

MINUTES OF THE SPECIAL TOWN COUNCIL MEETING HELD ON APRIL 29, 1998

I. CALL TO ORDER AND ROLL CALL

The meeting to consider issues related to the future water supply for the Town of Palm Beach was called to order by President Lesly Smith at 10:00 a.m. on Wednesday, April 29, 1998, in the Town Council Chambers. On roll call, the following Elected Officials were found to be in attendance: Mayor Paul Ilyinsky, President Lesly Smith, President Pro Tem Sam McLendon, Councilmen Jack McDonald, Leslie Shaw and Allen Wyett. Also, present were Acting Town Manager Peter Elwell, Town Attorney John Randolph, Public Works Director Al Dusey, Planning, Zoning & Building Director Robert Moore, and Town Clerk Mary Pollitt.

II. APPROVAL OF AGENDA

Mr. McLendon made a motion to approve the agenda. Mr. McDonald seconded the motion which carried unanimously.

III. CONSIDERATION OF ALTERNATIVE WATER RESOURCES -- EIGHT (8) PRESENTATIONS BY DESIGNERS, CONSTRUCTORS, AND OPERATORS OF WATER SYSTEMS

Mrs. Smith informed all present that it was her understanding the applicant's order was picked by a draw and Progress Energy Corporation is the first presenter.

1. PROGRESS ENERGY CORPORATION

Don Jones of Progress Energy Corporation introduced himself and informed Town Council that Progress Energy Corporation is a subsidiary of Florida Progress Corporation which is the parent company of Florida Power Corporation. Under Florida Progress, Florida Power Corporation specializes in the utility area and Progress Energy Corporation specializes in the area of energy and technology.

Mr. Jones said they develop non-regulated projects from the utility aspect and that they got into the desalinization area because they had a lot of power plants which needed treated water. A power plant is a convenient location for putting a desalinization plant because typically there is an intake structure, a discharge canal and water flow.

Progress Energy Corporation does build, own and operate desalination plants primarily with reverse osmosis. Mr. Jones went on to explain that a RO plant operates by taking seawater or brackish water from wells and then it is run through the RO filters. Depending on the salinity of the water, you would get approximately half pure water and half saltier water from brine.

Mr. Jones reported that there are several processes around that treat water such as thermal distillation which normally uses heat or steam from a power plant or boilers. There's a co-generation plant proposal in Tampa Bay where the exhaust from a jet engine will make steam to distill the water. Progress Energy Corporation bid on the Tampa Bay Desalination RFP when it came out, and he advised that they are currently the lowest bidder partnered with Ionics.

Mr. Jones explained that another treatment is the membrane process which is typically known as reverse osmosis. There are also a few developmental processes. He mentioned a process the military is working on using some sort of thin film technology, but it's still in the developmental stages and probably would not be good for commercial application.

Mr. Jones felt that the two real candidates whose technologies are in use today are distillation and reverse osmosis. He said some of the advantages of reverse osmosis are:

- There are a large number of suppliers of membranes so there are no problems with availability.
- Generally, the capital costs and the operating costs to run a plant are lower.
- The plants are modular.
- You can put in several units of one or two million gallons a day and take one unit down for maintenance and still maintain the output of your plant.
- Lower wastewater floats.
- Typically the reject water is lower with RO plants.

Mr. Jones went on to talk about the Tampa Bay Project that Progress Energy Corporation is currently involved in.

He reported that they are going to either use water from Tampa Bay or the Gulf where the solidity is not as bad as the dissolved solids. You have to pretreat the water so that you don't plug up the RO filters. The cleaner the water going into the RO filters, the longer they are going to last before they have to be replaced. He showed a cutaway of a RO filter that was about six inches in diameter, twenty or thirty feet long and explained that it is a roll of membranes. He said that the feed water is pumped in one end and the water is forced in under extreme high pressure at about 800 to 1000 pounds per square inch. The water is actually forced through a thin membrane which is somewhat like a sheet of plastic and pure water comes out the other side of the membrane. Eventually, it winds its way down the center pipe and the salty water comes out the end of the pipe. Simply, that is all there is to it.

Mr. Jones said that the energy is where all your cost really is. It's when you're using the high pressure pumps to get the pressure up high enough to go through the membranes. A typical plant that would produce twenty-five million gallons per day would probably use twelve to thirteen megawatts or twelve to thirteen thousand KW of power. So, it is quite a bit of electrical energy to pump the water through. The fresh water that comes out is essentially distilled water which needs a little treatment before it can be put in the system.

Mr. Jones advised that it is really necessary to do pilot testing before you install a plant in order to establish the water quality. He continued that this will heavily influence the design of the plant particularly the pretreatment. He explained a problem, at a site located close to a river mouth in the Gulf of Mexico, where they found the solidity varied greatly depending on tides and rain. If there's lots of rain, then fresh water comes out of the river and slowly goes down making it difficult to design the plant and keep it operating consistently with salinity bearing. Also, the dissolved solids vary quite a bit there. He reiterated that the membrane options and performance would vary depending on the water quality. As an example, he mentioned pretreatment testing for a project they did at the University of South Florida for about one year. He compared the river to the Red Sea because the majority of the large desalinization plants in the world are around the Red Sea. The sodium is much higher in the Red Sea than in the Gulf. He felt that since there are some huge plants there that work, it will work anywhere.

Mr. Jones continued with his discussion of pretreatment stating that chlorine is sometimes used to pretreat but they are getting away from using chlorine because it has to be removed before it goes to the RO filters. He showed some of the different pretreatment steps such as polishing filters and high pressure pumps. He pointed out the recovery turbines that are used to help boost the energy to the pumps. There are some post treatment chemicals, then storage and brine disposal. He stated that the pretreatment process through the RO filters is really very simple, but then there is some post treatment.

Mr. Jones discussed a little project that he was involved in for a few years at the University of Florida. This is a plant at the University of Florida that Progress Energy Corporation company built in 1991 and 1992. It's basically a co-generation plant used to supply electricity and steam to the University campus. It generates about fifty megawatts of electricity and supplies the whole campus. In addition, it provides all the steam and chill water for the air conditioning at the hospital and the campus. Mr. Jones showed the wastewater treatment plant at the University stating that it is state of the art and the first of its kind in the country. Its tertiary treatment is a French process. He said that he was faced with buying about one and a half to two million gallons a day of water from the City of Gainesville for the make-up water for the steam in this power plant. The steam had to be very pure because it was being used in the hospital for sterilization and laundry. They even cooked with it. The University said that would give them up to four million gallons a day free of tertiary treated wastewater. So, they looked into that and decided to go ahead and build a more sophisticated wastewater treatment facility for the co-generation plant and use that water. Mr. Jones said that, as far as he knew, it was the first in the country. He felt that they probably went a little overboard, but they weren't quite sure how good the water from the wastewater treatment plant would be. The reason being is that occasionally there can be upsets or mistakes, as they call them, and so mixed bed filters were installed. He continued that these were essentially sand filters, activated charcoal filters and the water would run through ultra violet filters then reverse osmosis and finally, condensate polishers before it went to the boiler. There's a mixing tank that looks like a large swimming pool where the discharge water from the RO filters or brackish water is diluted before it is returned to the sewer system. He stated that there are three of everything because the reliability of the water had to be very high for the hospital. For instance, one pump is on line, one pump could be down for maintenance, and one pump is in standby. They are all automatic. He then showed the three sets of RO filters and explained that each set or each train produces about two million gallons a day of fresh water. He reported that this plant, which has been in operation since 1992, is a medium size plant producing about ten million gallons per day with RO filters.

Mr. Jones mentioned a plant in Arizona on the Colorado River which is the largest in the country, and it produces seventy-five million gallons a day.

Mr. Jones went over some data that his company put together to show the relative cost of a desalinization plant. He listed some retail water pricing per kilo gallon in the United States:

Scranton, Pennsylvania \$6.48
Tacoma and Pinellas County, FL - \$2.00 range
Fort Lauderdale, FL - \$2.17
Sebring - \$3.76
Lakeland - \$1.45

The plant in Tampa Bay is in the mid to low \$2.00 range between \$2.25 and \$2.50. Mr. Jones mentioned again that his company has one project proposed on Tampa Bay and one in the Gulf which are larger plants and produce

twenty million gallons a day. Depending on the water quality and the size of the plant, the price can vary some. He said it was built on an operate and sell water to the grid and that was the bottom line. The cost of the water was for brackish water. He felt that on a smaller scale you could do better and the price could vary somewhat.

Mr. Jones felt that his presentation would give Town Council an idea of what his company was capable of doing. He wanted to know if there were any questions?

The Mayor wanted to know how many people get the fresh water needed from the big plant in Arizona which Mr. Jones said was the biggest plant in the world? Mr. Jones wasn't sure. The Mayor wanted to know if it was a state or county plant?

Mr. Jones said that he believed it was the county but he was not that familiar with that plant. He mentioned that there's about a ten million gallons a day plant in San Diego and a couple of brackish plants in Florida. They are smaller ones.

The Mayor wanted to know about the one in San Diego and who does that supply fresh water for?

Mr. Jones replied it was the city.

The Mayor then wanted to know what he meant by the city? Did he mean the billion and a half people that live in San Diego or whatever it is?

Mr. Jones said that it supplies water to the city, the city water supply system. He stated that in the Tampa Bay area, they would supply water into a regional grid which would supply Hillsboro County, Pinellas County, Pasco County and the cities. The desalinization plant would just supplement the existing well fields.

The Mayor asked if he had any idea what a consumer's going to have to pay per gallon after that's on line?

Mr. Jones said that their price, in the Tampa Bay area, will be in the mid \$2.00 range.

The Mayor asked if that was for the consumer?

Mr. Jones stated that no it was their price to the water system.

The Mayor then wanted to know what happens after that?

Mr. Jones stated that it will be blended in with the current usage which is approximately at 100 million gallons a day. The wholesale price of that now is under \$2.00. So, he said their \$2.30, \$2.40, \$2.50 price will be blended in with that. He also said that the impact will be noticeable but not significant.

Mr. McLendon wanted to know what is the connection between Florida Power Corporation and Florida Progress?

Mr. Jones replied that Florida Power Corporation is a subsidiary of Florida Progress. Florida Progress is the parent company and under Florida Progress there is Florida Power Corporation.

Mr. McLendon stated that, as he understands it, Mr. Jones' company is developing a supply which is a well or entrance from the sea that includes only the treatment development of the water and delivering it, in effect, to a water system. He asked if he were running the whole water system, would that just be a component of the cost? He also asked if Mr. Jones was talking about a \$2.50 ballpark figure for just the treated water because that would be a long way from the total cost.

Mr. Jones said their price is for a build, own and operate plant and to build a connecting line into their main system.

Mr. McLendon stated that if we didn't have a system or if we needed to replace an existing system, new pipe would have to be installed. He questioned the operating costs. He wanted to know if there would only be those costs connected with the plant and not include water meter reading, records keeping, or maintenance outside the plant.

Mr. Jones replied that was correct and that they were primarily in business to build, own and operate the water plants.

Regarding Mr. Jones description of ultra violet as a type of filter, Mr. McLendon questioned this statement, because he thought ultra violet was just a treatment system and not a filter.

Mr. Jones replied that it is just a treatment, and it was included primarily because it was treated wastewater.

Mr. McLendon wanted to know if a different kind of membrane is used for brackish water as opposed to more saltier seawater?

Mr. Jones said that he would not think it would be that different. We have looked at what's called beach wells or shoreline wells for some of our systems and the pretreatment would be different but the membranes could be the same. The City of Key West uses a system like that.

Mr. McLendon asked Mr. Jones that when mentioning the Colorado River, if he wasn't talking about real brackish water there but just total solids?

Mr. Jones said that was right. Totally dissolved solids are more or less a problem there as well as suspended solids.

Mr. McLendon wanted Mr. Jones to elaborate on the relative quantity of total solids as opposed to the salinity which was a problem in the Tampa Bay area.

Mr. Jones reported that there was a problem because the intake is close to the river and bay where there were boat traffic and tidal action causing the suspended and dissolved solids to both vary greatly. It varied, and it was hard to stay on top of the pretreatment process and keep the system working correctly. He stated that if it were steady, it would be easier to pretreat and they actually installed a small system and ran it for about one year.

Mr. McLendon wanted to know what his company had done in their plants regarding hydrogen sulfide removal?

Mr. Jones said that it was part of the pretreatment process.

Mr. McLendon wanted to know if Mr. Jones knew how they did it.

Mr. Jones didn't know stating that he is more involved in the financial end than the technical.

Mr. McLendon replied that he thought it might not be a fair question.

Mr. Jones continued that it is treated in the front end, in the pretreatment process.

Mr. Shaw wanted to know if they have designed a plant that would fit onto a barrier island?

Mr. Jones said that personally they hadn't and that the footprints of these plants are not very large.

Mr. Shaw wanted to know how large is not very large?

Mr. Jones said that the plant he had shown at the University of Florida is three million gallons per day and the water treatment area is probably not much bigger than this room.

Mr. Shaw then asked if the needs of the island would be twice the size of this room?

Mr. Jones replied that the size would depend on the through put and the type of intake water.

Mr. Shaw wanted to know if a co-generation plant would be something Mr. Jones would propose for the Town, since it is a built up island which doesn't have the resources to dedicate fifty acres to build a water plant and keep it away from everybody. Mr. Shaw asked is it something you would propose to build in conjunction with a power plant like the FPL plant across the intracoastal?

Mr. Jones replied that doing that does have some advantages because there already is an intake structure and there is a discharge canal. For instance, at the Florida plant discussed before, he pointed out that Progress Energy is going to lease about five acres on the plant side and use the intake and discharge canals. They won't have to build those structures or do any dredging or do any work in the intracoastal.

Mr. Shaw wanted to know if it was possible to mix, as a water source, run off water and storm drain water? He also wanted to know if they had done that?

Mr. Jones was sure you could. He didn't see why you couldn't but the pretreatment would probably be a little different.

Mr. Shaw wanted to know if there was a benefit to it or is it better going into brackish water or just pure salt water?

Mr. Jones felt that the only disadvantage is probably in your pretreatment process, and operation of the plant may be a little more complicated with different types of water. He explained that was the problem Progress Energy ran into at the project described earlier where the water varied so much. He felt it would have been easier to operate the plant if the water was saltier than if it varied.

Mr. Shaw asked what Progress Energy would propose to do with the waste products given that the Town has the ocean on one side and the intracoastal on the other side?

Mr. Jones felt that they could probably be discharged into the intracoastal or the ocean. As an example, he discussed the river site where they had an environmental firm provide computer models at the end of the discharge canal. They found that the difference was immeasurable. The amount they were putting back was saltier than the intake water but it didn't really change enough to measure which depends on the flow rate and where you dump it. He said that this particular canal has about a billion gallons a day passing through.

Mr. Shaw wanted to know if they would propose a centralized location or would the Town be better off with

regional plants based on the design of the island?

Mr. Jones felt that centralized would probably be better for operation as far as man power and maintenance. He mentioned that some of these plants are unmanned. They operate remotely with alarm systems and the Town could do it that way.

Mr. McLendon had a question with regard to their use of membranes. He stated that Mr. Jones indicated Progress Energy used some membranes regardless of the salinity. Mr. McLendon said he understood that the pressure would have to be considerably different when you get fluctuation of solids of which you're removing 99% or whatever. He wanted to know if you get fluctuating lower solids, do you automatically get an increased flow through the membrane if your pressure stays roughly the same, and are your pumps still operating?

Mr. Jones said that you need to remove the solids before they get to the membranes. If the totally dissolved solids fluctuate, you'll have to back flush or clean your pretreatment filters more often.

Mr. McLendon wanted to know if all of the solids are removed before you get to the RO? He understood that was the case for non-dissolved solids but wasn't aware of that for dissolved solids.

Mr. Jones said in some of the larger ones, they use five micron filters, and Mr. McLendon said he understood that.

Mr. Jones continued that the solidity of typical brackish wells that Mr. McLendon mentioned could have a lower pressure maybe four to five hundred pounds instead of eight hundred to a thousand.

Mrs. Smith asked what Mr. Jones estimates the cost would be to build and operate this water plant for the Town of Palm Beach?

Mr. Jones felt it would really be hard to say without knowing the water quality or whether the project would consist of smaller plants or one large plant.

Mrs. Smith then wanted to know if Progress Energy had looked at the Island explaining that the Town is twelve miles long and approximately a quarter of a mile wide.

He replied that Progress Energy really hadn't studied that but the proposal at Tampa Bay is for twenty million gallons per day and is about \$70 million. He mentioned that project is quite a bit different because it uses seawater.

Mr. McLendon wanted to know if there is an economy of scale here or can you just adjust your capacity by the capacity of adding one more pipe with the membranes in it?

Mr. Jones said there's definitely an economy of scale particularly in operating personnel, the building itself, an electrical switch heater, and as far as the RO systems, they are just added in trains. He continued that if you want to build a twenty million gallons per day plant, you would have RO filters for about twenty-four million gallons a day assuming that some would always be down for maintenance or being cleaned so you could continuously put out twenty. He continued that it is modular and there is an economy of scale.

Mr. McLendon told Mr. Jones that the Town's maximum day has been estimated at about sixteen million gallons a day and that the preliminary thinking is three or four plants would be appropriate. The distribution or transmission system doesn't have to be as huge as it would be with everything in one place. He wanted to know if Progress Energy has had any experience with that?

Mr. Jones reported that they haven't had any experience with plants like that. He didn't see why you would have to add many more personnel if you, for instance, had three plants. He felt that the plants were close enough together to drive back and forth. He said that their proposal is for about twenty people on the payroll working around the clock to operate this plant. He explained that you would always have someone there for maintenance and to cover vacations.

Mrs. Smith thanked Mr. Jones for his presentation and informed Town Council that U.S. Filter would be the next presenter.

2. U.S. FILTER

Kurt Mesedahl, Project Vice President with U.S. Filter Corporation introduced himself and some of his colleagues from the Houston office. He also introduced Bob Bradley, Technical Manager on reverse osmosis ion exchange technologies and Jake Erik who, he said, brings very strong distribution strength, piping and valving that may become an integral part of the project you are considering.

Mr. Mesedahl thanked Town Council for the opportunity to go over U.S. Filter's approach, understanding, and experience in reverse osmosis systems. He explained that what he wanted to do today was to not only show U.S. Filter's capabilities and experience as an organization but what some of the options the Town has when considering this important project. He advised that he would be going through the equipment, the services that U.S. Filter offers and the partnership approach that the Town could entertain as it looks into financing, designing and building this

system.

