Oceanside Water District
P.O. Box 360
Oceanside, OR 97134
(503) 842-0370

February 16, 2016 Minutes
Oceanside, OR

BOARD MEMBERS PRESENT:
Henry Wheeler-Chairman, Charles Ansorge-Vice Chair, Spike Klobas-Secretary, Paul Newman, Robert Garrigues

STAFF PRESENT:
Alan Tuckey-Watermaster, David Nordman-Plant Operator, Julie Johnson-Assistant Office Manager.

1. **CALLTO ORDER**:
   1:00 PM at the Oceanside Community Center.
2. **APPROVAL OF AGENDA**:
   Approval of the February 16, 2016 Board Meeting Agenda. **A motion was made by Mr. Ansorge to approve the agenda for February 16, 2016, motion was seconded by Mr. Newman. *Motion Passed.***
3. **GUESTS**: Mike Henry, HBH Engineering.
4. **APPROVAL OF MINUTES**:
   A. The January 19, 2016 Regular Board Meeting Minutes, with a spelling correction for POCIS, formally spelled POSIS. **Motion by Mr. Ansorge, seconded by Ms. Klobas to approve the January 19, 2016 Regular Board Meeting Minutes, with the spelling correction to POCIS. *Motion Passed.***
5. **REVIEW OF FINANCIAL STATEMENT**:
   Financial Statements as of February 16, 2016. ***Consensus was to approve the financial statements.***
6. **REVIEW & APPROVE OF ACCOUNTS PAYABLE**:
   Accounts Payable from January 19, 2016 to February 16, 2016 were presented for Board Approval. **A motion was made by Mr. Ansorge to approve the accounts payable from January 19, 2016 to February 16, 2016, motion seconded by Mr. Garrigues. *Motion Passed.***
7. **ON-GOING BUSINESS**:
   A. HBH-Mike Henry
      1. Cape Meares and Oceanside Water Treatment Plants are on schedule, final drawings are near completion. Structural and Electrical Drawings are being reviewed. The mobile generator that the District currently owns will need to be stored outside the building, this generator is to run the Short Creek pump in the case of a power outage. Discussion over where to store the generator on the property, and the best way to protect it from the elements followed.
      2. Infrastructure Improvements for both Oceanside and Cape Meares are being reviewed by HBH, at this time they are waiting on the surveyor's report for the waterline improvements in Camelot.
      3. A tentative schedule for the Oceanside Reservoir will be to go to bid on March 8, 2016. HBH will meet with interested contractors on March 24, 2016 at the Oceanside Community Center at 11 a.m. Bid opening will be on April 5, 2016,
         2 p.m., at the Oceanside Community Center. Reservations have been made for the Hall on February 22, 2016, the Hall will be undergoing some light construction but should have it cleaned up for our use.
      4. Rosenberg Water Rights are determined to be for Municipal use, with a 1 CFS Certificate, the diversion point being located on Green Crow property. Mr. Tuckey has sent an email to the local forester, who will present our request to the head of the corporation. OWD plans to use this water source as an emergency water source in the future. The location of the stream is ideal, as it has a shorter length of passage,

leaving less time for contaminates to enter the water. Elevation is better than Short Creek, which would eliminate the cost of pumping the water up to the Treatment Plant. Baughman Creek is also in a more secure location than Short Creek, as it is further from the main road and located within the gated area that secures NOSD. Plans to measure the flow of Baughman Creek this summer were discussed.

5. Coleman Creek Water Rights will need to be addressed by June 2017, the history of the Water Rights will need to be traced back to the original Rights. Also, by June of 2018 we will need to determine if the amount of water flow is sufficient for Cape Meares. This is needed in order to decide if we want to give up the Permit 5-43812 for 1 cfs. Coleman Creek is planned to be Cape Meares' main water source by next year.
6. Short Creek will need to have a Water Conservation Study and fish screen by June of 2017.
7. HBH presented a letter to OHA for the 2016 exemption, see attached.
8. IFA will be sent documents for OHA approval. The stabilization wall at the Oceanside Treatment Plant will be put into the justification letter, this will be for materials only. Mr. Henry, HBH, will put together a letter for OWD signature and letterhead.
9. Earth Works Excavating Final Pay Request in the amount of $48, 918.46 will be released on 2/30/16. **A motion was made by Mr. Garrigues to approve final payment to Earth Works Excavating in the amount of $48,918.46, motion was seconded by Mr. Newman. *Motion Passed.***
A motion was made by Mr. Newman to authorize Mr. Wheeler to sign the substantial completion letter from Earth Works Excavating, motion was seconded by Mr. Ansorge. *Motion Passed.*

B. Oceanside Clean Water Subcommittee Update (Paul Newman)
1. The Place Based Grant that has been discussed at prior meetings has been rejected.
2. The use of DEQ labs for the experiments being done for the Water Quality Grant have been declined.
3. Josh Seeds, DEQ, has not been able to work with DOGAMI to test the water in the holding ponds in the rock quarry located within the Short Creek Watershed.
4. A riverbank filtrations system was presented, see attached. Discussed followed.
5. Homes that are on a septic system and have meters below the water table pose a risk to the safety of the water system. Also, homes that have tested positive for lead inside their homes give the potential to contaminate the system. The Board has agreed that for the safety of the entire system that these homes be required to have a Backflow Device installed. **A motion was made Mr. Ansorge to require a BFD for any commercial or residential property that fails to meet the State required Lead and Copper limits, motion was seconded by Ms. Klobas. *Motion Passed.***
A motion was made by Mr. Newman to amend our current policy for Backflow Device (BFD), if a meter is located below the water table and a septic system is present, a BFD will be required, motion was seconded by Ms. Klobas. *Motion Passed.*

C. OWD-Oregon.org Website (Charles Ansorge) – No update, Mr. Ansorge requested this be removed from the agenda, as the website is maintained by Staff.

8. NEW BUSINESS:

A. Resolution 16-01, Oregon Ethics Law for a 2% discount on the SDIS Insurance Policy. **A motion was made by Mr. Ansorge to adopt Resolution 16-01 as OWD Board Policy, motion was seconded by Mr. Garrigues. *Motion Passed.***

B. Appointing a Budget Officer for the 2016-2017 fiscal year. **A motion was made by Mr. Garrigues to appoint Mr. Wheeler, Chairman, as the Budget Officer for the 2016-2017 Budget, motion was seconded by Mr. Newman. *Motion Passed.***

C. Appointing a Consumer Confidence Officer for the report due to be available to the public by July 2016. **A motion was made to appoint Mr. Newman as the Consumer Confidence Report (CCR) Officer, motion was seconded by Ms. Klobas. *Motion Passed.***

9. DISTRICT REPORT: Mr. Nordman reviewed the attached report.

10. OFFICE REPORT: Mrs. Johnson reviewed the attached report.

11. CORRESPONDENCE: None

12. COMMISSIONER COMMENTS:

A. The next Board Meeting is set for March 15, 2016 at the Cape Meares Community Center.
   Consensus agreed on the next meeting date.

