Abstract:

In this interview, Owen Randall discusses his role in the expansion of the Soldier Canyon water treatment plant, or water plant #2, and more generally, some of the unique aspects and challenges of Fort Collins’s water supply. In the early 1980s, with the closure of water plant #1, Fort Collins Utilities had to redesign water plant #2 to run all year long and process water from the Cache la Poudre River. Additionally, in the 1980s and early 1990s, prior to a turn toward water conservation in Fort Collins, a rapidly expanding population forced Fort Collins Utilities to quickly enlarge water plant #2’s processing capacity and Fort Collins’s treated water storage capacity. As Randall explains, to expand water treatment production, from 24 million gallons a day to 34 million in the 1980s, and then to 88 million gallons in the early 1990s, efficiency, teamwork, and communication were critical. Randall stresses the importance of the Alternative Product Delivery Systems in the rapid expansion of water treatment as it assembled city officials and contractors around the same table to figure out current problems and potential issues moving forward. Expansion projects in the 1980s and 1990s utilized and modified pipes and holding tanks from the 1960s and APDS proved itself capable of handling the complexities and unknowns that came with such projects. While water conservation in the mid-1990s ended the need for further water processing expansion, it was the application of APDS that allowed Utilities to quickly increase water processing capabilities to match population growth. Speaking on the complexities and challenges of rapid expansion, reconfiguring aging infrastructure, and the importance of public relations, Randall concludes the interview with a simple reminder: the water that flows with a turn of the faucet is the result of a host of multifaceted processes.

Interview

Q: This is Ruth Alexander, Professor of History at Colorado State University, and we are in Fort Collins, Colorado, at the Utility Service Center. It’s March 5, 2019, and I’m doing my second interview with Owen Randall, Utilities Chief Engineer, and we’re going to be speaking today about the city’s water treatment facility. This facility began as the Soldier Canyon water treatment plant, also known was water treatment plant #2. It was constructed in the late 1960s to treat water from Horsetooth Reservoir and was originally a peaking plant, that is a plant used
only from about April to September when demands for treated water exceeded the capacity of water treatment plant #1 on the Poudre River.

After plant #1 was closed down in the late 1980s, the water treatment facility treated water from both the Poudre River and the Horsetooth Reservoir, so for starters, Owen, I’ve got a question about the water treatment facility that follows on the history of Gateway Park and the Poudre River that we’ve already discussed. As the water treatment facility took on treating water from both the Poudre River and Horsetooth, did Utilities discover any differences in water in the two sources that complicated treatment practices, either mechanical or chemical?

RANDALL: That’s a big question with a lot of nuances to that. Certainly, as a peaking plant, like you mentioned, it only treated Horsetooth water. It never treated Poudre River water before, and so when that conversion was done there in the late ‘80s to bring Poudre water down to water treatment plant #2, there certainly was a difference in water quality. So we had now had Horsetooth water to treat, as well as Poudre water to treat, and the other thing that changed through the years was that the water quality inside Horsetooth Reservoir also changed.

It did change and has continued to change through the years, sometimes better and sometimes worse, and we’ve learned different processes to deal with both water sources, and the other thing that changes throughout the year is that Poudre River water changes, depending on what time of the season it is, what time of year. When you have runoff in the Poudre River, as anybody can see, the high turbidity levels that we have is a concern.

Through the years, there were also other water quality impacts. Forest fires presented a different challenge that we had never had before, and so on and so forth that way. When we first expanded water treatment plant #2, and it was no longer a peaking plant, so we started to run it year-round for the first time, we used some new technology. The original plant was
expanded, as you mentioned, in the early ‘80s, and we put in a different type of flocculation sedimentation treatment process that we had not had before and that we used tube settlers, flocculation all by tube settlers, and then eventually we added another treatment training, and we put in a completely new process called lamella plate settling, and we were one of the first treatment plants in the United States to use lamella plates, technology that I believe came from Europe, and I want to say we were the third plant in the country to put lamella plates in.

That’s a small part of the story about the water sources and what we did as far as treatment goes. The other thing that changed through the years was chemical feed systems that we used chemicals we added to the water in order to treat different aspects, different characteristics of the water, water-softening to adjust the pH of the water.

Some of the problems that have happened in Detroit in the last few years with the lead poisoning, we recognized that issue all the way back in the, I want to say, mid, late ‘80s. Actually, it was before that, in the early ‘80s, recognized that the pH of the water, it determines how corrosive the water is, and actually where there were still old lead surfaces or lead fixtures in the houses, that water would decay the lead, and so we adjusted the pH in our water to make it noncorrosive, so there was a whole chemical system.

One of the projects that we talked about up at plant #1 a couple of weeks ago, that chemical feed system was put into both plants, pretty much an identical system. That’s what we did it for. Now whatever that’s been, 30-some years ago, we recognize that problem and address that issue.

Q: Shall we move on to a slightly different question?

RANDALL: You bet.
Q: This is a question about the water treatment facility’s capacity for treatment, and my understanding is that it’s been enlarged numerous times, and you’ve been involved in these expansions, so why don’t we begin with your first project at the water treatment facility when it expanded from a treatment capacity of 24 to 34 million gallons per day. When did this project take place, and what’s the background to this project? How did the city decide that it wanted to expand treatment capacity to that extent?

RANDALL: Well, for anybody that’s been around Fort Collins a long time, the city has grown and grown and grown, and back in the early ‘80s when water treatment plant #1 up the canyon was our main plant, and then we ran plant #2 as a peaking plant, at some point, it was becoming obvious that the Poudre plant, water plant #1, would no longer meet the demands in the wintertime, and so we were going to have to start to run water plant #2 year-‘round also. For a number of years, we ran both plants around the clock, 24/7 in order to meet the demand of the city.

