STATE COLLEGE BOROUGH WATER AUTHORITY
CENTRE COUNTY, PA

LONG RANGE PLAN UPDATE

AUGUST 2014

GD&F
GWIN
DOBSON &
FOREMAN
CONSULTING ENGINEERS

GENERAL

Gwin, Dobson & Foreman, Inc. (GDF) reviewed the State College Borough Water Authority (SCBWA) 2004 Long Range Plan and 2006 and 2009 updates in relation to current system needs and recent regulatory developments. In consultation with Authority staff, the following report summarizes our recommendations for future capital projects and operational-level planning.

PREVIOUS PLANNING EFFORTS

Over the last 20 years, the following planning studies have been completed for the SCBWA:

- Capital Improvement Study – January 1995
- Distribution System Modeling & Master Plan - 1997
- Original Long Range Plan - May 2004
- Source Water Protection Program – 2006 (Veolia)
- LRP Update No. 1 - September 2006
- LRP Update No. 2 - July 2009

The principal guidance document has been the 2004 Long Range Plan which was a comprehensive evaluation of all aspects of system operation.

As part of the LRP, a capital improvement program was developed for a 25-year planning horizon. Foremost among these was the need to hydraulically reinforce deficient elements of the distribution system identified in the 1997 hydraulic study. These recommended projects have been completed by the Authority which is considered a major accomplishment.

- 13 Major Waterline Replacement Projects
- Administrative Office Building Addition
- Musser Gap Property Acquisition
- Radio-Read Meter Replacement Project

Other 2004 LRP projects originally programmed, but deferred, included the following:

- Filtration/Treatment of Nixon-Kocher Well Field
- Zone 5 Storage Deficiency (Toftrees 2.0 MG Tank)
- Zone 1 Storage Deficiency (Aaron Drive 1.0 MG Elevated Tank)
- Toftrees Transmission Main Replacements
- North-South Grid Reinforcement
- Personnel Needs – Water Distribution System

One recommendation was considered unnecessary. Because of a decline in water demand, SCBWA did not petition the Susquehanna River Basin Commission (SRBC) to increase the water withdrawal limit of 9.1 MGD.

PLANNING COMPONENTS

Our analysis will compare the assumptions and conclusions of past planning efforts with current system needs. The major components of this assessment include the following:

- Risk Assessment
- System Redundancy
- Supply Vulnerability
- Operational Needs
- Capital Projects
- Programming
- Rates and Funding

RISK ASSESSMENT

As with other types of engineered systems, risk and reliability factors also apply to public water suppliers. Risk is a measure of system failure potential while reliability is the level of dependability whereby system needs can still be met. For our evaluation, a proper risk assessment should consider reasonable risks with those facilities necessary to deal with them. This analysis was done in the 2004 LRP but it is worth repeating in the following narrative.

Water Supply Risks – The most obvious risk is the effect of a prolonged drought on the available water supply. With groundwater derived from a karst aquifer system, the risks for SCBWA are considered minimal based on historical pump testing, though water quality would be expected to deteriorate.

Water Treatment Risks - Potential hazards that may impact the SCBWA water supply system are mass contamination events. Some recent examples are the Charleston, WV pollution incident, Toledo (OH) Lake Erie algae outbreak and the 1988 Ashland Oil spill on the Ohio River.

Other risk factors affecting treatment include surface water impacts and emerging contaminants such as pharmaceuticals, endocrine disrupters and various synthetic and organic compounds.

As a karst-derived water supply, the potential for these hazards should not be discounted. These events can disable a water supply system if not properly planned for.

Distribution System Risks – Fire is considered the major risk for distribution systems although water quality within the pipeline system itself is coming under scrutiny from regulators. Municipal fire protection is governed by many codes and standards including those of the Insurance Services Office (ISO). The “ISO Guide for Determination of Needed Fire Flow” quantifies the adequacy of public water supplies. In essence, storage and transmission facilities should be compatible for the required level of fire protection. This aspect was examined in great detail for the 1997 hydraulic study and 2004 LRP. Most of the projects since 2004 have specifically addressed fire protection deficiencies in the distribution system including work on College and Beaver Avenues. In fact, the College Avenue Phase II project is the last project to address major fire protection deficiencies.

Recently, DEP has proposed wholesale changes to its public water supply regulations in response to the updated USEPA Total Coliform Rule. These changes will become effective on April 1, 2016 and include enhanced distribution system disinfection and monitoring. Recent outbreaks of *legionella* have focused national attention on coliform bacteria (specifically E. coli) in distribution systems. Inadequate filtration, poor disinfection practices, insufficient system circulation and long residence times are factors most often cited for these outbreaks. Although the risk to the SCBWA system is minimal, new regulations place a premium on good treatment.

RISK PLANNING AND SYSTEM RELIABLITY

Exposed Population - The extent of risk planning is often governed by the level of exposed population. In USEPA toxicity and risk assessments, the larger the population served, the greater the potential for contamination and the more frequent the monitoring and reporting requirements. For SCBWA, the growth of the water system has been one of its defining characteristics. Since 2003, the population served by SCBWA has increased from 62,800 to 71,900 or an increase of 14.5% (1.45% per year). The following graph shows the projected increase in Authority customers in 2025, ranging from 17,800 to 20,000. This translates to an estimated service area population of 85,000 to 100,000.

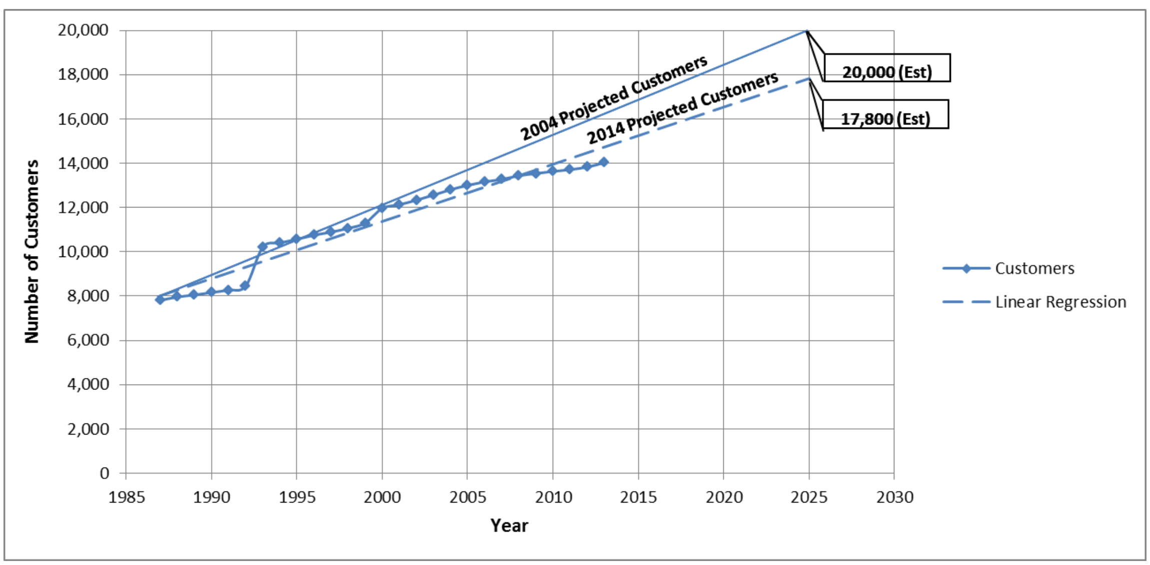

Figure No. 1 – Number of Customers

The areal extent of system growth is shown on the following map of the service area. This growth is graphically depicted by the appendages extending from the core service area which partly reflects system acquisition in Harris Township (Boalsburg), Ferguson Township (Pine Grove Mills) and Patton Township (Ridgemont/Grays Woods).

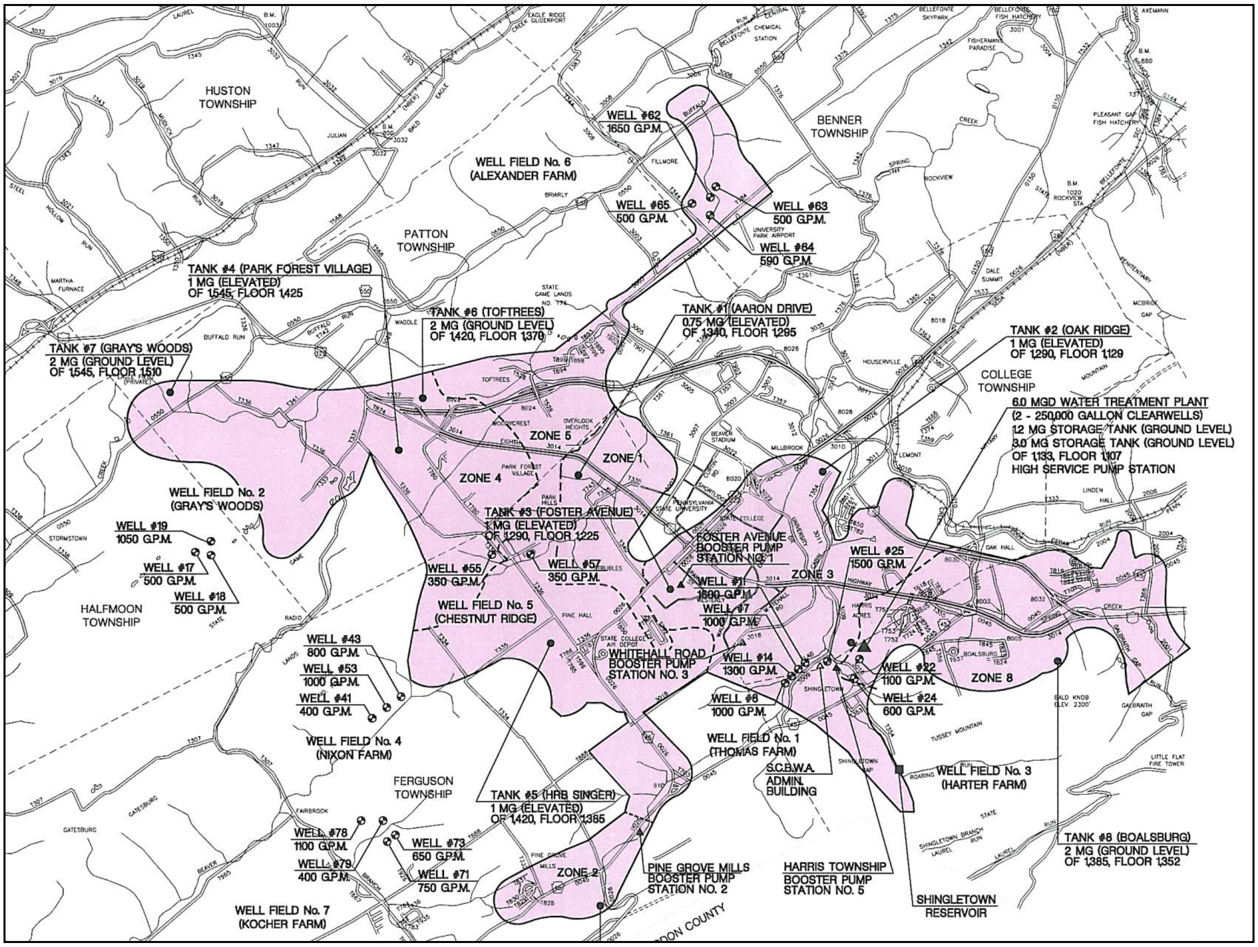

Figure 2 – State College Borough Water Authority Service Area

In reviewing the potential for future growth, it is our belief that the SCBWA service area will grow and expand at a similar rate over the next 20 years. Some known, prospective developments in the service area include:

- Toftrees Build-out and Expansion – 4,700 units
- Toll Brothers Campus Living PRD – 500 units
- Stonebridge Phase V Senior Living PRD – 108 units
- Turnberry Traditional Town Development (TTD) – 900 mixed dwelling units
- Patton Township (Buffalo Run/Route 550/Grays Woods) – 100 units (est)
- Rock Springs Water Company – 500 units
- Grays Woods Build-out and Expansion – 500 units
- Fraser Center High Rise Hotel – 184 units
- The Metropolitan High Rise Student Housing Complex – 150 units
- The Gates Townhouse Complex/Rockey Ridge PRD – 215 units

The addition of 8,000 units over the next 20 years would equate to a water demand of 1 MGD. Given the current and projected growth of the service area, system reliability must be a major consideration for future planning purposes. With a service area population nearing 100,000 by

2025, SCBWA will soon be considered a “large” water system and subject to greater monitoring and regulatory scrutiny by PADEP.