B. Mr. Garrigues agreed to sign checks on February 29, 2016.

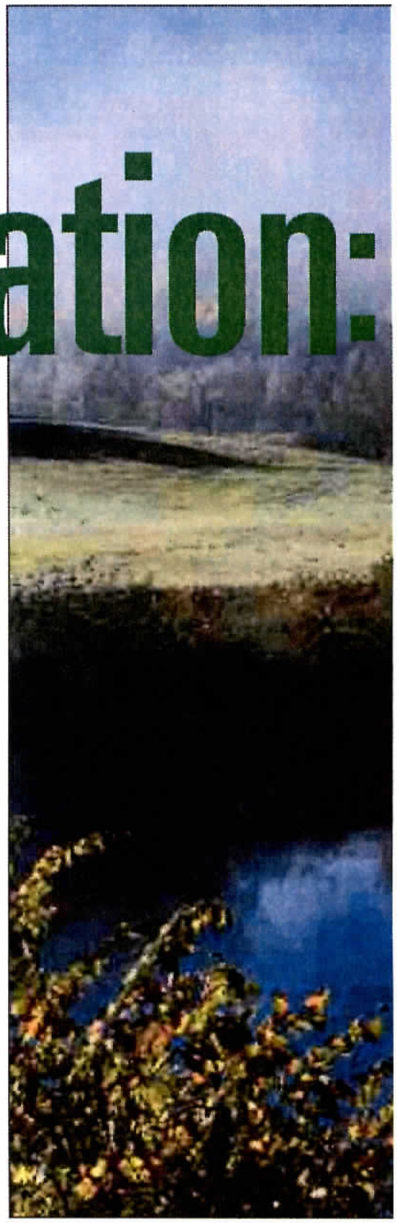
13. The February 16, 2016 Regular Meeting was adjourned at 3:10 p.m. **A motion was made by Ms. Klobas to adjourn the February 16, 2016 regular Board Meeting at 3:10 p.m., motion was seconded by Mr. Ansorge.** ***Motion Passed.***

Respectfully submitted by:

Spike Klobas, Secretary
Minutes taken by Julia Johnson, Assistant Office Manager

BY WOLFGANG KUEHN AND UWE MUELLER

riverbank filtration: AN OVERVIEW

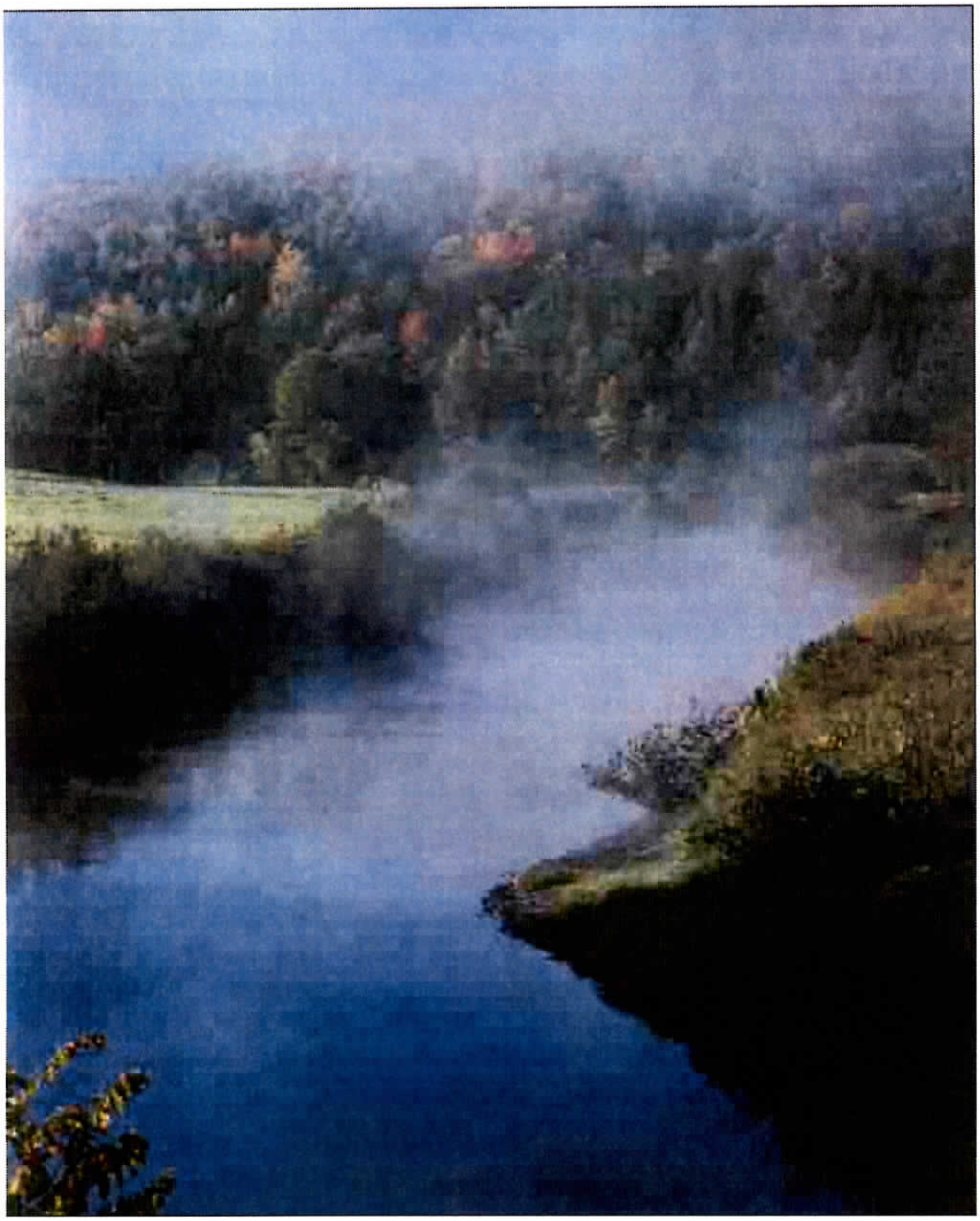


BANK FILTRATION CAN NATURALLY TREAT RIVER WATER, SUPPORTING AND IN SOME CASES REPLACING OTHER TREATMENT STEPS.

