If you’re a little squeamish don’t look at this picture but those dots are cockroaches. That’s the before picture and in the after picture they’re all gone. We think that the program, if properly used, has a two-year guarantee that will come back and re-spray anything that’s seen, so, I think we’re moving in the right direction, to rid the sewers of American Cockroaches. Near and dear to everybody’s heart is the odor that comes out of wastewater. Talk about force main discharges, from the other sources, there’s also odor sources in any part of the system. There’s turbulence that’s generated or a very, very slow moving wastewater occurs that becomes septic. So we have 12 chemical dosing units, three vapor phase units. Pictures on the bottom, the one on the left is one we installed last year, developed by Dr. __________ from the University of Arizona, is called a bio filter and the one on the right is another vendors’ paper-based treatment called ________, so we try different vendors, try different manufacturers looking for the right applications. All the work I talked about gets inputted into a computerized maintenance management program. The collection system has been operating since 1985 so we have 1.5 million historical records. All new reaches are added to the system and the maintenance we do is recorded so we will have a long history of maintenance that we can develop our programs from, be able to zero in on areas that need special attention. We’ve also moved to mobilize laptop systems. Upper right hand we have an operator with an authorized lap top so that he can pick up work orders in the truck, go out and complete the work orders, and electronically upload them. We used to have to do a hand entry, it saves a lot of time.

Lets move from the maintenance side and we’ll talk about condition assessment now.

Starting out with manhole condition assessments. We just completed last year a 60,000 manholes inspection and inventory program. Through this effort were able to categorize all the defects of 60,000 manholes as well as to get their GPS position and invert elevation, which was critical to develop our hydraulic model. We needed to develop consistent data to be able to build a model from and this program gave us that information. Of course we found some interesting things out there in the field, the corroded exposed manholes, number three here with a unique un-permitted tap. Someone put a PVC pipe in the top of the manhole all that for a sewer connection, and we did find out that the Africanized bee loves to live in the sewers. The little pick holes in our manhole covers are just the perfect size for them to come in and our workers are trained to be, trained to identify potential beehives in the manholes by bees coming in and out of the pick hole and this is actually a fairly small hive we found. We've seen some two to three-feet long within the manholes. The picture on the lower right is a vandalized manhole that people just dumped debris in. As I mentioned, our system is out of sight, out of mind. Through the manholes we can use closed circuit television or CCTV to do our inspection.

That's our primary tool, it's our visual inspection tool and we've got five in-house trucks that work on both responding to maintenance calls from an operator who thinks something is wrong. The worker will go out there and visually inspect it or also some of them we have on repeated visual inspections. Our large diameter sewage pipes, after the Speedway sinkhole, I'll touch on that in a minute, we've put on three to five year repeated visual inspection. We learned our lesson on Speedway that if we wait too long, bad things happens. So, these concrete pipes need to be inspected every 5 years until we can rehabilitate them. All of our operators are certified. They use a pipeline assessment condition program so we're using a national standard to identify our defects. All the defects are accumulated into a code score and each reach gets a grade. Grade 1 means is in excellent condition and grade 5 means you better put it in for repair and rehabilitation immediately.

Now, I'll touch on Speedway very quickly. September 2002 we had a large interceptor main collapse on Speedway near the Arizona School for the Deaf and Blind. If you hadn't been in town, I'm sure you've heard about that. That was an eye opener for us. We had visual inspections of our interceptors, we were doing rehabilitation, and you're reading of other municipalities in this nation, with collapses and we thought, "We're on top of it". Well, this was a sign that we weren't on top of it as quickly as we should have been. So from that incident we accelerated our visual inspection, we accelerated our rehabilitation programs. So now we think we're ahead of the ball in keeping the movement in that manner but until that happens to you, I think you won't put the effort forward. Some good pictures of root growth, concrete corrosion in the upper right, tuberculation, liner failures, all these are defects that we find within our small diameter and large diameter pipe.

