

## **APPENDIX L**

### **DSL STUDY**

# CITY OF BINGEN

KLICKITAT COUNTY

WASHINGTON



## DISTRIBUTION SYSTEM LEAKAGE STUDY

G&O #11248  
JULY 2012



**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

# CITY OF BINGEN

KLICKITAT COUNTY

WASHINGTON



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## INTRODUCTION

This report aims to pinpoint areas where the City of Bingen (City) is experiencing distribution system leakage (DSL) and recommend an action plan to reduce losses within the system. The City updated their Water System Plan (WSP) in December 2008 and the Department of Health (DOH) approved the City's WSP in May 2009. As a requirement of the WSP, the City looked at historical water production and consumption data. The data was used to forecast future water use needs for the City and to meet the requirements of the Municipal Water Law.

The Municipal Water Law was passed in 2003 under RCW 90.46 to require water systems to implement water use conservation measures. As a result of the law, DOH developed Water Use Efficiency (WUE) requirements in 2006. The purpose of the WUE requirements are to ensure long-term water supply reliability, protect public health, promote efficient use of the state's water resources, and ensure efficient operation and management of water systems. The WUE requirements must be included as part of the WSP and per the *DOH Water Use Efficiency Guidebook, January 2011*, include:

- Data collection
- Demand forecasting
- Evaluating WUE measures
- Calculating distribution system leakage (DSL)
- Implementing a WUE program to meet goals

Additional WUE requirements include meeting a distribution system leakage standard of ten percent to minimize water loss. The 10 percent DSL is calculated and reported to DOH as a 3-year rolling average. Systems are also required to report annually to DOH and customers on the performance of meeting the WUE goals.

This study will be organized into the following sections:

- Summary of 2008 WSP Data and Water Use Efficiency Plan
- Review existing water production and consumption data
- Review the leak detection survey and estimate potential DSL
- Evaluate information from additional meters
- Recommend an action plan for reducing DSL

Figure 1 shows the City's water system facilities, largest water users, and leak locations.

## 2008 WSP DATA AND WATER USE EFFICIENCY PROGRAM

DOH defines DSL as "all water that is not authorized consumption. The water lost from the distribution system and includes both apparent losses and real losses." DSL may come from inaccurate meters, errors in data collection, water main leaks, and theft.

Table 1 shows the summary of DSL data that was included in Chapter 4 of the City's 2008 WSP.

**TABLE 1**

**2008 Water System Plan Historical DSL Summary City of Bingen**

Year	Metered Production (MG)	Authorized Consumption (MG)	Distribution System Leakage		
			MG	%	3-year Rolling Average
2001	71.23	47.13	24.10	34%	
2002	73.61	45.45	28.16	38%	
2003	89.56	67.21	22.34	25%	32%
2004	86.82	64.99	21.82	25%	29%
2005	82.48	53.58	28.89	35%	28%
2006	78.35	40.10	38.26	49%	36%
2007	73.88	40.88	33.00	45%	43%

The City's DSL in 2007 was 45 percent and generally increased from 2001 to 2007. The City's DSL is well above the target level of 10 percent. At the time the WSP was written, the City had identified two areas in its distribution system that seem to have contributed to a significant amount of the City's total DSL. One area is the Old Line that comes directly from White Salmon; the other is the metering system for Underwood Fruit, the second largest water user in the City. SDS consumed 19,085 gpd (17.04%) in 2007 while Underwood Fruit consumed 7,328 gpd (6.54%).

**2007 OLD LINE ANALYSIS**

The difference between the White Salmon meter and the sum of the individual service meters is substantial. In 2007, total metered consumption for the City was 40,876,627 gallons and metered production, including purchases from White Salmon, was 73,876,097 gallons. The rate of DSL in 2007 was 32,999,470 gallons, while DSL on the Old Line was 5,832,966 gallons, which represents 17.7 percent of the City's total DSL for 2007. If the Old Line truly has a leak totaling approximately 5.8 MG per year, the City's rate of DSL would drop by about five percent if this apparent leak is fixed.

**2008 WUE PROGRAM**

The City made two Water Use Efficiency goals in the 2008 WSP. Goal No. 1 of the WUE Program was to reduce DSL to a 3-year rolling average of ten percent by July 2011. The City would also develop a water loss control action plan to remain in compliance with DOH DSL standards if this is not met. Goal No. 2 was to reduce the customer consumption by 10 percent over the 20-year planning period. The City had

already begun to reduce DSL at this time by beginning radio read service meter installation in 2010, starting a leak detection program in 2009, installing new service meters at Underwood Fruit, and installing a PRV on the Old Line to reduce system pressures to the 13 services on that part of the water system.