Mr. Mesedahl began with the vision statement of U.S. Filter Corporation. He explained that the whole structure of the company was developed to bring all the products and services together that are needed so that their clients can go to one source for everything and be confident in the product that they end up with for the next twenty years or better.

Mr. Mesedahl gave a thumbnail sketch of the U.S. Filter Organization stating that they are an American firm publicly traded on the New York Stock Exchange and that right now they expect to do five billion dollars in revenues. He said that they have more than four billion dollars in assets and no long term debt against it. He hoped to show the financial strength and stability of the company and to show that they stand behind the performance guarantees that are offered.

Mr. Mesedahl reported that, to date, they have done more than two and a half billion dollars in design/ build/ operate projects. In fact, on that day they were breaking ground on a first of its kind twenty year design/build/operate project in Moncton, New Brunswick, Canada for a thirty million gallon a day water treatment facility.

Mr. Mesedahl stated that U.S. Filter has more than five hundred offices with about twenty of them in Florida alone. There are more than ninety companies that have been integrated from the minute the water is taken out of the ground, used and reused in a number of ways and put back in the ground. He stated that U.S. Filter's goal is to amass those companies and integrate them into their organization. They have more than seventy different technologies that can be mixed and matched into the right solution for each client.

Mr. Mesedahl said that U.S. Filter is a company that is not satisfied in being a me too player and that they are on the leading edge of services and proud of it. He said that their operations and maintenance services set the standard in the industry and that they have thousands of patents. He mentioned that Bob Bradley has more than twenty-six years of experience and has five patents himself.

Mr. Mesedahl said that currently they have more than 200,000 installations of different types and many are reverse osmosis systems. He informed that they probably have the most of any firm out there as well as other product technologies.

Mr. Mesedahl thought that perhaps Mr. Dusey would be more familiar with some of the companies within U.S. Filter. He stated that each one of these firms is nationally recognized and a very respectable company in the industry. They are all integrated into U.S. Filter's service offering which has created fewer and fewer middlemen in getting the right technologies for their clients. He showed the rate of growth of the U.S. Filter Organization compared to other firms in the water treatment industry and with the acquisition of Culligan, in about a month or two, stated that gets even bigger. He said the estimates for 1998 will be five and a half billion dollars in annual revenues.

Mr. Mesedahl went on to talk about total project capabilities focusing again on U.S. Filter's ability to have all the services and products in-house in order to provide total product capabilities to their clients. He said engineering firms, for example, will focus on identifying the problem, doing the treat-ability analysis and designing a process. They then go out to a manufacturer to have them manufacture a system. There will be contractors to install it and perhaps another contractor to operate it long term. He explained that they integrate all of that into one service offering a fixed price in performance guarantee.

Mr. Mesedahl said they have over four hundred build/own/operate clients. He mentioned one in Atlanta, GA where they operate a fifty-six million gallons a day water treatment plant which is currently at eighty-five million gallons and being upgraded to one hundred and fifteen. In addition to winning awards for the best tasting water in Georgia, he believed the most important point regarding that operation was that they were able to increase the throughput through the facility. They were able to get DEP approval for an extra twenty million gallons a day through the existing system through their operations. He explained it was increased water capacity and revenues for this city without any incremental capital cost or a nominal capital cost.

Another example of their leading technology, he advised, was in Franklin, Ohio where the first transfer of a municipal asset to the private sector was done a few years ago.

Mr. Mesedahl mentioned Wilmington, Delaware which is a hundred and five million gallons a day waste water treatment plant that they have a twenty-year agreement with. He stated that they gave the city a million dollar concession payment and fifteen million dollars in immediate capital improvements to their system. He informed Town Council that those are some of the kinds of projects that U.S. Filter has among the four hundred.

Mr. Mesedahl briefly went through the integration of services and that it begins with engineering. He said that Just for Engineering is their engineering arm consisting of approximately 350 employees. It ranked number seventeen nationally in water and wastewater engineering. The reason for this is that they focused entirely on water and wastewater for the last eighty-eight years.

Mr. Mesedahl explained that the way U.S. Filter integrated Chester Engineering into the whole organization was that all their engineering is linked electronically to U.S. Filter's production facilities. He said they are currently doing six projects right now in concert with U.S. Filter's manufacturing facilities. When a process design is

determined, they electronically download the drawings needed, the manufacturing drawings, and incorporates them into the other drawings. He stated that it's not only faster and smoother but it's more accurate in the long run.

Mr. Mesedahl reported on another aspect of his company which is their distribution division which does about a billion dollars a year in revenues. He introduced Jake Garret who has a very long and strong distribution background. He said that when building a facility, you have to consider getting transmission and distribution lines installed or refurbished. He mentioned that U.S. Filter companies actually supply 25% of all the pipes, valves, meters and hydrants sold in the U.S. today. He said, in considering the scope of work that's possible to package, the distribution system and the piping should be included as part of the package that you would want to have provided. He stated that what makes them so effective are that all their distribution offices are also electronically linked providing just in time kind of services. He pointed out that you don't have to tie up your money in inventory and you can have your product and services on a next day basis or two-day basis. He showed the distribution locations and said there are about fifteen piping distribution locations in Florida. He said that Jake might have the opportunity to explain more about the distribution side of U.S. Filter under questions and answers.

Mr. Mesedahl said that U.S. Filter Operating Services, Inc. has been providing operation and maintenance services for approximately fifty years. He reiterated that they pioneered the municipal contract operations business back in 1972 and have been setting the standards for safety and performance ever since. He stated that they have twenty-six years of contract operations experience in the management controls that are earning U.S. Filter more awards than any other firm in the industry. They operate four plants nationally including FPL and said that maybe Bob will tell a little bit about the FPL and some other industrial reverse osmosis projects.

Bob Bradley greeted Town Council and explained that U.S. Filter operates all the water treatment facilities and all the fossil plants for FPL. He said all the plants have reverse osmosis and ion exchange equipment to pretreat the water for their high pressure boilers. He advised that they have the highest water requirements there is. They have the contract for fifteen years to operate FPL's water treatment and to provide their water.

Mr. Bradley said that they have a lot of experience operating reverse osmosis equipment on the Florida Aquifer, and that they do apply it right down the way in Vero Beach. He cited another example of U.S. Filter's operating in the industrial sector, in Texas, where he's from. It is in Freeport, Texas and it is one of the largest chemical plants in the world. He reported that it's a Dow facility and that Dow, the largest membrane manufacturer in United States, owns Filmtech which is the inventor of the Thin Film Composite membrane. He said the Freeport facility is their flagship chemical plant and has a fifteen hundred gallons per minute two pass reverse osmosis system making the water for their chemical processing. U.S. Filter, he reported, operates that plant on a ten-year build/own/operate contract showing that the largest membrane manufacturer in the world contracts U.S. Filter to provide their reverse osmosis equipment and water. He said that they have over a thousand employees operating these facilities but their total number of employees all over the country is ten to twenty thousand. He advised that they are proud of their safety record and their record with these industrial and municipal clients.

Mr. Bradley went on to review the four partnering options. He stated the Town can have a design/build/own and operate kind of project where firms such as U.S. Filter will actually finance the facility, operate and maintain it for a fixed fee. He continued that the Town can finance it themselves and U.S. Filter will design/build/operate the facility. The Town, once it builds a facility, can enter a long term lease and then have a private firm lease it back as U.S. Filter does in some installations or the Town can just have a long term and operations maintenance contract. He told of a twenty-year contract they just entered into with the City of Danbury, Connecticut to operate their fifteen million gallons a day wastewater treatment plant for twenty years. It is just a simple operations and maintenance contract for a long term, and the new IRS laws allow you to do that.

Mr. Bradley explained that some basic features of these build and operate kind of projects is that you can have a guaranteed price over the term of the project. He said they would give a price in today's dollars to operate the facility and charge the same amount for twenty years, give or take adjustments in the consumer price index. He said that, as part of that, the Town would have guaranteed performance and quantities and qualities of water to call on, and financial backing of the organization to deliver.

Mr. Bradley reported that the one concern clients often have when talking about privatizing the water treatment facilities, is what happens when it breaks, how do you repair it, how do you back it up, how do step in and make these repairs very quickly? He advised that U.S. Filter operates an entire mobile fleet that has anything you can think of as far as filtration, softening, clarification, reverse osmosis or ion exchange equipment which they have loaded on a truck. If there is an emergency and suddenly a piece of equipment breaks, they can have a piece of equipment on the site within twenty-four hours or less, operating and making any repairs necessary to the permanent installation. He stated that U.S. Filter will take care of any emergencies that come up and take full responsibility for the performance of that equipment.

Mr. Mesedahl said that he now wanted to discuss briefly the black box concept that they prefer when they are working with a client on meeting their goals. He said they would be unhindered by someone else's design or time frames. U.S. Filter wants the client to tell them the water characteristics, the quantities of water that they want to have on a daily basis and the qualities that they want the water to have. Then leave it to U.S. Filter to tell the client the technology that's needed to back into the black box and guarantee the quantities and qualities of water that are wanted, in addition to bringing the most cost effective price for delivering that project and guaranteeing it. U.S. Filter is a firm that will guarantee the performance so the procurement costs and the time line are significantly shortened. He reported that many of their design/build/operate projects are done in six to eleven months though a

municipal project might have some permitting issues causing it to take a little longer.

As Mr. Mesedahl summarized his presentation, saying that he just wanted to convey that U.S. Filter has all the engineering, construction, operations and financing capabilities in-house. In addition, he advised that they probably have and are operating the most reverse osmosis installations of any firm that's out there. Also, U.S. Filter has the back up equipment to respond to problems as they might arise. He also stated that part of U.S. Filter's guarantee is the guarantee of quantities and qualities. He went over again that U.S. Filter has done approximately two and a half billion dollars in design/build/operate projects with fifty years of O&M services.

Mr. Mesedahl felt the point to emphasize is that U.S. Filter is one approach that the Town can take but it's the one that gives a single source responsibility for the caliber of the system that the Town has. When the onus is put on U.S. Filter to design a system and stand behind it for twenty years, it is actually going to be a better system which will have a little more integrity than going toe to toe on a competitive bid basis for the lowest price against one on one bids. He said that they can do it that way but if U.S. Filter is going to be responsible for all the capital repairs for a system for twenty years then they are going to build a better caliber unit for the Town.

Mr. Mesedahl said, in closing, that not only does U.S. Filter have the best technologies, but perhaps the most experience of any firm, and he thought the most capable to give the Town a single source solution to the reverse osmosis or drinking water program that is being considered at this time. He opened up the floor to some questions.

Mr. McLendon asked if he could assume by his comments that only Dow membranes were proposed?

Mr. Bradley said that they do business with all the membrane manufacturers but they are particularly close to Dow buying about half their production. However, U.S. Filter is not limited to Dow membranes at all. He named several membrane companies that they do business with but stated that making the membrane selection, at this time, would be premature. He indicated that the Dow membrane would not be a bad choice at all, and they use Dow membranes at Vero Beach on the Florida Aquifer. He said that he wouldn't say that they wouldn't use Dow membranes exclusively because there are a couple of ways to go with the selection of membranes. The choice of membranes is an economic one. He said that you have to sit down with a calculator and work out the specifications that the Town wants for finished water quality and then make a decision on looking at operating, maintenance, capital and electrical costs. He stated that would determine what would be the better choice as far as the membrane selection goes.

Mr. McLendon informed them that the Town does not have a water department here. He explained that there is a Public Works Department that oversees the wastewater collection system which pumps to a dual plant over on the mainland. Relating to the financing of the project, Mr. McLendon stated that he didn't think anyone could do any better because of the Town's AAA rating with the bonding people. He had doubts on how that can blend into the Town's transferring most of the responsibilities to someone like U.S. Filter. He guessed that it is doable but it's not clear cut.

Mr. Mesedahl explained the City of Leominster, Massachusetts engaged U.S. Filter to not only provide a twenty-year operation of the maintenance but also does a capital upgrade to increase the capacity of their water filtration facility. He reported that, once it was built, they were going to buy it out from them in order to take advantage of the time line that U.S. Filter can provide since we don't have to go through all the paper protocols, especially with borrowing money and things in the shortened time line and then buy it on a buyout schedule.

Mr. McLendon stated that they would still have to have it bonded which would be more expensive than if the Town were bonding it.

Mr. Mesedahl stated that it's clear they're never going to compete with 2% money from State revolving funds. It starts to make more economic sense at 6% to 8%.

Mr. McLendon wanted to hear a little more specifically about the location and the capacity of the RO plants that U.S. Filter had done.

Mr. Mesedahl asked his technical man, Bob, to address that.

Bob Bradley reported that U.S. Filter has a lot more industrial RO facilities than municipal ones. He explained that from the standpoint of RO treatment, it lends itself to boiler feed water and process water where you need distilled quality water. He said for the most part in looking at water supply like the Mississippi River, there is no reason why you would treat it with reverse osmosis just for drinking water, clarification infiltration is fine. He stated here in Florida, the ground water is salty or brackish and a lot of systems use reverse osmosis as a treatment. He again reported that U.S. Filter has several dozen systems operating in Florida for power plants and that he doesn't know about the municipal side of things because he's an industrial person.

Mr. McLendon said that he was just going to ask if U.S. Filter has any municipal systems operating in Florida?

Mr. Bradley replied that he didn't know that answer. He knew U.S. Filter has built a number of them but he didn't know how many of them they owned and operated.

Mr. McLendon asked, "What about the municipal ones that were built here in Florida?"

Mr. Bradley replied that there were several large plants built by Bermuda Company which is one of the U.S. Filter companies and he believed one was in Coral Gables.

Mr. McLendon wanted to know if they were reverse osmosis?

Mr. Bradley replied that they were.

Mr. Shaw had concerns with the reference to twenty year contracts. He stated that to some that is a very short period of time and to others it may not really be that much of a concern but to him it was. He said that they use to look at thirty year water contracts with regard to a simple distribution system. Mr. Shaw said he is a little apprehensive to start a dialogue where at the end of twenty years, he won't know where the Town is. He reported that it's taken the Town five years to get to this point and with a twenty year contract, before you know, we'll be starting all over again. He wanted to know what you do for the second twenty?

Mr. Mesedahl said that it's a contractual issue and sometimes there are constraints by the IRS on how long you can contract a facility especially if there are some federal loans against the facility. He stated the IRS only recently changed its laws to let you go past three to five years and go to fifteen to twenty years. He reported if you were going to enter a contract longer term than that, you would have to diffuse those bonds without compromising any tax exempt bonds. He said that's why they generally talk in terms of fifteen to twenty years but it can go longer with a contract renewal.

Mr. Shaw wanted to know what they consider to be the usual life of a facility? He said he was more concerned about the facility that the Town would be putting in than about the contract to operate it.

Mr. Mesedahl said that he wasn't sure what Bob would say on this, but conceptually U.S. Filter will operate, maintain and manage the capital equipment and be responsible for that for the time period. He explained that they plan the replacement material so at the end of the contract period, you have a good working facility, normal wear and tear accepted. He wanted to know if that answered Mr. Shaw's questions?

Mr. Shaw responded that no it hadn't answered his questions. He wanted to know how many years do you feel the basic structure of the plant, what it's useful life is knowing that there are some disposable products?

Mr. Mesedahl replied that it was thirty years.

Mr. Shaw wanted to know if they operate the FPL plant in Riviera Beach because Mr. Mesedahl had referred to an FPL plant in Vero.

Mr. Mesedahl apologized and said that they operate all FPL fossil fuel facilities for the water treatment facilities at those plants.

Mr. Shaw wanted to know if Mr. Mesedahl thought, under that scenario, if it would be beneficial for Palm Beach to enter into a relationship with FPL to possibly take the water from them if their plant was upgraded to the Town's capacity. He thought this had been raised before at Council.

Mr. Mesedahl said there are differences because we are talking about feed to a high pressure boiler. He reported that the purity of that water is unbelievably high. He said it's better than what you would consider for drinking water so the design of that facility would be somewhat different. Also, he stated that it's relatively small by the Town's standards being a couple of hundred gallons a minute as opposed to 3500 gallons a minute. Mr. Mesedahl said it would have to be made ten times larger. He told Mr. Shaw that the answer is that it's a possibility and something that might be explored, because FPL has the power available, the land, and the intakes.

Mr. Shaw wanted to know if it was something U.S. Filter would explore?

Mr. Mesedahl said that they did not have the time to think about it carefully. However, they would very much like to look at that and report back with a reasonable answer.

Mr. Shaw wanted to know if the Danbury operation is a complete operation where they put in the distribution system and operated it, or is it strictly the water plant?

Mr. Mesedahl replied that Danbury happens to be a wastewater treatment facility.

Mr. Shaw asked if it was just wastewater?

Mr. Mesedahl replied that it was. It's one of the longer twenty year contracts that have been let recently.

Mr. Shaw asked if they have any fifteen million gallon plants which they operate either totally or actually handle the entire distribution and operation system? He said that he was trying to get a cost basis, a projection that the Town would understand if U.S. Filter were to take over Palm Beach's water. He asked Mr. Mesedahl where he thought the Town's water would be based on this twenty-year agreement?

Since Mr. Mesedahl didn't understand the question, Mr. Shaw restated it asking what does he think the Town's

water costs would be for an owned, operated and maintained facility with a distribution system under U.S. Filter's designs and operations?

Mr. Mesedahl asked Bob Bradley what he had to say regarding that. He stated that he could not answer the question on the distribution system. He said that U.S. Filter can produce reverse osmosis treated water for around \$1.80 a thousand gallons.

Mr. Shaw asked if that's for the treatment plant itself?

Mr. Bradley replied that yes it's the treatment plant itself starting with the Florida Aquifer's brackish water. He said that they can treat that water for about \$1.80 a thousand. He explained that since all the water doesn't have to be treated by reverse osmosis, you would probably blend back 40% of the water after a little bit of further treatment to remove the hydrogen sulfide. The result would be a blend that's put in storage after chlorinating it at around \$1.50 a thousand gallons.

Replying to Mr. Shaw's asking about the maintenance and distribution, Mr. Mesedahl stated that they operate several small distribution systems. He explained that they're not a water utility kind of company so with some of U.S. Filter's contracts, they have the responsibility of the distribution systems which include the water towers, the lines, hydrants flushing and things like that.

