Engineering Overview and Analysis
July 2009 Update
of the
Herron Island Water System

System Leaks

No detailed history of leaks has been kept by the water system; however, the water committee was able to put together a general history of repair work to the distribution system through historic time records.

We have reviewed the leak/repair history over the last three years and mapped all the repairs on a map of the island. It certainly appears that leakage is a more serious issue than when we gathered information over a year ago. This additional data will help the community make better decisions. Thus far, 2009 has seen the worst leakage so far with three main breaks and four breaks on service laterals. While this is a higher rate of repair than would generally be considered acceptable, it is not necessarily an indication that the leakage is getting worse over time. The limited data does not show a clear trend of breaks getting worse.

It has been reported that all of the leaks are occurring at joints. This is the normal route of failure and is actually a good sign. If the leaks had been occurring in the middle of the pipes, we would suspect that the Asbestos-Cement pipe was becoming soft and heading towards catastrophic failure.

As it is, the pipe is failing at the joints, an indication that the ground has shifted and/or is shifting. I would also recommend reviewing your repair procedures. A couple repairs were completed on the same valve/service connection. In addition, some of the main repairs were completed in the immediate vicinity of each other. This indicates that the first repair may have contributed to the need of a second repair.

When we composed the initial engineering report, we did not have this repair history data. Therefore, while I would not classify your system as in a "catastrophic failure" or in an "emergency", I would recommend that replacement of the distribution system takes a very high priority. If an off-island contractor were hired, you would be spending $10,000-$20,000/ year on repairs, which is 1-2% of the cost to replace the main backbone of the distribution system. Eventually, the system will come to the point where you will be paying more to repair the system than it would cost to replace it, making replacement all the more difficult to afford.

It was also reported to us that January usage was nearly 1,000,000 gallons for the system. This results in approximately 830 gallons per day per active home. One would expect actual water use to be closer to 150-250 gallons per day per active home (240,000 gallons actual usage during the month). This means that there was an average leakage of about 17 gpm during this time and that the system was loosing 3 times more water than it was using. Of course without service meters, these are just rough estimates.

Coliform Monitoring
Every leak also increases the likelihood of contamination and the requirement for chlorination. Technically, every time a system (or portion thereof) looses pressure, or a waterline is repaired, an additional coliform sample should be taken to see if contamination did indeed occur. While there is not a specific requirement in the law that dictates if and when samples should be taken, industry standards and Department of Health expectations are that system operators use their judgment to protect the health of their customers.

In general, I would recommend the system collects an investigative sample under the following conditions:

1. A portion of the distribution system has had pressure below 20 psi for more than four hours.
2. A portion of the distribution system has experienced a negative pressure.
3. A portion of the distribution system has been emptied.
4. Any part of the water system has been "opened up" (other than the reservoir hatch or other feature meant to be regularly opened).

If several repairs are occurring over a short period of time, it may be appropriate to wait until the end of the project before sampling.

The coliform sample should be marked "investigative construction or repair". It should be taken immediately downstream of the affected location. If the sample comes back positive, the affected area should have additional disinfection and be re-sampled.

The operator should temper these guidelines with common sense. In short any time there is a reasonable risk that the system was contaminated, an investigative sample should be submitted. Taking several samples over the course of many years may be an added expense and inconvenience; however, it is very cheap insurance against having accusations thrown against the community after someone gets sick (whether it is actually related to the water or not).

Conclusions and Recommendations
While the new data adds some urgency to the need for the community to make decisions and work towards replacing the distribution system, it does not significantly change or previous recommendations.

Leaks and line breaks are undesirable for the following reasons:

1. Increased pumping (electricity) costs
2. Potential of microbial contamination
3. Inconvenience for property owners during an "out of water" event.
4. Possible damage to property through flooding (roads, homes, etc.)

The likelihood of a significant health hazard or major damage to property is unlikely; however, the possible ramifications if such an incident were to occur could be very serious.

In general, four to five major breaks a year is not acceptable for a system of your size. While they may be able to be justified financially, they likely do not meet the reliability expectations of the community.

The Washington State Department of Health regulates reliability in a manner different than most other aspects of a water system. The reliability of a system needs to provide a level of service acceptable to the customers served by that system. While every member will have a different expectation, I would anticipated that at 4-5 major breaks a years, a significant percentage of the membership will expect reliability to improve.

As a community, you still need to commit to replacing the entire distribution system within the next several years. This can be done by prioritizing the problem areas and areas with the most year-round residences first. While you have time to make good decisions, you do not have time to "wait and see". The leaks and water outages, while they may come in bunches, will generally get worse over time. Therefore, it is imperative that the community begins taking steps to replace the water mains as soon as possible.

While your water system is not in a "state of emergency" you definitely need to have a sense of urgency regarding upgrades to the distribution system. As previously stated the important steps to take at this point are:

1. Choose the Ownership Route

If community retains ownership, then:

2. Identify criteria to be used to make the distribution system replacement decisions (decide on fireflow, determine condition of pipes, choose how it will be funded, etc)
3. Choose a realistic service meter and/or distribution system replacement timeline
4. Have bid docs prepared for service meter installation or the engineering/bid docs prepared for the distribution system replacement.

As stated in the original report, outside ownership of your system may decrease the amount of effort required by the community; however, it will result in additional expense through loss of volunteer effort and the need for outside contractors to visit the island to work on the system as well as loss of control of how the system is operated and upgrades are completed in the future.

Long term risk associated with responsibility of the water system is minimal provided the responsible party is following Department of Health regulations and generally accepted industry practices. Even if control is forfeited to an outside party, the system will carry

some degree of liability for the system. Ownership by another utility would not include a full-time, on-site presence. Therefore, the association would still have liability associated with notifying an owner of problems, access of the owner to the system, and cooperating with the owner in regards to the roads, ferry, community property, and other island business.

Regardless of who owns the system and who controls the asset of your water supply, it is important to recognize that upgrading the distribution system needs to happen either way. Moreover, the property owners will end up paying for these upgrades regardless of who owns the system.