## REVIEW OF EXISTING DATA

Production data is recorded by hand 5 days a week at each source on a Daily Log Sheet. The water system operator then transfers this data into a monthly EXCEL table. The City Clerk then compiles the data from each source, consumption data, and other authorized uses to create the DSL report.

Gray & Osborne reviewed the DSL summary reports to verify totals were taken correctly. It appears that the monthly totals for all sources were taken from middle of month to middle of month. The reason the City calculates monthly production totals from these dates is to match the dates when service (consumption) water meters are read.

The daily volume of water produced for each source was compared to the EXCEL file produced by the operator. The operator EXCEL records were randomly spot checked against the hand recorded log sheets for two days per source per month. No inconsistencies were found in the record keeping or manual transfer of production values.

The City uses BIDS as their water and sewer system billing software. Seventy percent of the City's 355 customer accounts are radio read. The remaining 105 accounts are read manually. This study did not review the manual meter reading records or the data from the radio reads. We reviewed the summary data produced by BIDS for production values. BIDS has a slight flaw when producing the summary report for each month. It includes a 'No Service' customer class in the water use by class summary that is sewer use. These values must be subtracted from the BIDS total. There are two 'No Service' sewer line items for each month that must be subtracted. City records account for this inaccuracy, and we have double checked that the values subtracted are correct.

Table 2 shows DSL values from 2008 through 2011, as reported by City staff.

**TABLE 2**

**2008 to 2011 DSL City of Bingen**

	2008	2009	2010	2011
Production	69,585,568	78,340,328	102,018,190	100,130,825
Consumption	42,481,821	47,973,554	47,280,559	43,982,870
DSL	27,103,747	30,366,774	54,737,631	56,147,955
Percent DSL	38.95%	38.76%	53.65%	56.07%
<b>3-Year Average</b>	<b>44.32%</b>	<b>40.90%</b>	<b>43.79%</b>	<b>49.57%</b>

Production volume includes water from the City's three wells (Reservoir, Park and Dry Creek Wells) and three metered interties with the City of White Salmon. Production volumes increased by more than 30 million gallons between 2008 and 2011 while consumption slightly decreased. Consumption volume includes all metered water usage and estimated fire hydrant and flushing usage. There were no flushing estimates in the records for 2011.

The data in Table 2 shows that since the WUE program was implemented in the 2008 WSP, the City has been unsuccessful in meeting their WUE goals. The City reduced the 3-year rolling average of DSL in 2009 to 41 percent, but production volumes increased significantly in 2010 while consumption remained essentially the same.

**CORRECTED DATA**

In reviewing the 2011 consumption records, three discrepancies were found. The total water use for August should be 5,838,548 gallons instead of 5,856,318 gallons, the 'No Service' sewer line totals for August should be 250,070 gallons instead of 267,840 gallons, and the 'No Service' sewer line totals for October should be 1,070,333 gallons instead of 972,323 gallons. These corrections are included in Table 3.

Flushing and hydrant use has been historically recorded by the City. Values for 2008 through 2010 were provided, but 2011 data has not been provided. In Table 3, flushing for 2011 has been estimated as the average of previous years until more accurate data is obtained.

In July 2011, it was discovered that one of the meters for SDS Lumber, had been consistently misread by a factor of 1,000 gallons. Historical data presented in Table 3 has corrected this reading error.

**TABLE 3**

**2008 to 2011 DSL – Corrected Data**

	2008	2009	2010	2011
<b>Production</b>	69,585,568	78,340,328	102,018,190	108,988,545
Metered Consumption	46,682,760	52,651,689	54,914,649	56,137,313
BIDS Correction	(1)	(1)	(7,992,568)	(8,591,046)
Flushing	795,060	152,020	358,478	255,249 <sup>(2)</sup>
SDS Usage	NA	2,355,809	7,346,646	3,860,066
<b>Consumption</b>	47,477,820	55,159,518	54,627,205	51,661,582
<b>DSL</b>	27,103,747	23,180,810	47,390,985	57,326,963
<b>Percent DSL</b>	31.77%	29.59%	46.45%	52.60%
<b>3-year Average</b>	36.92%	35.45%	35.94%	42.88%

(1) Not broken out in records, value included in metered consumption.

(2) Estimated based on the average from 2009 and 2010 until estimates are obtained from City.



The changes shown in Table 3 incorporate accounting errors for 2011 consumption records and corrected SDS meter readings. The revised data is a more accurate indication of the City's DSL. The corrected data decreased the 3-year average of DSL in 2011 from 50 percent to 43 percent, a reduction of 7 percent.