Mr. Shaw responded that they had given him a range.

Mr. McLendon questioned the terms they talked about in regard to their financing. He wondered where you would exactly zero in when discussing fifteen to thirty years. He said that obviously the various components of a RO plant have different lives. He mentioned, as examples, the building is certainly going to last fifty years, the pumps are going to last twenty-five or thirty perhaps and how often do the RO membranes have to be replaced ten, fifteen or less years?

In response to that, Mr. Mesedahl said that they figure the RO membranes usually have an economic life of three to five years. He stated that considering U.S. Filter knows this aquifer fairly well and that it's well water, he would budget in a five-year replacement on the membranes.

Mr. McLendon said when you talk about the term of a contract, obviously you're not talking about replacing the pipes which will last 50 years or the accessory pipes or the pumps which you know will last twenty to thirty years normally. He asked if they would be thinking in terms of just new membranes and where would they stop the refitting, retrofitting of what your turning over to somebody else?

Mr. Mesedahl replied that from his involvement in other privatization projects, they would plan on all consumable replacements over the lifetime of the contract. He said that it gets built into the cost because the fixed price would encompass all that. He explained that where the scope of work is going to include capital responsibility for the transmission lines and distribution system, they would make their estimate on the condition of that system and make their projection on what it's going to cost and build it into the price. He stated that they will stand behind whatever number they believe it's worth and back into a fixed price.

Mr. Bradley stated that in coming up with a price for such a facility, the money is accrued for pump maintenance, membrane replacement, for the maintenance of the piping and instruments, etc.

Mr. McLendon wanted to know if the numbers U.S. Filter had given them were estimates.

Mr. Mesedahl said it was and that the \$1.85 includes membrane replacement and pump maintenance.

Mr. McLendon said the difference between the \$1.80 mentioned earlier and a \$1.85 figure just given is small and he would accept the \$1.85.

Mr. Mesedahl thanked Mr. McLendon for that but informed him that it wouldn't include the transmission line if U.S. Filter had to assume responsibility for that.

Mr. McLendon said he understood. He wanted to know where they've done RO plants where they have blended to wind up with zero or whatever. He asked would you want to take it all out, to take out a certain high percentage of things?

Mr. Mesedahl said that if they were operating a Thin Film Composite DOW System, they would take the 700 BP in total dissolved solids in the Florida Aquifer down to about ten. He explained that you certainly wouldn't want to distribute ten parts per million total dissolved salt water because it's nearly distilled water which becomes quite aggressive to metal plumbing and pipe fixtures. He continued that it would be blended back to get a little bit of hardness and alkalinity in the water and make a PH adjustment.

Mr. McLendon asked if they would mainly use just some raw water to mix with the treated water.

Mr. Mesedahl said yes, exactly. He continued that on an 8-MGD type of system, that would be a sixty, forty-ratio.

Mr. McLendon wanted to clarify if he had heard Mr. Mesedahl correctly when he spoke about roughly 700 milligrams per liter from the Florida Aquifer, because Mr. McLendon didn't think he would find that here.

Mr. Mesedahl responded that he was making up numbers and would like to see analysis, because it could be a thousand here. He stated it does vary a little bit.

Mr. McLendon said he felt a better number would be between two and three thousand from what he had seen.

Mr. Mesedahl felt that was very high and that maybe he had misspoken. He said he was sorry and the blend would be 90%.

Mr. McLendon wanted to know how would that effect the numbers he gave the Town, cost wise?

Going back to the cost, Mr. Mesedahl said it goes up a little bit and that they're probably talking for reverse osmosis treatment between \$1.80 and \$1.85. He felt that since the blend goes down, \$1.85 would become firm for all the water.

Mrs. Smith explained that the Town of Palm Beach had this discussion about seven or eight years ago with the Dupont Company and from her understanding, the technology now is more advanced. She asked him what would stop the water system from becoming obsolete in five years like the computer systems that we have?

Mr. Mesedahl replied that it is a risk that U.S. Filter takes because when giving a price, they have to figure it on using this technology for the term of the contract to the extent that when new technology comes out, they could capitalize it and reduce the Town's costs. He stated that they would do that.

Mrs. Smith inquired if they would replace the old equipment with new advanced equipment at their cost?

Mr. Mesedahl said that it would make economic sense for them to do so over the time frame. He also stated that then they would pass those savings onto the Town.

Mrs. Smith wanted to know when talking about raising the price of the water due to a cost of living which might not necessarily happen but she wondered if they would also reduce it?

The response from Mr. Mesedahl was that if the CPI did go down, which is rare, their contract would be adjusted downward.

Mrs. Smith asked him if he had looked at the Town of Palm Beach, the island of Palm Beach and thought about the optimum place for a plant?

Mr. Mesedahl replied that they're not that far into the project.

Mr. Dusey asked Mr. Mesedahl that in asking the Town to put all their eggs into U.S. Filter's basket and commit to them 100%, what kind of provisions do they have in their contracts to guarantee that they are not going to become an odor problem or something like that? Mr. Dusey explained that the Town is concerned about being a good neighbor and respects their residential community.

Mr. Mesedahl explained that historically wastewater treatment plants are going to be a little more problematic than water treatment plants. He continued that they have the experts, in-house, that actually manufactures the odor control systems. He was very confident that they could control odors and that it can be contractually defined. He told of a project they have in Poughkeepsie, New York where an odor panel meets every three months walking the neighborhood to respond to any odor problems that might occur. He stated that this way the problems get handled right on the spot. He reported that they have contractual obligations not to let odors get over the plant confines because there is a college next door and residents in the common wind directions.

Mr. Dusey wanted to know if there is any provision that a penalty is paid if it is violated?

Mr. Mesedahl replied that it's usually a financial penalty with time lines to rectify.

Mr. McLendon said that as a student, he would really like to know why they feel the use of pressure aeration, contained and recirculating with more added air, can't be used? He also asked why that can't take the place of an expensive, complicated H₂S removal system? He wondered this since the hydrogen sulphide that is available, certainly is oxidizable by aeration, oxygen or what not.

Mr. Mesedahl replied that it's economics. Air stripping is the least expensive way to get rid of the hydrogen sulphide.

Mr. McLendon continued that then you would have to treat what you strip out and Mr. Mesedahl said that the air goes through an absorption column where the hydrogen sulphide with caustic is absorbed. He said that you can oxidize the hydrogen sulphide with potassium permanganate or chlorine.

Mr. McLendon wanted to know if you can do it with oxygen to which Mr. Mesedahl replied that yes you can

catalytically do it with oxygen but from an economic standpoint it is normally done by air stripping.

Mr. McLendon said that he knows what's normally done. He explained that he has seen a couple of plants locally that spent maybe a million and half dollars on H2S treatment systems but he was questioning the necessity of that. He continued that since U.S. Filter was planning to do it like the others do, he wasn't going to pursue it.

Mr. Mesedahl wanted to make sure that it was clear in Mr. McLendon's understanding of the process that the hydrogen sulphide gets stripped after the RO process.

Mr. McLendon asked if he meant prior to the membrane, because he thought it was concentrated and even a little bit of H2S smells terribly. He said he thought it only takes about a seventh of a milligram per liter of oxygen to neutralize a milligram per liter of H2S so he doesn't know why that cannot be done.

Mr. Mesedahl's response was that you can't afford to have the hydrogen sulfide precipitate out before your membranes because you would be accelerating the death of the membranes. He said that the water should be treated under anaerobic conditions as it comes out of the well and then aerate it so that the precipitates that do come out don't blind the membranes.

Mr. McLendon said that he knew that everybody was not interested in this, and he would talk to Mr. Mesedahl later.

Mr. Bowser wanted to know that if they did go with a Town bonded design/build facility, at the end of twenty years, the Town has the option of operating or having someone else operate it, would U.S. Filter be opposed to the Town reviewing the quality of the materials they are planning to put into the plant before the design begins?

Mr. Mesedahl said they would not be opposed, and they would propose something that will meet the criteria. He stated that if the Town wanted something different, the Town can dictate the caliber and U.S. Filter would have to adjust the price. He restated that since they're going to be responsible for the maintenance for twenty to thirty years, they're going to put in a higher caliber system with stainless steel valves instead of carbon as an example.

Mr. Bowser said that they wanted to make sure the Town is getting apples to apples and that the bids are even. He stated they want to be sure that everyone bidding on a design/built contract is going to put together the same quality equipment.

Mr. Mesedahl explained that they meet with their clients and work out the specifications so the equipment they provide is the same as the other equipment in the facility. He said that if one meter is a Rosemont, then all the other meters will be Rosemont. He stated that U.S. Filter is the one standing behind the guarantees so they wouldn't do anything to degrade the quality.

Mr. Bowser wondered if it would be unreasonable to request a capital replacement schedule so that at the end of the twenty-year period, the Town would have a better idea of what it had.

Mr. Mesedahl replied that they would be very open on what their capital expenditure plan was going to be over the time frame of the project. For an example, he discussed their plant in Danbury, Ct where a year before the contract ends, they have a walk through by the city to obtain an objective assessment of the condition of the equipment. He continued that if they have not maintained it on a normal wear and tear basis, money will be withheld from U.S. Filter until it's rectified. He stated that they can even show the Town the accrual schedule on some of these major pieces of equipment. Explaining that since they don't know if a pump will fail in seven years or in twenty-seven years, they accrue money accordingly for every pump they have. Because they have enough pumps of the same design operating throughout the country, they know the average pump is going to last twenty years. Stating that if they got twenty-one or thirty-one years out of it, so much the better.

Mr. Bowser asked if there are any sole source type equipment that U.S. Filter manufacturers?

Mr. Mesedahl said that they manufacture it all.

Mr. Bowser wanted to know if there was a sole source that the Town would end up having to buy from, once the plant has been turned over?

Mr. Mesedahl replied "water", and Mr. Bowser said he meant equipment. Mr. Mesedahl said the equipment is interchangeable with other manufacturers provided it was basically the same. He mentioned the earlier discussion of improved technology.

Mr. Bowser asked him if he was talking about individual components?

Mr. Mesedahl said he was. He also said that U.S. Filter doesn't make pumps but they do business with various manufacturers since they use standard pumps. He explained that they also might put in different membranes from various manufacturers such as Ionics or Fluid Systems since they are interchangeable. He said that you can take one manufacturer's system such as DOW and stuff it with another manufacturer's membrane. He stated that there are some manufacturers of membranes that will use an oddball size such as a 6" size but they don't. He advised that they use the 8" membrane which is the standard membrane that everybody makes. He went on to say that during year five, if there is a good deal on a different brand of membranes as opposed to the membranes the system started out with, they will slide right into the same pressure vessel.

Mrs. Smith thanked him very much and announced that the next presentation was by Alcade and Fay. She advised everyone that they will be adjourning at approximately 12:15 for lunch and reconvening at 1:00.

Mr. Dusey stated that Alcade and Fay represented Mineral Development International who was making the presentation in their stay.

3. MINERAL DEVELOPMENT INTERNATIONAL

Mike Stefanic, International Sales Manager for Mineral Development International, told how his company started two and a half years ago in South Africa and has developed probably the most innovative aspect of reverse osmosis technology in the last twenty years since the thin film membrane was created by the Filmtech Corporation.

Mr. Stefanic introduced his colleague, Dave Forkawa, who he said has been involved in reverse osmosis since 1960 and he himself since 1968. He briefly told Town Council of his and Mr. Forkawa's background.

Mr. Stefanic explained that while he was in the employ of Fluid Systems two and a half years ago, he became involved with Mineral Development when they required reverse osmosis membranes. Mineral Development International was started as a result of a problem in a conventional reverse osmosis unit at a water treatment plant in South Africa. The problem unit was relatively small one with only three membranes. He stated that an innovative specialist named William Graham was hired to make recommendations concerning major operating problems. He told how the capacity of the RO system had dropped off and the salt rejection had decreased or the salt passage had increased. He reported that Mr. Graham who had never ever seen a reverse osmosis unit before had taken a look at the reverse osmosis membranes that were in the RO unit and had cut them apart and done a visual autopsy on them. Mr. Graham was able to observe a few of the problems that occurred on the membrane.

Mr. Stefanic said that what Mr. Graham found was that there were certain areas of membrane that fouled more readily than others and he was trying to understand how some of these problems of membrane deterioration occur. He continued that it is relatively interesting how Mr. Graham came across innovating two different technologies that helped distribute the flow of water over membranes and helped eliminate some of the problems of scaling that would cause problems within the membrane operation.

Mr. Stefanic explained that he had been working with them in supplying them with commercially available membrane elements somewhat modified physically to meet their needs. It was not at all in terms of the chemical technology or in terms of the physical appearance. He said he was somewhat surprised and excited because they were able to operate systems for two years on turbine waters and especially open seawater intakes without having any deterioration of the membrane or any chemical pretreatment nor any fouling of the membrane itself. He exclaimed that it seemed like it was almost too good to be true. Since that time, the company in South Africa has grown to about forty people. He said that the turnover last year in terms of commercial reverse osmosis units was about a half a million dollars far less than the two billion dollars one imagines.

Mr. Stefanic told of the Albany Municipal Water Treatment at Kenton-on Sea in South Africa near Port Elizabeth, a major installation using reverse osmosis technology, that had a unit installed last year in beach wells where the water quality coming from those wells was considered somewhat normal. He continued that the silt density index was not extraordinarily good or bad but was around the area of three. He explained that five is somewhat unacceptable and .5 is very good. What they found was the process was able to operate at fluxes of the membrane. The through put of the membrane per unit area was around 14 GFD and on conventional systems operating on a fouling nature of this type, it would be normally about 10 or 11 GFD. He reported that the increases in the flux per unit area and the continuous operation were incredible over the past year. This has led to lower operating costs and greater cost savings in the operation of the unit. Anytime you can reduce your cost of energy by twenty to 30% regardless if it's a municipality or at your own home, it is very welcome.

Mr. Stefanic stated that the company has grown from that aspect and has exhibited the equipment at different conferences, exhibitions and has presented papers that received enthusiastic responses from other technological companies involved in waste treatment around the world.

Mr. Stefanic said that they have entered into some joint venture operations throughout the United States, Europe, Southeast Asia and Australia and just opened up an office in San Diego, CA. He stated said that they are now looking to open up an office in the Palm Beach County area where they hope to manufacture some of their equipment by the end of the year. This is in addition to manufacturing in Europe and in Southeast Asia possibly by the middle of next year.

Mr. Stefanic turned the presentation over to his colleague, Dave Forkawa who would go into more detail about the equipment and the technology.

Mr. Forkawa introduced himself and gave some of his background. He stated that currently he is president of the International Desalinization Association and a private consultant. He is a consultant to Mineral Water Development, the City of San Diego and the City of Los Angeles. He continued that he is a technical advisor to the Electric Power Research Institute, and he's on the research advisory board of the National Water Research Institute and the Middle East Desalinization Research Institute which he helped found about three or four years ago as part of the peace process in the Middle East.

Mr. Forkawa advised that, as of June of this year, he has been in membranes for some thirty-eight years. He has

been involved in three of the breakthroughs in the reverse osmosis state of the art. He cited the first one was in the late sixty's when an experimental membrane from UCLA was put inside a tube creating probably the first commercial reverse osmosis system. The second breakthrough was the Thin Film Composite membrane, which has previously been explained, and is now the largest membrane in the world. He said that he considers the development by Mineral Water Development as the third breakthrough he has had the privilege of helping develop and which he feels will have a great future. He referred to the earlier question regarding new technology making a system obsolete and said this may be the new technology. He went back to the earlier discussion of what the life of a membrane is and where it was said that normally three to five years and for clean water five years. He explained that the reason for that is not because the membranes are made out of a plastic polymer combination but the lifetime is cut short by contaminants that foul the membrane. Mr. Forkawa said that, beyond that point, you can't clean it enough to make it economic and efficient to operate which has been one of the big problems with this process to begin with. He continued that what they've come up with is a device which is placed in front of the membrane and it distributes the water flow more evenly across the face of that membrane eliminating those dead areas in it. He said by using your membrane more effectively, you are going to produce more water and you are less likely to collect any foulents. The other thing that the device does is to expel gases and expelling carbon dioxide is very unique and has not been done before in this fashion. He continued that as you expel the carbon dioxide, the level of bicarbonates is significantly reduced in the feed water, so the device doesn't have to use any acid to eliminate that problem. The other advantage is that as the gas is being expelled, it helps to scrub the membrane.

Mr. Forkawa reported that the second thing they've come up with which is very unique is an electromagnetic device that encircles all of the membrane and when you place ions through an electromagnetic field it affects the ion significantly. He explained that basically it changes the electron spin residence of which atoms move around the nucleus.

The Mayor interjected that Mr. Forkawa might be going over everyone's head pretty soon.

Mr. Forkawa replied that he's trying to understand it better himself. He continued that the other thing it effects is the organic contaminants, the bacteria, that are in natural water. He stated the bacteria will not attach themselves to the negatively charged membranes. The first field test he observed was in South Africa and it was for more than a one year period. Mr. Forkawa explained how this technique can effectively remove the gross solids before they get into the membrane. Showing a new membrane and a membrane that was fouled by another company, he explained that after it was subjected to the electromagnetic technique, the membrane was as good as new. He said it was tested and it did perform just as a new membrane would.

Mr. Forkawa continued to explain, in detail, the technical aspects and the equipment used but said that in order to prove to others and to develop a better understanding of the hypothesis that he made regarding how this works, he is having the testing done for them at the University of South Florida. He felt then they will find some of the answers that everyone is obviously going to be asking such as how and why does it work.

Mr. Forkawa reported that he is having additional testing done for Yuma, Arizona under the direction of the Bureau of Reclamation which was his old employer, his initial employer, as well as the National Water Research Institute. Also, tests are being done in California under the supervision of the University of California and San Diego State University and finally, in the City of Corpus Christi under the direction of the Electric Power Research Institute in concert with Central Power and Light. He expects those results will be coming, not necessarily to prove that this works, but simply to get more data so that everyone understands these mechanisms better than are understood at the present time. He continued that it is a basic unit that Mineral Water Development has come up with commercially.

In summarizing, Mr. Forkawa said that they're not talking about a giant U.S. Filter or any of the other large companies. This is a new technology, and he felt it was important to tell the Town Council about it because it is what they're going to be seeing more of in the next few months and few years. He stated that it does give you lower operating and maintenance costs and it does utilize lower energy and it is unique. He thanked everyone and advised he would be glad to answer any questions, if he can.