Riverbank filtration is a natural process that has been used for more than a hundred years under this name. Before that, the process was unnamed but in use, probably for centuries. Bank filtrate is river water that has passed through the river banks and proceeded to the groundwater table. Another process using underground passage is infiltration. Both processes are shown in the flow scheme in Figure 1.

Infiltration is often characterized by pretreatment of the river water, e.g., by flocculation and filtration, followed by slow sand filtration, artificial recharge, and other treatment. Bank filtrate and infiltrate are collected underground in wells and then undergo further treatment by the water utility. Infiltration is often used if (1) the quantity of water provided by bank filtration is too low, (2) bank filtration is impossible because of geological conditions, or (3) groundwater sources at the river bank are highly contaminated. The residence time of bank filtrate in the underground is determined by local conditions. The retention time may vary from 5 to 100 days and in practice is a mixture of times.

Bank filtration and infiltration have been widely used in Germany.[1–7] In Germany, the major raw water source for drinking water treatment is groundwater, followed by bank filtration. Bank filtration is regarded as groundwater by water utilities and consumers, a reasonable view given that in most cases, bank filtrate is blended with groundwater. Approximately 16% of the drinking water in Germany is produced from bank filtrate or infiltrate.[8] Because of pollution, direct treatment of river water has dropped to 1% (Figure 2).



Bank filtrate consists of river water that has passed through the river banks and proceeded to the groundwater table.

BANK FILTRATE AND INFILTRATE MAY REQUIRE VARIOUS TREATMENTS

The quality of the river water determines the treatment steps that follow the water's underground passage. In earlier years and in some cases today, bank filtrate is used without any treatment, even disinfection. Along the Rhine River, however, chemical pollution necessitates an elaborate treatment chain that includes a multiple-barrier system.

Utilities apply a variety of technologies to treat bank filtrate (Figure 3). Treatment strategies for bank filtrate and infiltrate may be quite different.

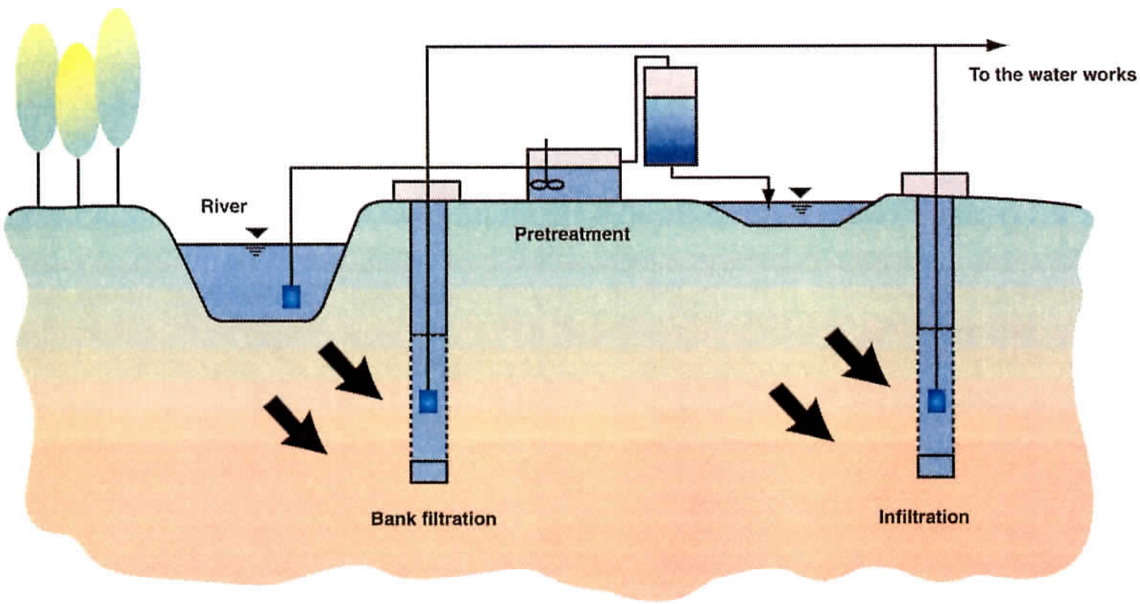
Infiltrate pretreatment depends on river water quality. To ensure that trickling water achieves a sufficient velocity during infiltration, river water may require particle removal by such processes as flocculation, sedimentation, and filtration. Special circumstances may require even further pretreatment before infiltration, e.g., ozonation, filtration, and adsorption. Such intensive pretreatment helps protect the groundwater against contamination by the infiltrate. Use of the subsoil for drinking water treatment purposes is not regarded as pollution of groundwater according to European law. For the most part, less water is drawn from the aquifer than is infiltrated, and the system is more or less a closed one.

Bank filtrate may require more treatment. In general, bank filtrate requires additional treatment steps. This is especially true for bank filtrate from rivers in areas with significant human activities, which may result in high concentrations of ammonia, organic compounds, and micropollutants in the river water. Depending on the water's residence time underground, the hydrogeological situation, and other factors discussed later, contaminants may not be removed by bank filtration but only blended in some cases.

Because more-persistent contaminants may be unaffected by underground passage, treatment of bank filtrate often includes granular activated carbon (GAC) filtration for the adsorbable species. Bank filtrate has a relatively low concentration of dissolved organic carbon (DOC), so the run time of the GAC filter is longer compared with that of direct river water treatment.

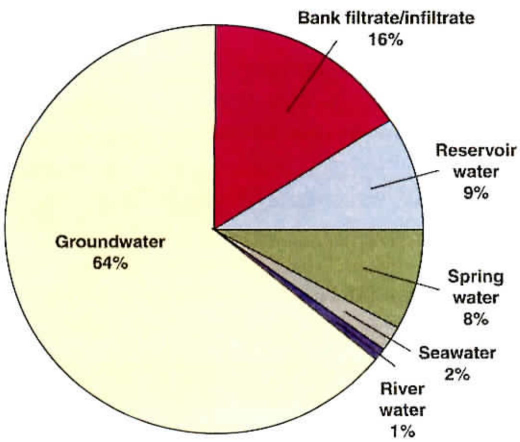
Biological processes help make bank filtration effective. Biological processes are an important reason

FIGURE 1 Differences between bank filtration and infiltration



for the oxygen demand reduction during bank filtration. Therefore, sometimes an aeration step is needed during treatment. If the river carries sufficient oxygen and the oxygen demand during passage underground is not too high, the conditions remain aerobic. However, if conditions become anaerobic, iron and manganese undergo chemical reduction and appear in the water, necessitating their elimination by treatment. Under anaerobic conditions, iron and manganese may also be released during bank filtration, again requiring removal by the treatment process.