We spent $6.5 million in the last two years for rehabilitation projects. We expect to continue to spend $3-5 million every year to keep ahead of the ______ that's deteriorating infrastructure. Moving now to the wastewater treatment system. This map should also be used for later. There are the 3 metropolitan area facilities as well as our outlying facilities in blue, 252 employees in our Wastewater Treatment Division. 73 operators. The Ina Road plant is more scaled larger for remote control telemetry. The Roger Road Facility is an older facility, a lot of that is done by manual operation. Another group of employees just focused on maintenance and this is where the analogy of the battleship comes in. We've got operation staff and maintenance staff constantly working to keep this facility operating and they're all journeymen, pipe fitters, welders, and electricians. And then corrosion protection. We've got an artist out at our Ina Road facility and when you drop by you'll see blue geckos painted on the side of our buildings, it makes it exciting. The best part is that it keeps the surfaces from corroding. And of course the treatment facilities have odor control. They focused the last couple of years, $7 million dollars spent at the Roger Road facility and some at the Ina Road facility to address odor problems and we have budgeted $39 million going to the next five years to those two facilities as we build new treatment plants. Some pictures of the Roger Road improvements. Coverings of the primary clarifiers, HTVE covers, a big tent over the tent over the headworks, you can see that from the highway, so if you thought it was the gem show coming early, it wasn't.

Just to show you some quick statistics, the larger cylinder is the measured odor prior to our improvements and the yellow are the odor measurements afterward. Again, a couple of other facilities. This is the primary clarifiers, the before and the after. So we think the $7 million dollars is well spent but there's a lot more work to do. To support these programs we have a state certified laboratory, an industrial waste program is to go out to the industrial dischargers to make sure they don't put something into the sewer that's not treatable, an in-house training center where all the certified operators. Both Tucson Water and Pima County Wastewater requires certified operators in their facilities, so we've got a training center for compliance. The treatment facilities also have maintenance management systems that started in 2007 and they're up and running full speed using that facility at the Roger Road plant as an example to get the work orders that they're generating. As far as treatment rehabilitation, we spent $12 million dollars at the Roger Road facility. That was the oldest plant. It started in 1951. It needed some infrastructure improvements. That's also the plant that will go away in 2015 when we build the new facility right next to it. At the Ina Road facility outlying, we've committed $7.8 million dollars this year, awarded to date to do repairs there.

Ok, before we do the personal tour, I'm going to walk you through the treatment processes so when you leave here you'll have something to talk about at the next party you go to. The typical treatment process: Wastewater comes in and needs screening and grit removal there's stuff in that water _______. Primary clarification. There's a bacteria process, Tucson Water and water treatment systems are primarily chemical related. They add chemicals to improve their water quality. On the wastewater side we rely on bugs, and it's a bunch of different bugs. Bacteria from all different types of _______ certain types of ___________ so you have to accommodate one bacteria strain in one process than to go try and get another one ________. After all the digestion is done, there's secondary clarification and disinfection. All the solvents go to further digestion and then out to disposal. We'll go through these rather quickly. Headworks for odor control, odor generators, this is where wastewater comes in. Large solids are removed with the bar screens. Grit and sand are removed with vortex removers and it goes on to treatment process. Primary Clarification. There's circular clarifiers on the lower left. Rectangular and covered on the upper right at Ina so you can't really see the process at Ina Road. Those are both ways to allow wastewater to come in, travel across _________ so the solids can settle out. On the right there are a number of biological processes that we use that are at our water facilities. It goes the gammet of oxidation ditches to biotowers to aerated ponds. All, basically bacterial processes using an activated sludge.

The state of the art facility at Randolph Park uses both the activated sludge and some physical membrane cartridges that do a further job of cleaning the wastewater it's an additional _________. There's a picture of a membrane cartridge unit pulled out at Randolph, biotowers at Roger Road, 30 feet tall towers that are plastic _________ inside, water is trickled through it and the biomass it grows on takes care of the digestion.