Q: Was that in the mid ‘80s?

RANDALL: Well, it would have been probably in the mid ‘80s is when we started running water plant #2 year-‘round. Honestly, I can’t remember exactly, so mid ‘80s will have to do, but I think Fort Collins Utilities, as a whole, has always done a really good job of planning, looking at the future, seeing what the projections were for anything, but certainly growth, in this case, and demand for water has done a good job with that. That’s been an ongoing process that we still do today on a regular basis.

We do a masterplan, or we call it a masterplan, update now. We look at projections for the next five to ten years and beyond to see what kind of facilities we need to construct or to be ahead of in order to make sure that we meet demand before we get to where it becomes a
really, really critical nature. That’s what even went on back there in the mid ‘80s is that the treatment, we knew that we needed additional treatment capacity, so we did that expansion, and the first major expansion that I worked on, the treatment plant, like you mentioned a minute ago, expanded the treatment capacity from 24 to 34 million gallons, but even at that stage we built a lot of infrastructure inside the treatment plant to be able to expand it again to 44.

The concrete was built. Most of the piping was put in. We didn’t do the filter media, but a lot of the infrastructure was done in order to relatively simply add another 10 mgd of capacity. And then after that, there was a time there when I went and worked on some other projects, and I didn’t work at the treatment plant, and there was another expansion done, I think to take it to around 60 million gallons a day, and then in the early ‘90s, we reached a point where the water treatment plant all summer long was basically maxed out. It was running as hard as it could go.

10:09

Q: And that was at 60-something?

RANDALL: I want to say 60 million is what the capacity was, at that time. In fact, on a per capita basis, and maybe even on a total basis, we used a lot more water then than we use today. Water conservationists had a huge impact on the amount of finished water that we use and, therefore, what we have to treat on a daily basis, but, at that time, that 60 mgd plant was maxed out.

I’ve heard the analogy given that it’s like a racecar, or your car, if you got in your car and you were going to drive to New York and you got in the car, you went over to I-80 and you pedal to the metal, fast as your car would go all day long, your car’s not made to run like that.
It’s not made to run as hard as it will go nonstop, and we were at a point with the treatment plant that we were almost that way. We were making every gallon of water we could make every day.

Q: Can you say a little bit more about what kinds of pressures that intensity was putting on the system?

RANDALL: Yes. At the treatment plant, good point, there is a mechanical system with all kinds of mechanical components, and when you have no flexibility left, if something breaks, something goes down, you need to do maintenance, etc., now you can get a wet spell, a rainstorm, and back way off and people don’t use near as much water, but it goes to the point where we didn’t have that flexibility anymore. The treatment plant was doing everything it could do.

We can talk about that a little bit more in a minute. We can talk about exactly what we did, but the point what I wanted to get across is, we did, have done, and continue to do masterplans, to look at projections for demand, for growth, to make sure that we always have the treatment capacity that we need in order to meet the demands of the city of Fort Collins’ customers that we have.

Q: Can you say a little bit more, with these two expansions, I guess three, up to 34, up to 60, then up to 92, you wanted to expand capacity? How over that same span of time were the treatment methods, either chemical or mechanical, changing as well, either because new technologies were emerging or new water quality issues were emerging or new regulations were coming into play?

RANDALL: Well, all those play into the facilities and what we build and how we build it, when we build it, I’d say simply demands of our customers for water quality. The state has water quality parameters that we have to meet from a regulatory point of view, and some of those
at times drove treatment process improvements, whether it was filter media or chemical feed systems.

The other one is safety dealing with chlorine that’s put in the water in order to protect the operators, as well as the public, from any kind of chlorine leak, chlorine disaster, facilities built around that. Does that answer your question?

Q: Yeah. In any of these expansions and modifications to treatment methods, were there really interesting or important challenges or obstacles or difficulties that you confronted in any of those? Did they go smoothly? Where were the opportunities really for lessons learned, that kind of thing?

RANDALL: I’m going to partially answer your question, and maybe it goes back to your previous question too about new technology and things that we did, we developed and built what is called a pilot plant at water plant #2. A pilot plant is simply a small-scale treatment facility on a very small scale, but it allows the plant operators and the water quality laboratory to do experimentation on treatment methods, on chemical feed systems, on every aspect of a treatment plant, and it allows us to do it at a very small scale with no risk.

The public doesn’t drink that water, but it’s a unique opportunity, and a lot of places do pilot studies, they call it, where they’ll either bring in facilities or hire a firm that brings in a pilot plant of some sort, but we actually build a treatment facility, a pilot treatment facility. We had three different treatment trains [ph] so we could run them parallel with the very same water quality at the very same time.

Q: Is it still operational?

RANDALL: It is still operational. In fact, we’re redoing that pilot plant as we speak.
There was a time in the last few years where I don’t believe it’s been used a whole lot, but it’s a really unique facility. We had different entities from all over the country, if not even the world, come to look at our pilot plant to see what we did and how we had done it, because, relatively speaking, it’s a cheap way of making sure the proposed improvements that you’re going to do work before you invest millions or tens of millions of dollars into a treatment plant in terms of concrete and steel and everything else to make sure it works.

Even back at water treatment plant #1 up at Gateway Park, there were pilot studies done there way back in the early ‘80s. We did pilot studies on particularly the Poudre River water. It was very unique. One of the challenges of the Poudre River, particularly in the wintertime when it’s cold, is that water is so clean, this sounds funny, but it’s so clean it’s hard to treat, and so we used pilot studies even back then.