Mitigation by Water Rationing - In dealing with potential risks and threats to the water system, we strongly believe that water rationing is not a viable planning option. Rationing should be employed only in the most extreme emergencies and even then only for several days. Some risks should not be tolerated if only to avoid the negative implications of long term rationing. It has been shown in numerous instances (most recently in Charleston, WV) that the public’s confidence in a water system, built-up over many years, can evaporate within a week of water rationing. Other risk planning strategies should be employed.

SYSTEM REDUNDANCY

An effective means of reducing risk and dealing with system vulnerabilities is to provide facility redundancy. For prolonged supply outages, alternate systems must have adequate capacity to provide uninterrupted service from supply and treatment through transmission and distribution. Since all elements are interrelated, facilities must have full, equivalent capacities that are available for service upon demand. System redundancy was addressed in the 2004 LRP and 2009 LRP update and GDF concluded that the system possessed certain vulnerabilities which justified the expense of additional back-up systems. Accordingly, GDF made the following recommendations:

- **Water Supply** - Projections indicated that water demand would exceed the SRBC permitted withdrawal limit of 9.1 MGD during the planning period. This assessment was based on a safe supply factor of 1.5 times the SCBWA average daily demand. Since water demand has gradually declined over the last 10 years, the current supply limit was deemed adequate. However, given future system demands, this may be revisited.
- **Filtration** – GDF recommended a treatment facility at the Nixon-Kocher well field to 1) supplement the Woodside Drive plant by serving a growing area (Zone 5) or 2) provide a filtered water supply in the event of an outage at Woodside. This plant was deferred.
- **Transmission** – GDF recommended a 20-inch main to provide full transmission capacity between the northern and southern well fields. The rationale was that in the event of a well field outage, water could be effectively transferred from any supply source without any hydraulic constriction that would limit flow capacity. This main was only partially completed. Also, undersized pipe segments in the Toftrees transmission main prevent the Alexander well field from operating at full capacity. This work was not completed.
- **Storage** – Although total storage capacity is adequate under the DEP criteria (one day), discrete storage deficiencies were noted in Zone No.’s 1 and 5. Additional tanks were recommended at Aaron Drive (Zone 1) and Toftrees (Zone 5) but were not completed
- **Distribution** – Based on the 1997 hydraulic study, a full range of waterline replacement projects were recommended to improve fire protection, grid reinforcement and system leakage. As previously noted, this work has been largely completed. Although fire risks have been reduced, no assessment was made of distribution system water quality.

Our current assessment indicates the system reliability has not significantly improved over the last ten years and, in fact, may have declined in certain respects. The service area population has increased almost 15% since 2003 and may reach 100,000 by 2025. This fact alone indicates that risk has increased since the exposed population has and will continue to increase.

Until sufficient system redundancy is provided, GDF believes that risks resulting from inadequate storage, transmission restrictions and insufficient filtered water capacity will remain. The next section will examine another risk factor – vulnerability of the water supply to contamination - and alternatives available to increase reliability.

SUPPLY VULNERABILITIES

Since 2004, the following factors have provided additional insight into the vulnerabilities of the water supply.

- Groundwater Rule
- Contamination Risk of Shallow Karst Aquifers
- 2012 Nixon Pump Testing
- Penn State University Well Fields
- Emerging Contaminants
- Aquifer Pumping and Sustainability
- Revised Total Coliform Rule
- Regulatory Emphasis - Multiple Barriers

Groundwater Rule – USEPA promulgated the final Ground Water Rule (GWR) in October 2006 to reduce the risk of exposure to fecal contamination that may be present in public water systems that use ground water sources. The rule establishes a risk-targeted strategy to identify ground water systems that are at high risk for fecal contamination. The basic elements of this rules as it applies to the SCBWA wells include:

- Provide Sufficient Disinfection and Contact Time for 4-log Pathogen Removal (*giardia, cryptosporidium*)
- Includes Nixon-Kocher, Chestnut Ridge, Grays Woods and Alexander Well Fields
- Criteria Applies to Microbial Contamination Only
- Defines Groundwater Affected by Surface Water

Compliance Status - The PADEP considers the SCBWA well fields to be in compliance with the Groundwater Rule based on documentation that sufficient chlorination and chlorine contact time (CT) is provided to achieve 4-log removal at each field.

Groundwater Under the Direct Influence Defined - According to the PADEP, the regulatory definition of "groundwater under the direct influence" (GUDI) of surface water is, "… *Any water beneath the surface of the ground with the presence of insects or other macro organisms, algae, organic debris or large diameter pathogens such as giardia and cryptosporidium, or* ***significant and relatively or rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions***…."

If wells are found to be GUDI of surface water, filtration is required along with continuous turbidity monitoring. The PADEP filtration standard is 0.3 NTU for turbidity and a Tier 1 Notice (boil water) must be issued by the public water supplier if it exceeds 1 NTU.

The Harter and Thomas well fields were tested and found to be GUDI-effected in the early 2000's and later connected to the Woodside filtration plant. PADEP has classified all other wells as "groundwater sources" and the Authority is under no obligation to test or monitor for turbidity, just daily monitoring for chlorine residual, well levels and flow.

Regulatory Approach - Based on our experience, GDF believes that the PADEP Northcentral Region's regulatory posture is comparatively light in comparison to other PADEP regions. For instance, PADEP has not done prescribed sanitary surveys of SCBWA wells (as prescribed by the Groundwater Rule) nor performed a filter plant performance evaluation of the Woodside treatment plant since 2003 (typically done every 3-4 years). This posture may be dictated by a shortage of technical personnel such as hydrogeologists and experienced sanitarians

Treatment Status: The following data shows individual reservoir and well field capacities along with their current treatment:

- Slab Cabin Run: 7.3 MGD
  - Shingletown Reservoir - 2.0 MGD (Peak); Filtration/Disinfection Required
  - Harter Well Field - 2.5 MGD (Peak) Filtration/Disinfection Required (GWUDI, 2001)
  - Thomas Well Field - 3.37 MGD (Peak); Filtration/Disinfection Required (GWUDI, 2001)
- Nixon Well Field: 3.0 MGD; Disinfection Only
- Kocher Well Field: Not to Exceed 25% of Total Demand; Disinfection Only
- Chestnut Ridge Well Field: 1.01 MGD; Disinfection Only
- Alexander Well Field: 4.7 MGD; Disinfection Only
- Grays Woods Well Field: 3.88 MGD; Disinfection Only
  Total SRBC Maximum Withdrawal Limit: 9.1 MGD

Conclusion - Of the eight water sources, five sources provide disinfection only as the sole treatment barrier.

Contamination Risk of Shallow Karst Aquifers – Although karst aquifers are long known to be at risk for surface contamination, it is useful to revisit pollutant pathways and recharge mechanisms for these groundwater systems.

- Karst aquifers bypass soil filtering through macro pores and shallow holes
- Groundwater flows through conduits with little filtration or sorption
- Pollutant movements not directly observed in surface-flowing stream
- Flow paths may take routes not apparent from surface topography
- High flow velocities in karst aquifers transmit pollutants faster
- Flow is in converging conduits; pollutants are not diluted via dispersal

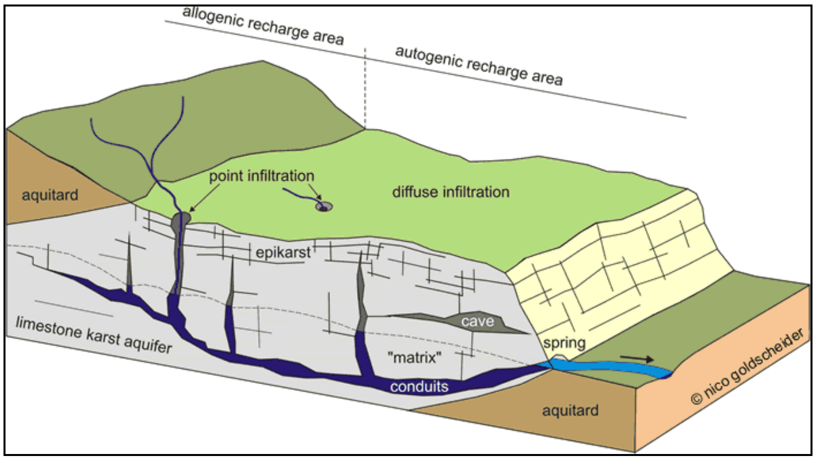

Figure No. 3 – Karst Recharge Block Diagram

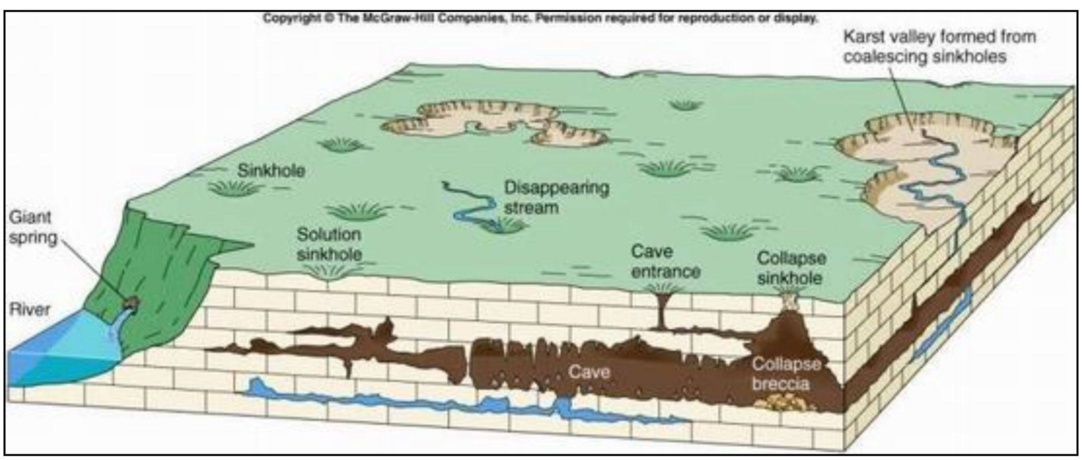

Figure No. 4 – Karst System Recharge Mechanism

Many state regulatory agencies are re-examining their treatment regulations for karst-derived groundwater sources. Virginia now requires most karst-supplies to be filtered and we are aware of several karst supplies in the southcentral region of Pennsylvania that require filtration.