McLendon wanted to know, with regard to the membranes, if he had any production cost figures for a powered RO plant using the existing total solids of three thousand milligrams per liter and supplied by a well of two million gallons a day? He thought it might cost a million dollars but he didn't think they delved into any of this with regard to what the Town is concerned about.

Mr. Forkawa replied that they have looked into it at an installation very near to Palm Beach.

Town Council members inquired if it was a working one?

Mr. Forkawa restated that they've been doing some interesting studies. As mentioned earlier, 125,000 gallons a day or half a million gallons a day or whatever the case may be fits into the scheme of things and can be addressed immediately. He could not state exactly what would be included in the operating costs. He did not amortize the cost of equipment which he said he could do easily depending on the length of time that the Town wanted, ten or twenty years, whatever the case may be. Based upon some of the experience others have had in this area and taking into account membrane replacement, the lack of chemical treatment, with very low cleaning, labor, overhead and maintenance costs, the cost would be forty to forty-five cents per thousand gallons. Considering the amortization of the equipment, the cost would be somewhat less than \$1.80 or more like \$1.50 per thousand gallons over a period of time. He said that they do know what the operating costs would be just for the O&M aspects of it that do not

include the amortization because that has to be discussed as to how long it is amortized.

Mr. McLendon said that as he understands it, in the typical system, whether it is 125 million gallons a day or whatever, it's a component that can be stacked and added to get whatever is needed. Mr. McLendon wanted to know if these new membranes are patented or has the company taken old membranes and worked with them?

Mr. Forkawa reported that there are patents covering the process and that the membranes are not new. He specifically had them run tests using this device with the three large membrane manufacturing company membranes and it worked equally well with all three of them. He stated that it uses commercial off the shelf membranes and there are no new membranes involved just the process itself is new.

Mr. McLendon said that, with due respect, it sounds like you would be a prime candidate for acquisition.

Mr. Forkawa said, as a matter of fact, he had been told by the chairman of the company that they have been approached. They have reasonable size investors and so they are able to do it on their own. He also advised that they are growing very rapidly.

Mr. McLendon wanted to know what the .45 was he mentioned?

Mr. Forkawa replied that he had said the membrane replacement was over a five-year period and the energy costs in this case were relatively low about .7 to .8 kilowatt hours per thousand gallons. He stated that if there was to be some chemical treatment, it would only be in the case of adding a caustic or chemicals to the post treatment of the water that may contain hydrogen sulfide depending on the nature of the water. He continued that if it was going to be drinking water, you would have to have one technology to remove it and if you were to have it just for irrigation purposes or so, you may not have to go into such extensive post treatment. Potassium hypochlorite could be added just to remove the odor. He said that it all depends on what the nature of the water would be. You're looking at chemical cleaning which he expects, at the worst case, one time per year and typical labor and maintenance costs which includes allocating for a person to walk around and look at the system even though you will have a remote monitoring of the system.

Mr. McLendon asked if most of the fouling materials would be some form of silica?

Mr. Forkawa replied that through the years organic fouling has been more prevalent.

Mr. McLendon said that he wasn't sure organic fouling would come from a fairly deep well source. He wanted to know if it's practical to backwash a membrane like you would do to a filter, for example?

Mr. Forkawa said no and that he is thinking of reversing the flow of water across the membrane and that it isn't practical.

Mrs. Smith wanted to know if they would work with a company for example like Florida Progress or U.S. Filter to install this as part of the system that they would build?

Mr. Forkawa replied that they would, depending on the size and scope of it. He felt that they could form a joint venture with someone of that magnitude and would be able to incorporate it into their design. In terms of the physical assembly or adaptation to a system, it isn't that difficult but just another step and wouldn't have to change the looks of the system. He stated that if it were small enough, they would probably be able to do it themselves.

Mrs. Smith thanked them very much and adjourned for lunch. She announced that they will resume at 1:00 p.m.

Mrs. Smith reconvened the Town Council Workshop and announced that the next presentation will be Frank J. McKeown.

Mr. McKeown informed the Council that he was there only as the attorney for a group of interested investors as well as United Industries, Inc. and ICF Kaiser Inc. He advised that the presentation was going to be made by Gary J. Beard the Vice President of United Industries. He said Mr. Beard will make his presentation and try to give useful information as to what

is available to the Town in acquiring its own water system. Mr. McKeown stated that as a resident for more than 20 years, he is aware of the problems facing the Town. He explained that he knew the Town was trying to determine whether or not they wanted to go into this project on their own or whether to continue with the City of West Palm Beach. Mr. McKeown said that the people he has been involved with are interested in showing the Town that there is an excellent alternative and he introduced Mr. Gary Beard who made the presentation.

4. UNITED INDUSTRIES, INC.

Mr. Beard, Vice President of United Industries, introduced himself. He began by stating that while there are many companies that can deliver a water system to the Town, there are differences which are not easily discernable at the service level. He went on to explain that it principally involves a tripartite function which consists of guarantee, delivery and technology. He thought the Town's solution here is quite simple.

Mr. Beard briefly gave some background on United Industries reporting that it is a corporation which began with

EPA research. He said it was founded about thirty years ago primarily for development and delivery of innovative environmental systems, products and programs to municipal governments only. United Industries was involved in development of new cost-effective technologies and has been involved with that ever since. He reported that they did not procure these technologies from anyone else and that they developed them and have patents for them. He said that his presentation would show some of the technology, the delivery mechanism and the guarantees that he thought the Town should want and ask for.

Mr. Beard stated all that has to be done to every drop of rain that falls in this Town, every drop of water that's utilized, every drop of water that's turned away is to reclaim it using the correct technology to deliver it back into reusable fashion. He continued that one of the principal functions when they were involved in EPA research was the development of a technology that could be used for municipal governments that took less land, less energy, less maintenance and could eliminate odors that you normally associate with water treatment, waste treatment. What they came up with was a patented system. This system, he said, utilizes an oxidation principal for all the raw waste that's collected and then it is transmitted to one point with the entire biological process taking place in one vessel. He explained how the raw sewage or raw waste is transmitted directly into a pipe which goes into this aerated vessel. He said that for every gallon that is pumped in, a gallon has to leave and the only place it can leave is out of the bow of the unit. It is a very simplistic system where the water is aerated and circulated around the vessel, and where the oxidated tank, as it goes underneath this boat device, enters the stern trying to get to the bow as it moves internally in the vessel. Since it's quiescent, the solids that can't be in your discharge will settle out. He reported that it is the hydraulics of the water moving around the tank that suck the sludge out.

The Mayor said to Mr. Beard that he seemed to be talking about wastewater treatment and Mr. Beard replied that he was. The Mayor said he wanted to make sure that he didn't go down the wrong road and Mr. Beard said he understood.

Mr. Beard continued that the water after using one mechanical device is taken and reclaimed at filtration. He said many of the facilities they have designed and constructed in Florida are reclaimed water or wastewater facilities. He reported that the amount of money spent on potable water generation is reduced by making reclaimed water available and that these systems are less expensive than the construction of potable water facilities. Mr. Beard said that they are used, in Florida, principally for irrigation of golf courses, roadside irrigations, and irrigation at a lot of homes.

The Mayor interjected that he knows where Mr. Beard is headed now.

Mr. Beard stated that if nitrogen can be eliminated as required by the new Federal edicts, then water can be reclaimed very effectively and used to offset potable consumption demand.

Mr. Beard mentioned United Industries teammates in this venture, Kaiser Engineering and ICF Kaiser International which are involved in reclaimed water, RO systems, potable water consumption as well as huge environmental programs such as the one at Boston Harbor. The Boston Harbor project is one of the largest environmental cleanup programs in the United States costing 4.1 billion dollars. It involves treatment, power generation, raw sewage conveyance and ocean outfall. He told about San Diego where about 50% of their potable water is used for irrigation. It is the city's largest capital improvement program in its history and they use reclaimed water from their facility which Kaiser Engineering was responsible for.

Mr. Beard told of another association they have, the Weir Group. They are a multibillion dollar group and the oldest company in the world for clean water, for reverse osmosis. The Weir Group also has multistage flash distillation, thermo-compression distillation and other technologies. They built the largest and the oldest reverse osmosis facility in the world.

Mr. Beard said the Town can go through a conventional design program, or hire a consultant engineer, or bid out the construction. He stated doing that incurs risks such as potential discrepancies between the drawings and the actual construction, poor plant performance, high end costs, and no guarantees on a cost or performance deliverable under the conventional programs. He reported that many cities have turned to turnkey boot operations where they try to put something together as a package to be delivered. The problem is that you can't delineate a specific enough set of documents so that you get apples to apples delivered to the city. He continued that because of that many cities have turned to privatization which has to be financed and you then own and operate it. He said that lead to some problems because in the later years of operation, you have a degrading system and you have new technologies coming in. As an example, if the Town selected four firms and told them they wanted a privatization concept giving them detailed specifications, each group will then present a total package, engineering, construction, finance, operations. He continued that no one group is going to have the lowest possible price on each one of those items. So, the Town will take the most cost effective package which is delivered to you and that is okay but is it the best thing for the Town. Mr. Beard felt that it wasn't and explained that what he would offer is a new hybrid program consisting of water and wastewater reclamation that can be delivered to the Town.

Mr. Beard reported that this new program was pioneered in Chino Basin, California. He explained that the municipal government of Chino Basin needed a water reclamation facility because they were buying high cost water from one source and they were being held captive. To offset that water cost, he said, they decided to opt to use wastewater, regenerate it, pump it to industry and irrigation for the purpose of decreasing water demand. He advised that it was designed on conventional methods with a price tag of \$70 million for a population equivalent of 700,000 people plus industry. Mr. Beard said that his company was contacted because of their technological advances and

unique program guaranteeing the total capital cost of \$33 million. He told how they put together the program and that they bid construction. The reason they bid construction was so they could minimize the capital cost by taking the best and most responsive bid, at the time, for a select group of technologies and to allow competition. He said they then constructed it minimizing change orders, took control of the program and the price tag was \$29.7 million with less than a quarter of 1% change order. What this meant to the owner, he explained, was that the total capital cost was guaranteed as was the operations and performance. He said that United would be willing to come in analyze the situation at no charge and make recommendations for water and wastewater with the cost guaranteed. They could provide independent financing, if the Town wanted them to, and they would move forward quickly to secure the lowest possible financing package putting it together with the construction. At the end of the program, it would be the Town's option as to whether or not they would like to procure the system for the capital costs which would already be known.

Mr. Beard stated that they feel this is the reasonable way of going because you want the option of being able to procure with the guarantees in place. No municipal government wants to be held captive by anyone whether it's another municipal government or whether it's private industry. He explained that under a private basis, the general rule is that you have two line items on your cost which is the operations cost and the capital replacement cost. The Town could procure it keeping the operations in place so the guarantees can be kept in place and then the Town would be able to use the lower cost municipal financing to offset and reduce the charge on millage per gallon basis.

Mr. Beard advised that the program he is talking about is a little bit radical. The one at Chino is the first time it has ever been done before in the United States, to his knowledge. It allows for full guarantees, it allows for the owner, ultimately the Town, to return ownership to their system, and it keeps the guarantees in place from the standpoint of performance. He said by doing it the other way, you're going to own it, you're going to operate it for twenty years and then face the problem of changing technology. In the last few years of that contract, are the monies guaranteed for equipment replacement so that at the end of the twentieth year, you have an operable system. As a municipal government, it can be structured so you can buy it at any time from the first year through the twentieth year. The entity keeps it up because it is theirs to operate, to maintain, and to guarantee.

Mr. Beard stated that the end product of the water has to meet a certain criterion established by the Feds and not only can that be met but it can be guaranteed. This technology is currently working, in the field, with five people on an eight-hour day basis. He said that you may feel what we have to offer is a good deal and want us to come in and train your people so that the profit you make is on the operation side and then use the money for expansion or reduce the cost per gallon to the residents. He ended by saying that is what he recommends.

Mr. McLendon wanted to know how the water is distributed from their plant?

Mr. Beard replied that it is a pipeline that runs from the plant through Chino Basin and lines run off that for reclaimed water.

Mr. McLendon inquired if it was pipes or canals and Mr. Beard replied it was pipe.

Mr. McLendon asked if it was countryside stuff and not individual home irrigation?

Mr. Beard replied no, the new subdivisions in Chino Basin are being mandated to put in two pipes, blue pipe, white pipe or purple pipe. It will be mandated to use reclaimed water outside the home. He stated that, with the older homes, there is more of a cost involved in going back to put in new piping systems and it isn't something to be mandated up front. He continued that normally, you take biggest users of reclaimed water such as the golf courses, the power plants, those types of things or industry that can use reclaimed water and deliver the water to them at a percentage of the potable water rate.

Mr. McLendon said that the Town doesn't have anything like that being a residential community with only three big non-drinking use customers of the system. He said the Town couldn't utilize a reclaimed water system unless they had a dual pipe system and that is very costly. He reported that the Town looked at a preliminary estimate of what it would cost to take our sewage and treat it in a plant. He explained that now it goes out to the turnpike and is treated very excellently out there but it is, unfortunately, seven miles to get back to where we would like to reuse it. He told Mr. Beard that he shouldn't even consider thinking of putting a sewage treatment plant in the Town of Palm Beach.

Mr. Beard replied that he understood but just wanted to present this technology, the capability of the technology, the options that are available and most importantly the mechanism of delivery to this system which they've had experience within California.

Mr. McLendon asked what, with their ability, would they propose for the potable water?

Mr. Beard replied that there are three different technologies that can be used. He stated that RO is one, multiple stage flash distillation is two and the other is thermo-compression distillation. He felt that without knowing the details of the components of your water, RO is probably the way to handle it.

Mr. McLendon asked if they have experience with that?

Mr. Beard said that Kaiser and another of their associates have built them all over the world. He stated that his is

the delivery mechanism. If that is what the Town wants, he would be happy to deliver it and it's not a problem. He reported that he feels the mechanism is as important as the technology because it's the mechanism that delivers the technology. He stated that there are a multitude of companies with a multitude of systems some of which are interchangeable and some of which are patented. He felt that it's better for the Town to provide competitive bidding for these technologies if water and pure water is what you want. He said that if that ends up being the most cost effective mechanism, than he would say that's how the Town should do it. The delivery mechanism, he felt, should be altered as opposed to the conventional and norms of thinking of how we would normally do that. There is a better way of doing it and that is the one they pioneered in California.

The Mayor stated that since every point of distribution is along a paved street, the Town would spend an extra 10 million dollars to put in a dual system as opposed to trying to do the whole thing in a combined system.

Mr. Beard said that was right and that he understands, but then again it's the Town's cost per gallon of treatment. Can that cost of treatment you're paying for right now be lessened with the water being utilized instead of being dumped?

The Mayor told him that unless he had some specific proposal of beating the run of the mill reverse osmosis costs, he didn't see that possibility.

Mr. Beard replied that wastewater treatment by far is cheaper than reverse osmosis and he could guarantee that.

Mayor said that would require a dual pipe system to use it.

Mr. Beard said that he understood that but the question is though you have more than just the differentiation between reverse osmosis and reclaimed water cost. It's the differential also of what you're paying now and what you could pay.

The Mayor then wanted to know how far out in the ocean could they handle putting in a waste treatment plant to get it away from Town?

Mr. Beard said it depends where you want to put it and that Boston Harbor was far out.

Mrs. Smith thanked him and announced that the next presenter was Fluid Systems.

5. FLUID SYSTEMS, INC.

Mr. John Buonassisi, the Southeast Regional Sales Manager, thanked the Council for giving him the opportunity to address them. He reported that he had a really quick slide show he wanted to present, and would try and address the group based on information he had on municipal systems within the State of Florida.

Mr. Buonassisi told them that Fluid Systems is in the business of making reverse osmosis membranes. His first slide was a view of the filtration spectrum which showed particle filtration, micro filtration, ultra filtration and reverse osmosis. He reported that in a filtration process everything that enters the filter will exit the filter and be filtered. Basically, what it's for is to filter out undissolved materials in the raw water source. He continued explaining that when you get down on the spectrum to ultra filtration and reverse osmosis which is also called hyper-filtration, it is a cross flow separation process. All the water that enters the device does not necessarily go through the membranes which are constructed of a semipermeable polymer developed to allow water molecules to pass through more rapidly than dissolved solids.

Mr. Buonassisi said he wanted to differentiate between undissolved solids and dissolved solids. The reverse osmosis process is designed to remove dissolved solids such as salt from seawater and calcium and magnesium from hard water.

Mr. Buonassisi said some of the other uses for the reverse osmosis process is water reuse. He stated that they do treat advanced treated wastewater which in some communities has been allowed to enter back into the water distribution system as potable water. He reported that it is monitored a lot by the local health department and does go through quite a bit of scrutiny and treatment before it does go back into the distribution system.

Mr. Buonassisi explained that osmosis is a phenomenon where a more dilute solution will flow through a semipermeable membrane to a more concentrated solution. He advised that the first membrane used was a pig's bladder which was not viable commercially so Fluid Systems and the United States Government got involved in developing a synthetic material that demonstrated these same qualities. The first synthetic material was cellulose acetate. We want to take the more concentrated solution which in your particular case is a brackish solution, and we want to produce potable water from it. So, we have to reverse the process and construct a barrier, a semipermeable membrane, in between the water supply to overcome the natural osmotic pressure or the natural tendency of the more dilute solution to flow into the more concentrated side. We apply pressure to reverse that process.

Mr. Buonassisi advised that he wants everyone to understand when he talks about pressure for the rest of his discussion, he's talking about money, less pressure less money, energy is the cost there. He showed a graphic illustration of reverse osmosis and explained that they're applying pressure to impede or overcome the natural

illustration of reverse osmosis and explained that they're applying pressure to impede or overcome the natural osmotic pressure and eventually start forcing water in the reverse direction. He said that commercially, they have to add excess pressure to be able to produce enough water to make a commercial product.

Mr. Buonassisi stated there are a couple of terms that are important to know one being recovery which is that percentage of the water that goes into the system that is kept and that's potable water which we call permeate that goes through the membrane, and you keep that part. He said that recovery ratios are an economic thing and the higher the recovery the less cost for the water. He reported that traditionally seawater systems operate at around 30% recovery. Many brackish systems can operate anywhere from 50% to 85% of recovery depending on the concentrations in the raw water.