The pilot plant was a big step that was somewhat unique. Most entities didn’t have that kind of facility. The thing we did at the water treatment plant in the early ‘80s, we actually built what we call a water quality laboratory. We had a full-time staff of chemists that their job is to monitor and to make sure that the water quality coming out of the treatment plant, as well as in our distribution system, that it meets certainly all of state and federal regulations, but our own standards also. It’s a nationally-recognized laboratory that continues to operate today.

Q: Can you offer any examples of when the pilot plant really revealed some information or data about treatment methods that were just absolutely crucial?

RANDALL: Well, you’re starting to push my realm of expertise, but certainly one aspect was in the ability to treat and remove cryptosporidium and giardia from the water, which occurs in nature everywhere. It can make people very, very sick. It can make immune-compromised people worse than sick. It can kill people, so we did a tremendous amount of work on crypto. I
use the term “we” here really in a big sense, because it wasn’t me, in a big sense, pilot studies to figure out how in the world you treat crypto and giardia, and it’s even more difficult here, because I mentioned just a minute ago with the really clean water, it actually makes it harder.

The microorganisms are so small that you don’t filter them out, not in the kind of media that we use, so that was, I think, a good example to answer your question of really an important discovery that we made; not discovery, but figured out the right treatment processes in order to be able to deal with crypto and giardia.

Through the years, we also changed the filters. Actually, the big step of treatment is water actually going through a filter that removes particles, and through the years we’ve changed. We use different types of filter media, it’s called, and so we’ve had everything from a very coarse, almost gravel, layer to sand to finer sand, to charcoal, called a multimedia filter vs. a dual media. Through the years, we’ve changed different media products, and that kind of research continues to go on today.

Q: Which occurs first, mechanical filtration or chemical treatment, or has it changed over time?

20:34

RANDALL: In general, they occur together, but in general we put chemicals in the water almost at the very start, and that helps bind the particles that are in the water together into what’s called a floc.

If you looked inside one of these big basins called flocculation sedimentation basins, the first third of the basin is basically a flocculator. The chemicals bind together, and there’ll be a three- or four-stage flocculation basin where we mix the water, and the chemicals react, and as you look through each of the processes, very, very fine particles, almost that you can’t see at the
start, look in the next basin ten feet away, and the particles are bigger, and the next one they’re bigger. It’s kind of like a snowstorm when it’s really, really cold and the flakes are tiny to a blizzard, a spring snowstorm when the flakes are huge.

That’s kind of the same thing it looks in the water as you build a floc. The floc binds particles together. Then it goes next into the basin called a sedimentation basin where we let that water settle very slowly, and that floc literally settles out. From there it goes into the filters, but we add chemicals at different stages all the way through to the very end of the plant right before it leaves the treatment facility where we dose it with chlorine to keep the water safe to drink as it goes into the distribution system.

Q: This is all very interesting. What I don’t yet know in what you’ve told us about expansion of the treatment facility, I don’t yet have a very good sense of how you, Owen Randall, what your particular jobs were with each of these expansions, so perhaps you could tell us a little bit about that.

RANDALL: The first job that I really held really with the city was as a resident engineer at water treatment plant #2 on the expansion from 24 to 34 million gallons, and so my job there was the design had been completed, the project had been bid, and we had a contractor onboard to build it.

My job was to be onsite in the field during the construction and to watch that construction, to work with the contractor to make sure that it got build according to the plans and the specifications, to help coordinate that work with the treatment plant staff as they operated. The first part of that job was easier than it became later on, because it still was a peaking plant, and we weren’t running in the wintertime, but when summertime got there, we had to coordinate
the construction and the work they were doing with the demand and the need to treat water. That was certainly a challenge.

My main job initially was to be onsite, make sure it got built right, built according to the plans and specifications, and then through time and through experience, my role expanded, became greater, and so in future jobs I was involved in in the implementation of masterplans as we did the masterplan, looked at what our demands were, what our needs were, looked at replacement of existing facilities, everything that went into planning the next construction job, I was involved in that phase of work.

Then in bidding the job, once again, in building it, and then this would probably be a good time to talk about the large expansion that we did in the early ‘90s was in a time when we were transitioning from a hard-bid atmosphere to alternative product delivery system that we did, and, at that time, as I mentioned a few minutes ago, our treatment plant was running right on the very edge of what it could keep up with the demands of the system, and so to this day I’ll never, ever forget sitting there discussing this in a group of probably 20 people that were intimately involved in the production of water for Fort Collins and our design engineer and making the statement to that group.

They were really, really concerned whether or not we could keep up with the demand for water, and particularly if you’re going to do an expansion of the plant, at the same time, just like I mentioned ago, the impacts the construction can have on production of water. I remember making the statement as, we will build this plant, this expansion, in the next 18 months. We’ll put the right team of people together. We can do this, and we did with the help of the design engineer, who, at that time, was CH2M Hill, and the contractor that we eventually hired as part
of our team, which was Garney Construction, one of the first major plants that they had ever built.

They’d been a pipeline contractor, and they wanted to start an arm in the treatment plants, and so we hired them, and everybody knew the constraints we had. Everybody knew the challenges we had at the treatment plant, and so basically we designed everything that was called below grade. Basically, underground we designed that, went to work building it while we finished designing everything above grade, and so we were literally building while we were designing.

Q: And you were treating all the time.

RANDALL: And the plant was running the whole time, so we had one more summer where we were kind of up against the wall making the plant do everything it could do to produce the water that we needed, and by the time the next summer came around, we had expanded the plant to out the door 88mgd of water that we could actually produce for the city, 88 million gallons a day.

At that time, our demand was in the low, maybe even mid 70s, and that additional treatment capacity that we built was for the projected growth, and then very, very shortly after that, a drought started here that lasted the better part of five years all up and down the front [ph] range. This wasn’t just Fort Collins by any stretch of the imagination, and water conservation became a much more popular idea, and water-conserving features in houses, and sprinkler systems, all this contributed to the projection of water demand. Instead of going like this, it started to at least flatten out. In many, many cases, it actually went down, and so we got that major expansion done just about in time to meet a completely-changing world.