FIGURE 2 Sources used for drinking water treatment in Germany



UNDERGROUND PASSAGE OF WATER OFFERS ADVANTAGES

Passage of water underground provides several benefits for drinking water treatment. Underground passage removes particles, bacteria, viruses, parasites, micropollutants, and other organic and inorganic compounds, including such biodegradable compounds as natural organic matter and ammonia that are regularly present in river waters.

Underground passage may compensate for peaks and shock loads. It is well known that the concentrations of contaminants in a river water may vary significantly, depending on such factors as water flow, seasonal effects, spills, runoff, and emissions by municipal and industrial entities. Underground passage reduces the effects of concentration peaks because of the varying distances covered by a water molecule from the river to the well. The flow from the river bottom through the underground to a well results in different retention times for the water molecules.

Concentration peaks are also compensated for by the different porosities of the soil that the water molecule passes through. Moreover, in some cases, bank filtrate may blend with

Germany has widely used bank filtrate and infiltrate, which are collected from the underground in wells and then undergo further treatment by the water utility.

groundwater, resulting in dilution of the bank filtrate. In addition to smoothing out normal variations in concentrations of contaminants, underground passage acts as a barrier against shock loads resulting from such emergency situations as chemical spills or defects in industrial wastewater plants.

The underground passage of bank filtrate offers other advantages as well. Riverbanks are filled with more water in times of high flow than in drought situations. At periods of high water flow, there is also more dilution and quite often lower concentrations of pollutants, a normal effect that supports the philosophy of bank filtration. Bank filtration also results in compensation of temperature peaks, which further improves water quality. Bank filtrate is usually cooler than surface water in summer and warmer in winter, resulting in a more constant water temperature.

Figures 4 and 5 provide examples of the balancing effects of bank filtration.[9] Figure 4 compares chloride concentrations in Rhine River water and the bank filtrate. The chloride concentration in the river varied between 145 and 320 mg/L. In the bank filtrate, blending and other factors reduced the chloride concentration to 100–160 mg/L. Furthermore, the periodic variations in chloride concentration that were seen in the river water were not found in the bank filtrate.

Figure 5 shows the protection that bank filtrate provides against shock loads. The figure depicts a 1986 contamination of 1,2-dichloroethane in the Rhine River. The highest concentration found in the river was ~ 35 µg/L over a period of approximately one day. About three weeks later, the contaminant was detected in the bank filtrate at a concentration of ~ 1 µg/L over a period of two to three weeks. These findings indicate that a short-term shock load in the river may ultimately be detected in the bank filtrate at a low concentration for a longer time period. For the water utility, treat-

FIGURE 3 Process scheme development for river water treatment in Europe

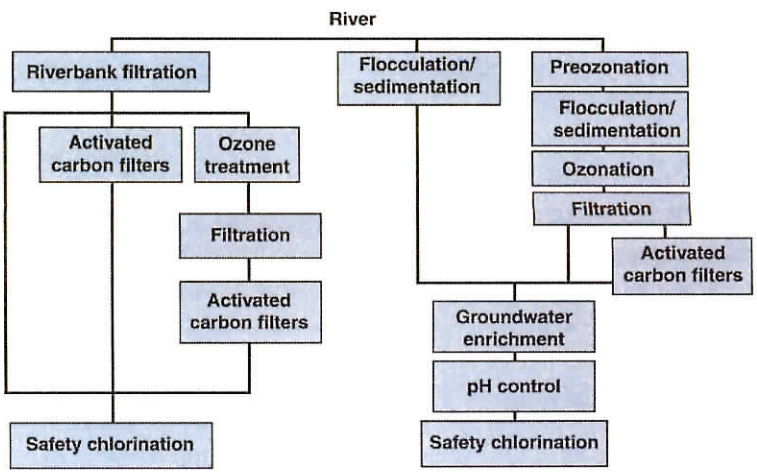


FIGURE 4 Example of the concentration compensation of bank filtration

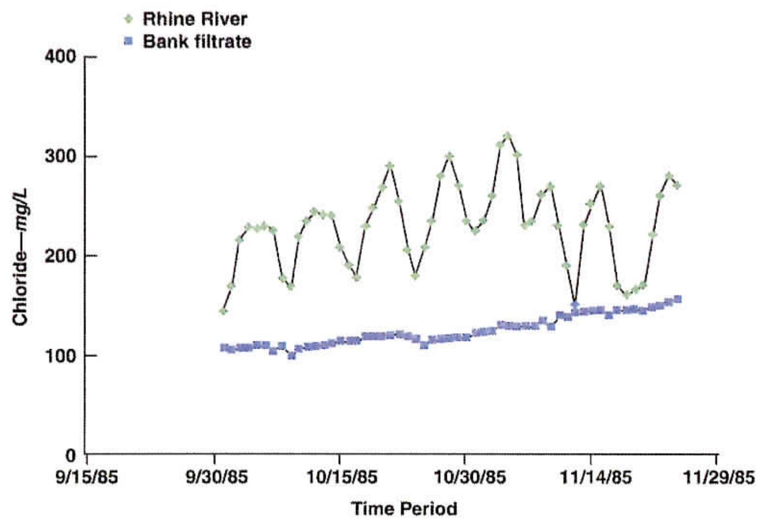


FIGURE 5 Example of the protection against shock loads by bank filtration

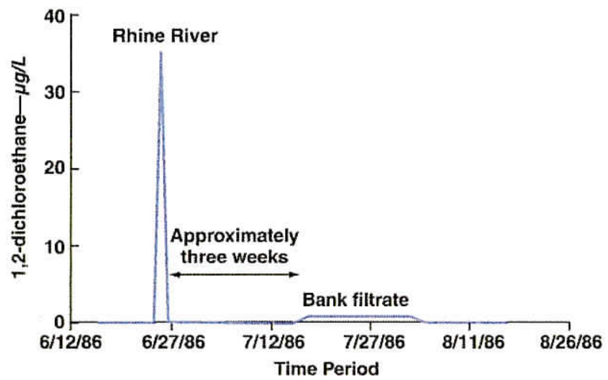
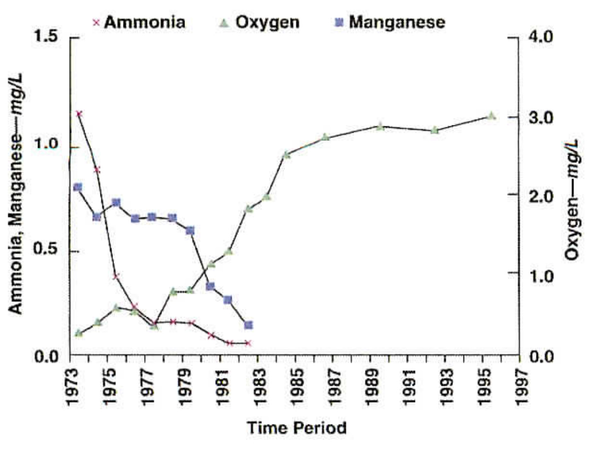


FIGURE 6 Development of bank filtrate quality from the Rhine River



ing the bank filtrate is easier and less expensive, because the utility does not need as much capability as it would to remove the contaminant from the river water in an emergency case.