Mr. Buonassisi said another term is rejection which is one he doesn't like to use. He prefers salt passage rather than rejection and explained that rejection is that percentage of salt in the raw water solution that does not pass through the system. He cited for example that if you have a 98% rejection element, it means a 2% will pass through. He continued that rejection and salt passage are two terms used interchangeably and one is the opposite of the other.

Mr. Buonassisi said that the advantage of spiral wound elements is that the packing density could be high and you could put in a fairly high producing water treatment plant in a fairly small profile or footprint. Fluid Systems held the patent initially for the spiral wound element back in 1967.

Mr. Buonassisi showed the different size elements they produce and also showed a picture of membranes being loaded into a pressure vessel to contain the feed water pressure. He explained that pressure vessels are made to hold anywhere from one up to seven elements and they can be two and a half inches, four inches or eight inches in diameter in a municipal marketplace. He then explained that thin film composite means that there are two membranes

involved or two layers. One being the support layer and the upper layer which actually is a semipermeable membrane and is usually of a polyamide construction. He advised that Fluid Systems makes two products, membranes and elements.

Mr. Buonassisi stated that because semipermeable membranes have the ability to reject salts in the raw water source. Fluid Systems had to be able to devise a delivery device or some way to get high square footage into a small area that could treat sufficient amounts of water to make it commercially viable. The spiral wound element is the result.

Mr. Buonassisi reported that RO systems can be modular and can easily be expanded. As an example, he explained that way back when a lot of development was going on in Florida, they would buy enough water production to handle the first phase, and as the second phase came in, a second reverse osmosis train would be ordered. Two of those trains would be added on and then proceed with phases three and four. He said that there were some advantages in that expandability.

Mr. Buonassisi told of a RO system that's in the City of Venice, Florida on the west coast where the raw water supply is about thirty four-hundred parts per million and he showed a block or train which he thought consisted of thirty-two pressure vessels with six elements a piece. He reported that the system operates at around 55% recovery and it still has the same spiral wound elements when it was installed back in 1989. He said it is one of the older plants as far as the age of the membranes goes. They are watching it with a lot of interest to see how long it will actually go before it's time to start selective replacement.

Fluid Systems was involved in 74 million gallons of production membrane in the Yuma project where the plant was designed to desalt or clean up the Colorado River for irrigation. Mr. Buonassisi stated that before he worked with Fluid Systems, he did work with a design outfit that designed reverse osmosis water treatment plants. He wanted to illustrate the viability of the reverse osmosis process in a municipal marketplace. The most effective way to treat salt water intrusion was either a thermal process or the reverse osmosis process. He went on to tell of reverse osmosis processes in Florida reporting that not all membrane plants have Fluid Systems membranes. He listed those that are Fluid System plants such as City of Fort Pierce, Martin County, City of Jupiter and Royal Palm Beach. The Palm Beach County plant is a 10 million gallons a day plant that just went on line about a year and a half ago. The Village of Wellington is an old plant, seven years old and still has original membranes. The City of Plantation is a new type of plant which is a hybrid plant that has softening elements as well as ultra low pressure elements operating within the same train and we're interested in seeing how that's going to operate. He continued with the City of Sunrise which is under construction, City of Hollywood, Cooper City; Collier County; City of Fort Myers; City of Cape Coral; City of Englewood; City of Venice and the City of Sarasota. He said that these are only the municipal plants but there are a lot of small private utilities that also own and operate reverse osmosis plants.

Mr. Buonassisi said that when he first got involved in reverse osmosis business, standard pressures were 350 to 400 pounds per square inch to drive the systems. With the improvement of membrane technology, those pressures went down to 250 to 300. He said that today they have ultra low pressure, low energy pressure membranes. He continued that every membrane manufacturer has a new different name for it. It's not a new polymer but it's a new process in the fabrication of the membrane that has allowed pressures to go down below 200 pounds per square inch still making very good quality water and also produce the volumes that are necessary for the municipal marketplace.

Mr. Buonassisi wanted to point out that one of the costs involved in operating a RO system is the replacement of

said that some of the plants have replaced elements only because new technology has come up. Reporting that there was very little retrofitting to the plant but just a matter of taking those worn elements and replacing them with new technology. He explained that in some instances the drops in pressure equated to enough savings to be able to pay for the new types of membranes.

Mr. Buonassisi went over some of the costs and the percentages for a brackish water system, old brackish type membranes, stating that membrane replacement is at 12%, chemicals at 14%, labor at 25%, energy at 44% and miscellaneous costs around 5%. He reported that there are new membranes now that will be able to reduce that 44% by a factor of fifteen which makes it even more interesting. He said it enables them to take the cut down on the biggest chunk of the operation and maintenance costs.

In reference to labor, he thought the local health department would require a minimum of hours for qualified operators to be at the facility. He felt that this was something the Town might want to look into if they do decide to go with several plants as opposed to one plant. He said they should consider what the burden of labor would be on operating that way as opposed to a central plant. He thought that everyone would understand that a central plant would probably be the least expensive way to go. The Town does have some unique problems because the island is built out making it hard to find nooks and crannies and places to be able to put larger facilities which would be the better way to go.

Mr. Buonassisi had some figures that were relatively new on a system that produced 840,000 gallons per day of permeate from a brackish water supply. He explained that they were comparison figures from the new low pressure technology type elements to the standard, or the generation before this new generation which he will call just the standard brackish system. He continued that the costs do not take into account the civil engineering and the building and all that. What you're looking at is basically the process equipment only. He said the capital costs are for an 840,000 gallons per day RO system treating brackish water similar to the scenario that the Town is looking at here. He stated that the first number which is the capital cost for the current system, a low pressure system, now is 2.18 million as opposed to 2.14 for the standard brackish water elements type plant. Operation and maintenance costs would be 523,000 for the low pressure elements and 587,000 for the standard brackish water elements. Costs per thousand gallons with a low pressure system, low pressure brackish water system is fifty-three cents and the standard brackish water would be around 60%. Annual energy costs for the low pressure system would be 224,000. The standard brackish plant would be somewhere in the vicinity of 296,000.

Mr. Buonassisi said the reason for mentioning this is that sometimes, as you see here, the capital costs can run you more money for newer technology, and the payback comes in reduced operation and maintenance costs which is something you pay every year. He stated that if the membrane elements last ten years, then you get your money back in spades by the savings realized in the reduced operation and maintenance costs.

Mr. Buonassisi opened the floor to questions.

Mr. McLendon started by asking if low pressure, low energy is like membrane softening and if that would really be a desalting plant?

Mr. Buonassisi said that was a good question and replied that yes it would be. He said that Palm Beach County's system three plant is a softening plant. He reported that they use ground water and the raw water supply is 400 milligrams per liter TDS. A lot of pressure is not needed because there is no sodium chloride in it and it's basically an organic color, organic materials and has a little hardness so a softening membrane is used. That particular plant operates anywhere from 90 to 110 pounds.

Mr. McLendon informed him that the Town doesn't have that ability here.

Mr. Buonassisi replied that unfortunately the Town doesn't have that raw water supply so it's a brackish water supply which is going to be anywhere from eighteen hundred to five thousand milligrams per liter. With the newer low pressure, low energy, ultra low pressure membranes, the ability is there to maintain fairly good rejection. Every company that makes membranes has a different name for it. He continued that you're going to take a little hit on rejection maybe one or 2% more salt passage but you are going to see a marked difference in the energy costs or the net driving pressures to make the same volume of water.

Mr. McLendon wanted to know if there is a standard relationship between quality of raw water, pressure and pass through rate and if it has to be intertwined?

Mr. Buonassisi replied that it was almost a linear relationship and that as the raw water, the TDS goes up so does the pressure. He advised that the ideal situation for finding a feed source for the reverse osmosis process is to find a water that has the lowest TDS but still it is going to require some volume. So, you have to have the volume of water and that's why the Floridian Aquifer is so appealing.

Mr. McLendon wanted to know if there was a system operating and a secondary or dual source of water that would, at times, even approach fresh as it was pumped, it would become more saline, and what sort of problems does that give in the operating or maintaining of the membranes? Can fresh or less salty water be brought in and used to the extent that it can save operating pressures and costs?

Mr. Buonassisi said certainly, if the Town had a system. He said that this occurs a lot especially in Alaska where

Mr. Buonassisi said certainly, if the Town had a system. He said that this occurs a lot especially in Alaska where they have degrees or varying concentrations of raw water on a seasonal basis. He said it also happens in a lot of places where you're treating surface water, river water, for example, as a raw water source for reverse osmosis. The water is going to be colder in the winter time. In the summer, depending on the rain, there is going to be more dissolved solids. There will be more undissolved solids in that raw feed source during certain times of the year. He told Mr. McLendon that, as he pointed out earlier, there is a relationship to the total dissolved solids concentration of the raw water and pressure. As the quality of the water improves, the raw water source improves. It is only necessary to back off on the feed pressure which equates to savings, energy savings and as the quality deteriorates or becomes more concentrated, the pressure has to be increased. The trick in designing the plant is to make sure that there is a pump that has enough pressure capacity to be able to take care of a worse case scenario.

Mr. McLendon wanted to know if they normally use centrifugal or positive displacement?

Mr. Buonassisi said that centrifugal pumps with variable speed drives seem to be the norm and that makes good sense because if we put a throttling valve on the discharge of a centrifugal pump, we're paying for the energy costs whether we're using it or not. So, he continued, bringing up and reducing the RPM of the pumps seems to be a nifty way to that.

Mrs. Smith asked if anyone else had any questions and no one did. She announced that the next presentation will be from Parsons Infrastructure and Technology Group, Inc.

6. PARSONS INFRASTRUCTURE AND TECHNOLOGY GROUP INC.

Loran Furland introduced himself and his cohort, Erskine Howard. He informed everyone that he is with Parsons Engineering Science. Parsons Infrastructure and Technology is their parent organization founded by the Ralph M. Parsons Company in 1944. They have a number of offices in Florida with their headquarters in Pasadena, CA. They operate in fifty states and in eighty countries. Currently, they have more than nine thousand employees and they are totally employee owned.

Mr. Furland said that he had a slide presentation and that he would like to tell a little bit about their company, their view of application of the various desalinization technologies, and their views on financing and designing build options for owning either your own or privatization of a water system for the Town of Palm Beach.

Mr. Furland reported that Parsons is an internationally recognized engineer procurement, construction, management firm. They're usually within the top five on engineering news record lists of the top five hundred contractors and have been number one several times in the past five or six years. He said their firm emphasizes project management and technology rather than just construction. They provide the total package for most any type of infrastructure project, design, procurement, construction, management, operations, maintenance and hazardous waste facilities all the way through facility closure. The company is organized with various groups and his company is the Parson's Infrastructure and Technology Group. The Parson's Process Group is primarily in petrochemicals and mining. The Power Group is in the power industry. The Parson's Transportation Group is basically in roads and bridges.

Mr. Furland said that they were one of the first to privatize wastewater facilities in the United States and did most of those in the mid 1980's until the 1986 tax law changed some of the attractiveness of wastewater privatization. Parsons did Chandler, AZ, Gilbert, AZ, Downingtown, PA, Pelham, AL. They own and operate all of those facilities except for Pelham, AL which has been transferred back to the municipality.

Mr. Furland mentioned that they operate by contract or through their own ownership more than twenty wastewater and water treatment facilities ranging from three to thirty-three million gallons per day capacity. They have desalinization experience which includes some very large multiple effect distillation projects in Kuwait and Saudi Arabia. He told of their involvement in the development of an interesting new technology with Metropolitan Water District of Southern California. He said they are developing a vertical tube, multiple effect distillation process which promises to greatly reduce the energy costs of distillation. He advised that they also have reverse osmosis experience.

Mr. Furland discussed some of the applicable desalinization technologies. First, he discussed reverse osmosis which involves forcing or pumping the water at high pressure through membranes. He advised that brackish water operates at much lower pressure than with seawater but this product is somewhat higher in dissolved solids and salinity. He advised that it's generally the lowest technology overall for brackish water and often for seawater. They're seeing costs as low as \$2.50 to \$3.00 per one thousand gallons for this type of treatment.

The second technology he discussed was multiple effect distillation which is used primarily for large seawater desalinization. It has higher energy costs and it needs to be at a power plant or steam production facility. He advised that it's not normally used for brackish water. The overall costs can be up to \$4.00 a thousand gallons depending on energy costs, but this produces very high quality water. It's generally higher in quality than reverse osmosis water.

The third technology he discussed was another distillation process called mechanical vapor compression which is basically an electrically driven low temperature distillation process. He advised that it's usually used for smaller facilities. Again, it is not normally used for brackish water but does produce the very high distilled quality of water. He explained that it uses steam, in addition to electric power, to somewhat improve its economics. The overall costs are between \$3.00 and \$4.00 per 1,000 gallons.

Mr. Furland discussed the experimental process known as the vertical tube multiple effect distillation that they are currently developing with the Metropolitan Water District of Southern California. It promises to reduce the energy cost for distillation by something like half. He explained that they are in partnership not only with MWD but also with an Israeli firm which is currently designing a twelve million gallons per day pilot facility. Currently, they are looking for a power plant to locate that.

Mr. Furland discussed brackish water versus seawater mentioning that the operating costs for RO are significantly less for brackish water than for seawater. He said that sometimes distillation processes are used to desalt seawater and then blend that high quality product water with brackish water to produce additional water at very low costs. He didn't know if that would be applicable here. He explained that because distillation produces very low total dissolved solids and salinity, it can be blended with brackish waters in the range of one thousand to two thousand milligrams per liter TDS, and still produce an acceptable overall product.

Finally, Mr. Furland wanted to discuss the design, build and financing options. First thing he listed was the conventional, which everyone is used to, which consists of selecting the engineer. The engineer then produces a design and assists during construction. A general contractor constructs and the city owns and operates or it can contract for operation. He advised that this, under ideal conditions, may result as low a cost as any other approach but it increases the risks over some of the other approaches. The risks are contractor nonperformance and difficulty in controlling the schedule.

The next option Mr. Furland discussed was design, construction, management saying it is similar to what he just showed except that a designer might manage multiple construction contractors. He advised that there are Florida laws that affect this approach now because recent laws require that the construction be done by a licensed general contractor. This makes it difficult in Florida because the CM must be licensed as general contractor or the design engineer must be licensed as general contractor or the general contractor must be a professional engineer or general contractor and a professional engineer must partner.

Mr. Furland advised a typical design/build arrangement as covered under Florida's Consultants Competitive Negotiation Act, would normally require the city to select an engineer to produce design documents that are thirty to 40% completed. The design/build firm would bid the project from the partially completed design and then complete the design with the city owning and operating or contracting for operation of those facilities.

Mr. Furland discussed another approach called design/build/operate which is the same as design/build except it could contain an operations contract. Still another approach discussed was design/build/own/operate where the city selects a developer and negotiates a price. CCNA doesn't apply here since the city wouldn't own the facility and the developer would finance, design, build, own and operate and could sell water to the city. The final approach he discussed was design/build/own/operate/transfer which is similar to the design/build/own/operate except that the developer transfers ownership through a contracted sale to the city in the future. The city can then operate the facility themselves or contract with a developer or with any other qualified firm to operate the facilities. Basically, this transfer allows the city to take advantage of its tax free municipal bonding capabilities and the lower associated interest rates to reduce the overall costs.

Mr. Furland said that finally, he wanted to outline the way to structure a project if you select the design/build/own/operate/developer selection approach. He presented a flow chart to guide everyone through the process. It started out with defining what your requirements are, how the new system interfaces with your existing facility, what water quality you need, what schedule you need, what special procurement requirements you're going to have, and financial capabilities of the developer. Basically, he said, a preliminary RFP is developed, alternatives workshop would be held with the Town Council or the Town staff and pre-qualification requirements developed for the developer. A request for qualifications would be issued and then evaluated, and then a draft request for financial proposals, hard dollars would be proposed for these facilities. He felt that everything else was obvious on there and concluded his presentation opening the floor to any questions.

Mrs. Smith thanked him and wanted to know if he could tell her, why the Town Council would pick his firm if they went ahead with this project?

Mr. Furland replied that his firm is financially strong and that they are in the process of developing similar projects for other agencies. Also, they're one of the respondents for the West Coast Regional Water Supply Authority's twenty million gallons per day capacity seawater desalt facility's design/build/own/operate over on the West Coast. In addition, he said they have a lot of varied desalinization experience both in the United States and internationally with all different types of processes. They have a very strong background in project development and financing. He felt that they were somewhat unique in that respect.

Mrs. Smith thanked him.

Mr. McLendon wanted to know if it was the Ralph Parsons firm that had made the recommendation on the west coast to tow an iceberg from Alaska down to California and let it melt and then pump it ashore some thirty to forty years ago?

Mr. Furland replied that he didn't know and had no knowledge of that.

Mrs. Smith asked if they were able to do it?

Mr. Furland said he doesn't think they did it but he's been with them for only ten years. He said that Ralph Parsons was originally in partnership with Bechtel's during WWII building liberty ships and then he formed his own firm after that.

Mr. McLendon said that he knew they were quite involved in northern California water issues because getting more water down into the lower state was a big problem. He then apologized for asking if he missed the discussion on what operating plants they have designed or built or whatever? He wanted the information specifically on reverse osmosis and asked if most of them were out of the country?

Mr. Furland said that he didn't have any really large plants on his list and yes, most of them are out of the country.

Mrs. Smith responded that some of those listed were Paradise Island, Bahamas, Yanbu, SA, Endicott, AK.

Mr. McLendon wanted to know if he also missed the size of those plants?

Mr. Furland said that offhand he didn't know the numbers but some of them are small. He didn't think any of them were bigger than 10 MGD's.

Mr. Shaw said he was expecting information on a type of system that would be applicable to the Town's unique circumstances being a barrier island with no land basically available to build out. He wanted to know what Mr. Furland's firm could propose? The Mayor agreed with that.

Mr. Furland replied that his knowledge is somewhat limited regarding the Town's existing circumstances, and he hadn't had the time to study them extensively. He said it appears that desalinization is the applicable technology. The preferred source would be brackish water but you would have to be careful that the brackish water available is enough and doesn't exceed the safe yield of brackish water so that your salinity goes up and performance of the desalinization facilities goes down. If there is not enough brackish water you may need to consider seawater desalination. It may be beneficial to blend desalinated seawater and brackish water with a distillation process if the exact right combination of water quality and quantity from those sources was available.