Q: How many millions of gallons of water is the treatment plant treating now?
RANDALL: Peak day in the summertime, and we ought to check this to make sure, but I think peak day this past year was around 70 million.

Q: That’s quite lower than 92.

RANDALL: Well, it’s way below our capacity. It’s less than demand was 15 years ago, in spite of all the growth in Fort Collins, so it’s changed tremendously.

Q: So in the ‘90s when you were working on this enormous expansion, was the city of Fort Collins beginning to think about conservation before the drought? Were Utilities engineers beginning to think about it and wondering how you were going to get the public onboard? What was the thinking that was going on, even as you were working on the expansion, about the future?

29:33

RANDALL: Water conservation, I’d say, in Fort Collins has, I’ll say, always been—as long as I can remember, when I first came to work here in the early ‘80s, there was a water conservation officer. That’s what her job was was to try and convince people to not waste water, and it’s kind of funny looking back now, but part of her job, I think, was to drive up and down the street, and if somebody had a sprinkler that was running down the street or on a sidewalk, to go up and very pleasantly encourage them to not water the concrete, that it didn’t need water, that kind of thing.

Water conservation, you go way back. I don’t remember the dates exactly, but somewhere around the late ‘80s, into the mid ‘90s, Fort Collins water wasn’t metered. It was a flat rate. You could use 1,000 gallons a month or 50,000 gallons a month. It didn’t matter. You paid for water, and you got as much water as you wanted, and I even remember Water Board members saying, air is free, water ought to be too. So the thinking, a complete paradigm shift to
today where we have rates that the more water you use, the more money you pay, that kind of
ting thing, to try and encourage people to not waste water or use it wisely.
Q: And that went through in about 2002, something like that?
RANDALL: The full implementation of metering?
Q: Uh-huh.
RANDALL: I think you’re right. I don’t remember the date exactly, but that was a huge project. You think about all the homes in Fort Collins that didn’t have a water meter. We had to install meters in every home and every business in Fort Collins.
Q: Were you involved in that personally? Was that part of your job?
RANDALL: I didn’t work on that initial meter project at all. Different area.
Q: Can we talk a little bit about storage capacity? You’ve talked quite a bit now about the expansion of treatment capacity in order to keep up with demand, and then we’ve discussed as well how conservation has helped to diminish that demand, first level it off, and then diminish it over time, and that’s very important, but certainly the water treatment plant is treating more now than it was when it first began. It’s well above the 24 million gallons a day, so what has that meant in terms of storage capacity? Is the water just coming in and immediately going out, or is it coming in, and then sitting someplace for a while before it’s actually drawn down into pipes and a distribution system that takes it into people’s houses and into businesses and so forth?
RANDALL: Storage is a critical part of any water provider’s system, and so way, way back in the ‘60s, in fact, with the original water treatment plant that was built in the early ‘60s there where our water treatment plant is on Laporte, they built a 15-million-gallon water storage tank.
Q: Above ground, underground?

RANDALL: It’s underground. A lot of entities, you see the towers, the water balls, whatever. Ours are all underground, all concrete, very, very long life. There was a 15-million-gallon water storage tank built in the early ‘60s. There was another twin tank built to it in the late ‘60s, so we had 30 million gallons of storage. Then we built two more water storage tanks through the years, so those are each 15 million gallons of water they hold. Then we built a 4-million-gallon storage tank up on the foothills behind where Hughes Stadium was.

We had a 4-million-gallon tank built there, and then in the late ‘90s, we built a 2-1/2-million-gallon tank in the foothills up in the northwest part of town, north of Laporte, so that’s all the storage that Fort Collins has. As far as the average for the size of the treatment plant we have and the size of the town, we’re on the very, very low end of storage. Because of the treatment capacity that we have in order to ramp up and meet high demands if something would come on, we are able to do that, unlike a lot of entities.

Maybe to back up, make this make more sense, water demand, if you plotted water demand across 24 hours, it’s not a straight line. It goes up in the morning. It goes down during the day generally. It goes up in the evening when people come home, and then it goes down at night. That curve’s also changed through the years with all the sprinkler systems. Most people run them at night when more efficient, and so all that used to happen during the day when people would “water their yards,” so it’s flattened some of the curve out. It’s made the lower demands higher and the higher demands lower, closer to the straight line.

One of the things that helps a treatment plant process is to run as consistently as possible. If the city’s using 40 million gallons of water total during the day, if we can set out treatment plant to run at 40 all day long, that works much better than ramping it up, and then
ramping it down, ramping it up, and ramping it down. At 40 mgd capacity, there may be demands for a peak hour that is 60 million gallons, and so in order to not have to change the treatment plant production rate, that water gets drawn down out of our reservoirs, and then when the demand goes down, our production’s the same.

It fills the tank back up, so that’s one of the benefits of water storage. Another is emergency in the sense of huge fire where there’s high demands. The tanks can meet that demand, or if something goes wrong at a treatment plant, you’re not instantaneously out of water. If you have to shut the plant down, for some reason, the tanks, once again, can meet the demand. All those things go into water storage.

Another part that goes into water storage, it’s called the disinfection byproducts rule of how long the water has to—after we add the final chemicals, there has to be a certain amount of time that the water has to, I’ll say, sit before it can be used by customers, and so because of that rule in our two tanks, so all our water goes through the two 15-million-gallon reservoirs before it goes to town. Well, in order to make sure that we have enough time to meet those regulations, we couldn’t use all of those 15 million gallons, so in each tank, it depends on a number of things, but I’ll say we could only use 10 million of it, so we didn’t actually have 30 million, we had 20 million that we could actually use.