To the outlying facilities, oxidation ditches are primarily used there, sort of race track type lakes where the water is pushed and pumped around and inside that wastewater there is bacteria growing there that's eating away the particles. Similar type of facility in Corona, that's Avra Valley and Biolac. The Marana facility is a pond that has air injection. It's just a big pond. Finally, chlorination and discharge. For us to discharge under the surface we require it to be chlorinated so it's a long, serpentine path. This is the time for the chlorine to come in contact with wastewater and then on to a de-chlorination facility for discharging to the rivers and Tucson Water's reclaimed system. Biosolids go through thickening, anaerobic digestion which generates for co-generation and _______application we got all that in the discussion before. We've seen that before. So then of course the final disposal either discharging, going to a pond, spray field, or reclaimed water system. There are some pretty pictures of ponds and then a spray field on the lower left at the Avra Valley facility. Not to belabor the point, but we talked about that we're operating under three different Clean Water Act departments: Aquifer Protection, Arizona Pollutant Discharge Elimination System and there's the Reclaimed Water Standards and we talked about Class A before.

Ok, take a deep breath. We'll just go through three or four of the main treatment plants and we'll repeat and show you where the processes are that we just discussed. Ina Road. This one was built in the 70s; that's an aerial view. Most of this plant is covered so if you went out there all you would see is a lot of concrete slabs, it's not that exciting. Ted Walker Sports Park right here, I-10, and then Ina Road to the south, to the north of the plant. North is to the bottom. There's the headworks over on the far corner, lots of odor control there, chemicals, scrubbers, the headworks. Two different process trains at Ina Road. The first one is a high purity oxygen, it uses oxygen to aerate the bacteria and it was state of the art when it was constructed, its now obsolete and we are removing the high purity oxygen. The second train is a 12.5 MGD train. This is a brand new one we just turned on this year and that one runs on activated sludge and as you can see full processes covered, nothing to see. Some of the unique odor control devices, lots of pipe, and then a co-generation plant at Ina, when it was originally constructed the methane generated from the 25-inch _______ plant was used to co-generate the powered facility. They used about 30% methane - 33% methane, 66% natural gas to power that train.

And then biosolids digestion, and then trucked out to________ application. You've seen this picture before. This shows you the Tucson Water reclaimed plant right there and we'll go through what, what wastewater does in this facility. The headworks with a nice tent that you can see off of I-10 and at night it's lit up too, that's really cool, it glows. Primary clarifiers, you can tell by the colors, they're green and everything else is dark blue that means it's a little dirtier. So we've got the primary clarifiers and you can see the odor control units we stuck around just covered. ________ generates the odor and sucks it up and put in to a carbon unit. Biotowers, state of the art and they were constructed in the mid 80s. They are now obsolete and at the end of their useful life. Force main biosolids digestion, and then all the sludge from Roger Road gets pumped through a force vein up to Ina. Randolph Park facility. Chris talked to you a little bit about this. When they came on line a couple of years ago we had to construct a force vein from an interceptor on the Aviation Corridor because we increased the capacity of 3 MGD wasn't enough wastewater in the existing system around 22nd and Alvernon, we had to come about 3 miles away to get additional wastewater. There's the pump station right off of Aviation Corridor that pumps it up to the plant here, we used the existing foot print of the old plant with updated technology and again, it's all covered, you can't see much, different basins.

Tucson Water reclaimed system discharge one-way, all the sludge and solids go back to the interceptor and discharge. That's one of the challenges of a reclaimed scalping plant, which this is, that you can pull out the water and send it to a reclaimed system but the residual solids have to get dumped back into the sewer system, which doesn't help that operation much. You have got to have enough flow and enough scour to keep it moving to the plant and not cause problems downstream. Quickly, the Green Valley plant, oxidation ditch, Avra Valley, one oxidation ditch right now, we're constructing two operating at 4 MGD. Corona just completed this expansion of 1 MGD. Marana started with small package plants to put in the Biolac and the plan is to increase it to a one and a half million gallon per day oxidation plant. Some of our ________ and of course our facility in Mount Lemon, hidden in a little building that looks like a log cabin. That completes the whirlwind tour of Pima County Wastewater.

CHAIRMAN: I'm going to ask the committee to reserve _______ and give the audience a couple minutes but its _____ and we've been here a long time.