Mr. Shaw passed to Mr. McLendon who said that since it takes a lot less energy to freeze water and separate the solids from the pure water. Why hasn't that been part of your operations?

Mr. Furland replied that he didn't believe freezing separates the salt.

Mr. McLendon advised him that it does and that salt water will freeze at lower temperatures. The salt gets left behind and only the pure water freezes. You have the problem of washing the coated stuff after that. He said that he has seen it tried in two locations.

He was asked if it worked?

Mr. McLendon said that there was a demonstration project in Wrightsville Beach, North Carolina and in the Village of Greenport on Long Island. They did it just by spraying water in the air in winter time, freezing it and letting it fall back on the ground. It obviously takes a lot less energy to do that and you lose some of it by having to wash it. It's surprising that it hasn't caught on.

Mrs. Smith asked Mr. Dusey if he knew anything about this and if he would want to freeze water in Palm Beach?

Mr. Dusey replied that he knew about freezing water but he didn't know about freezing salt water or how that works.

Mrs. Smith said that maybe you can debate that later and asked Mr. Dusey if he had any questions?

Mr. Dusey asked if they have constructed a distribution system as part of any of their own/operate facilities?

Mr. Furland said that as part of our own/operate, the only thing he could recall is that they constructed the entire collection system for wastewater in Pelham, AL. As far as he was aware of, they didn't do a water distribution system. He repeated that he can't recall anywhere else but they've designed hundreds of them around the world and they know what they're doing in water distribution.

Mr. Dusey asked if the Town had an owner/operate situation such as you just described, do you also include billing and those kinds of things?

Mr. Furland replied that they do. They can do anything as long as the contract is appropriate for that.

Mr. Dusey said that what he really wanted to know is if you have done that?

Mr. Furland couldn't recall that they had.

Mr. McLendon just wanted to comment that Parsons is a great firm and that they appreciated their coming and thanked them.

Mrs. Smith announced that the next presentation will be from Stone and Webster Engineering Corporation.

Jack Doran from Stone and Webster explained since this meeting was running ahead of schedule and part of his team was not there yet, it left him a little challenged. Their presentation was not until 3:30 and they are on their way up from Fort Lauderdale.

Mrs. Smith suggested that since the Ionics team was there and if they didn't mind, they could make their presentation.

A five minute break was taken so that the Ionics group could set up.

Mrs. Smith was advised that Mr. Wyett was not participating in this particular presentation because there was a conflict. He was going to stay but said he would just keep quiet.

Mrs. Smith introduced the Ionics group and thanked them.

7. IONICS, INC.

John Kiernan introduced himself and told the Council that he is the senior sales representative for Ionics out of Watertown, MA which is right next to Boston. He introduced Chris Miller who is President of Ionics Aqua Design, a subsidiary of Ionics. He said he was going to talk briefly today about what he considers the issues facing the Town are and how they propose to address those issues and how they would organize and go forward from there. He continued that as they see it, the Town of Palm Beach is looking to find a high quality long term independent water supply. The Town needs to have reasonable and predictable costs with guarantees to those costs and performance. Most importantly is the need to have safe and reliable water for the citizenry.

Mr. Kiernan stated that Ionics feels that water independence can be a reality for the Town of Palm Beach and proposes reverse osmosis technology using the Floridian Aquifer with a build/own/operate contract which will guarantee the costs and performance of the plant over the life of the contracts. Most important, he felt, was that the aquifer source is drought proof which will never subject the Town to water shortages imposed by exterior forces.

John Kiernan gave some background on Ionics, Inc. He stated that they are a world leader in reverse osmosis and membrane desalting technology and they are a pioneer in the build/own/operate/transfer desalting contracting. He continued that Ionics is very proud to be celebrating their fiftieth year this year. They started in 1948 and consider water as their business.

Mr. Kiernan informed those who weren't familiar with Ionics that a number of their plants are in the semiconductor business and they are the preferred vender for Motorola. In addition, he said they do a lot of high purity water systems, a lot of nuclear power plants, a lot of power plants, a lot of municipalities.

Mr. Kiernan advised that they are rated the number one company in the world having more installations over 20,000 gallons per day of membrane desalting than the next three competitors combined. He reported that more than a third of their business is in build/own/operate contracts which represents over 100 million dollars a year in revenues for Ionics. He mentioned some of their major contracts they are very proud of such as the City of Santa Barbara, CA which is a 6.7 million gallons per day seawater reverse osmosis plant. It was built as a drought proofing project in nine months from the date of permitting. The Maspolamas, Grand Canary Island facility is seven million gallons of seawater with another five million gallons brackish water desalting that Ionics put right into the pipelines throughout the Canary Islands. It is a 25-year contract. He reported that Ionics also did one for the government of the British Virgin Islands, the Diablo Canyon Nuclear Plant where there is a vast array of different technologies on-site all dealing with membranes which control water sources consisting of one-third seawater, one-third brackish river bed and one-third is surface water. In addition, he said that they have twenty smaller contracts throughout the Caribbean. He reported that the Tampa project is one of the largest and most visible of contracts right now and they are the low bidder and feel very confident that they will be awarded the contract. They had been told they were in the lead position. This will probably happen sometime in the fall.

Mr. Kiernan discussed some of their more recent projects such as the County of Sarasota which is a twelve million gallons a day brackish water membrane desalting plant. The City of San Diego is the wastewater reclaim project that was mentioned earlier explaining that the water was not of sufficient quality for irrigation and it required desalting. The City of Port Heuneme is a three million gallons a day pilot plant essentially with all three technologies at one million gallons per day. The City of Cape May, which is being installed as we speak, is a brackish water source where the wells of the city have been contaminated by seawater. He stated that they were awarded that project and then they were awarded the expansion prior to even installing the first part of the project. He said to the Town Council that he supposed they had seen enough RO systems.

Mr. McLendon interrupted asking if he could just ask him a question? He wanted to know if they were using the wells in New Jersey for their supply for the RO?

Mr. Kiernan replied that was correct and stated that by alternating their usage at different times, they will make sure that the intrusion does not get worse. He showed a skid that Ionics put in at Bermuda where they own forty-nine

and a half percent of the Island of Bermuda's water company. Ionics owns the mains, the pipe lines, the meters and everything of that portion of the island.

Mr. Kiernan felt that most importantly was how Ionics saw the present status of the Town of Palm Beach and if it is in line with what's really happening here. He thought Ionics had a real case. He stated that the Town presently purchases water from West Palm Beach at a delivered price of approximately \$1.48 per hundred cubic feet. He apologized because he just found out that there is a 25% surcharge that goes on top of this number. He reported that all of his graphs understate the Town's present costs by 25%.

Mr. McLendon told Mr. Kiernan that his price was per hundred cubic feet so he would have to multiply by 1.33 to get the cost per thousand gallons.

Mr. Kiernan agreed but said the numbers he received were in a hundred cubic feet increments. He was confident of that part and felt that, in a sense, his mistake only helps the case for water independence. He continued that water prices have been rising at an average rate of 4%. As he understood this, the guaranteed increase runs out in 1999 and that there was no real guarantee what the percent increase would be from then on. He wanted to know if that was correct?

He was informed that he was correct.

Mr. Kiernan continued that the distribution mains owned by West Palm Beach are in need of major infrastructure repair or replacement which is by their own admission. Again, he asked if that was correct and the reply was yes.

Mr. Kiernan reported that the Town's 1996 water usage was over 3.8 hundred cubic feet which represents 5.7 million dollars of revenue to West Palm Beach at \$1.48. Again, he pointed out that you would have to add the surcharge which brings it up to almost seven million dollars. He asked that everyone keep the numbers that he's got and mentally add that number to it later on. He reported that the estimate to repair the mains is sixteen million dollars. If that was bonded, it would be approximately a million dollars a year on a twenty-five-year bond. He advised that West Palm Beach is presently only allocating 8% for infrastructure repair. Based on the 5.7 million dollars, that's \$450,000 but it's a \$550,000 shortfall compared to what is really necessary for infrastructure repair if they finance the 16 million dollars over twenty-five years. He felt that since this might be a little confusing, he wanted to go slow here.

Mayor felt that the word replace might be better than the word repair.

Mr. Kiernan said okay to that and then reported that the replacement costs more than sixteen million, unfortunately. He said he was trying to give them the benefit of the doubt by keeping their costs as low as possible. He said that, quite frankly, they might not bond it and do it more than twenty-five years. He advised that if they did it on a pay as you go basis, it would probably cost more money. He felt that best case scenario, they are not putting in the money needed for infrastructure repair by what amounts to another 10% increase in your water costs and that bill is going to come to Palm Beach at some point whether now or later. One other thing, he pointed out, is that the 16 million dollars that they would bond for repair of the mains is only for the Town's portion. They would probably repair quite a bit of their own mains at the same time and the Town would have to pick up the Town's 37% of that cost which might be more than 16 million dollars.

Mr. Kiernan said the issues that he saw facing this council right now is whether or not they enter into the water business and there are two ways to do that. You can do a capital purchase and operation or build/own/operate contracts. He said he uses the term build/own/operate fairly loosely. There are a number of different ways to enter into it such as a BOO, BOOT, BOOM. One is a capital purchase and the other is a contract service agreement.

Mr. Kiernan said that some of the other issues facing the Town are site and land requirements. He said recognizing that this is not an undeveloped area, it might be more prudent to put in smaller plants along the island than to put in one central plant. Ionics would be willing to look at that.

Mr. Kiernan said another concern is storage. Ionics investigated and they think that underground storage underneath some parking lots that presently operate in the center of Town and possibly there are other sites. Ionics thinks that this would account for the Town's peak demand and obviously, the Town has hourly peak demands that go up quite high.

Mr. Kiernan felt that one of the more important issues is the permits. He also recommends applying for grants since they are not as scarce as people would think in Florida.

Mr. Kiernan advised that what Town Council had in front of them are estimated costs. \$1.12 per hundred cubic feet at the connection point at the year 2001 and that's for a 14 million gallons per day facility. He said that's the size facility Ionics feels would be necessary along with the storage to meet your peak on normal floats. Ionics estimates replacing the mains at \$20 million and felt if it was bonded, it would really only be 1.1 million dollars per year. He said that the cost differential between repairing and replacing is fairly low. It's really a matter of what the construction time period would be, one versus the other and the disruption to the traffic.

Mr. Kiernan said that Ionics estimates administration of billing to be about \$100,000 per year. He thought they generously put in for the maintenance on the mains, now that the Town would own them, a quarter of a million

dollars per year. He felt that it was probably a little high but it was figured to take about a 1% of the total cost. He said that quite frankly in the first few years, the Town should have almost no maintenance costs on the mains.

Mr. McLendon asked if he could interrupt. The Town would not have any revenue for quite a while so he thought the debt service has to be figured on two or three or less years of income. So, the bond issue has to be higher in order to provide the cash needed to go until revenue is generated from the system.

Mr. Kiernan felt that was an excellent point and said that one of the things they estimated is a bond rate of between say 5.8% and 6.5%. He said that Palm Beach can probably get a better bond rate so the numbers would go down. Another thing he thought the Town should think about is that estimate of 20 million dollars may be high for replacing the mains.

Council members responded that it could be low. Mr. Kiernan also stated that it could be low.

Mr. McLendon thought it was a pretty good guess.

Mrs. Smith asked if he anticipated that the 20 million would really be buying the mains from West Palm Beach and asked if he had factored in that the Town would buy it?

Mr. Kiernan responded that no, if the Town was going to buy it, you would then have to repair it which would probably cost about sixteen million to repair and four million to buy. However, he said, if you gave them their way it would be twenty million to buy and sixteen to repair.

Mrs. Smith agreed but wanted to know what he was anticipating if we have to dig up the whole Town and lay new pipes for the different plants?

Mr. Kiernan explained that if all the mains were to be replaced, not having bought the mains, the Town would not own those pipes so it would have to be done. He felt that it might make more sense to buy them and repair where necessary and take sort of a number in between the twenty and the sixteen million dollars.

Mrs. Smith said that was why she asked if his 20 million is for buying and repairing because if it was, it's low.

Mr. Kiernan said that the twenty million is for replacement of the mains.

Mr. Kiernan wanted to give a quick cost comparison of that and said that when he looked at what the cost, what the connection point would be for the year 2001, Ionics stands behind a \$1.12 per hundred cubic feet in that year. He stated that if you take the \$1.48 per hundred cubic feet that you're presently paying and increase it by 4% up to the year 2000 and add to it the million dollars per year plus for the repair of the system, you are in the range of \$1.78. He reiterated that this is without that 25% surcharge so it is probably short by 35 cents or 40 cents in the year 2000. Through an independent water supply, your costs would be approximately \$1.60.

Mr. Dusey wanted to know if the \$1.12 included maintenance of the plant?

Mr. Kiernan responded that yes, that it is delivered to the mains and includes storage. He said that they factored in storage.

Mr. Dusey asked if it is based on the design criteria that the Town sent or is it something less than that?

Mr. Kiernan said it's the Floridian Aquifer based on 14 MGD with approximately six million in storage.

Mrs. Smith asked if he could repeat the statement?

Mr. Kiernan said he was sorry and his associate continued that those costs include six million gallons of storage, the capital cost and the upkeep on that storage.

Mr. Dusey advised them that the estimate of the Town's needs is 16 million gallons per day peak.

Ionics reported that the 14 came from them.

Mr. Dusey asked if they were going to cut the Town off two million a day or what?

Mr. Kiernan said that he thought that one of the areas that does require more investigation is to determine what the peak daily demand is during a given month. He said right now the Town has a very accurate data base on the billing of what's actually delivered on a monthly basis. There appears to be no data, no actual data on what the maximum daily demand is within a month. In other words, the amount is known for January, February, March and April but not known what it is on the high day during the month and that balance is going to determine the exact storage and the exact size of the plant. He stated that one of their recommendations would be to install, to have the Town with the cooperation of the City, install water meters for the water coming over the canals. In addition, one of the things that's not known is the amount of leakage in the piping system in the Town itself. He reported that their numbers are based on putting in a new distribution system where Ionics assumes there would be no more than 4% leakage. Ionics suspects that due to the condition the piping system is in now, the leakage is considerably more than 4%

probably in the range of 15%.

Mr. Dusey wanted to know if they were short two million gallons a day, would that affect this pricing of \$1.12 a hundred?

Mr. Kiernan replied that it would effect the repayment of a capital portion of it and the fixed costs are going to be spread over the average consumption. So, if the Town has 3.8 million hundreds of cubic feet per year, the fixed costs are spread over that amount. It would appear that the water demand for the Town is fairly static. The Town is not growing in demand. If a larger plant needs to be put in or more storage is needed to account for a higher peak, it is Ionic's opinion, based on some amount of study, that the peak day is only going to be about 12 million gallons per day. He knew that is different from the 16 million that has been put forward.

It was asked what their amount of storage was and if it was six million?

Mr. Kiernan responded that it was six million. He said all the numbers can be investigated further but his point is to try and show the Town that given a set of circumstances, which he felt was very favorable to West Palm Beach's numbers, the argument for water independence is overwhelming.

Mr. Kiernan showed a slide with a graph of the costs over the next ten years. He explained that assuming there's a 4% increase in West Palm Beach's costs, you have the middle line, the red graph which is without the 25% surcharge. But if for some reason, they decide to increase their water rates at 6% instead of 4%, the top graph, the blue graph is actually what you'll be paying. Compared to that is the green graph which is Ionics' BOOT price which rises much slower because half of the costs are fixed. They're capital repayment costs and the only inflationary charge is given at the O&M costs which is approximately half of the total water bill. So, effectively, it is rising at a 2% increase instead of a four. In year two of the operation of this plant, you're at approximately 25 cents differential and based on the 3.8 or four million hundred cubic feet per year, it has a million dollars of savings. Add to it the 25% surcharge and that's another million dollars. So, the Town would be saving two million dollars in the second year of operation.

Mr. Kiernan explained again some the advantages of a BOOT contract such as there being no financial risks or financial risks that are greatly reduced to the Town. There's no up front capital cost for the plant, the cost of delivered water is guaranteed. The facility is delivered on time, on a guaranteed performance schedule which Ionics has done in many cases. Technical risks are also reduced. Plant performance is guaranteed and the Town would have a company running the plant whose main business is water. Ionics would, obviously, have very proactive technical support because if the plant was not operating correctly, Ionics revenues are reduced. It is sort of a built in warranty/guarantee because it's a twenty-five-year warranty/guarantee instead of a normal two year or such capital guarantees.

Mr. Kiernan said that what Ionics sees as the way to proceed is that the Council has to decide whether or not it wants to become independent. He advised that the next critical milestone would be permits. Ionics would then ask the Town to determine sites, determine demand, lock into a water supply contract with a reputable experienced provider and build the water distribution plant. There is some overlap in the engineering of one and the other that could coexist if the project is put in phases. Parts of the main could be replaced as one facility was brought on line if you did multiple sites.

Mr. Kiernan said that in conclusion, Ionics is positioned to make this project a reality, they feel that the numbers are there to make this project a reality and that the time to start is now. There is a certain construction period and a certain amount of permitting that has to go into effect in order to meet the numbers that were put up here for the year 2001 to realize those million dollar savings. The longer the Town delays, the numbers will still be there, but the Town will have lost that million dollars per year. Ionics is ready to begin.

Mrs. Smith wanted to know how long Mr. Kiernan anticipated it would be from the time the Council decided to move ahead with this project to the completion of the plant and the distribution of the water?

Mr. Kiernan replied that there are several factors that come into play and he estimated that probably nine months are required for permitting. During that time, the distribution mains could be evaluated and designs started. You would probably hold off on building a plant until the permits were finally secured. At which time, a 14 million gallons a day plant would probably take in the area of 30 to 40 weeks to assemble. So, you're talking in reality two years from date.

Mrs. Smith said at least that, and he agreed.

Mrs. Smith felt it was more like three.

Mr. Kiernan said it would probably be three and that was why he said that they would not start until the year 2000, 2002.

Mrs. Smith turned to Mr. McLendon for any questions.

Mr. McLendon asked if they had built into their so-called guarantee, not to exceed cost, anticipated power cost increases or not? Or is that subject to a contract?

Mr. Kiernan replied they would try and negotiate power costs off peak power costs or an interruptible power supply with back up. Those numbers do include power supply and the anticipated inflationary adjustment to power.