2012 Nixon Pump Testing – In 2012, the Nixon well field was pump tested to document yield and drawdown conditions for reauthorization of an SRBC withdrawal permit. An extensive long duration pumping and monitoring program was conducted by SCBWA personnel under the guidance of David Yoxheimer, PG, SCBWA Hydrogeological Consultant. The data that emerged from this testing revealed an aquifer that is sensitive to precipitation based on the following:

- Well levels erratic and within 50 ft. of surface
- Pre-pumping monitoring indicates a GUDI Condition
- On July 25, 2012, a 0.6 in. rainfall caused 1.5 ft. rise in the water table within 12 hours
- Kocher wells have documented background levels of total coliform
- After a static condition, 4-6 hours of pumping is required to reach 0.5 NTU turbidity

The SCBWA Hydrogeologist has indicated that the Nixon well field could be susceptible to sinkhole formation which would cause a direct surface water connection. It is possible that some sinkholes may already exist in adjacent woodlands.

A plot of 2006-2014 well levels for several SCBWA wells shows water table variations between "shallow" wells (Nixon, Thomas) and "deep" wells (Alexander). Shallow wells are more sensitive to variations in precipitation and indicative of possible direct surface water influences.

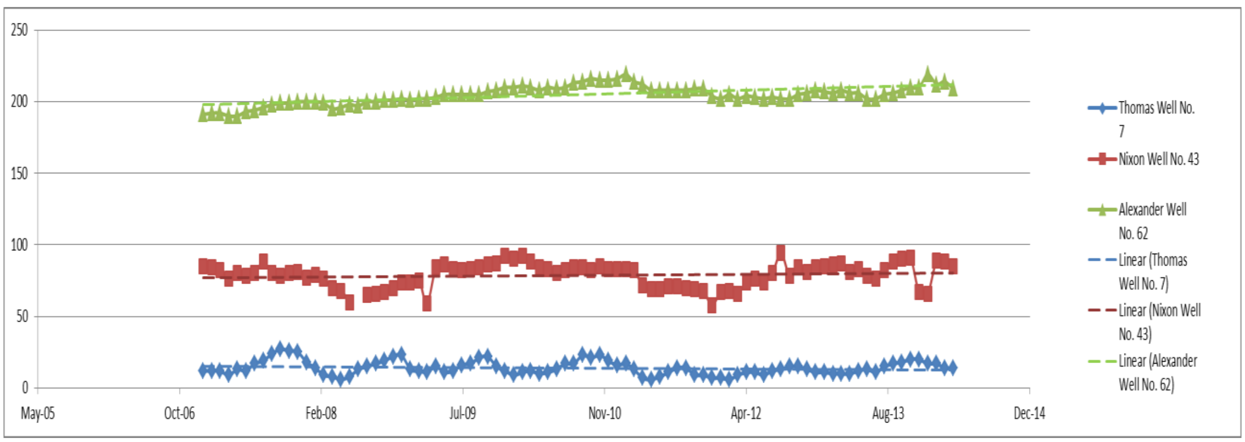

Figure No. 5 – Well Level Comparison, 2006-2014

Based on the background monitoring data, the Nixon well field exhibits many of the same characteristics of another SCBWA shallow aquifer. The Thomas well field was found to be GUDI-affected and later connected to the Woodside filtration plant. This data and the above indicators show that the Nixon well field may be highly vulnerable to contamination.

Penn State University Well Fields – The PSU Physical Plant Department is currently planning a new $38 million water treatment facility based on the discovery of *perchloroethylene* (PCE), E.coli and wet-weather turbidity spikes in their well fields. Since 2010, PSU had undertaken continuous monitoring and raw water testing to characterize their groundwater supply. According to PSU, this data confirmed their suspicions that the wells are GUDI-affected and subject to flooding effects. Control devices were installed so that well pumps shut down when turbidity exceeds 0.5 NTU for 10 minutes. This has been known to occur six times per year, on average. Based on this extensive data base, PSU is designing a new water treatment plant with a capacity of 5 MGD. Treatment processes will include microfiltration, granulated activated carbon and ultrafiltration (softening) processes for regulatory and institutional compliance.

In 2012, PSU and SCBWA had discussions about the University becoming a bulk water customer of the Authority. However, PSU declined the arrangement when SCBWA could not continuously provide filtered water. PSU based this conclusion on their extensive monitoring program and the fact that the SCBWA wells are in the same karst aquifer and subject to the same contamination potential. Their conclusion was that, despite being in regulatory compliance, SCBWA's unfiltered wells are under the direct influence of surface water and require filtration.

Emerging Contaminants - USEPA is evaluating endocrine disruptor chemicals (EDC) and pharmaceutical personal care products (PPCP) which are associated with prescription and over-the counter therapeutic drugs, veterinary drugs, fragrances, cosmetics, sun-screen products, steroids and hormonal products, diagnostic agents and nutraceuticals (e.g., vitamins).

Along with the UAJA Beneficial Reuse project, 24 EDC/PPCP chemicals were collected in June 2008 and November 2009 at the Woodside treatment plant. No well fields were sampled. In the 2008 sample, three parameters were detected including *sulfamethoxazole, atrazine* and *bisphenol A* while the 2009 sample revealed *fuoxetine, atrazine* and *bisphenol A*. All results were at parts per trillion (ppt) levels.

The four EDC/PPCP compounds detected can be attributed to land use surrounding the Harter/Thomas well fields. *Atrazine* is the second most widely used agricultural herbicide to prevent pre- and post-emergent broad leaf weeds for corn crops. It is also used for weed control on golf courses and residential lawns. *Sulfamethoxazole* is an antibiotic that is used to treat infections in both humans and animals. In humans it is typically blended with *trimethoprim* and is widely known as Bactrum™ and commonly prescribed by veterinarians as Tribrissen™ for horses, cattle and swine. *Fluoxetine* is an antidepressant (commonly known as Prozac™) prescribed for humans to treat depression, obsessive-compulsive disorder and various panic disorders. The presence of *sulfamethozazole* and *fluoxetine* in the Harter/Thomas well field is most likely due to agricultural run-off and on-lot sewage discharges. The fourth compound, *bisphenol A*, is a carbon-based synthetic compound used to make plastics and epoxy resins and is commonly known as BPA™. These resins are used to line water pipes and food and beverage containers and are widely found throughout the environment.

We can assume additional testing at the Authority well fields may provide a more complete characterization of PPCP and EDC. If so, a sampling program should be developed for each well field and the list of contaminants carefully reviewed. The current cost for the full PPPC/EDC testing matrix at all Authority production wells is $10,000. Based on discussions with EPA, health based standards are currently under evaluation based on monitoring and testing throughout the country. Advances in isotope-ratio mass spectrometry (IRMS) allow for more accurate detection of EDC/PPPC.

Unregulated Contaminant Monitoring Rule (UCMR) - The Authority is currently conducting sampling in accordance with USEPA's Unregulated Contaminant Monitoring Rule -3 (UCMR) which monitors 30 unregulated contaminants (28 chemicals and 2 viruses). The 1996 Safe Drinking Water Act amendments allows USEPA to collect data from contaminants that are suspected to be present in drinking water but that do not have health-based standards. Every five years, EPA develops a list of contaminants from the Contaminant Candidate List (CCL) and requires all systems serving more than 10,000 people to collect samples at various points in their system. The data generated from the UCMR 3 will be used for the future regulations development. Please refer to Appendix C for current SCBMA test results for UCMR3.

The Authority has already collected two quarterly samples from 10 different locations within the system. The samples are collected from the filter plant, three tank locations, four well fields and two points in the distribution system. As a system with a connected population under 100,000, the Authority is only required to conduct testing for List 1 contaminants (21 chemicals). They are not required to test for the List 2 contaminants which include additional testing for 7 endocrine disruptors and List 3 which includes an additional two viruses.

As shown on the attached spreadsheet, the results from the first two quarter sampling events shows detectable levels of *hexavalent chromium, total chromium, strontium* and *vanadium* at most locations. While the contaminant levels are very low, it is difficult to determine whether they will require treatment since health-based standards or impacts have not been determined. *Vanadium* and *strontium* are naturally occurring metals and their detection in the water supply may only be at background levels. The presence of these contaminants, however, should be considered during the selection of any future treatment processes. Of particular note is the presence of *strontium* and *vanadium* which has the potential for fouling reverse osmosis (RO) membrane systems.

The Authority should complete the required UCMR 3 monitoring and determine if the results justify additional sampling for certain contaminants. These contaminants may be included in any proposed treatability study. It is uncertain whether the detection of some UCMR's is a system vulnerability, other than to say that they are present at some level in the water supply.

Aquifer Pumping and Sustainability – In the early 1990's, the Authority developed additional groundwater supplies with well fields at Grays Woods, Alexander Farm and Kocher Farm. The Authority has compiled source water well production data over the last 10 years and performed a data analysis for review. Monthly production data was provided from 2003, 2010 and 2013 along with data from the Woodside treatment plant (Slab Cabin Sources-Shingletown Reservoir; Harter & Thomas Wells) and Well Field's No. 2 (Grays Woods); No.'s 4 and 7 (Nixon/Kocher); No. 5 (Chestnut Ridge); and No. 6 (Alexander). This data is graphically depicted for 2003 and 2013 in the following figures.