We just finished about two years ago what we call a chlorine contact basin, so inside that basin it’s basically a big tank, much smaller than the 15-million gallon, a serpentine fashion that the water flows through. That chlorine contact basin and the construction of it allows us for the first time ever since those tanks were built 40+ years ago to use the full 30 million gallons of capacity.

Q: That’s good.
RANDALL: There’s a snapshot of water storage in Fort Collins.

Q: That’s interesting. So you’re now using the full storage capacity that you have. Is there any indication that the city will have to expand storage capacity further, or do you think it’s pretty stable, at this point?

RANDALL: Barring significant changes in service area, I don’t see the need for additional water storage or water treatment capacity for Fort Collins. We’re in a somewhat unique circumstance in that our service area of Fort Collins, we are completely surrounded by three other water districts, and so in spite of the growth that you see in northern Colorado in the Fort Collins area, it’s not in our service area. The water districts around us are growing, but, by and large, our growth is in-fill and as we build more and more high-rise-type structures, that’s where our growing demand comes from. It doesn’t come from all the new houses you see being built around Fort Collins.

Q: Good thing to remember. Well, let’s talk a little bit about how the expansion of the water treatment facility changes in treatment methods over time have affected yard piping. Can you address this issue and how it’s intersected with your career?

RANDALL: You bet. When we use the term yard piping, there are large-diameter pipes, I’ll say, from four feet to six feet in diameter that are around the treatment plant outside. They carry both water as part of the treatment process between processes in the plant, but once the water’s completely treated and ready to leave the treatment plant, there’s large-diameter pipes.

Pipes vary in size at the treatment plant from four-inch to 84 inches in diameter, so a huge range. That piping, all underground, out of sight, nobody “knows about it.” It’s absolutely critical infrastructure.

40:45
Q: And it’s all over the city.

RANDALL: Well, it’s all over the city, but even right in the treatment plant, there are pipes that go everywhere, and those pipes have been put in the ground anywhere from—actually, we have pipes on the treatment plant that were built in probably the 1920s. The treatment plant up the canyon we’ve talked about before, part of the piping actually came to the water treatment plant site. It was an old open reservoir there onsite. Those two 15-million-gallon reservoirs I talked about were built on either side of that open reservoir, and the piping that came to that reservoir, same reason we talked about why reservoirs exist, and then pipes that went on to town.

Part of the piping on the treatment plant side is literally that old, even though the original plant wasn’t built until the early ‘60s. There are pipes that we still use that are that old there, and so part of the challenge of any infrastructure that we have is making sure that old infrastructure—there aren’t a lot of things that any of us use on a daily basis and depend on that are 50, 75, 100 years old, but, believe it or not, we depend on a lot of pipe in the ground that is that old.

Through the years, we’ve done different jobs of replacing or modifying or enlarging pipes on the treatment plant site, and so that’s also a very complicated process, because those pipes are in service. They have to work all the time, and when you try to go in and modify them or replace them, it’s a hard challenge to do.

Q: Can you talk about those challenges a little bit more? I imagine it’s very complicated. You’ve got a massive system of pipes of varying ages, and you’re trying to figure out how to replace some.

RANDALL: With a limited amount of room. It’s not just pipes. You also have electrical conduits with cables running everywhere. You have control systems that control valves,
chemical feed, everything there in the ground also, so any time you start digging in the ground of
the treatment plant is a complicated process. Whether you’re trying to dig up and replace or
whether you’re actually trying to put new pipes in, as the plant was expanded through the years,
we’ve built new pipes into the plant. They have to fit in conjunction with existing pipes that
were there. It’s been a huge challenge.

Another one of the more interesting projects that we did through the years, did two of
them, was those two 50-million-gallon tanks were built, like I said, in the ‘60s when demands
were not that high, and whoever designed them did not ever see the need for the kind of demands
we have today. It doesn’t matter how much water we have in the tank if you can’t get it out fast
enough, so when you build a plant that was 24mgd and you had a plant up the canyon that made
20mgd of water, there was the idea that you would be sending water to town at a peak hour rate
of 70 million to 100 million gallons.

They didn’t see that, and so the pipes that left the two reservoirs were very small, 24-
inch in diameter, and so there were times, I guess I’ll say, in the ‘80s when it became obvious
that the bottleneck in our system wasn’t the treatment plant. The bottleneck was getting the
water out of the reservoirs, and so the first thing we did—can I draw on this board? Can you
see? This might help people understand a little bit. The reservoirs look roughly like that.

They’re about 300 feet square across here, and, for some unknown reason, one of the
reservoirs had a 24-inch pipe that came out of the bottom. That seemed like a pretty good place
to take your water out. The other reservoir, for some unknown reason to me, the outlet was up
here, and so you had all this water down here that you couldn’t use at all. What we ended up
doing, a very unique project that we did, we needed a 60-inch-diameter pipe to come out of the
reservoir, so we did what they call a bore.
We pushed a 72-inch steel pipe, bored it underneath the reservoir until we hit the floor as far as we could push it. This was all out of service, and we came inside and we cut out all that concrete, cut out concrete down here, and we made a new basin down here like that, and then we pushed a 60-inch pipe through here, turned it down in here, and made a 60-inch outlet out of the reservoir, so we didn’t have to go down and dig underneath the whole reservoir. We came in here and made a siphon to take the pipe out. We ended up doing that in both reservoirs. It’s worked really well. Once again, it made the reservoirs function with the high demands that we see today that was never designed for originally. A very unique solution to a problem that we had to solve.

Q: That’s really interesting, and it does make you wonder why that pipe was put in so high originally.