QUESTION: You started off by talking about aging infrastructure and so we really have two challenges. One, replacing our existing system to serve existing residents and expanding the system to accommodate growth. Given the fact that material cost trends and energy cost trends are making the per capita cost of all infrastructures more and more expensive each day. How wise is it to conceptualize future infrastructure configurations as large central operations where as John mentioned the idea of pumping water all the way out to Vail and then pumping or, effluent all the way out to Vail golf course and then pumping it all the way back aren't we going to be reaching the limits of economies of scale and have to look at more decentralized solutions?

ANSWER: I think you've hit it on the head that it becomes a financial analysis, that even in the nation where the EPA has moved from centralized or decentralized back to centralized, we go on these cycles and it becomes sometimes cost prohibitive to continue to have long, long interceptors where a remote reclaimed plant or small treatment plant could be constructed. You're absolutely right and we do take that into account in every area that we're expanding to. Is it better to connect it to the existing infrastructure once the augmentation that has to be done all the way downstream to the main treatment plant, or is it cost beneficial to put in a small plant? What we found though, right now, is that it's still more beneficial to use the existing infrastructure going to the large treatment facilities than to place a small plant that has a marginal amount of flow. The cost to construct and operate those facilities are not yet as economical as operating our larger facilities and the collection system, but it's going to be a continual debate in comparison.

QUESTION: For future reference it would be helpful to see a graph of your grade A, grade 5, grade 4, grade 3. You were talking about grading the pipelines and I'm curious to see how many are grade 5 and wearing out so if you could provide that in print that would be helpful and then also how do you, do you have to flush the system with potable water? The City has been looking at that issue regarding its gray water use and when I heard you speak about the Randolph Park treatment and the sludge, I was thinking, ah-ha!, I bet they have to flush that with potable water. If so, how much and what's that schedule? How much potable water are we losing? And the rest, I'll submit in writing.

ANSWER: Ok, but I can respond that all grade 5s are repaired immediately, so right now, we have zero grade 5s on our list and that's not to say tomorrow one won't show up. So it's a dynamic list and we do have a GIS map of all of our defects from the 4s or 3s that are all scheduled for rehabilitation.

QUESTION: Ok, well let's see that as part of the show here as well as, we need to know, the whole community needs to know this question, which is, how much potable water does Pima County use to flush out the system and what's the schedule of that and where? You know, we need a very concrete particular on that question.

ANSWER: And let me quickly answer that. At our treatment facilities, we use the processed water so we don't use potable water from any treatment plants to clean and operate those systems. In the collection system, we're currently using potable water but we are in discussions with Tucson Water to try to convert those to using reclaimed water. We realize that's an area of improvement we can make and we are in deep dialogue with addressing that issue.

QUESTION: Right, and that's what we need. We need that dialogue to happen right here in transparency. So that's what I'm asking you for, is to provide us with the quantities and open that discussion to the here and now. Thank you.

QUESTION: Yes, I'm Donna Branch-Gilby. I'm a resident and co-developer of Milagro Co-housing. We face the same situation of the photo that you showed of the development that was on the slope and they had to pump their wastewater uphill with a pump station but we, we thought we wanted to use that water ourselves that, that recycled water, so we got permission to build our own subsurface wetland system and now we have the benefit of that water of course it's only 28 homes but as we battled our way through the system to get the permit for it we eventually found someone who said "thank you" because we really don't need any additional burden on the sewage treatment system and "thank you" for establishing your own. So, I'm wondering is there any effort being done to work with a particular developer that are in a situation where they would be having to pump or where its, its out on the fringe of the service area to actually develop their own subsurface wetland system which is working very well for us. It requires minimum amount of maintenance and really benefits the vegetation in our whole community.

ANSWER: I'll start by saying that I believe it's a philosophical discussion and that if all the wastewater stays on site there will be no effluent for reclaimed water. So, as we keep it there, is it really going to recharge the aquifer or is it just used to create wetlands? So you have to look for, what's the beneficial use and then at other levels the regulatory level. I think as you push the responsibility to private homeowners and small communities to maintain their systems, historically we found that's a risk. That if you have a change of ownership in your homeowners association, we hope that the money to maintain these systems could then start impacting the public health for those people in the community so it's a great point for discussion. I think it's something we'll have to bring up in the next couple sessions. What is the best scenario to balance them?