Mr. Kiernan said that the number of \$1.12 obviously is not fixed for the twenty-five years but it does have that inflationary adjustment. The green line did go up but it went up fairly slowly. He said that the component that's under the influence of inflation is probably only 50% so that an inflationary rate is taken into account for the power costs. If the power costs go up dramatically more than that, that's a problem for everybody and that can be factored into the contract.

Mr. McLendon didn't remember what he said referring to their costs including a million dollars a year for the mains or was it something double that?

Mr. Kiernan said that the \$1.12 figure has nothing to do with the mains. He said that he figured 20 million dollars with approximately \$1.1 million per year for the replacement of the mains and factored that number in dividing it by the number of a hundred cubic feet per year to get up to the \$1.60 value in the year 2001. The \$1.60 is a delivered cost to the consumer which includes the billing, overhead, maintenance of the mains, and service contract to Ionics which includes storage and maintenance to that facility.

Mr. McLendon said at this point, he shouldn't be saying that he thinks it is too low, but did think it was a good point.

Mr. Kiernan said that if the Town wished to pay them more, they would be happy to take it.

Mrs. Smith replied that no they don't want to and he shouldn't listen to Mr. McLendon and \$1.12 is fine. She said that in the Ionics proposal, it was mentioned that multiple sites were possible and wanted to know where?

Mr. Kiernan responded that not having talked to anyone that owns the properties, but he understands that both country clubs might have the ability to put storage facilities underneath their parking lots. There is a parking lot nearby here that could be used as underground storage. I would tend to think that you do not want above ground storage and asked if that was correct?

Mrs. Smith replied that was a definite.

Mr. Kiernan continued that there are one or two parcels of land that are owned by the Town that might be considered. One of the things he found out is that the Town owns some land in West Palm Beach which might be an excellent site for a central plant. It would require a little more diligence in their permitting because they would have to come across at several different connection points over the canal or under the canal. So, that would just be another factor to look into.

Mr. McLendon wanted to know if they or their architectural associates have had any experience on how you would make a reverse osmosis plant with storage underneath it blend in with Mediterranean type stuff such as the fire house in the south end of Palm Beach?

Mr. Kiernan said it was obvious that there is a cost associated with building something that is pleasing to the eye and fits in. He reported that in Maspolamas, which is a very touristy area in the Canary Islands, the facility Ionics built has a Mediterranean look that is found in Town. It has a fountain out front and beautiful large oaken doors.

Mr. McLendon said that he would like to see those pictures some day and Mr. Kiernan said that he could send them to him.

Mr. Shaw wanted to go over a few things but first thanked them for what he thought had been, and he realized there is one more presentation to come so he didn't want to jump the gun. He continued that there was a statement made that said it would be drought proof.

Mr. Kiernan said that he worked on the Floridian Aquifer on several projects and it's quite vast.

Mr. Shaw asked if it was his feeling that it is not something that could ever dry up or be diverted. He said he guessed the concerns are that what if, at some point, everybody starts pumping out of it? He said that he understands that it's permanent, but he hated to hear the word guaranteed, and wonders what becomes the back up. Is it just a matter of taking water out of the ocean and changing the formula?

Mr. Kiernan said that there are no guarantees.

Mr. Shaw said that the other thing the Town has been toying with and listening to presentations about is a dual distribution system. He stated that it is something he feels very strongly about. He thought that Mr. Kiernan had the packet of information from the Town's engineers of what they had looked at. Mr. Shaw said that although there is an up-front cost in putting it in, he would be interested in their opinion as how that effects both control of the water from the fact that irrigation can be controlled where potable cannot. Secondly, what does that do to the size of the plants, the size of the storage and obviously the economics that now you have a different type of the system?

Mr. Kiernan replied that he supposed he could take the easy way out and say he hadn't investigated that.

Mr. Shaw said that he knew that he had thought about it.

Mr. Kiernan believed dual distribution systems in areas that are not as unique as Palm Beach are a good way to go but the disruption to the traffic on this site he felt needed to be kept to a minimum for this project to move forward. He stated that the Town really doesn't have large users of irrigation water except individual homes. He is not really for individual area home irrigation like gray water. He thought if the Town had a lot of civic parks, golf courses, or median strips with azaleas or whatever growing in the middle of them, then the Town could save quite a bit of money by redistributing a gray water system. He said that the Town is seven miles away and that adds to the cost and you'd have to check on the salinity of the discharge to make sure that the situation that happened in San Diego did not occur here. They put in their distribution system and then found out that the water was killing all their flowers. They ended up having to desalt that anyway. So as a result, he said, that is really for an area that is on a limited water supply. Under this option, you would not be faced with that and he would lean away from it. In reality, he said again, he does fall back on the position that he hadn't studied it.

Mr. Shaw stated the reason he was looking at it was because if the irrigation system is separate from a potable system, it can be controlled when turned on and off.

Mr. Kiernan said that lawns are watered at midnight to four a.m., that reduces the peak.

Mr. Shaw responded that the Town is now on a watering system of Monday, Wednesday, Saturday and Tuesday, Thursday, Sunday.

Mr. Kiernan continued that in his condo in California, they have a timer on the system which is set for midnight. He said that the Town could almost play that game just by requiring your citizenry to do that, and Mrs. Smith told him that the Town does from 9:00 P.M. to 8:00 A.M.

Mr. Shaw continued that the Town does do it and it is something that it is controlled. He said that the difference is that when it is a separate plumbing system you have the magic switch. Mr. Shaw said there is an inverse rate that the Town is presently dealing with.

Mr. Kiernan said that he used an average rate and he debated a lot within himself whether he should put forth the lower rate. He didn't know if the Town is under legal restrictions to do an inverse rate and asked if that was a State law to conserve water?

The Mayor responded that as he understood it, the South Florida Water Management District recommends the conservation rate. He didn't think they dictated to each utility exactly what that rate schedule is. There is some latitude there and this is what West Palm came up with that would harm the Town of Palm Beach.

Everyone laughed.

Mr. Kiernan said he has to put on his Ionics hat and told Council that he really doesn't care how they bill Town's people. He just wants an average of this money coming into his company.

Mr. Shaw continued that, obviously, there are two major issues that he sees in all of these dialogues. One issue is does the Town want the independence of water versus what we're paying now which we know is a reasonable rate. He said that if the Town even looks at what the potential increases are compared to other areas of the country, it's still economically in the low end of the ladder. The other side that the Town is looking at is what is the physical impact going to be to the Town. He stated that if Ionics said they can come in here, wave a magic wand, play Merlin and there is a water plant and we could then get these lower rates, he didn't think they would be having a very long conversation. He continued that the real issue is the fact that the Town is very concerned about the impact of digging up all of the streets and how that is going to be done. The concept of purchasing the line, the distribution system, just puts us where we are today and that is we're digging up all the streets, not all simultaneously, but when the main pops, we go in and we fix it and then go to the next block. If we follow the existing or projected rates that are already sort of destined and take that formula as a repayment schedule rather than trying to save a water system, we can save a lot of money in the year 2010. He thought the Town has both the cash and the same operating financial system that allows doing something at an accelerated rate. The issue is how do you minimize the conversion and what is it that the Town would need to do.

Mr. Shaw said that he thought Ionics had hit on some of those ideas such as plant location, on how to handle it and he guessed it was just a question on trying to evaluate this to see at what point do we have to make a decision.

Mr. Kiernan said from what he'd been hearing, and he realizes that a vote has to be made, he thought the decision, according to his numbers, is fairly straightforward. Water dependence is the way to go but the question is how to implement it without the least amount of disruption to your people here. He continued that it had been stated that the Town is in very good shape compared to other water rates and that's true but you're not in as good a shape as it could be. Those are real dollars that are up on the screen there that are going to West Palm Beach instead of going to Palm Beach at the same water rate. If you can reduce the water rate, you're effectively distributing that back to the people that way as well.

Mr. Shaw asked if there is any innovative or very creative thought that you would want to suggest or propose that we should look at?

Mr. Kiernan asked if he meant for main replacement and Mr. Shaw replied yes for a distribution system.

Mr. Kiernan said that in Bermuda they actually had put in mains but he wouldn't say that Ionics is an expert in that field. He would be stretching the truth quite a bit if he said that Ionics is the right company to replace your mains. They could certainly cover that under their service agreement by putting an umbrella over the entire project and we've done that for a number of places. For instance, in the city of Santa Barbara, we put in all of the ocean outfalls and had underwater riggers and everything else. Now, are there any underwater riggers that are Ionics employees full time? No, we subcontract that out and that's how we would look at this. He believed that there are a lot of innovative ideas in repairing and replacing mains. There is enough written about it so getting the right partner is a critical requirement for that portion of the job.

Mr. McLendon asked if he would just like to go back to and readdress the safety of the sewers. He said that tapping the Florida Aquifer does require a consumptive permit from the water management district. It would be subject to restrictions less likely to be imposed on us than someone using fresh drinkable water from regular sources. He felt it would be prudent of the Town to avoid any possibility of drought restrictions that might require a 20% reduction or something like that and to actually build in or to do one small half a plant capacity, two to three gallons a day of seawater and use it only as a last resort for peak hours or whatever. He said it should be available in case the drought restriction was threatened and then it can be operated during that time and not be concerned about restrictions.

Mr. Kiernan said that's certainly an option and probably a very prudent option. There is a noticeable increase in cost for seawater desalinization than brackish water. There are the same permitting restrictions and such but that could be a project that could be done in parallel to this and it could be done four years after you installed the brackish plant as an appeasement to the water management districts. So, he felt, it was really a separate issue.

Mr. McLendon said he wanted to make one other point regarding something Mr. Kiernan said because he felt it was incorrect. He stated that the Town doesn't have the option of taking the time of replacing water pipes. The reasons being that the City of West Palm owns them and, from what he has heard and has been told, they're not about to turn them over to the Town for anything resembling a reasonable price. He stated new pipe would have to be put in all over Town. He went one step further and said that when the Town bids they should bid the alternative of putting a second pipe in the same trench and see if we can bring that ten million-dollar differential on reuse water cost down to something that would be comparable. He felt that was important.

Mr. Kiernan said that when Mr. McLendon brought up the safety of water, he thought he was going to talk about the biological aspect of the water.

Mr. McLendon said no, he meant an available source.

Mr. Kiernan said that one thing that the Council should be aware of is that with a new piping system and a reverse osmosis plant which is effectively a membrane barrier against viruses, giardia, and such, you will have the safest water available in this area.

Mr. McLendon said he didn't think Mr. Kiernan would want the Town to use the reclaimed water with reverse osmosis and use that for drinking water.

Mrs. Smith asked what is the size of the average water plant that would be put in the Town of Palm Beach?

Mr. Kiernan replied that he would certainly look at a full scale plant and see if a site could be found for one plant.

Mrs. Smith wanted to know how big is a full scale plant, what is the size?

Mr. Kiernan wanted to know what she meant by size and Mrs. Smith told him that we're a very small Town, mainly residential, and there are zoning issues.

He responded that the building itself would be about 10,000 square feet or about a quarter of an acre and then there would be some other land around that for parking and ancillary use. The total amount of land might be in the order of a half acre. This would be for 14 million.

Mr. Kiernan responded to the question of how high and said it would be a single story probably in the range of 14 to 16 feet eave height.

Mrs. Smith wanted to know if they had looked at sights in Town that are not in residential areas?

Mr. Kiernan replied that they looked at one that was down by the South Fire Station with probably a range of one third of the capacity and perhaps, half the capacity can be put there without difficulty.

Mrs. Smith then asked if there were any other sites in the middle of Town because it's mainly residential and developed.

Mr. Kiernan replied that was correct, and as John had mentioned, there is some possibility at the country club and

at The Breakers for a couple of million gallons of capacity at each place. He said that there maybe a little more at The Breakers.

Mrs. Smith thanked him and turned the questioning over to Mr. Dusey who asked if the Town is in the Florida Aquifer, would they be subject to the drought restrictions which South Florida institutes?

Mr. Kiernan replied that the only two sources of water that are drought proof are the ocean water and reuse water. Unless South Florida has changes in its regulations, those are the only two sources which are drought proof.

Mr. Shaw said that was one of the reasons he was looking at a dual system because even if there is a drought, they're not going to cut off the drinking water but they're going to cut off the irrigation water. As long as there are separate systems, then the Town can still control it. He stated that he thought as much as the Town prides itself on not wanting the water towers and digging up all the streets, it also does not want to see the lawns go brown. Mr. Shaw said there has to be a compromise in order to get where the Town wants to be.

Mr. Kiernan thought that what Mr. McLendon was saying was probably a prudent way to go and see where the bids fall in.

The Mayor mentioned that there are four stages of drought restriction and wanted to know what the percentage of reduction was required on the most severe one.

Mr. Dusey replied that actually the one the Town was under a couple of years ago was a stage two. He thought it was when watering could be done between midnight and nine in the morning, three days a week. He felt that it probably wasn't much different from what we should be doing.

The Mayor asked if he remembered what the severest was?

Mr. Dusey responded that it is no irrigation but as far as he knew that hasn't happened. He said that the Town was down to a two which is pretty severe but that's not to say that it can't happen. He continued that his biggest concern is the size of the plant and asked if Mr. Kiernan could inform them if the unit cost would be increased if you had to provide four million a day extra.

Mr. Kiernan said that off the top of his head, he'd say you're talking about a 1/7 increase that is applied to the capital which is about 50% of the water costs. So, you're talking essentially seven cents per hundred cubic something like that. He thought that he was doing the calculations correctly.

Mr. Dusey said his last question is based on recent answers to some previous questions and stated that it appeared that Ionics looked at multiple plant locations rather than one singular plant. He wanted to know if that changes the formula on the costs, which are unit costs if you were to have three or four smaller plants?

Mr. Kiernan replied that yes there would be a slight increase but he didn't think it would be dramatic. He said that there are pluses and minuses in having multiple sights, and he would ask that they as a company work closely with the Town engineer in developing what he thought would be best for distribution of the water. He felt that there might be some pressure concerns and that they might want to have several different pumping stations and maybe put the plants right at that site.

Mr. Dusey had nothing else and thanked him.

Mrs. Smith stated that Mr. Kiernan had given them the time frame for the building of the plant but wanted to know if they took into account the fact that there is no building in the Town between the first of December and first of May and the specific hours.

Mr. Kiernan stated the mains are really affected by that but probably not the RO system as much.

Mrs. Smith responded that they are talking about getting the whole system up and going.

Mr. Kiernan responded that he anticipates that work would start on the mains almost immediately and that would be without having a permit for the plant. He said you can do the modeling and such and the construction period could probably be two years maybe slightly longer for the mains.

Mrs. Smith stated she thought if it happened, they would probably do it as part of the capital improvement plan but explained that they are not going to be the ones to make the ultimate decision but the voters. This will certainly have to go to a referendum due to the major cost to the Town.

Mr. McLendon said he wanted to make one last comment with regard to multiple plants or to a central plant. He thought that certainly the pumping equipment would be more economical on a central plant but the cost of transmission mains is going to be substantially increased. You would need to have one at each site of stand by power engines if you're splitting them up. He felt that there are pluses and minuses in both directions.

Mr. Kiernan said he understood that the Town presently has several connection points to the mains and so, if the

new mains were designed similar to the old, there might not be enough capacity in the pipe size for one central plant. He felt that the Town would have to look at that as well.

Mrs. Smith thanked him very much as did the Mayor who said it was a very fine presentation.

Mrs. Smith presented Stone and Webster Engineering Corporation as the next group.

8. STONE & WEBSTER DEVELOPMENT CORPORATION

Jack Doran, Executive Vice President of Stone & Webster Development Corporation said that there was a team present representing Stone & Webster. He introduced Andy Kingman who's a Vice President of Finance for Poseidon, Curt Kiefer who's Project Engineer for Stone & Webster Engineers and Constructors, Tom Leonardi who's a regional manager from their Miami office.

On behalf of the team, Mr. Doran thanked Council for allowing them to come and make a presentation as part of this workshop. He said they prepared an agenda for their presentation which includes a brief discussion on the Stone & Webster team members and who they are and what they do. It includes a discussion from Poseidon Resource on the business issues that the Town may be facing and a discussion on technical aspects of the project from Stone & Webster Engineers and Constructors. There will, of course, be questions and answers.

Mr. Doran continued that the Stone & Webster organization was formed in 1889. They are a New York Stock Exchange Company with revenues last year of 1.32 billion dollars. They have seven thousand employees worldwide and their core business is engineering and construction. Poseidon Resources Corporation was formed in 1995 and their core business is the development and equity ownership of water and wastewater projects. It is their sole business. They have a total capitalization of projects completed to date of 150 million dollars with other projects under development that have an estimated value of 500 million dollars. The principal management team of Poseidon Energy was the former senior management team for J. Makowski Company, an independent power plant developer and owner back in the late 80's and 90's responsible for over 2.5 billion dollars of infrastructure projects. The same team is leading the Poseidon Corporation.

Mr. Doran continued with an overview of Stone & Webster stating that they have a number of companies within its family organization. The two represented today are Stone & Webster Engineers and Constructors and Stone & Webster Development Corporation. Stone & Webster is a full service organization. In addition to the engineering and construction contracts provided on a routine basis, a full complement of services includes operations maintenance, training, environmental permitting among others. He said that they have offices throughout the world. They've been in the Miami area since the 1980's but more importantly they have been doing projects within the Florida communities since the beginning of their 108-year history. Stone & Webster Development Corporation was founded in 1989 and the purpose for his organization within the Stone & Webster family is to develop projects and to manage the portfolio projects. They currently have equity interest in projects valued at over 150 million dollars and have over 600 million dollars of projects under development in the business sectors that the engineering corporation operates. The engineering corporation operates in four business sectors and the infrastructure sector is one of its biggest and most important. They have been involved in water resources, wastewater and solid waste treatment facilities including desalinization.

Included in their brochure are a number of projects but Mr. Doran stated that it certainly is not an all-inclusive list of projects they have under development. It does show the range of their involvement with projects as big as the six billion dollar Boston Harbor clean up project to a seven and a half million-dollar membrane water treatment project in Cooper City.

Mr. Doran then turned the presentation over to Mr. Andy Kingman, the Vice President of Finance for Poseidon Resources. He also said that they would be happy to answer questions during any part of the presentation or at the end.