RANDALL: There was a 16-inch pipe. That big is out of the floor, so they could get some water out.

Q: So slowly.

RANDALL: You’ll not even start to meet the demands. It was like what we always joked about, they built that, and they started building the reservoir and somebody said, maybe that 16-inch pipe isn’t big enough. We ought to add another one.

So they put it in a third of the way up the side of the reservoir, which makes no sense whatsoever to me, but that’s what they did. We came in and took all that old piping out and put the big pipes in. That was back probably late ‘80s, early ‘90s, somewhere in there, so it’s worked really well for a long, long time.

Q: Good. I wanted to ask a couple of more questions, and one of them is about this alternative product delivery system, which has been so important to your career, and to Utilities
and the success of this department, and I’m wondering if you can tell us a little bit more about how and when you’ve worked to implement this APDS at the water treatment facility in various projects. You’ve alluded to it a little bit, but I’d like a little bit more detail.

RANDALL: The builder that used the APDS system has made an enormous impact on the success of projects and the ability for the city to meet its customers’ expectations through the years. So I go back to the very first job I ever worked on at the treatment plant, and it was designed in a vacuum. The city hired an engineer and said, we need whatever, 10 million gallons of treatment capacity. We want to be able to expand it, and they came back in a year and said, here’s your plans, and we put it on the street and bid it, and the particular treatment plant people had absolutely zero input into anything that was done. The people that know the most about their treatment plant, what it does, what it does well, what it doesn’t do well, what the problems are, never part of the equation, and then you hire the contractor, whose goal was to meet the specifications that said you had to have this project done by such and such a time, and we’re going to pay this amount of money and go to it. Not a mention of any way, shape, or form of the idea that you’ve got to work with a treatment plant, because they have to make water all the time. From the very start, they were butting heads over everything. Between the contractor and between me, my job was trying to get it done right, and then you’ve got the treatment plant stuff, who were completely out of the picture.

50:18

I like to say when we got done with that job, walked in, dropped the keys to the treatment plant on the desk of the chief operator and said, there’s your plant, and walked out the door. I was done. I had done my job. That was Friday afternoon. On Monday morning, so to speak, the treatment plant set out to modify the plant so it would work for them, and it was just a
crazy way of doing business. We went on with several other expansions that, to put it mildly, they were a challenge, because of the delivery model that was there.

We got to the early ‘90s and we talked about the large-scale expansion. For the first time ever, we had our treatment plant staff, we had the engineering staff from my group, we had the consulting engineer, and we had the contractor all sitting at the same table, so we all knew what the challenges were. We knew what the problems were. We all knew what the goal was, and we had the same goals, and we established it together to work together so that when we got all done with the project, the treatment plant staff, I’ll say for the first time ever, they got what they needed instead of what somebody perceived they needed.

We built it on time in an extremely short timeframe, which I’ve talked about already, in that 18 months. Absolutely amazing what we got accomplished. The engineer and the contractor were both successful. They made money on the job, which is a nuance that some people don’t understand, that if the contractor doesn’t make money, you’re getting an inferior product, guaranteed every single time.

The contractor made money. The engineer put it in their resume. They learned things that they could apply in future jobs they did. We had a team of people that made a successful project together, and that’s what the APDS system has done. I think it’s invaluable to the utility, period, no matter kind of projects we’re doing, but at the treatment plants, it is so, so critical, because we don’t get to send out inferior water, because we had to do a tie-in. It doesn’t work. You have to do it right. The city has to always make safe water 24/7, 365, period. It’s not an option to do otherwise.

In the hard-bid days, the contractor was not concerned or motivated unless he just personally was, but as far as the contractor goes, he had no motivation whatsoever to be a help in
that, where with APDS, they do, and so what has been successful at the treatment plants for water will get to the wastewater eventually, but the same thing is true down there. It’s very, very complicated and challenging working inside and operating a treatment facility, and so to have everybody understand the issues, the constraints, the goals, everybody understands everything from the very start; maybe not from the very start, but that’s part of our process is there are no dumb questions. Everybody needs to and gets to ask every question they possibly can so they understand what makes a project successful.

Q: So with this big expansion up to 92 million gallons a day, clearly the APDS system worked really well in that particular project. Before that project had begun, when you were thinking about it, when you were planning it, how and when did you and others identify the APDS system as an absolutely critical piece of this project, the thing that was going to make this project successful? How did you get it off the ground, get people to embrace it, get people to understand what it was, work with the various groups who were involved, the people at the treatment center, the potential contractors and so on and so forth? It’s a big shift.

RANDALL: It’s a huge shift. It’s a completely different way of doing business than the conventional municipal design-bid-build mentality. We could talk about this for literally hours and hours and hours, so I’ll try to make this relatively brief. APDS wasn’t something that we just said, okay, we’re doing it this way; now we’re going to do it this way. The way it originally started was actually working at one of our wastewater plants where I was sitting with the engineer, working with them on trying to figure out how we were going to design just a little tiny piece of the project; not the project, just some little tiny piece, and there were so many unknowns, things we didn’t know about what we were going to find in the ground, what the impacts were going to be, just everything under the sun. We didn’t know.
Somebody goes, why don’t we ask a contractor to tell us how they would bid this? That’s how it started, and we called up a contractor, said, hey, would you come over here and spend a couple of hours with us and talk about how you bid this?

Because in a hard-bid world, unknowns always equal risk, and risk always equals dollars, equals cost to the owner, so if there’s risky jobs, in a hard-bid world, it equals lots of money, because a contractor, you’re asking him to say, tell me what you build this for, how much are you going to charge me, and if I don’t know all the ramifications, I have to put money in there for all the what-if the risk.