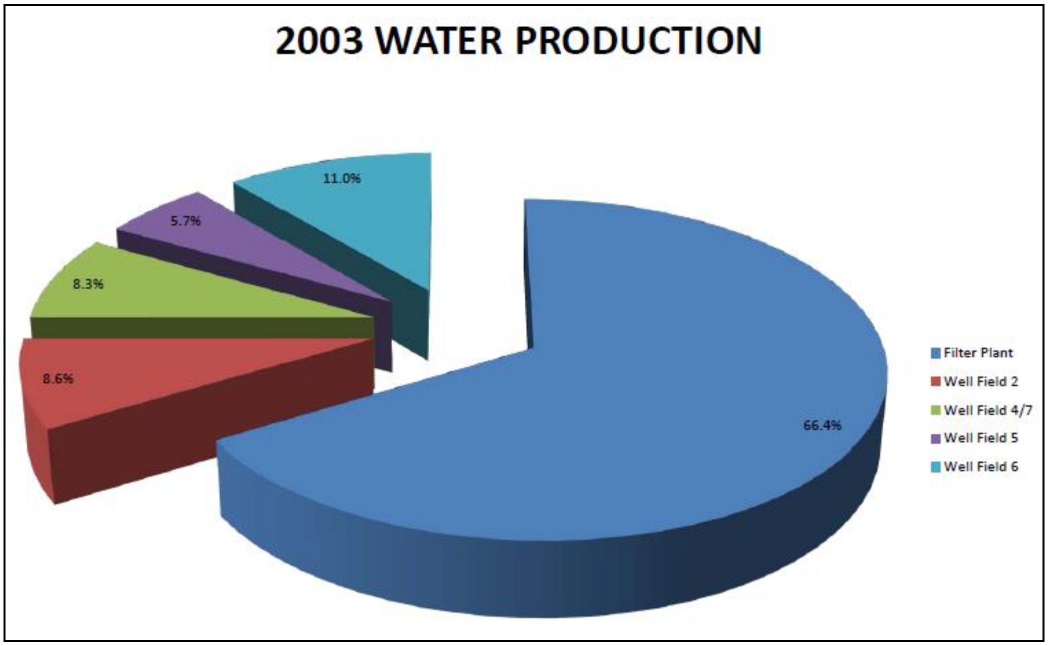

Figure No. 6 – 2003 Water Production by Source

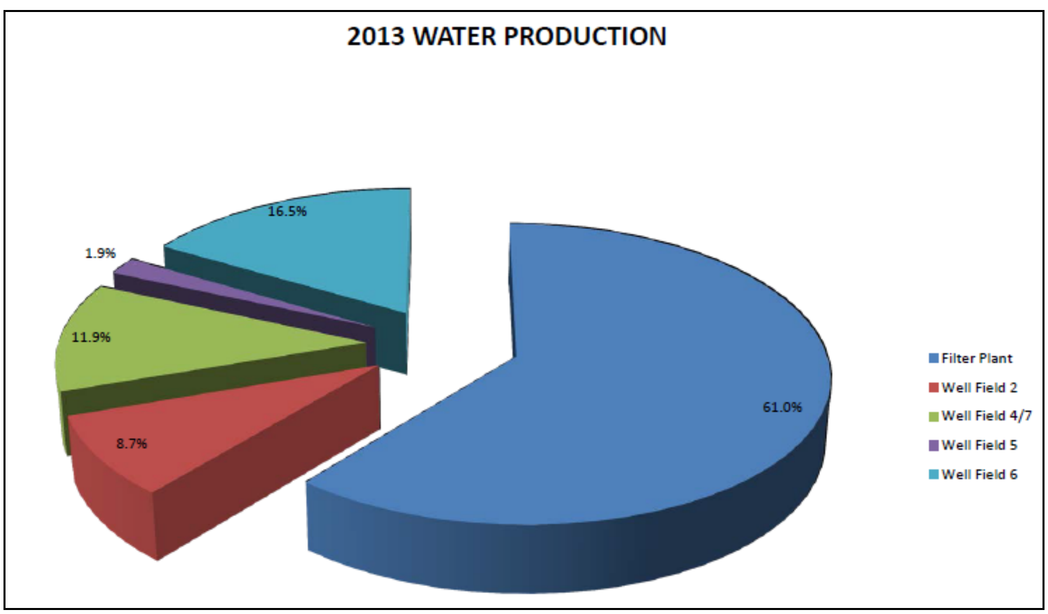

Figure No. 7 – 2013 Water Production by Source

In 2013, the total system production was 4.764 MGD. The Woodside treatment plant (Slab Cabin sources) produced 2.9 MGD or 61% of the total system demand. Well Field No. 2 (Grays Woods) provided 0.415 MGD or 8.7%; Well Field No. 4/7 (Nixon/Kocher) produced 0.5670 MGD or 11.9%; Well Field No. 5 (Chestnut Ridge) provided 0.090 MGD or 1.9%; and Well Field No. 6 (Alexander) provided 0.786 MGD or 16.5%. The production ratios from these sources have remained fairly consistent the last ten years.

Since the Woodside treatment plant was brought on-line 20 years ago, the Authority has made a reasonable and cost effective decision to concentrate groundwater withdrawals from sources (Slab Cabin Run) that have access to maximum treatment (filtration) at the lowest cost.

Whether the magnitude of these withdrawals is sustainable in the future is an environmental and regulatory question. Additional research is needed to determine if an apparent withdrawal imbalance from the Slab Cabin basin is an aquatic biology/sustainability problem. Recently, PADEP has reclassified Slab Cabin Run as a High-Quality Cold Water Fishery by PADEP at the behest of the PA Fish and Boat Commission (PFBC).

In an October 14, 2013 *Centre Daily Times* news article, it was stated that, "…*The discussion started with a report from the PA Fish and Boat Commission. The commission studied brown trout levels at seven sample sites during July and August 2012. The report concluded that* ***Slab Cabin*** *has an "excellent wild brown trout population" and "****warrants maximum protection against any future degradation to water quality****." Those resulted in three recommendations — add Slab Cabin to Fish and Boat's Class A Wild Trout Waters list, manage it as such with no stocking of hatchery trout, and the request to DEP to designate the stream as high quality*…"

It seems clear that withdrawals from the Slab Cabin basin will be under future regulatory scrutiny. The PADEP Shingletown Run Reservoir (Slab Cabin Run headwaters) water allocation permit expires in 2017. Given the reclassification of Slab Cabin Run, PADEP has indicated that PFBC and SRBC will likely object to reissuance of a withdrawal permit from this source used 4-5 months per year. Also, if the Harter and Thomas well fields are reevaluated by SRBC, the local withdrawal effects on Slab Cabin Run as a "losing" stream will be heavily scrutinized. These sources are currently "grandfathered" by SRBC but undoubtedly will be subject to full permitting during the planning period.

If production shifts to other SCBWA well fields, a water quality assessment will be required for higher pumping rates. Historical testing of the Alexander, Grays Woods, Chestnut Ridge and Nixon-Kocher has occurred at pumping rates well below the rated capacities of the well fields. In most cases, these wells are used at 10-15% of their permitted capacity. Concerns have been raised about nitrate levels in some fields that have not yet been fully quantified at higher pumping rates. The results of this water quality testing will need to be evaluated in terms of appropriate treatment for not only nitrates but other contaminants. An example of this type of assessment is provided in the following discussion of the nitrate levels at Nixon-Chestnut Ridge well fields. Ultimately, water quality may govern the effective capacities of the well fields.

Nixon-Chestnut Ridge Well Fields Nitrate Testing – Nitrate is considered a primary drinking water contaminant with a Maximum Contaminant Level (MCL) of 10 mg/l. According to USEPA, "…*Infants below six months who drink water containing nitrate in excess of the maximum contaminant level (MCL) could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome*…" Direct nitrate treatment is difficult and costly with ion exchange and RO treatment being the typical treatment methods. More often, high nitrate water is blended with a low nitrate source to achieve the MCL.

As an example of a nitrate assessment, data (1996-2014) from the Nixon and Chestnut Ridge Well fields were analyzed. The average nitrate concentration in the Nixon Well field was 5.0 mg/l with a maximum of 8.55 mg/l. The average nitrate concentration in the Chestnut Ridge Well field was 3.8 mg/l with a maximum of 5.66 mg/l. The Nixon well field produced an average of 0.567 MGD representing 12% of the total system daily demand while the Chestnut Ridge well field produced an average of 0.089 MGD representing 2% of total system demand.

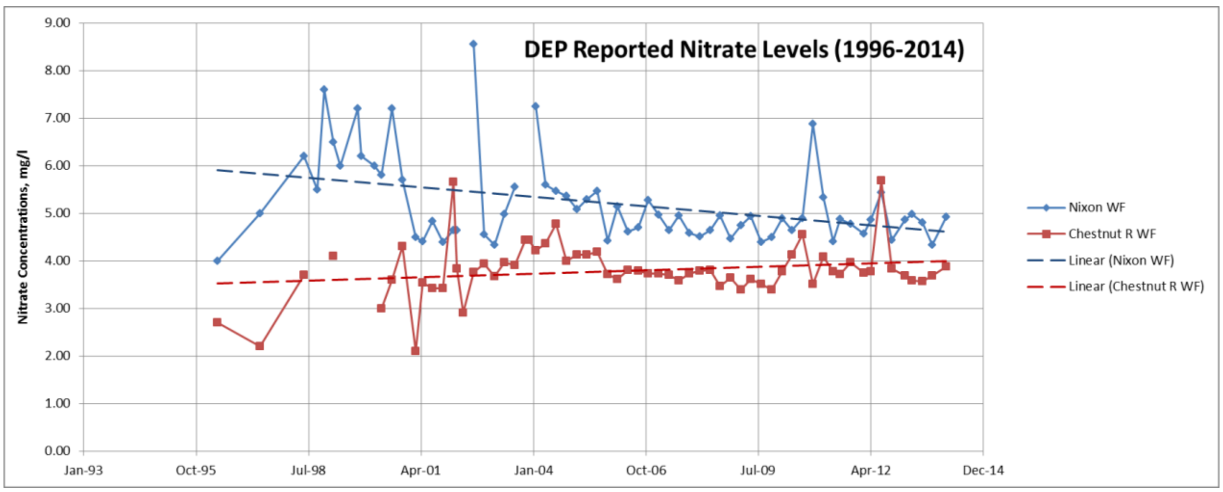

Figure No. 8 – Chestnut Ridge/Nixon Well Fields Nitrate Concentrations

Although Chestnut Ridge is a limited supply (1 MGD), a possible blend ratio of 1.3:1 may be feasible. However, recent trends suggest that the Nixon nitrate range may be decreasing. Nutrient management plans for farms in the Nixon recharge zone or that the well is pumped well below capacity may be possible explanations.

Regardless, since the average nitrate concentrations are approaching 50% of the MCL of 10 mg/l, more intensive sampling should be conducted to determine if nitrate treatment or blending is necessary. At a minimum, monthly samples should be collected from each well in service. Records should be kept to reflect the specific wells in service and their production rates. Well field production must determine if higher pumping rates affect a larger recharge area that may impact nitrate concentrations. As outlined above, GDF believes that no final treatment technique for any well field source can be finalized until a thorough source-water assessment and treatability studies are performed.

Revised Total Coliform Rule – On February 13, 2013, USEPA published the Revised Total Coliform Rule (RTCR) in the Federal Register which will replace the 1989 TCR. To maintain primacy, PADEP has drafted major revisions to its Chapter 109 rules and regulations which will take effect on April 1, 2016 for public water systems in Pennsylvania. They include the monitoring and reporting requirements for E. coli from EPA's RTCR as well as numerous changes to the water supply regulations. The portions applicable to SCBWA include:

1. The Authority will need to update their site sampling plan and continue monitoring for E. coli and total coliform at selected locations. If tests exceed the proposed MCLs, the Authority will have to conduct Level I or Level II assessments to prevent further contamination. These assessments would include both distribution system operation and potentially the well head protection and recharge areas.

2. Daily contact time (CT) calculations as well as disinfection profiling is required.

3. The Authority generally complies with the 0.3 mg/l chlorine residual in the distribution system. Dead end areas may need to be flushed more frequently or looped to meet the 0.3 mg/l requirement. Booster chlorination would be a method of last resort.