Andy Kingman introduced himself and stated that Poseidon Resources is a company who came into existence in 1995 to develop, invest in, construct and manage drinking water and wastewater treatment facilities. They have three offices in Stamford, CT, Boston, MA and Scottsdale, AZ. They are now also focusing overseas. The important thing to point out about Poseidon Resources is that in terms of their equipment and operations, they are actually unaffiliated. He said that what they try to do is to bring together the solutions for the municipality or the industrial company that makes the most sense. He said that the reason they are working with Stone & Webster is that they have the same philosophy as an EPC contractor. They'll pick out the right equipment provider, they'll pick out the right operator and try to bring the lowest cost solution for the party that they deal with. He said that when he gets to it, he would like to show an example of how they can approach this from a business prospective such as the wastewater treatment facility in Cranston RI. He explained that it was an existing facility that needed upgrading and they took over the system have been operating it now for twenty-five years.

Mr. Kingman stated that having heard a number of people talk about some of the issues facing the Town such as the access to capital which has been important to a number of municipalities but in the case of Palm Beach may not be a problem.

Mr. Kingman felt that the Town still has a lot of issues facing them and one, in particular, is using money wisely. He stated that an important point when he gets to it is to show that the water business has been typically a

municipal business and has truly outpaced CPI cost inflation. He stated that when you look at some of the other industries that have gone through deregulation and privatization, they are now and have been for the last number of years well below CPI.

Mr. Kingman said there are two things that have really helped and allowed the privatization in the water sector, basically, in the last two years. This may come into play here because of the existing infrastructure if you do want to purchase it from the Town of West Palm Beach. He said that when Federal grants had been involved before and there was a transfer back to the private sector. They had to be repaid. This would increase dramatically the cost to them and there was free money they would then have to give back. He felt that may be part of the reason they are hesitant in trying to do this other than just trying to keep you as a customer.

Mr. Kingman stated that another point is that it's not tax exempt yet. At the beginning of 1997, it will allow for twenty years of operation contracts and ownership contracts without triggering a repayment of all existing tax-exempt debt that would be related to that system. Again, both of those things are now allowing the private sector to get involved in the water and wastewater sector.

Mr. Kingman said that the three examples he'll talk a little bit about is the power, telecommunications and natural gas industry. They have gone through deregulation and now you can see the benefits of what's happened in the private sector there. Wholesale power rates have gone from eight cents in the early 90's to three cents today. Rate increases in electricity, telephone services and piped gas are significantly below increases in CPI.

Mr. Kingman stated that his next slide will show what's happened with the water and wastewater. Today, the rate increases for water and sewer services outpace CPI. He felt that may be part of the reason that you have this 4% per year kind of guaranteed rate increase from the City of West Palm Beach but he assumed, as Ionics proposed and as they would propose, it would be well below CPI when you go through on a long term privatization basis. He explained that the capital is charged. In review, you have a private infrastructure and it will be their business to try and maintain that. He explained that the transfer risk and accountability, are going to be Stone & Webster's issue. It's their team that is going to take over this plant and have to get it done on schedule. He stated that they will work with the Town's committee requirements, they'll have to pull it all together, but at the end of the day, if they don't get it done on time, they will pay and the Town will not pay. He said they will take it all the way through including even the obligation of the debt and they will stand behind the facility. If it's not done, it's not your obligation. In fact, regarding the transfer provisions, we would probably allow you to take it over and not have the debt responsibility. He restated that they will meet all the requirements for enforcement and for capital improvements long term. He explained that with private ownership, they take all the responsibility and the Town doesn't pay unless Stone & Webster performs. You'll get integrated procurement, you'll get technology, financing, you'll get guarantees on cost schedule and performance, everything will have a firm rate, and Stone & Webster will take the obligation of the consumption risk and performance risk. If it goes to the point of billing, they will take that responsibility on. They will apply the best practices that the Town has seen across multiple facilities.

As an example, he told of what they had recently done on a project they closed on last fall at Cranston, RI. He explained that they were facing a huge issue in terms of capital improvements for that water facility and sought the private sector to help them do that. Poseidon took over on a transfer basis for the next twenty-five years managing and owning the full facility. It is our obligation to do all the upgrades, do all the improvements, to do the operating performance and to provide them with predictable stable rates. But yet the city still maintains control. We have an obligation to perform because if we don't perform, the city gets the plant back and we're out the capital we put into the project.

Mr. Kingman showed a basic overview of the structure and said that in the middle they have a special purpose company called Triton Ocean State, the city which he said he would replace, in this instance, with Palm Beach would be on the overside on top, Poseidon on the left takes all the responsibility on contracts, financing equity, the accountability. He reported that they hired and have under their auspices a design/build/contractor which in their case is obviously Stone & Webster. They would bring in an O&M contractor and in this industry, there are probably five or six O&M operators that all have 20, 50, 100 experienced facilities they operate on their own. He said that it's a very competitive industry and they operate on margins that are very thin. They can be brought in and they will put their balance sheet behind their performance and would operate it for the next twenty or twenty-five years on fixed price, fixed schedules. He reported that obviously his company would be over them, taking the first responsibility but it's a very competitive procurement process. He said that Poseidon, in that instance, invests the equity, arranges the financing, they are the contact point for the municipality, structure all the contracts, take the equity risk and have the long term management and accountability on it. When you're thinking about what your doing here, they've found in the procurement process, the first step is really to have the Town figure out what their long-term forecast is and what do they think it's going to cost them? If you're thinking about which way to go either a dual pipe or a single pipe system, how many plant facilities and if you come up with an estimate of what you think it is and what the scope of services is, you'll get a better procurement and process from the private industry.

Mr. Kingman stated that they are also involved with Stone & Webster in the Tampa project. He reported that right now they are ranked second in that process and thinks, hopefully, after Monday, they'll be first. He felt the Town needed to assemble a project team and unfortunately, you probably do need advisors. In this day and age, if you're talking about a facility at the costs we are, having an advisor in the legal front, the engineering front and contract front is a necessary evil. Select a process and have a strong RFP as sole source, ensure compliance with procurement regulations because these things are subject to review and subject to protest from the parties who don't win. He said that you should obviously evaluate on a level playing field meaning that probably it is the most

important point to have a good strong proposal, get the input from the private sector on how that proposal should come together. He thought then you will be happy with the results that you have.

Mr. Kingman turned the presentation over to Curt Kiefer who was going to address the technical aspects of the solution that they are trying to purpose.

Curt Kiefer thanked him and told everyone that he wanted to talk a little bit about some of the technical aspects of the proposed project for the Town of Palm Beach. He presented an outline of what he was going to discuss. He said that first of all he wanted to give an overview of membrane technology. How it's been developed in Florida and how it applies here in Florida. He wanted to also talk a little bit about their expertise in that area and then talk about some of the design factors for projects such as the one that's proposed including the water supply sources, water quality issues and energy requirements. He wanted to talk a little bit about concentrate disposal and give some examples of some typical plants and also talk a little bit about the treatment costs.

Mr. Kiefer thought that it might be interesting to some to know how RO technology was basically pioneered and explained that some early pioneering work was done right here in Florida in the late 1950's and that some of the first plants were installed in this State. Florida has played a key role in the development of membrane technology and currently has the largest number of membrane plants of any state in the country. Initially membranes were applied in Florida for salinity control and that's much like you're proposing to do by treating the Florida Aquifer. The water source here is really too salty to drink as it is and it needs treatment to get to a potable water standard. The other two factors that have dramatically increased the development of membrane technology in Florida are that in the past fifteen years with developments in technology itself, membrane treatment has become very cost competitive with more traditional methods such as lime softening. The other big factor has been the changes in the safe drinking water acts starting in about 1986. Those regulations were amended and they significantly increased the number of contaminants in water that are regulated. Most municipalities or many municipalities are recognizing that membrane technology is the best available technology to meet these more stringent requirements.

As far as their experience goes, Stone & Webster has been active in desalinization in Florida since the late 1960's. Mr. Kiefer reported that's a continuation from when they purchased DSS Engineers which was a local company. In that time, they have executed more than 100 desalinization projects, some of their major accomplishments included the design of the world's largest desalinization plant at 260 million gallons a day. The design of one of the world's largest seawater RO plants at 12 million gallons a day. They've designed all different types of commercially available desalinization technology including the full range of RO from seawater RO to ultra low pressure RO.

Mr. Kiefer presented a representative list of some of their clients in South Florida and mentioned that they are currently building a membrane softening plant for Cooper City.

Mr. Kiefer continued that one of the first things the Town has to consider, in a project such as this, is where you're going to get the water from. The indication or preliminary decision has been for the use of the Floridian Aquifer. He discussed the Surficial Aquifer and the Floridian Aquifer which are the two primary aquifers in this area. He stated that from first glance it might appear that the Floridian Aquifer might not be the logical selection because of the higher salinity of that water which creates the need for more treatment than the Surficial Aquifer. He indicated that he would show using slides later that as the salinity increases then the treatment cost is also going to increase. So, on the other hand you have to look at, first of all, to see whether the Surficial Aquifer is available in this area because of salt water intrusion problems. Many communities are forced off using the Surficial. He said that they did a project with the City of Hollywood and for any new water supply development or any future plan expansion, they had to go to the Floridian Aquifer as their only option. The salt water intrusion has impacted all areas of the state, but here on the east coast it has resulted in seawater intrusion, moving well fields back. On the west coast of Florida, in the Tampa area, it's resulted in declining levels in the lakes which has caused or provided impetus for this Tampa desal project that they're involved in. They're actually looking at desalination as an alternate to take some of the pressure off the overtaxed groundwater resources.

Mr. Kiefer said the other factor in being able to permit this water source is competition from other users. The Surficial Aquifer in this area, in Palm Beach County, has a lot of other users and so, getting a permit should be much easier for the Floridian Aquifer than the Surficial Aquifer.

Mr. Kiefer advised that there is less risk associated with the Floridian Aquifer from sources of groundwater contamination like leaky petroleum tanks or spills from dry-cleaning facilities that kind of thing.

As far as water quality issues, he pointed out a few of the primary features and said that as was previously mentioned, the Floridian Aquifer is much saltier than the Surficial Aquifer. It's almost a factor of ten on the main salt concentration and with membrane treatment the water quality can get down to a very acceptable range. You can get them much lower than the regulations on all the dissolved solids sodium chlorides. Other factors which are of interest or concern are THM's and TAA's because they are potentially carcinogenic and they've been getting a lot of scrutiny of late. Currently, the regulations for THM's are 100 but they're already scheduled to incrementally go down to 80 and 60 in the near future.

Mr. Kiefer explained that the table he showed is based on the Palm Beach County Surficial Aquifer and is also roughly based on the performance from the Town of Jupiter plant which is really the closest plant to the Town which is treating the Floridian Aquifer. He showed that performance of the removal of THM's by conventional

treatment is marginal at best and probably wouldn't be able to meet future regulations. He said that membrane treatment is able to remove up to 98% of the precursors which are responsible for forming these THM's and TAA's. He stated that with membrane treatment there is a much higher removal rate of these problem chemicals and that's another reason why so many communities in the Town's area are moving toward this technology. Finally, he said, it also shows that this treatment process is very effective in removing some of the other troublesome constituents that often have to be dealt with here in Florida which is hardness, color and iron.

Mr. Kiefer's graph basically showed that if treating water from the Floridian Aquifer, it would be in the range of low pressure RO. You would be using approximately twice as much energy for the process as you would if you were using membrane softening or ultra low pressure. He stated that if you go up to seawater, and even seawater with energy recovery, you would be talking about an increase of four to five times on the energy requirement that you'd have from treating the Floridian Aquifer. He reported that if you actually looked at the overall cost of the plant as well, it basically follows the same trend in that seawater plants tend to be on the order of three to four times more expensive than treating groundwater in that range. He went over a basic process flow for a membrane treatment plant diagram stating that it's a fairly simple process and at basic pretreatment, there's some chemical addition and cartridge filtration. The pumps boost the pressure to 150 to 200 PSI and under this pressure, in the membranes, the water gets separated into a purified stream and into a concentrate stream and the purified stream would go to degas the fire for removal of CO2 and for removal of hydrogen sulfide if it's in the water. Typically, Floridian water can have hydrogen sulfide, and in that case, you could put in a scrubber to take the hydrogen sulfide out and then you have several disposal options for the concentrate from the process. He said that earlier it was mentioned that the intent is to put the concentrate into the intracoastal, he told of the City of Jupiter which has been discharging into the C24 canal for about eight years. He said that they have had some discussions with FDEP on this subject, and they don't seem to want to grandfather people in based on the Jupiter experience. So, there are other options to look at for disposal such as ocean outfall or deep well.

Mr. Kiefer stated that their expertise is in permitting and they can help get the Town permitted in this area.

Next, Mr. Kiefer showed a picture of their Marco Island plant and explained that there are parallels between the Marco Island plant and the facility that's proposed for the Town of Palm Beach. One is that Marco is also located on a barrier island very similar to Palm Beach's. He then went on to discuss the hydrologist who projected that the water quality would deteriorate from about 6000 PPM to 10,000 PPM over about a ten-year period. He said that the water quality actually deteriorated down to about 12,000 PPM and that was only for about a 3-year period. Fortunately, he reported, there was enough flexibility and safety margins designed into the plant that it could continue to make the required quantity and quality even at these more challenging design conditions or operating conditions.

Mr. Kiefer stated that another parallel that might be of interest to the Town of Palm Beach is some of the provisions that were made for noise control. He showed that there were sound panels installed in the ceiling and also sound proofing in the walls. He pointed out the absorbing closures on the motors. He said that, as a result, even though this facility is in a residential neighborhood and some of the houses are only 150 to 200 feet away from the actual plant building, the plant is still considered to be a good neighbor.

Mr. Kiefer showed a slide of the Acme Improvement District and referred back to some questions raised as to what the buildings could look like from the outside. He said that architecturally the buildings can pretty much be blended into any kind of community environment. Showing a slide of the plant he mentioned earlier for the Town of Jupiter, he said the equipment was actually furnished by their team partner for Tampa. It's a nine-MGD plant, and it's treating water of about four thousand PPNTTS from the Floridian Aquifer. These are some representative costs from that facility and he advised that the total capital costs including off sites and out sites basically are limited to the well field. Storage is about 15 million dollars, total annual cost is about \$3,871,000 which translates to a water cost of about \$1.31 per thousand gallons including recovery of the amortized capital that translates roughly to about \$1.00 per thousand cubic feet or a hundred cubic feet. He advised that the Town is looking at about \$1.00 as compared to the \$1.12 Ionics was talking about as a representative number on approximately the same basis.

Mr. Shaw asked if he could give him the conversion between cubic feet and a thousand gallons? He wanted to know if it is just a multiple of ten?

Mr. Kiefer replied that it's 7.48 gallons per cubic foot.

Mr. Shaw responded that he was off by a decimal point. He said yours is \$1.21 per thousand gallons and Mr. Kiefer advised that it was \$1.31.

Mr. Shaw said \$1.31 per thousand gallons and the other proposal was based on cubic feet so that's a big difference.

Mr. Kiefer said yes 100 cubic feet is 750 gallons and Mr. Shaw wanted to know if the \$1.12 mentioned previously, compared to Stone & Webster's \$1.31 if the factor is \$7.48?

Mr. Kiefer replied that you have to multiply the \$1.31 by .75 and that gets you down to about \$1.00.

Mr. Shaw thanked him.

Mr. Kiefer continued that there is a lot of discussion on what the impact of the plant size is on the cost and he had

an illustration that kind of explained that. He showed a unit with the installed cost on a dollar per gallon per day of capacity and this is a plant size ranging from one million to fifteen million gallons a day and you're talking about a plant in the five million to fifteen million gallons per day range. The Jupiter plant was nine million gallons a day so you can see it falls right within this curve at \$1.32. He said you're talking about going anywhere from \$2.00 down to more like \$1.40 at the high end and you'd probably be more in this range.

Mr. Kiefer informed Town Council that this ended his prepared presentation and he turned it back to Jack.

Jack Doran thanked everyone and said they would be happy to answer any questions.

Mr. Dusey questioned the chart they just had which indicated that if the Town built three or four smaller plants, the unit cost will actually be more, the cost production would be more.

Mr. Kiefer replied that was right and that it's based on historical data. He said what he meant was that the curve was developed from about a dozen membrane treatment plants here in South Florida. Some of the factors that tend to make the cost go up so much at the end, for instance, is that those plants have a variety of different types of well fields, they have different disposal options. Some of them have deep well injection, and of course, any time you go to install a deep well, it's going cost you probably a million-dollars almost independent of the size of the membrane.

Mr. Shaw asked if they are also proposing a turn key, a BOOT operation?

Mr. Doran replied that they can participate in any range of business arrangements as outlined by Andy but they certainly would be more than happy and the preferred situation for them is to take a BOOT situation over.

Mrs. Smith thanked everybody very much and that she appreciated all the companies that took the time and effort to fly in from all over the country to educate us and she for one appreciated it very much.

The Mayor agreed and Mrs. Smith said she looked forward to seeing several of them when they get to the point of putting it out for bid and then on to the short list. She gave her personal thanks.

Mr. McLendon had one quick question and asked if they had actually done a project including dual piping systems.

Mr. Doran said that he didn't believe that Stone & Webster had but they have done facets of both projects but not in one single system.

Mrs. Smith said thank you very much and that they appreciated it. She asked if there were any other matters and Mr. Wyett wondered if another meeting on this subject could be scheduled.

Mrs. Smith asked when would they like to have another meeting?

Peter Elwell responded that they could agree on a time to have another meeting. It is an action the Council could take even though policy action can not be taken at a workshop. The other option would to wait and discuss this as an agenda item in May.

Mrs. Smith felt it would be better to discuss it at a separate time because it could turn into a very lengthy discussion and the May agenda is already very long.

Mr. Elwell suggested that the Town Council have it as an agenda item in May for the purposes of setting the next meeting date not for the purposes of discussing it in detail.

Mrs. Smith asked Mr. Wyett what he thought of that idea. He said he was agreeable especially since he's going to mostly be a listener because of his conflict with Ionics. He said that he found all the presentations today to be quite informative with one almost confirming the other.

Mrs. Smith advised that they will put it on the agenda to pick a date at the May meeting. She asked if there was a motion to adjourn.

The Mayor made the motion to adjourn.

The meeting was adjourned at 4:30 p.m.

Prepared by:
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