Many factors contribute to underground passage's effectiveness. Also contributing to the efficiency of the underground passage are such factors as the quality and porosity of the soil, the residence time of the water in the underground, and the water's temperature, pH conditions, and oxygen concentration. Depending on local conditions, the soil may show a nearly unlimited capacity for adsorption and ion exchange as well. Moreover, the characteristics of the bank filtrate are affected by quality and quantity changes in the river water, characterized by the number of particles, concentration of dissolved organic matter from natural and artificial sources, oxygen, ammonia, nutrients, microorganisms, and other pollutants.

Figure 6 summarizes the concentration of ammonia, manganese, and oxygen in the bank filtrate of the Rhine River in the past 25 years.[10] In the early 1970s, the bank filtrate was typically high in ammonia and manganese concentrations and low in oxygen levels. At the time, European rivers (especially the Rhine River) were highly polluted, and nitrification and biodegradation consumed what little oxygen remained in the water. Since then, environmental protection measures have led to improved river water quality, including increased oxygen concentrations. Remediation by industrial polluters and municipal wastewater plants resulted in removal of all ammonia and many biodegradable compounds. These steps have had a beneficial effect on oxygen concentrations in the bank filtrate as well.

As shown in Figure 6, the bank filtrate in the 1970s was characterized

FIGURE 7 Effect of bank filtration on biological regrowth

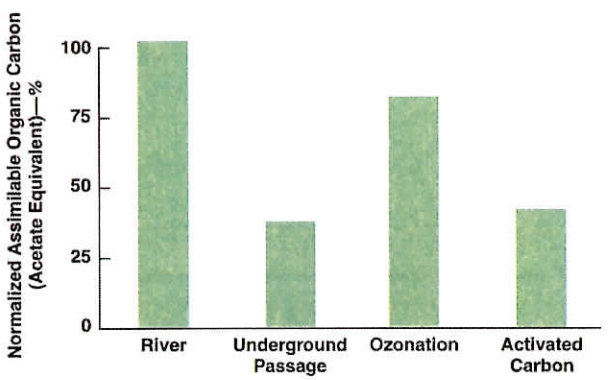
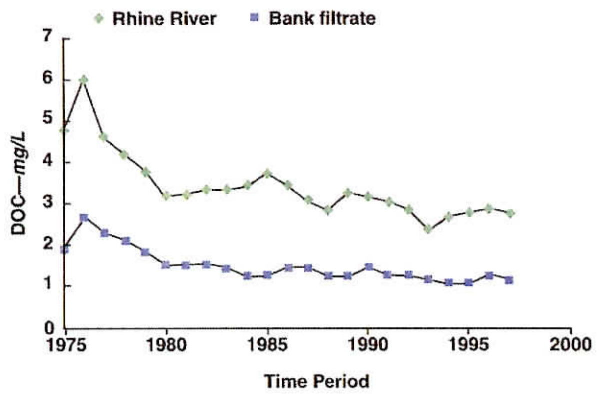


FIGURE 8 DOC concentration in river water and bank filtrate



DOC—dissolved organic carbon

by anaerobic conditions, with oxygen concentrations < 1 mg/L. The 1980s saw a continuous increase in oxygen concentrations in the bank filtrate, with levels reaching ~ 3 mg/L. These increased oxygen concentrations resulted in higher removals of ammonia and manganese. In 1973, for example, > 1 mg/L ammonia was detected in the bank filtrate. Seven years later, the ammonia concentration was < 0.1 mg/L.

Analogous observations were made for iron and manganese as well. These species are often found underground in an oxidized form and therefore are not soluble. Under anaerobic conditions, they are reduced to iron(II) and manganese(II), which are soluble species. This illustrates one disadvantage of bank filtration, because once the iron and manganese are released from the earth/soil matrix, they must then be removed by a subsequent treatment step.

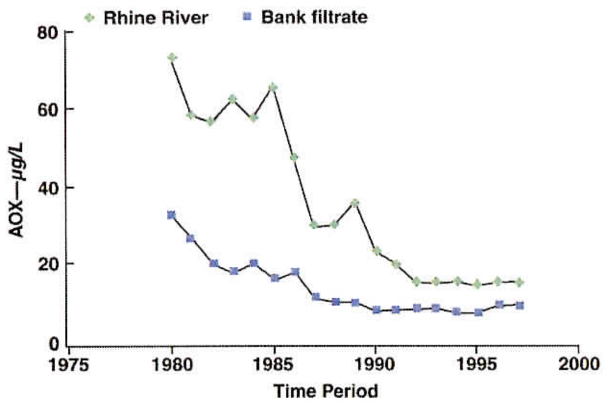
Bank filtration reduces potential for biological regrowth. Bank filtration also improves the microbial quality of the water, which can be measured as a decrease of the biological regrowth potential (BRP). In the example shown in Figure 7, BRP is measured by assimilable organic carbon. The BRP of the river water was set at 100%. Underground passage decreased the BRP from 100 to 37%. As expected, a subsequent ozonation step increased the BRP to nearly the same value as measured in the river water because of the oxidation of organics, which become more biodegradable. These biodegradable compounds were then removed by biologically active filters, shown by the further drop of the BRP in the effluent of the GAC filters.

Biodegradable compounds are responsible for regrowth potential, so having fewer biodegradable compounds is important. Bank filtrate is therefore a fairly biologically stable water with a lower disinfection or oxidation demand. This leads to decreased formation of trihalomethanes after disinfection with chlorine. Although bank filtration does not replace the disinfection step in general, there are cases in which no disinfection is used.