4. According to the revisions, all systems with filtration will be required to have continuous monitoring of combined and individual filter effluent turbidity, annual filter bed expansion measurements and adherence to the filter-to-waste turbidity standards prior to returning a filter to service following a backwash. The Authority's Woodside Drive treatment facility currently complies with the proposed turbidity monitoring. The Authority will need to do annual filter bed inspections and measure filter bed expansion.

5. The Authority is making plans to install continuous recording turbidimeters at each well field for in-house monitoring purposes and to allow shutdown on high turbidity levels.

6. SCBWA will need to conduct annual sanitary surveys of the water sources usually which shall include an inspection of wellhead protection areas, a review of available information for possible sources of contamination or other activities that may have an adverse impact on water quality or quantity. Revisions to the source water assessment plan are required for changes to any actual or probable sources of contamination. The annual system evaluations must be documented and made available to PA DEP.

Extensive treatment and monitoring requirements are required in the proposed regulations for GUDI-affected wells. The difference between a true groundwater well and GUDI-affected water well is most apparent in these regulations since the potential for contamination is so much higher.

Regulatory Emphasis - Multiple Barriers – Regulatory agencies are stressing the importance of "multiple-barriers" and more advanced treatment techniques. The trend is toward progressive levels (or barriers) of treatment which are compatible with the pollutant threats and provide greater reliability and redundancy. Specifically, the EPA Long Term 2 Enhanced Surface Water Treatment Rule lists several treatment techniques under its Microbial Toolbox Options:

- UV Disinfection: Pathogen Deactivation
- Ozonation: VOC Removal, Taste & Odor Control, Pathogen Deactivation
- Granulated or Powdered Activated Carbon: Organics
- Membrane Filtration: Particle and Virus Removal

The advantage of membrane treatment is as particle barrier to the submicron level. Relative particle sizes and contaminate removal capability are shown in the following figures:

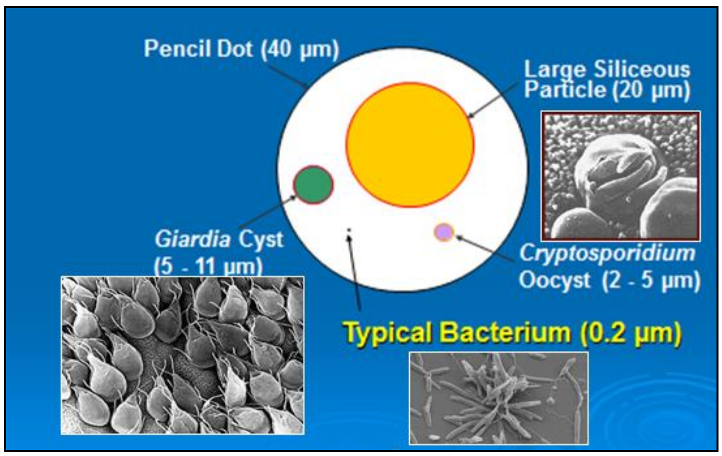

Figure No. 9 – Relative Particle Size

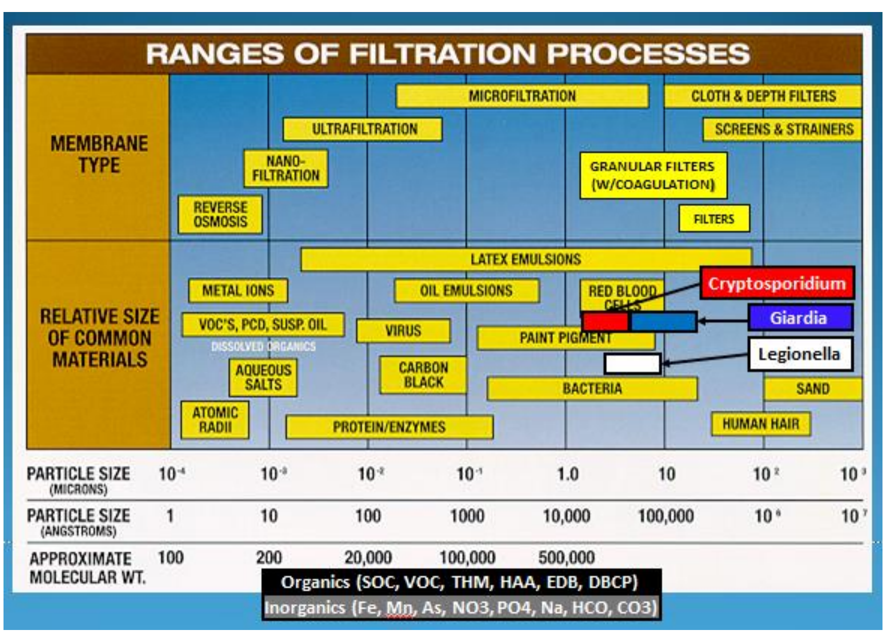

Figure No. 10 – Size Ranges of Filtration Processes

Summary of Source Water Vulnerabilities – When considering the above factors and assessing the contaminant potential of each well field, the following preliminary conclusions can be reached:

Nixon-Kocher Well Field Contamination Threats

- Animal Waste Applied in a Zone 1 Wellhead Protection Area
- Fertilizers/Pesticides Applied in a Zone 1 Wellhead Protection Area
- Elevated Nitrate Levels are Detected
- Whitehall Rd/Route 26 Roadway Runoff Containing Deicing Chemicals, Petrochemicals
- Malfunctioning On-Lot Sewage Disposal Systems
- Fecal Coliform
- Sinkholes with Flooding Potential
- Shallow and Erratic Groundwater Levels
- Precipitation Impacts (Summer 2012 Pump Test)

Alexander Well Field Contamination Threats

- Adjacent Airport – Jet Fuel, Deicing Chemicals
- Wellhead Protection Area - Animal Waste and Fertilizer/Pesticide

Chestnut Ridge Well Field Contamination Threats

- Sink Hole Development – Flooding Potential (located in a residential area)
- Fertilizer/Pesticide – Residential Areas
- Possible Treatment at Nixon-Kocher Plant and as a Nitrate Blending Source

Grays Woods Well Field Contamination Threats

- Future Residential Development
- Contamination Limited (Deep Aquifer, Game Lands)

Conclusion: Our risk assessment and vulnerability evaluation conclusions are as follows:

- Nixon-Kocher well field is considered GUDI-affected and requires filtration
- Consideration should be given to using Chestnut Ridge wells as a nitrate blending source
- Continuous monitoring is required for other SCBWA unfiltered sources (turbidity, precipitation, well levels) to assess contamination potential
- After further evaluation, the ultimate conclusion may be all sources require filtration
- If treatment is required, use Best Available Treatment (BAT) technologies and techniques per USEPA guidelines
- Additional treatability studies and pilot testing are needed to confirm process treatment systems and costs

PROPOSED CAPITAL IMPROVEMENTS

With some exceptions, the capital project projections are the same as those listed in the 2004 LRP and 2007 and 2009 updates. Project values have been updated to reflect current costs. A brief summary of the capital projects are as follows:

- Nixon-Kocher Water Treatment Facility - $23.20 Million
- New 2.0 MG Toftrees Storage Tank (Zone 5) $ 2.25 Million
- New 1.0 MG Aaron Dr. Storage Tank (Zone 1) $ 1.50 Million
- Toftrees Transmission Main Improvements $ 0.50 Million
- North-South Transmission Grid Reinforcement (with Atherton St. PennDOT Waterline Relocation) $ 1.50 Million

OPERATIONAL NEEDS

After extensive discussions with SCBWA staff and operations personnel, the following needs have been identified to support and enhance ongoing operation and maintenance efforts:

System Operations

- Billing Software (AMI Compatible) $ 250,000
- Thomas Well 8 Rehab & Well 7/8 Bldg Rehab $ 250,000
- Additional Monitoring (All Sources) $ 100,000
- Large Water Meters, Omni 4"-10" $ 200,000
- Valve Insertion Machine $ 150,000
- Hydraulic Model Update $ 50,000
- GIS Water System Map Completion $ 40,000
- Tapping Fee Study Update $ 10,000

Operating Budget Items

- Valve Replacement Program $ 100,000 (50 per year)
- Tank Painting $ 350,000/year
- Subcontract Hydrant Cleaning & Painting $ 25,000/year
- 300 Hydrant Replacements (B-50-B to B-84) $ 150,000/year (60 ea. for 5 years)
- Increase tapping fee and generate $100,000/year (currently $650, increase to $1,250)
- Incrementally increase municipal hydrant charge up to $100/hydrant
- "lost water" or "unaccounted-for-water" nomenclature; change to "lost revenue water"

Operating Personnel ($450,000/year)

- Staff Engineer
- HR Qualified Person
- GIS Technician
- Additional Distribution Personnel (3-4); currently 25% below regional average based on system miles - system has grown 30 miles (12%) since 2004
- Instrumentation and Telemetry Technician
- Non-Revenue Water Technician

RATES AND REVENUES

General - The following data is provided for water rates, customers and revenue generation:

- 2013 Water Rate $3.95/1,000 Gallons (+8.6%)
- 2003 Water Rate $3.65/1,000 Gallons
- Breakeven Water Rate $2.50/1,000 Gallons

- Avg. Residential Water Rate $15.80/Month
- Avg. Res. Breakeven Rate $10.00/Month

- Annual Revenue $6,000,000 Per Year
- Average Operating Surplus $2,200,000 Per Year

- New Customers Since 2003 1,695 Customers (+25%)
- Average Customers Per Year 170 Customers (+1.4% per Year)

Income and Expenses - A comparison of 2003/2013 operating income and expenses follows:

- 2013 Operating Income $6,370,000 (+$178,000 or 2.9%)
- 2003 Operating Income $6,192,000
- *2013 Operating Expenses $3,939,000 (+$1,269,000 or 48%)*
- *2003 Operating Expenses $2,670,000*
- 2013 Debt Service Cost $ 0
- 2003 Debt Service Cost $1,220,000
- *2013 Operating Surplus $2,026,000 (Board Reserve Fund)*
- *2003 Operating Surplus $2,126,000 (Capital Improvement Fund)*

Metered Consumption - An evaluation of metered consumption trends over the last 10 years reveals a decline in usage despite the addition of almost 1,700 customers during that time.

- 2013 Metered Consumption 4,525,000 GPD
- 2003 Metered Consumption 4,567,000 GPD

- 2013 Residential Consumption 4,000 Gallons/Month
- 2003 Residential Consumption 4,800 Gallons/Month

The average residential consumption has declined 17% over the last 10 years due to many of the factors noted earlier.

A graphical representation of annual consumption patterns is also provided in the following figure.