## **SOURCES OF DSL**

A review of data accuracy, methods, and errors reduced the DSL seen by the City by approximately 7 percent. The 2011 3-year average DSL of 42 percent remains well above the target level of ten percent. This section of the study will assess areas within the City's system that are a likely contribution to DSL.

### **2010 AND 2011 OLD LINE ANALYSIS**

The City has known that the 1,800 LF of 3-inch steel main along Oak Street, referred to as the Old Line, has been contributing to DSL since the 2008 WSP. This portion of the distribution system is not connected to the rest of the City's system. The 3-inch line is supplied by White Salmon through a master meter and serves a total of 13 homes.

A comparison between the master meter data and the consumption records for the 13 homes served by the Old Line is significant. In 2010, the Old Line contributed 2.4 MG to DSL and in 2011 the Old Line contributed 2.1 MG to DSL. If the losses in the Old Line were eliminated, 2010 and 2011 DSL would be 45 and 52 percent, respectively. This is a total reduction of approximately one percent DSL.

The Old Line is a known source of DSL and the City is taking steps toward replacing this water main. This project is included as a capital improvement in the WSP. The City applied for Drinking Water State Revolving Funds for this project, but was denied financing. The City applied for Public Works Trust Fund financing in May 2012.

### **STEBEN STREET WATER MAIN**

On February 21, 2012, the City experienced a water main break on a 3-inch steel line on Steuben Street. The City installed a temporary fix, but replacement of 570 feet of the main is scheduled to occur with the Old Line main replacement. In the 2 months since the leak was fixed on Steuben Street, the City has noticed a significant reduction in DSL. 2012 data is shown below in Table 4.

This table also shows the DSL the City would see if there was not any leakage in the Old Line. The volume lost in the Old Line was calculated with the master meter reading that serves the line from White Salmon, and the sum of individual service meters on the Old Line. The difference between these values is the total volume lost in the Old Line. This lost volume of water is subtracted from the total production volume to determine what DSL would be seen by the City if the Old Line leaks were eliminated.

TABLE 4

## 2012 DSL Data City of Bingen

(gallons)	January	February	March	April	May	June
Production	10,028,836	8,744,394	6,347,633	5,731,968	5,277,780	5,256,750
Old Line Losses	233,414	185,000	209,950	178,410	192,414	201,316
Consumption	3,825,208	3,589,792	4,272,750	4,090,336	3,347,051	3,394,090
Flushing	4,580	10,480	8,050	10,170	89,375	21,180
DSL	6,203,628	5,154,602	2,074,883	1,641,632	1,930,729	1,862,660
	61.9%	58.9%	32.7%	28.6%	36.6%	35.4%
DSL w/Old Line Adjustment	5,970,214	4,969,602	1,864,933	1,463,222	1,738,315	1,661,344
	60.9%	58.1%	30.4%	26.3%	34.2%	32.9%

Since repairing the leak at Steuben Street, the City has seen a reduction in DSL of approximately 26 percent. Once the City repairs the Old Line, an additional potential DSL reduction of three percent is anticipated.

## REVIEW OF LEAK DETECTION SURVEY

As documented in Appendix 1 and shown on Figure 1, leak detection survey was performed by Leak Masters LLC July 12, 2010 through July 15, 2010. The entire system was surveyed and several leaks were found with a S30 Surveyor leak noise amplification system, and an Accucorr leak correlator.

### LEAK NO. 1

A leaking main and valve at the abandoned mill on the east end of Bingen by the river was located and has an estimated leakage of 5 gpm. The valve was operated but noise continued, indicating that the valve is not operating correctly and is leaking water into the old piping at the mill. Leak Masters recommends replacing this valve. Yearly leakage could amount to 3 MG according to the estimates provided by Leak Masters.

### LEAK NO. 2

A leak was detected with the detection equipment on an abandoned 1-1/4-inch line on Henderson Drive on the east end of the City. The valve on this line was operated and does not shut off completely. Leak Masters recommends replacing this portion of the water line and the main valve. Alternatively, a valve could be installed directly upstream of this location because there are no additional services off of the 1-1/4-inch line. Yearly leakage at this location could amount to approximately 3 MG according to the estimates provided by Leak Masters.

### **LEAK NO. 3**

This leak found was a main leak on a 4-inch steel line at Alder and Lincoln in front of the veterinary clinic. Notes from Leak Masters indicate that three meters off of this line are loud, as well as the valves on each end of the line. A creek runs directly west of this location, and makes it difficult to pinpoint the exact location of the leak with the correlator. Although additional access is required to determine the exact location of the leak, Leak Masters estimates leakage between 5-25 gpm. City staff repaired the leak on this line on August 12, 2010 and estimate 10 gpm has been leaking for several years. It is possible that there are additional leaks in this area that have not been fixed. Gray & Osborne recommends replacing the service meters and valves around this location. Yearly leakage here could amount to approximately 13 MG, based on Leak Masters estimate of 25 gpm.