TABLE 1 Effect of bank filtration on various water quality parameters in the Elbe River example

Parameter	River	Bank Filtrate	Percent Elimination
pH	7.5	7.1	5
Carbonic acid—*mol/m³*	0.13	0.31	–138
Dissolved organic carbon—*mg/L*	6.2	4.5	27
Adsorbable organic halogen—*mg/L*	0.09	0.04	56
Adsorbable organic sulfur—*mg/L*	0.25	0.21	16
Biological oxygen demand—*mg/L*	4.5	0.8	82
Ammonia—*mg/L*	0.7	0.2	71
Oxygen—*mg/L*	8.3	1.1	87
Colony count at 20°C—*cfu/mL*	21,272	15	99.9

FIGURE 9 AOX concentration in river water and bank filtrate



AOX—adsorbable organic halogen

FIGURE 10 Influence of bank filtration on the concentration of dichlofenac

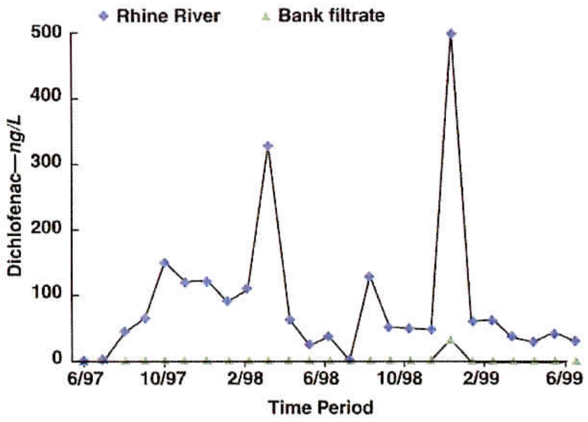


Table 1 shows one instance of the effect of bank filtration on indicator parameters. The increase in the concentration of carbonic acid combined with the drop in the pH is attributable to microbial processes in the underground, because organic substances (measured by the DOC concentration) are mineralized to carbon dioxide. Substances measured as DOC, adsorbable organic halogen (AOX), adsorbable organic sulfur (AOS), and biological oxygen demand are removed partly by the underground passage of the water.

Conditions affect bank filtration efficiency. As discussed previously, the efficiency of underground passage depends on several factors. The degree to which substances are reduced, for example, may vary between different rivers and at different sampling points on a river. Because bank filtration is affected by such local circumstances as river water quality, retention time, and geological conditions, it is impossible to make specific claims regarding the efficiency of bank filtration. In general, however, the efficiency of bank filtration is such that bank filtrate can be regarded as a good groundwater.

In addition to smoothing out normal variations in concentrations of contaminants, underground passage acts as a barrier against shock loads resulting from such emergency situations as chemical spills or defects in industrial wastewater plants.

The percentages in Table 1 are valid only for a specific sampling point in a specific water treatment plant. In most situations, however, bank filtration's removal of substances measured as DOC, AOX, and AOS is between 30 and 80%. In most cases, there is also a small dilution effect with groundwater, but the carbon mass balance in the example shows a good relation of DOC transformation into carbon dioxide. The decrease of ammonia depends on the oxygen profile in the underground. At aerobic conditions, ammonia is often removed completely. The considerable decrease in the colony count shown in Table 1 should be valid for most applications of bank filtration.

Experience has shown that the efficiency of underground passage in removing substances dissolved in river water is continuous. Long-term measurements have indicated a nearly constant performance for bank filtration. Figures 8 and 9 show DOC and AOX concentrations for one specific sampling point to exclude side effects.[10]

Figure 8 compares DOC concentrations in the *Rhine River* and in

FIGURE 11 Influence of bank filtration on the concentration of carbamacepine

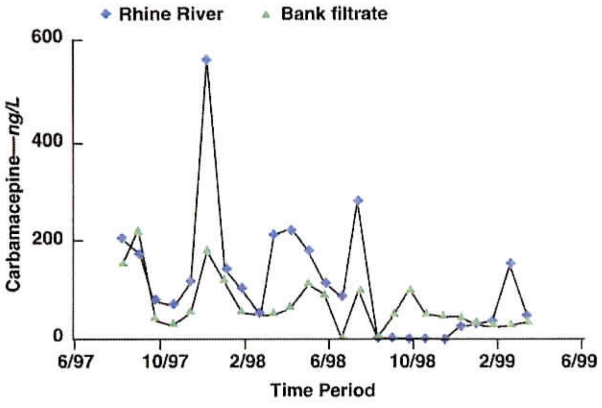
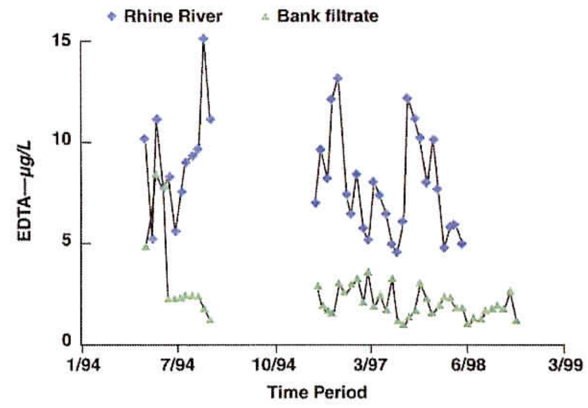


FIGURE 12 Influence of bank filtration on the concentration of EDTA



EDTA—ethylenediaminetetraacetic acid

the corresponding bank filtrate for a water utility in the central Rhine area over the past 25 years. In the late 1970s, the DOC concentration in the Rhine River was > 3 mg/L, compared with a DOC concentration in the bank filtrate of 2–3 mg/L. In later years, the DOC concentration in the river dropped to ~ 2.5 mg/L, with a corresponding decrease in the bank filtrate DOC concentration to ~ 1 mg/L. Within the time interval depicted, the percentage of the DOC reduction between the river and bank filtrate was nearly constant at approximately 50%.

Figure 9 shows similar results for monitoring of AOX concentrations. In the 1970s and early 1980s, AOX concentrations of ~ 60 µg/L were found in the Rhine River. In the years that followed, AOX concentrations dropped to ~ 10 µg/L because of environmental protection measures (in this instance, primarily oxygen treatment replacing chlorine bleaching in paper mills). A corresponding decrease in AOX concentration was found in the bank filtrate. Experiences in other water plants along the Rhine and other rivers indicate that the behavior demonstrated here was representative.