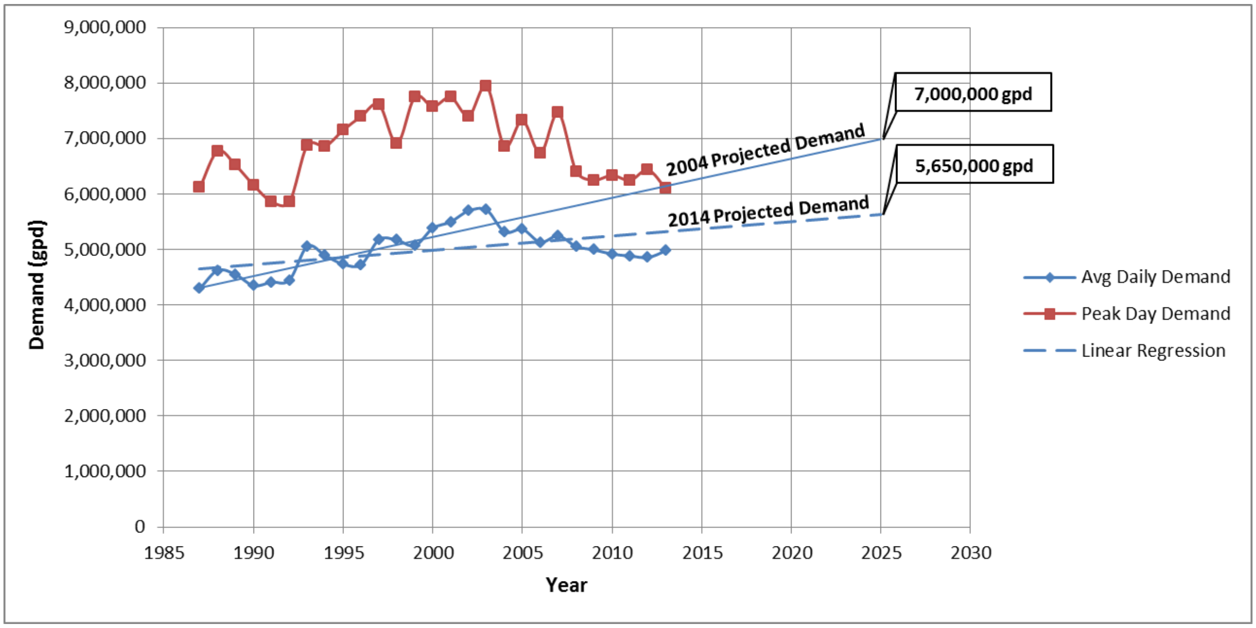

Figure No. 11 – Annual Metered Consumption

There are various explanations for the contradiction of declining metered consumption with substantial increases in the customer base including water saving fixtures, plumbing code requirements, water conservation efforts, public outreach efforts and declining economic conditions in the late 2000's.

Peak daily water demand also declined over the last 10 years from a high of 8 MGD in 2003 to 6 MGD in 2013. It is ironic that the highest metered consumption occurred during the 2004 LRP which skewed the linear regression analysis. It is more likely that projected 2025 metered consumption will be 5.65 MGD instead of the 7.0 MGD figure projected in 2004.

The safe water factor of 1.5 times the average daily production (which we estimate to be 6.2 MGD with a 10% lost water component) results in required supply rate of 9.2 MGD in 2025. This approximates the current SRBC withdrawal limit.

Revenue Generation – Based on the revenue generation capability of the Authority, about $2.2 million per year can finance $30 million in capital improvements based on a 20-year water revenue bond at current AAA rated-bond interest rates of 4.0%. This annual debt service is equal to the current board reserve fund of $2.2 million which is generated as an annual operating surplus. This corresponds to a $5 monthly user rate.

Of course, the Authority could apply a portion of its unrestricted cash and investments to offset borrowing costs. It is also noted that Pennvest has low interest loans available for capital projects. The current 20-year Pennvest interest cap rate for Centre County is 2.07% for a 20-year, $20 million (maximum) loan. Analysis of project financing means and methods is within the province of the Finance Committee.

Rates and Revenues Summary – Based on the above analysis, the following summary conclusions can be drawn concerning the rates and revenues of the Authority:

- Metered consumption has declined 3% since 2004 despite 1,700 new customers
- Operating income has been flat (+3%) over the last 10 years
- Operating expenses have risen 48% since 2004 due to major medical, pension and salary costs. Other operating expenses have risen at the general inflation rate
- Water rates increased only 8% (tap fees, new customer revenue and no debt service)
- Operating surpluses total $24.5 million from 2003 that funded $12 million in capital projects and $4.2 million in maintenance work (AMI, tank painting)
- Water rates are substantially below comparable regional systems
- The annual operating surplus of $2.2 million will finance $30 million in capital projects
- Unrestricted cash and investments of the Authority could be used to reduce borrowing

CAPITAL PROJECT RECOMMENDATIONS

GDF recommends that the State College Borough Water Authority consider the following schedule of capital projects over the next 5 years (2015-2020).

Nixon-Kocher Water Treatment Plant	$23,200,000
Toftrees 2.0 MG Tank (Zone 5)	2,250,000
Aaron Drive 1.0 MG Elevated Tank (Zone 1)	1,500,000
Northern-Southern Grid Reinforcement	1,500,000
Toftrees Transmission Main Improvements	500,000
New Billing Software (AMI Compatible)	250,000
Thomas Well 8 Rehab & Well 7/8 Bldg Rehab	250,000
Turbidimeters (All Sources)	100,000
Large Turbo Meters, Omni Type (4”-10”)	200,000
Valve Insertion Machine	150,000
Hydraulic Model, Tap Fee, GIS Map	100,000
TOTAL	$30,000,000

PROJECT PROGRAMMING

A schedule for project implementation is based on the following assumptions:

- All projects will be designed and constructed in five years from 2015-2019.
- Preliminary engineering and treatability studies (see Appendix A) are needed to confirm the scope and timing of the Nixon/Kocher well field supply. For purposes of our schedule, construction of the plant will begin in 2016 and be completed in 2018.
- Transmission main work is programmed earlier than new storage tanks
- It is assumed that non-treatment plant work can be funded through the annual proceeds of the SCBWA Capital Improvement Fund with Water Revenue Bonds and Pennvest Loans to fund the treatment plant and tank projects

A project timeline, showing individual capital projects and large operating budget items, is shown in the following year-by-year tabulation. A capital budget analysis is in Appendix D.

2015

- Toftrees Transmission Main Improvements ($500,000)
- North-South Grid Reinforcement ($500,000)
- Valve Insertion Machine ($150,000)
- New Billing Software ($250,000)
- Hydrant and Valve Replacement Program ($250,000)
- Tank Painting ($350,000)

2016

- Commence Nixon-Kocher Water Treatment Plant ($5,000,000)
- North-South Grid Reinforcement ($500,000)
- Large Turbo Meters, Omni Type (4”-10”) ($200,000)
- Thomas Well No. 2 Well Pumps and Building Rehabilitation ($250,000)
- Hydrant and Valve Replacement Program ($250,000)
- Tank Painting ($350,000)

2017

- Ongoing Nixon-Kocher Water Treatment Plant ($9,000,000)
- Hydrant and Valve Replacement Program ($250,000)
- North-South Grid Reinforcement ($500,000)
- Tank Painting ($350,000)
- Hydraulic Model, Tap Fee, GIS Map ($100,000)

2018

- Completion of Nixon-Kocher Water Treatment Plant ($9,200,000)
- Toftrees 2.0 MG Water Storage Tank ($2,250,000)
- Hydrant and Valve Replacement Program ($250,000)
- Tank Painting ($350,000)

2019

- Aaron Drive 1.0 MG Elevated Water Storage Tank ($1,500,000)
- Hydrant and Valve Replacement Program ($250,000)
- Tank Painting ($350,000)

Operating Labor - As noted earlier, additions to operating labor are anticipated for distribution system personnel, HR manager, staff engineer and instrumentation, GIS and non-revenue water technicians. These positions will be added at the discretion of Authority staff and board based on operating needs. However, we assume that these positons will be fully integrated by the year 2020.

Another situation looming for the Authority is current workforce demographics. A roster of employees is shown in the Appendix B. Eleven (11) workers will be retiring in the next five years or about a third of the workforce. Of these, 50% of the meter shop, 67% of the billing office and 40% of the administrative staff will be retiring. Almost all of the retiring employees are in supervisory positions with an average tenure of 23 years at the Authority. This institutional knowledge and skill sets will be difficult to replace. Replacement of these personnel is in addition to new employees recommended in this LRP update.

The hiring process will present a challenge to management to insure that highly skilled and properly trained and educated personnel are retained for these important positions. An evaluation of existing personnel for promotion to supervisory roles will be part of this process.

POST- 2020 LRP PLANNING

Post-2020 planning should consider the following factors and recommendations:

- Assess GUDI parameters for all unfiltered well fields

- Evaluate continuous monitoring data for well level, precipitation and turbidity at all unfiltered water sources

- Consider treatment and filtration for all sources including Alexander and Gays Woods if data shows surface water impacts

- Future waterline replacement should be generally performed by SCBWA forces

- Woodside treatment plant is 20 years old and the Authority should consider an upgrade in 2025 (per 2004 LRP) using Best Available Technology

- Possible SRBC Slab Cabin Basin withdrawal reductions may warrant changes to production at other sources based on a water quality and cost effectiveness evaluation

- Monitor water usage vs SRBC limit as future growth and new systems are brought online. SCBWA may need to petition SRBC to increase the withdrawal limit of 9.1 MGD

- It is projected that 8,000 additional housing units will be added to the SCBWA service area in the next 10-15 years

- A service area population of 85,000 to 100,000 is forecast for the year 2025. This may result in a PA DEP “large” system designation which will result in greater regulatory scrutiny, treatment and monitoring

- Perform a detailed master plan (similar to the 2004 LRP) of complete system operations

APPENDIX A – OUTLINE OF TREATABILITY STUDY FOR NIXON/KOCHER WELL FIELDS

General - A critical component of the Authority's Long Range Plan is to provide treatment of additional well sources. The current regulatory trend focuses on the evaluation and treatment of groundwater sources. This is evidenced by DEP's SWIP testing protocol, the recent Groundwater Rule, EPA's Revised Total Coliform Rule and their UCMR 3 program, DEP's proposed update to Chapter 109, and the requirements to conduct sanitary surveys and designate source water protection areas. These regulations scrutinize the development of new groundwater sources and treatment required of those wells having contamination potential.

Slab Cabin Run Sources - The Authority began treatment of the Shingletown Reservoir and Harter well fields nearly twenty years ago with the construction of the Woodside Drive water treatment facility. Treatment of the Thomas wells started in 2001. This facility continues to provide approximately 60% of the system's daily water demand.

The Authority will most likely lose their withdrawal authorization for the Shingletown Reservoir in 2017 when the current allocation permit expires. Furthermore, the Authority will continue to come under scrutiny to reduce their impact to Slab Cabin Run which recently received a High Quality Stream designation under the Chapter 93 program.

The significant reliance on the aging Woodside Drive treatment facility and the imbalance of water withdrawal within that system will likely require the Authority to increase production from other well fields.

Nixon-Kocher Well Fields - The Authority is currently considering treatment of the Nixon/Kocher well field to ensure compliance with future regulations, provide additional treated water capacity to the system and to reduce reliance on the Thomas/Harter well field. A treatability study is needed to determine the appropriate and cost effective level of treatment required for these sources.