That is one of the tenets of APDS is the elimination of risk, and so in a treatment plant scenario, the contractor is sitting there at the table with us, and we need to build this in this way at this time of year and use these materials, and he’s going, well, if you do that, it’s going to cost extra, because of this, and pouring that type of concrete in these ground conditions at this time of year is going to cause—I’m going to have to heat it longer. There’s all these ramifications.

When you’ve got everybody sitting at the table, say, well, maybe if we built that structure in March instead of in January, there’s some cost savings. Use this forming system, it’s going to cost this much. Use this forming system, I can do it twice as fast. Everything under the sun from materials to, we call it, constructability, ways that you build things, the contractor, he’s sitting there, he’s going to do it. He has direct thoughts and input into means and methods where that’s a complete unknown in a design-bid-build world. Goal, eliminating risk, minimizing impact to, in this case, the treatment plant staff and, therefore, the water that they’ve got to make 24/7.
Q: That’s great. So you clearly got some insight into how this system might work with some wastewater issues, and then you, at some point, figured out that you could expand this model and use it with the water treatment facility.

Were there challenges in getting people onboard? What was the communication process, because that’s what this whole thing is? It’s communication about the process, and then it’s using a process that prioritizes communication.

58:40

RANDALL: Absolutely, to everybody, to everybody that’s involved in the job. They have to be involved in decision-making and understanding what ramifications are of doing certain things, etc. Did we have challenges and get it accepted?

Q: Yeah. Let me just say from an outsider’s point of view, one can imagine that some people might say, oh, gosh, this is going to require a lot more meetings on my part. It’s going to take a lot of time in my busy work day to become involved in this more elaborate planning process. So I’m just imagining that there might have been a few skeptics.

RANDALL: Well, you asked a question from a viewpoint I wasn’t even thinking of. Really good question. I think that the staff of the treatment facilities were thrilled with somebody who actually cared whatsoever about what their thoughts were, so I don’t think people in general, including us, realized the demands for time, because you’re exactly right. You think about how much time it takes that whole group of people I described to be involved in the design of a $40 million project. It is a huge time commitment, and you think back to what I said a while ago, you hired an engineer and said, here, design me a 20-million-gallon capacity treatment plant and come back in a year when you’re done.
There’s the contrast from somebody go do it all, come back and tell us when you’re done. Your involvement was just miniscule.

Q: There was a lot of risk.

RANDALL: Well, you had a lot of risk, and whether or not that treatment facility was anything at all of what you pictured they were going to design for you, and your observation is completely right, it takes a lot of time, and it’s a balance we still struggle with from time to time is how much is enough input? Because everybody has other jobs to do in this city. The treatment plant staff can’t all come and sit in a design meeting for four hours every week. They can’t do that. They have a plant to run. They have a plant to maintain, and you have things to take care of, so finding the right people to be there at the right time for the right questions is a challenge that we always deal with.

There’s a balance there, because it does take time and effort, but I think everybody recognizes without any doubt the huge benefits that it pays, so in the long run the challenge, and this is a whole question in and of itself, there’s a whole other aspect to it and that’s it’s not a common way to deliver projects in a government setting, and so there’s a whole set of challenges around that too that we deal with of making sure that we meet the intent of city code the way it’s written, the way we deliver projects in a competitive fashion. That’s a whole other topic that we could talk about for a long period of time.

Q: We’re not going to talk about that today, but maybe with another project we’ll get a chance to. I do have one last topic that I’d like to address and that is the various ways in which your work at the water treatment facility over time has involved input from or reactions from the public. Your goal is to deliver quality water and the public expects quality water and probably isn’t very happy if there are disruptions in the delivery of what quality water. Can you reflect
upon points in time when treatment plant projects or treatment plant work has been most affected by public concerns, public input, public pushback?

RANDALL: I think I’d say, by and large, that’s a really question to answer, and it’s been very little, and it’s unique compared to other projects that we do that are in the public eye and the public right of way where we directly impact people’s lives where we spend a lot of time in outreach to the public making sure they understand what the problem is, that we’re the right people to solve it, that we can do this, and that we’re going to do everything we can to minimize the impact of their lives.

At our treatment plants, they’re closed to the public. It always has been a security concern, and the public, they’re not directly impacted by what we do at the treatment plant as far as their life goes day-to-day. They probably don’t realize how impacted they could be, to point to your question, but the main place I would say that the public, they have opportunity for input, most people don’t, I’ll say, take advantage of that opportunity is in either the budget process where projects are budgeted. Millions of dollars are budgeted. The public certainly has an opportunity for input there. The other time that we used to always do it was we took the masterplans, basically on a five-year basis, we took them to city council for adoption, and so the masterplan, it’s public.

It was public knowledge, the public could comment, and there were a few people through the years—there’s been a few issues that the public had big concerns about. One of those is we put fluoride in the water to protect people’s teeth, and there are, I’ll even say, organizations, I guess, who are extremely against fluoride, and so that’s one big picture of water treatment. It’s a tiny, tiny, tiny part of it, but very, very politically-sensitive at times through the years about fluoride.
Q: When was fluoridation first implemented in Fort Collins? Do you know?

RANDALL: No, I don’t. I can’t tell you. I think there was fluoride being added even in the late ‘70s, I think, and then we had to redo the whole fluoride—it’s a very, very corrosive chemical—system in probably the early ‘90s, somewhere in there, and that’s when it really was a big topic of discussion at Water Board and city council over and over and over again.

We actually turned off the fluoride. We had to turn it off completely and remove it, and we took the system out and put in a brand new fluoride system, so it was off for some weeks. I don’t remember exactly how long, but that’s one that the public had—there was a small segment of the public that was really, really concerned about that. Everybody wants water. Nobody has to argue. Everybody wants water, and they want it safe, and they want it all the time, so our goals, there are very, very few people that argue with the basic tenet of supplying water, so it’s not a controversial topic in the big picture. There’s little pieces of it that can be, but fluoride is one that when you ask that question, what immediately pops to my mind is the whole fluoride issue.