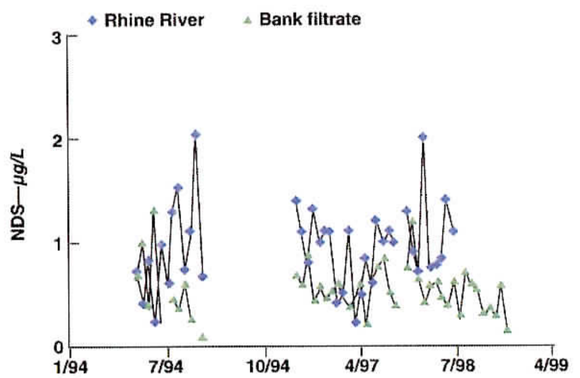
Many contaminants are removed by bank filtration. Monitoring of micropollutants in river water and bank filtrate indicate that bank filtration acts as a barrier for many substances. Application of advanced analytical methods to monitor micropollutants such as chelating agents, pesticides, amines, sulfonates, pharmaceuticals, and endocrine disrupters may yield similar findings. Because the behavior of a given compound during bank filtration can be quite well predicted if the biodegradability of the substance is known, similarly biodegradable substances should behave in a similar way in bank filtration settings. Therefore, although there are data for many compounds, only a few examples are cited here.

Figure 10 summarizes analytical data of dichlofenac in the Rhine River and the bank filtrate.[11,12] Dichlofenac, a common pharmaceutical used as a basic compound in antirheumatics therapy, is present in

TABLE 2 Bank filtration versus technology

River Water Contaminant	Bank Filtration	Engineered Process (Excluding Biological)
Ammonia	Nitrification (aerobic)	Oxidation (chlorine, stripping)
Nitrate	Denitrification (anaerobic)	Ion exchange, reverse osmosis
Other inorganic compounds	Adsorption, ion exchange, precipitation	Flocculation
Biodegradable organic compounds	Biological degradation	Oxidation, flocculation
Particles	Filtration	Flocculation, filtration, membranes
Microorganisms	Adsorption, filtration	Disinfection, membranes, filtration
Persistent compounds	None	Adsorption, oxidation

FIGURE 13 Influence of bank filtration on the concentration of NDS



NDS—naphthalene-1,5-disulfonate

most domestic wastewater and therefore in rivers. In the period studied (June 1997–June 1999), the concentration of dichlofenac in the river was between the detection limit and 500 ng/L. In general, the substance was not detectable in samples of bank filtrate. Similar results were found for bezafibrate, a pharmaceutical used as a lipid-regulating agent. These results indicate that both pharmaceuticals are highly biodegradable during bank filtration.

Some compounds may be persistent. Other micropollutants, however, are less affected by passage underground and consequently are harder to treat. Carbamacepine is a pharmaceutical used in the treatment of epilepsy. As Figure 11 shows, carbamacepine was present in both the river water and bank filtrate for the period June 1997–June 1999.[11,12] The concentrations in the river water and the bank filtrate were often similar, although some spiking was evident.

The chelating agent ethylenediaminetetraacetic acid (EDTA) is present in many river waters and therefore is a good indicator for human activities. Figure 12 summarizes the EDTA concentration in water samples collected from the river water and bank filtrate.[12] The figure shows moderate elimination of EDTA by bank filtration. In contrast, practical cases and laboratory tests have shown that nitrilotriacetic acid, a similar but more biodegradable compound, is nearly completely removed by bank filtration.

Naphthalene-1,5-disulfonate (NDS), a concrete additive, is another micropollutant that shows slight elimination during bank filtration (Figure 13). Data from the period January 1994–April 1999 indicate the NDS concentration of the bank filtrate is somewhat lower than that of the river water.[12] At various points in time, however, the concentration in the bank filtrate may be even higher than in the river water, because of the time lag during bank filtration. Such results do not contradict the results shown in Figure 5. Bank filtration is able to reduce shock loads, i.e., short-term incidents. However, long-term contamination of the river water by persistent compounds is seen (after the time lag) as contamination in the bank filtrate. For this reason, water utilities should consider removal of these persistent contaminants a priority. Compounds that defy riverbank filtration should be removed from wastewater plants at the point of production or replaced by biodegradable species that are less harmful to the environment as well as drinking water quality.

BANK FILTRATION AFFECTS TREATMENT TECHNOLOGY REQUIRED

Bank filtration is efficient enough to replace or support treatment steps in a water plant. Table 2 lists some contaminants, describes how they are affected by bank filtration, and summarizes the treatment processes that are supported or replaced.

For example, under aerobic conditions bank filtration transforms ammonia by biological nitrification, making the treatment step of oxidation of ammonia with chlorine unnecessary. Nitrate is often removed by expensive technological processes such as ion exchange or reverse osmosis. If the underground passage conditions are anaerobic, bank filtration eliminates nitrate by natural processes.

In addition, the removal of biodegradable organic and inorganic compounds by bank filtration supports most treatment steps. For example, a decrease of the DOC concentration will afford an enhanced adsorption of micropollutants onto activated carbon, thus extending the run-time of the activated carbon filters. If flocculation is used as the first step in river water treatment, flocculants

In Germany, the major raw water source for drinking water treatment is groundwater, followed by bank filtration.

Continued emphasis should be placed on steps to improve and safeguard river water quality, including protection of catchment areas, environmental protection measures, and more efficient wastewater treatment.

are required to remove biodegradable substances, whereas bank filtration removes biodegradable substances naturally. Consequently, the biological degradation of substances dissolved in the water decreases the quantity of water treatment residuals and the use of chemicals in the first place. The removal of particles and microorganisms during bank filtration also supports other treatment steps such as filtration, membrane technologies, or disinfection.

It is true that bank filtration has no effect on more-persistent compounds and that bank filtration treatment of highly contaminated river water often requires an additional oxidation or adsorption step. Nevertheless, the overall advantages of bank filtration are significant and should help reduce treatment costs for utilities using river water.

SUMMARY AND CONCLUSIONS

Bank filtration is a natural treatment process that can replace or support other treatment steps. Because of this, long-term application of underground passage as a treatment tool can lead to decreased water treatment costs. The passage of water underground can constitute an important treatment step to improve drinking water quality. Furthermore, application of bank filtration or infiltration in the treatment process provides an additional safeguard for drinking water, because of the processes' effectiveness in emergency situations. All of these advantages should make bank filtration an acceptable treatment alternative for both consumers and water suppliers.

Nonetheless, the water industry must keep in mind that underground passage of water is not capable of removing all relevant contaminants from river water nor is it applicable in all river beds or riverbanks. Therefore, continued emphasis should be placed on steps to improve and safeguard river water quality, including protection of catchment areas, environmental protection measures, and more efficient wastewater treatment.

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If you have a comment about this article, please contact us at <journal@awwa.org>.