Treatability Study - The treatability study will require characterization of the source water quality, the evaluation of applicable treatment technology and the pilot testing of selected treatment processes. The characterization of source water quality will require the development of a source water sampling protocol.

In order to provide proper treatment, sufficient water quality data is needed to accurately characterize the various well sources. Due to the land use and topographic and geologic setting of the wells, pumping rates may impact water quality, specifically water quality. Therefore, the Authority should maximize pumping rates during sample collection and pilot study operations.

The sampling protocol should include the designated sampling locations, a sampling frequency schedule and a list of chemical and microbial parameters to be tested. Sampling should begin this fall and continue at least throughout the pilot study scheduled for the spring/summer of 2015.

The evaluation of treatment processes should include a multiple barrier treatment approach to ensure compliance and provide process redundancy. At this time, possible treatment processes include ultrafiltration membranes, granulated activated carbon filtration, nanofiltration/reverse osmosis, UV disinfection, nitrate blending and chlorination. Each process will be evaluated to determine the most cost effective treatment for the sources. Other treatment processes may need to be considered following evaluation of additional water quality data.

It is proposed to pilot test the ultrafiltration, GAC and NF/RO processes. A pilot study protocol will be developed to define the study objectives and the parameters required to fully evaluate each process technology for submission to PA DEP.

Proposed Pilot Study Schedule - It is proposed to conduct a three to four month pilot study starting in the spring months to capture any potential wet weather impacts to the well fields. A detailed pilot study protocol will be prepared and submitted to DEP. Following DEP approval, equipment will be ordered and by early spring, the pilot systems will be constructed. A temporary structure will likely be needed as well as a temporary electrical service, phone/communication service, plumbing, site piping, etc.

The pilot equipment will be operated for at least three months with a contingency to operate an additional month if necessary. Following completion of operation, an additional month will be needed to receive all laboratory data. A final report will be prepared to document all study findings and provide recommendations for design.

The following schedule is proposed:

Prepare Draft Pilot Study Protocol	October 1, 2014
Finalize Protocol and Submit to PADEP	November 1, 2014
Receive PADEP Approval	December 15, 2014
Pilot Equipment Procurement	January 1, 2015
Begin Equipment Installation	February 15, 2015
Complete Equipment installation	March 1, 2015
Commencement of Operation	March 15, 2015
Complete Operation	July 15, 2015
Complete Final Engineering Report	August 15, 2015

Estimated Pilot Study Cost - The estimated cost to conduct the proposed pilot study is $220,000 which includes the rental of pilot study equipment for three months and all materials needed for installation. The cost includes engineering costs for the preparation of the pilot study protocol, installation assistance, operational assistance and final report preparation.

The cost does not include labor to install the equipment or for daily operation as it is assumed Authority personnel will be available for these tasks.

The following estimate is considered sufficiently accurate for budget purposes:

Prepare Pilot Study Protocol	$ 15,000
Procure Treatment Equipment	$ 45,000
Temporary Storage Building	$ 13,000
Electrical, Phone, Cable	$ 10,000
Miscellaneous Piping, Tanks	$ 10,000
Chemical Feed Systems	$ 12,000
Operational Assistance	$ 30,000
Laboratory Analyses	$ 75,000
Preliminary Engineering Report	$ 15,000
Total Estimated Cost	$225,000

A more detailed pilot study proposal will be prepared when costs for analytical testing, equipment rental, pilot testing setup and other parameters are finalized. The proposal will be submitted to the Authority for review and approval prior to submission to PA DEP.

APPENDIX B – SCBWA EMPLOYEE ROSTER

POSITION	EMPLOYEE NAME	HIRE	VESTING SERVICE		
			PAST	FUTURE	TOTAL
ADMINISTRATION (6)					
EXECUTIVE DIRECTOR	LICHMAN, JOHN	9/17/2012	1	7	8
ASSISTANT EXECUTIVE DIRECTOR	NEVEL, DAVID	1/1/1995	19	0	19
DIRECTOR OF FINANCE/SECRETARY	RUNK, SUSAN	6/16/1999	15	2	17
STAFF TECHNICIAN	ALBRIGHT, STEVEN	9/6/1988	25	7	32
NETWORKING AND COLLECTIONS ADMIN.	KNISELY, AUDRA	4/16/2007	7	28	35
STAFF FINANCIAL ASSISTANT	MCCAULLEY, KATIE	9/16/2013	0	31	31
BILLING (6)					
CUSTOMER ACCOUNTS SUPERVISOR	FETZER, SHERRY	1/2/1979	35	0	35
LEAD CUSTOMER ACCOUNTS REP.	CRAFTS, SHERYL	1/1/1995	19	4	23
CUSTOMER ACCOUNTS REPRESENTATIVE	TRESSLER, RHONDA	2/27/1984	30	0	30
CUSTOMER ACCOUNTS REPRESENTATIVE	JUDEICH, BARBARA	4/1/1996	18	0	18
CUSTOMER ACCOUNTS REPRESENTATIVE	MEEK, CINDY	8/22/2005	8	16	24
CUSTOMER ACCOUNTS REPRESENTATIVE	FEIGHNER, CHEYENNE	10/1/2014	0	35	35
DISTRIBUTION (13)					
DISTRIBUTION SUPERINTENDENT	FETTEROLF, DANIEL	3/1/1982	32	3	35
ASST. DISTRIBUTION SUPERINTENDENT	ONDER, KENNETH	7/5/1994	20	14	34
DISTRIBUTION CREW SUPERINTENDENT	SIMPSON, TERRANCE	8/16/1999	14	21	35
DISTRIBUTION CREW SUPERVISOR	SHAWVER, RUSTY	3/16/2005	9	26	35
LEAD MAINTENANCE WORKER	SHAWVER, JOHN	4/17/2006	8	27	35
MAINTENANCE WORKER	BREON, JEFF	4/1/1996	18	15	33
MAINTENANCE WORKER	CRESTANI, LEONARD	6/6/2005	9	4	13
MAINTENANCE WORKER	CLAAR, JEFF	5/16/2008	6	9	15
MAINTENANCE WORKER	GREENAWALT, DEREK	3/16/2009	5	30	35
MAINTENANCE WORKER	COFFMAN, JOHN	6/17/2013	1	27	28
MAINTENANCE WORKER	BROWN, JUSTIN	6/25/2014	0	34	34
MAINTENANCE WORKER	HOFFMASTER, DUSTIN	6/25/2014	0	34	34
MAINTENANCE WORKER	HOUTZ, KYLE	6/30/2014	0	35	35
PHYSICAL PLANT (6)					
WATER PRODUCTION SUPERINTENDENT	HEISER, BRIAN	9/21/2000	13	15	28
ASST. WATER PRODUCTION SUPERINTENDANT	KOLENO, TIMOTHY	10/16/1992	21	7	28
WATER PLANT OPERATOR I	BUTTS, JOHN	10/3/1994	19	15	34
WATER PLANT OPERATOR II	HOSTERMAN, BRYAN	6/3/2002	12	15	27
CHIEF PHYSICAL PLANT MAINTENANCE TECH.	BRUNGART, GARY	7/16/2008	6	21	27
WATER PLANT OPERATOR I	CORMAN, LEWIS	12/16/2013	0	21	21
METER SHOP (6)					
METER SHOP SUPERINTENDENT	BROWN, GARTH	10/1/1991	22	0	22
ASST. METER SHOP SUPERINTENDENT/BACKFLOW	STERE, JAMES	3/1/1985	29	2	31
METER READER/REPAIRER	HOLT, LARRY	8/8/1990	23	2	25
METER READER/REPAIRER	BUTTS, DONALD	11/1/1994	19	15	34
METER READER/REPAIRER	RICHARD, JASON	10/16/2003	10	25	35
METER READER/REPAIRER	MILLER, ERIC	7/16/2007	7	28	35
TOTAL POTENTIAL RETIRES WITHIN THE NEXT 5 YEARS				11	