QUESTION: If there is some major change in the kinds of technology, more on the, more on the order of what Donna is talking about, is the County obligated to produce 68,000 acre feet a year of wastewater for reclamation or is that simply the designed goal?

ANSWER: I do not believe we are obligated to, to deliver anything except the amount of effluent discharge by agreement, is divided by percentages.

QUESTION: Ok, so a decrease, if there was one, would impact and it would be split with that 90/10?

ANSWER: That's right, and we're already seeing that by reduced wastewater or water use and wastewater discharge by the homeowners throughout the community. Like low flow toilets, low flow shower heads, that's reducing our discharge as well.

CHAIRMAN: I'm going to ask the audience that if you have questions, you got forms that you can fill out and give to me and let me give the committee a chance. John?

QUESTION: Very quickly, grease, you went into the transportation system but it really raises hell at your treatment plant, does it not?

ANSWER: It also does, yes.

QUESTION FROM MEMBER: Ok, in low flow we've gone a while for a low flow because of low gravity, a low gravity system in some areas that's where you're having problems so that has to be coordinated with the City too now doesn't it, your low flow toilet system?

ANSWER: Yes, it does. We believe there are some problems with going lower flow because the main system in the sewer system may not operate properly in the neighborhoods, so, we still have a lot of research and work to do on that but there is a potential negative impact if we use ______.

QUESTION: And, and finally gray water, you are encouraging people to use it but there's a process to go through with County clearance and the City should love it if people water their plants with gray water, is that right? Where are we?

ANSWER: Pima County Regional Wastewater Management still feels there's more study that needs to be done before we can support a full gray water implementation everywhere. I think there are areas where it would work well and areas where it will negatively impact communities.

MEMBER: Yeah, that's logical, but ok, thank you.

QUESTION: If you can identify (unintelligible).

ANSWER: There are some landfills in the area, also some other local industrial facilities that do generate odors. We do monitor them and for the most part they are in compliance, but sometimes the odors are also coming from areas that we have no control over and just general discharges, septic dumping stations at RV Parks could generate odors. Because odors are very unique, you can't go right to the source. They sort of waif around until somebody smells them and you don't really know where the source is when they smell them.

QUESTION: I got a Pima County map guide a while ago and my particular house showed a private sewer line that then appeared to connect to the County sewer line. What does that mean and how many miles of private line is out there and what does it mean in terms of maintenance and responsibility and that kind of thing?

ANSWER: Good question. There are a number of commercial developments or even private developments that don't want the public, Pima County to maintain and operate their system so they have designed their facility to have a private sewer system in which case, we the County, have no responsibility to operate, maintain or monitor it and its wholly the homeowners association's responsibility to keep it clean and upgraded and maintained, so there's a number of them, they are designated on that map guide site as private and we try to encourage them to come into the County system because we feel that we have better resources to manage it, but some of the newer communities and the gated communities don't want maintenance people in and out, are the ones that want private streets and private sewers.

QUESTION: But that's private sewers coming in that eventually connect to the public treatment?
ANSWER: That's correct, they'll connect to a public manhole.

CHAIRMAN: Anybody else on the committee? Ok, very well done. We have 10 minutes left so lets do the Call to the Audience. I know you all have a lot to do. You can submit it in writing and then we'll do it next week or. . .

QUESTION: Yes, when is the next meeting?
ANSWER: The next meeting is in two weeks.

AUDIENCE: Ok, I'd like to submit this letter from the neighborhood infill coalition and give it to you, Mr. Chair, for the record, as well as Melody so she can put it online and then I'd like the opportunity to read it in full at our next meeting.

CHAIRMAN: Ok, we'll do that. Anybody else for the Call to the Audience? Ok, do I hear a motion to adjourn? Thank you all for coming.

Meeting Adjourned.