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Oceanside Water District

Source Water Strategy

Current Situation

- Short Creek (Principal Source for Oceanside and Cape Meares)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- <0.15cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Coleman Creek (Unused)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Baughman Creek (Unused)
  - Water Rights Owner-- Ron Rosenburg
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Greencrow

Future Situation (Scenario 1)

- Short Creek (Principal Source for Oceanside)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- <0.15cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Coleman Creek (Principal Source for Cape Meares)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Baughman Creek (Unused- emergency backup)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Greencrow

Future Situation (Scenario 2)

- Short Creek (Backup Source for Oceanside)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- <0.15cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Coleman Creek (Principal Source for Cape Meares)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs
    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Stimson Lumber Co.
- Baughman Creek (Principal Source for Oceanside)
  - Water Rights Owner-- Oceanside Water District
    - Authorized Flow- 0.7 cfs

    - Actual OWD diverted flow- 0.0 cfs
  - Watershed Land Owner- Greencrow

Issues Remaining to achieve Scenarios

- Scenario 1
  - Obtain and Secure Rights to Baughman Creek
  - Obtain and Secure Rights to Coleman Creek
  - Carry out needed water quality tests to Baughman Creek
  - Carry out needed water quality tests to Coleman Creek
  - Connect Coleman Creek to Cape Meares Distribution System
  - Explore scheme for connection to Baughman in an emergency
- Scenario 2
  - Obtain and Secure Rights to Baughman Creek
  - Obtain and Secure Rights to Coleman Creek
  - Carry out needed water quality tests to Baughman Creek
  - Carry out needed water quality tests to Coleman Creek
  - Connect Coleman Creek to Cape Meares Distribution System
  - Connect Baughman Creek to Oceanside Distribution System

OCEANSIDE WATER DISTRICT
Monthly Operations Report

January 2016 ~ February 2016

	Gallons Used In January 2016	Gallons Used In January 2015	Percentage Change %
Cape Meares	**556,200**	**489,000**	**+13**
The Capes	**162,000**	**515,000**	**-316**
Oceanside	**777,950**	**623,850**	**+20**
Maxwell Mt.	**267,500**	**177,700**	**+34**
Camelot	**287,000**	**403,000**	**-140**
Totals	**2,256,800**	**2,388,100**	**+4**

Monthly Backwash Waste Total: 206,150 gals. *Daily Average*: 72,800gals.

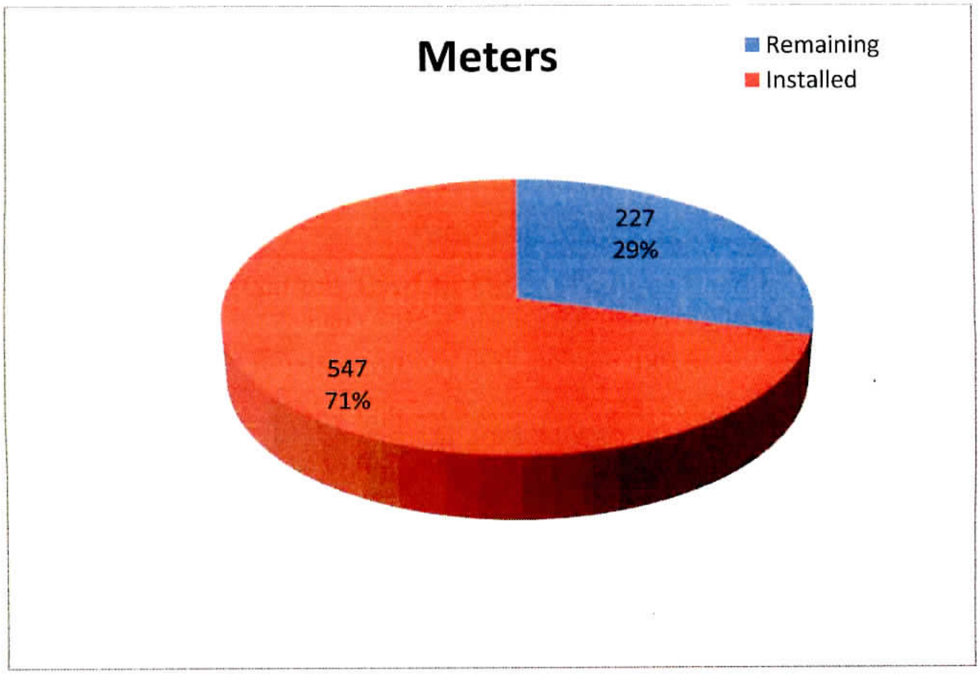
Treatment Plant: A customer on Maxwell Mountain reported he had returned twice from Portland to find his water running from a hose faucet at his home. He is now shutting off his water when he leaves, but this is a portion of the increase in Maxwell mountain usage.

Because of the Maxwell Mountain pump being out of service we have been using the submersible pumps at the plant to send water up the mountain. The submersible pumps feed from a line that fills the Oceanside main reservoir. Therefore when the submersible pumps run they are pulling water from the main reservoir that has already passed through the Oceanside meter. This distorts the usage readings for both Maxwell Mountain and Oceanside.

Last year we had leaks located and repaired in both the Capes and Camelot areas which accounts for the large decrease in usage for both those areas.

The New pump installed for Maxwell Mountain ran for about 15 minutes and then seized. The field representative from PumpTech was present and working on the pump when it seized. We pulled the pump on Feb 2nd and sent it back to their shop for repairs. The cause of the malfunction has yet to be determined.

Distribution System: Your distribution crew has been diligently installing meters in Oceanside and should be on to Cape Meares within the week. Spike reported a customer side leak in Cape Meares and turned off their service at the meter.



OCEANSIDE WATER DISTRICT

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MEMO TO:	OWD Board of Commissioners
FROM:	Julia Johnson, Assistant Office Manager
SUBJECT:	Office Report for February 16, 2016 Board meeting

OFFICE UPDATE:

1. 38 Past Due Letters were sent out last week, with late fee and interest added.

2. Continuing to update accounts to radio meters that are being installed in Oceanside. At this time there are approximately 48 meters left in Oceanside to install and we will be ready to start in Cape Meares. Meters will be read again the first week in March.

3. A new feature is now offered in our billing software were customers can set up fixed recurring payments with either a credit card or e-check. This feature is set to accept quarterly payments on the 10th of each quarter.

4. Employee accruals-
   David Nordman: 52 hrs. sick leave, 104 hrs. vacation accrued.
   Alan Tuckey: 90 hrs. sick leave, 62.70 hrs. vacation, 14.25 hrs. comp time accrued.
   Julia Johnson: 46.5 hrs. of sick leave, and 16.35 hrs. of vacation accrued.

Respectfully submitted,
Julia Johnson, Assistant Office Manager