APPENDIX C – UCMR3 MONITORING SUMMARY

STATE COLLEGE BOROUGH WATER AUTHORITY
UCMR 3 SAMPLING SUMMARY

			WET CHEMISTRY								METALS					VOLATILE ORGANICS							SEMIVOLATILES
COLLECTION DATE	Sample Quarter No.	SAMPLE ID	Chlorate (ug/L)	Hexavalent Chromium (ug/L)	Perfluorooctanoic Acid (ug/L)	Perfluorobutanesulfonic Acid (ug/L)	Perfluorohexanesulfonic acid (ug/L)	Perfluoroheptanoic Acid (ug/L)	Perfluorooctanesulfonic Acid (ug/L)	Perfluorononanoic Acid (ug/L)	Total Chromium (ug/L)	Total Cobalt (ug/L)	Total Molybdenum (ug/L)	Total Strontium (ug/L)	Total Vanadium (ug/L)	Bromochloromethane (ug/L)	Bromomethane (ug/L)	1,3-Butadiene (ug/L)	Chlorodifluoromethane (ug/L)	Chloromethane (ug/L)	1,1-Dichloroethane (ug/L)	1,2,3-Trichloropropane (ug/L)	1,4-Dioxane (ug/L)
3/11/2014	1	Filter Plant	ND	0.27	ND	ND	ND	ND	ND	ND	0.26	ND	ND	120	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/10/2014	2	Filter Plant	ND	0.30	ND	ND	ND	ND	ND	ND	-	-	-	-	-	ND	ND	ND	ND	ND	ND	ND	ND
6/26/2014	2	Filter Plant	-	-	-	-	-	-	-	-	0.32	ND	ND	130	ND	-	-	-	-	-	-	-	-
Sept. 2014	3	Filter Plant																					
Dec. 2014	4	Filter Plant																					
-		Method Reporting Limit (MRL)	20	0.03	0.02	0.09	0.03	0.01	0.04	0.02	0.2	1	1	0.3	0.2	60	200	100	80	200	30	30	0.07
		Minimum:																					
		Maximum:																					
		Average:																					
3/10/2014	1	Tank No. 1	ND	0.28	-	-	-	-	-	-	0.29	ND	ND	130	ND	-	-	-	-	-	-	-	-
6/10/2014	2	Tank No. 1	ND	0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6/26/2014	2	Tank No. 1	-	-	-	-	-	-	-	-	0.31	ND	ND	100	ND	-	-	-	-	-	-	-	-
Sept. 2014	3	Tank No. 1																					
Dec. 2014	4	Tank No. 1																					
-		Method Reporting Limit (MRL)	20	0.03	-	-	-	-	-	-	0.2	1	1	0.3	0.2	-	-	-	-	-	-	-	-
		Minimum:																					
		Maximum:																					
		Average:																					
3/10/2014	1	Tank No. 6	ND	0.28	-	-	-	-	-	-	0.30	ND	ND	35	0.20	-	-	-	-	-	-	-	-
Sept. 2014	3	Tank No. 6																					
-		Method Reporting Limit (MRL)	20	0.03	-	-	-	-	-	-	0.2	1	1	0.3	0.2	-	-	-	-	-	-	-	-
		Minimum:																					
		Maximum:																					
		Average:																					
3/10/2014	1	Tank No. 7	ND	0.28	-	-	-	-	-	-	0.30	ND	ND	94	0.25	-	-	-	-	-	-	-	-
Sept. 2014	3	Tank No. 7																					
-		Method Reporting Limit (MRL)	20	0.03	-	-	-	-	-	-	0.2	1	1	0.3	0.2	-	-	-	-	-	-	-	-
		Minimum:																					
		Maximum:																					
		Average:																					
3/11/2014	1	Wellfield No. 2 (Grays Woods)	ND	0.26	ND	ND	ND	ND	ND	ND	0.95	ND	ND	88	0.62	ND	ND	ND	ND	ND	ND	ND	ND
Sept. 2014	3	Wellfield No. 2 (Grays Woods)																					
-		Method Reporting Limit (MRL)	20	0.03	0.02	0.09	0.03	0.01	0.04	0.02	0.2	1	1	0.3	0.2	60	200	100	80	200	30	30	0.07
		Minimum:																					
		Maximum:																					
		Average:																					
3/11/2014	1	Wellfield No. 4 (Nixon)	ND	0.60	ND	ND	ND	ND	ND	ND	0.56	ND	ND	34	0.21	ND	ND	ND	ND	ND	ND	ND	ND
Sept. 2014	3	Wellfield No. 4 (Nixon)																					
-		Method Reporting Limit (MRL)	20	0.03	0.02	0.09	0.03	0.01	0.04	0.02	0.2	1	1	0.3	0.2	60	200	100	80	200	30	30	0.07
		Minimum:																					
		Maximum:																					
		Average:																					
3/11/2014	1	Wellfield No. 5 (Chestnut Ridge)	ND	0.44	ND	ND	ND	ND	ND	ND	0.42	ND	ND	61	0.22	ND	ND	ND	ND	ND	ND	ND	ND
Sept. 2014	3	Wellfield No. 5 (Chestnut Ridge)																					
-		Method Reporting Limit (MRL)	20	0.03	0.02	0.09	0.03	0.01	0.04	0.02	0.2	1	1	0.3	0.2	60	200	100	80	200	30	30	0.07
		Minimum:																					
		Maximum:																					
		Average:																					
3/11/2014	1	Wellfield No. 6 (Alexander)	ND	0.28	ND	ND	ND	ND	ND	ND	0.25	ND	ND	32	0.20	ND	ND	ND	ND	ND	ND	ND	0.077
Sept. 2014	3	Wellfield No. 6 (Alexander)																					
-		Method Reporting Limit (MRL)	20	0.03	0.02	0.09	0.03	0.01	0.04	0.02	0.2	1	1	0.3	0.2	60	200	100	80	200	30	30	0.07
		Minimum:																					
		Maximum:																					
		Average:																					
3/10/2014	1	Pine Grove Lions Club	-	-	-	-	-	-	-	-	0.53	ND	ND	53	ND	-	-	-	-	-	-	-	-
3/18/2014	3	Pine Grove Lions Club	ND	0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept. 2014		Pine Grove Lions Club																					
-		Method Reporting Limit (MRL)	20	0.03	-	-	-	-	-	-	0.2	1	1	0.3	0.2	-	-	-	-	-	-	-	-
		Minimum:																					
		Maximum:																					
		Average:																					
3/10/2014	1	Park Forest Villas	ND	0.29	-	-	-	-	-	-	0.27	ND	ND	32	ND	-	-	-	-	-	-	-	-
Sept. 2014	3	Park Forest Villas																					
-		Method Reporting Limit (MRL)	20	0.03	-	-	-	-	-	-	0.2	1	1	0.3	0.2	-	-	-	-	-	-	-	-
		Minimum:																					
		Maximum:																					
		Average:																					

APPENDIX D – CAPITAL BUDGET ANALYSIS

This analysis shows the impact of the recommended capital improvement plan on future water rates and budgets. Under this scenario, the Nixon-Kocher treatment plant and Toftrees & Aaron Drive tanks would be funded through borrowed money (combination of Pennvest loans and Water Revenue Bonds in 2016). The remainder would be funded through operating revenue surpluses which we have shown as cash flows in-and-out of the capital reserve fund (based on an initial, assumed balance). Assumptions on revenues are provided in the footnotes. Many other options exist that will be examined by the Finance Committee if a capital plan is adopted.

2014 LONG RANGE PLAN UPDATE
CAPITAL BUDGET ANALYSIS
2013 - 2023

	2013 (1)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
OPERATING INCOME											
Charges for Services (2)	$6,250,805	$6,282,059	$6,313,469	$6,345,037	$6,376,762	$6,408,646	$7,600,000	$7,638,000	$7,676,190	$7,714,571	$7,753,144
Revenues Other Than Water Sales	$117,989	$118,579	$119,765	$121,561	$123,992	$127,092	$130,905	$136,141	$142,948	$150,810	$159,859
TOTAL	$6,368,794	$6,400,638	$6,433,234	$6,466,598	$6,500,754	$6,535,738	$7,730,905	$7,774,141	$7,819,138	$7,865,381	$7,913,003
OPERATING EXPENSES											
Purification (3)	$131,510	$185,000	$188,700	$192,474	$196,323	$235,250	$274,955	$280,454	$286,063	$291,784	$297,620
Pumping (4)	$332,410	$331,000	$337,620	$344,372	$351,260	$400,000	$475,000	$484,500	$494,190	$504,074	$514,155
Filtration (5)	$205,045	$237,000	$241,740	$246,575	$251,506	$300,000	$325,000	$331,500	$338,130	$344,893	$351,790
Distribution (6)	$515,173	$472,000	$531,440	$592,069	$653,910	$666,988	$680,328	$693,935	$707,813	$721,970	$736,409
General Expense (7)	$2,715,164	$2,956,000	$3,059,460	$3,166,541	$3,377,370	$3,595,578	$3,821,423	$3,897,852	$3,975,809	$4,055,325	$4,136,431
TOTAL	$3,899,302	$4,181,000	$4,358,960	$4,542,031	$4,830,370	$5,197,816	$5,576,706	$5,688,240	$5,802,005	$5,918,045	$6,036,406
DEBT SERVICE											
Water Revenue Bonds, Series of 2016 (8)	$0	$0	$0	$0	$0	$615,700	$1,231,400	$1,231,400	$1,231,400	$1,231,400	$1,231,400
Water Revenue Bonds Coverage	$0	$0	$0	$0	$0	$61,570	$123,140	$123,140	$123,140	$123,140	$123,140
Pennvest Loan (9)	$0	$0	$0	$0	$0	$255,700	$511,400	$511,400	$511,400	$511,400	$511,400
TOTAL	$0	$0	$0	$0	$0	$932,970	$1,865,940	$1,865,940	$1,865,940	$1,865,940	$1,865,940
NET INCOME BEFORE CAPITAL ADD.	$2,469,492	$2,219,638	$2,074,274	$1,924,567	$1,670,384	$404,952	$288,259	$219,961	$151,193	$81,396	$10,657
PROJECTED CAPITAL ADDITIONS (10)	$1,983,000	$2,193,000									
Toftrees Transmission Main			$500,000								
North-South Grid Reinforcement			$500,000	$500,000	$500,000						
Valve Insertion Machine			$150,000								
New Billing Software			$250,000								
Hydrant & Valve Replacement			$250,000	$250,000	$250,000	$250,000	$250,000				
Tank Painting			$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000
Nixon-Kocher Treatment Plant				$5,000,000	$9,000,000	$9,200,000					
Large Turbo Meters (4"-10")				$200,000							
Thomas Well 8 Rehab/No 7/8 Bldg Rehab				$250,000							
Hydraulic Model, GIS, Tap Study					$100,000						
Toftrees 2.0 MG Storage Tank						$2,250,000					
Aaron Drive 1.0 Storage Tank							$1,500,000				
TOTAL (Exclusive of DSP Projects) (11)	$1,983,000	$2,193,000	$2,000,000	$1,550,000	$1,200,000	$600,000	$600,000	$350,000	$350,000	$350,000	$350,000
TOTAL NET ANNUAL INCOME	$486,492	$26,638	$74,274	$374,567	$470,384	-$195,048	-$311,741	-$130,039	-$198,807	-$268,604	-$339,343
OPERATING SURPLUS CASH FLOW (12)	$486,492	$513,130	$587,404	$961,971	$1,432,355	$1,237,307	$925,566	$795,526	$596,719	$328,115	-$11,228
WATER RATE (13)	$3.95	$3.95	$3.95	$3.95	$3.95	$3.95	$4.68	$4.68	$4.68	$4.68	$4.68
AVERAGE MONTHLY RESIDENTIAL COST	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$18.74	$18.72	$18.72	$18.72	$18.72

NOTES

(1) "2013 Revenues and Expenses" Based on 2013 Independent Auditors Report by Ritchey, Cox & Assoc
(2) "Charges for Services" Assumed to Increase at 1/2% per Year Except as Required by a Water Rate Increase. Annual revenues include service to the Mt. Nittany Medi
(3) "Purification" Expenses Assumed to Increase at 2% per Year Except for $35,000 Increase in 2018 & 2019 for Additional Treatment and Membrane Cleaning Chemicals
(4) "Pumping" Expenses Assumed to Increase at 2% per Year Except for $50,000 Increase in 2018 & $75,000 Increase in 2019 for Additional Electrical Charges
(5) "Filtration" Expenses Assumed to Increase at 2% per Year Except for $25,000 Increase in 2018 & $50,000 Increase in 2019 for Additional Filtration-Related Costs
(6) "Distribution" Expenses Assumed to Increase at 2% per Year Except for $50,000 Increase in 2015, 2016 & 2017 for Additional Distribution Crew (1 person per year)
(7) "General Expenses" Assumed to Increase at 3.5% per Year from 2015 to 2019 and 2.0% per Year from 2019 to 2023 with an Additional $100,000 Increase in 2017, 2018 & 2019 for Personnel
(8) Water Revenue Bonds Assumes a $6.95 Million Principal Amount at 4% for 20 Years Based on a Fully Insured, AAA Rated Revenue Bond. Projects Include the Nixon/Kocher Water Treatment Plant, Toftrees 2.0 MG Tank & 1.0 Aaron Dr. Tank. Debt Service Payments (Principal & Interest) Commence in 2018 with Interest Only Payments in 2016-2018.
(9) Pennvest Loan Assumes a $20 Million Principal Amount at 2.07% for 20 Years Based on a Blended Cap Rate for Centre County
(10) Capital Additions Based on 2014 Long Range Plan Update List of Capital Projects. Multi-Year Projects show Costs Incurred for the Year.
(11) The Debt Service Projects (DSP) are Not Included in the Operating Surplus Cash Flow Computation.
(12) "Operating Surplus Cash Flow" is a Continuous Reconciliation of Surplus Revenues Based on Year-By-Year Additions of Annual Surplus Cash Less Costs Incurred for Capital Projects
(13) "Water Rate" Based on Flat Rate Assessed per 1,000 Gallons. Monthly Residential Cost Based on Average Domestic Metered Consumption of 4,000 Gallons per Month

LEGEND - DEBT SERVICE PROJECTS: $1,500,000