Q: I want to ask kind of a concluding question, and this is one that you can think about in terms of the public or in terms of your colleagues at Utilities, and that is as you think back over your career and over the projects that you’ve done at the water treatment facility, are there things about that facility that you wish were better understood by the public? Are there things about the treatment plant that you think are really important for other people at Utilities to appreciate, to know about, to understand?

RANDALL: Let me address the public one, and then I might ask you to repeat the second part. I think that, much as I just explained in that last question about the public not realizing—they simply don’t realize what goes into the fact that every time they open a faucet,
every time they turn on their hose, whatever it is, every time they go to the carwash, water’s always there. I wish people had an appreciation for what it takes to make that happen 24/7, 365 for years and years and years and do it an extremely safe manner all the time.

The technology, the operations, the people, the people that are working 24/7 at our water treatment plant, every single day no matter what, they’re there. Just the complexities of everything that goes into that, not only people’s homes, but the businesses, whether it’s Anheuser-Busch Brewery or Coopersmith’s, they’re the same way. They want top quality water every day no matter what, and we take a tremendous amount of pride in making that happen without fail. That, I guess, what I wish people could understand and would appreciate the amount of effort that goes into doing it on a day-to-day basis, and also the amount of effort and work that it’s taken to put the facilities out there that do that and do it reliably, and do it efficiently too.

01:10:21

Q: This raises a related question. This isn’t perhaps something that you’ve worked on directly, but you’ve probably been aware of it. How has the Utilities’ effort in community education changed over time, because clearly that’s important?

RANDALL: Yeah, that’s really important, and you’re right, that’s not really in my bailiwick, but we have a whole staff of people, customer connections division they call it, and we’ve seen the need through the last relatively short time, I’d say, the last ten years to try and educate our customers better on everything that we provide. Water’s just a portion of it, and so we have a whole staff of people that that’s what they do, whether they’re going into grade schools or speaking on college campuses or social media things, publications. We do all kinds of
stuff to try and educate as many people as we can about the services that the Fort Collins Utilities provides day in and day out.

Q: Let me go back to my second question that you wanted me to repeat, and I’ll try and say it a little bit more clearly this time. We’re interested, in a general sense, in conducting all of these interviews with you in the transfer of knowledge. You’ve got all this experience under your belt. You’ve got all this knowledge packed into your mind that’s based on a whole career of work with Fort Collins Utilities, and today we’re focusing on the water treatment facility, and so I’m wondering if in reflecting upon the water treatment facility and projects that you’ve worked on over the years if there are any concluding remarks, concluding stories that you’d like to share that you think would be valuable for people at Utilities to know about, people within your circle, not so much the general public.

RANDALL: The answer is yes.

Q: The selection process.

RANDALL: The specifics of them, Ruth, I could talk for days about specific items that I know about or experienced or saw happen or whatever the case is that I could try and leave, but I can’t even start to answer that question, because there’s a million of them. Literally, a week ago Sunday, we replaced meters in the vault out at Anheuser-Busch Brewery, and those meters have been in there since the mid ‘80s; had to be replaced, and, for a variety of reasons, we had to shut all the water off to Anheuser-Busch, and so they didn’t have a drop of water.

We coordinated with them. They were doing some maintenance, etc., so it all went really well. We turned the water back on, and within half an hour, we had a main break up here in North College, and we had, I forget, seven, eight, or nine alarms of fire systems that experienced low pressure, and the guys over in our crews that respond to main breaks, they got
calls from the fire department, because they had all these alarms all over town right after we turned the water on.

They’re all scratching their heads, why, why, why? To go to your question, the reason I’m telling you this is that when we originally put the line into the brewery and started water out there, we started experiencing the same thing. The main break they had up off of North College, we had main break after main break after main break out there, and nobody could figure out why. To make a long story short, there were issues with the way apparently the water was turned back on inside the brewery that caused water hammer back into town, and the water hammer broke the main, and it caused all the alarms.

Q: What’s water hammer? What does that mean?

RANDALL: Water hammer is if you have water flowing in a pipe and you close a valve quickly, that can be defined different ways, depending, but if you close a valve quickly, there’s a pressure that builds. It’s like a freight train going down the track, and if the engine stops instantly and you’ve got 100 train cars behind you, what happens? All that energy has to go somewhere, and so in a pipe, water pressure goes back the other way. It’s a pressure surge. It goes the other way, and so that’s what was happening way back when the brewery was originally started.

They were closing valves. Water was flowing into the plant. They’d close valves, and we had water hammer coming back into town, and it magnifies itself. It gets greater. It bounces back and forth. Water hammer can destroy anything. Kind of off the track, but the point is that nobody over in our crews that work with us had any idea about this, and on Monday morning I was talking to a guy and he started telling me what happened. I said, “Well, that’s exactly what happened 30 years ago,” because this, this, and this.
There are so many instances like that of things that it would be really good to transfer
to somebody else so they don’t have to scratch their heads or learn the hard way or
not know what in the world is going on. Some of them are inconveniences. Some of them are
challenges. Some of them could be really, really bad, depending on what people know, that are
very costly.

To answer your question about the water plant, I couldn’t even start to tell you. I
could start to tell you a story and two and three, but we’d run out of battery and tape before we
were done.

Q: We’ll stop there for now. I’m not sure when we’re going to be doing wastewater, but
pretty soon.

RANDALL: We’ll get there.

Q: Thank you very much.

RANDALL: Thank you.