### **LEAK NO. 4**

Another main leak was located at Lois Lane and Oak on the 2-1/2-inch line that feeds the City from White Salmon. Two leaks were found 1.4 feet and 6.4 feet from this intersection. It is possible that additional leaks were not found on this line due to the extreme traffic noise that interferes with the leak detection equipment. Leak Masters estimates the leakage here could amount to approximately 3 MG. Leak Masters recommends replacing 10 feet of main up the hill from this location.

### **ADDITIONAL LEAK DETECTION INFORMATION**

City staff found a leaking valve that was not completely shut on Warner road. One gpm is estimated to be lost from this location for 2 years and is now fixed.

Another leaking valve was operated, flushed out, repaired on July 23, 2010 at 1401 East Steuben. Two gpm was estimated to be lost from this location by City staff.

### **EVALUATION OF ADDITIONAL METERS**

The City has installed a 2-inch meter on a portion of the system to conduct a mass balance and compare the large meter reading to the customer meter reads. The City has not supplied Gray & Osborne with this data and has stated that the 2-inch meter has not provided any additional insight to locations of additional DSL.

The City installed a 4 and 6 inch meter on portions of the system in January 2012. This data is has not been available for analysis. The City does not believe that the data provides any insight to additional sources of DSL.

## ABANDONED DISTRIBUTION SYSTEM

At the east end of the City there is no distribution system piping. This portion of the system was abandoned many years ago. It is likely that the system is connected to the abandoned portion and is leaking into the unused piping. Two leaks were found in this area by Leak Masters, and there is no distribution piping shown in the area on the City's water system base map.

## RECOMMENDATIONS

The following measures are recommended to more accurately determine and reduce DSL:

- **Mass Balance** – As soon as the first month of consumption data is available, the new large meter reads should be compared to the customer consumption on the downstream side. If a significant difference is noticed, then the City can identify a more specific location where DSL may be occurring.
- **Leak Repairs** – The City should replace the Old Line and pipe, valves, and meters that were found to be leaking during the leak detection survey. If the estimates by Leak Masters are accurate, a total of nearly 8 MG a year may be lost due to leaks. Assuming that Leak No. 3 has been completely repaired. Table 5 shows estimated DSL in 2012 if this volume was not lost due to leakage.

TABLE 5

Estimate of Potential 2012 DSL for City of Bingen with Leaks Repaired

(gallons)	January	February	March	April	May	June
Production	10,028,836	8,744,394	6,347,633	5,731,968	5,277,780	5,256,750
Old Line Losses	233,414	185,000	209,950	178,410	192,414	201,316
Leak Masters Losses	648,000	648,000	648,000	648,000	648,000	648,000
Consumption	3,825,208	3,589,792	4,272,750	4,090,336	3,347,051	3,394,090
	6,203,628	5,154,602	2,074,883	1,641,632	1,930,729	1,862,660
<b>DSL, existing</b>	<b>61.9%</b>	<b>58.9%</b>	<b>32.7%</b>	<b>28.6%</b>	<b>36.6%</b>	<b>35.4%</b>
<b>DSL w/Old Line Adjustment</b>	<b>5,970,214</b>	<b>4,969,602</b>	<b>1,864,933</b>	<b>1,463,222</b>	<b>1,738,315</b>	<b>1,661,344</b>
	<b>60.9%</b>	<b>58.1%</b>	<b>30.4%</b>	<b>26.3%</b>	<b>34.2%</b>	<b>32.9%</b>
<b>DSL w/Leak Masters Adjustment</b>	<b>5,322,214</b>	<b>4,321,602</b>	<b>1,216,933</b>	<b>815,222</b>	<b>1,090,315</b>	<b>1,013,344</b>
	<b>58.2%</b>	<b>54.6%</b>	<b>22.2%</b>	<b>16.6%</b>	<b>24.6%</b>	<b>23.0%</b>

- **Valve Exercising Program** – The City should implement a valve exercising program to ensure that valves within the system are operating

correctly and are fully closed where they should be. City staff will also be aware of any valves that require replacement.

- **Source Meter Calibration** – The City should verify the accuracy of the source meters at the wells by having them calibrated.
- **Underwood Fruit Meters** – Three meters currently serve Underwood Fruit in a deep vault along SR 14. The configuration and set up of these meters should be simplified and may prove to be a source of unaccounted water.
- **Meter Replacement Program** – The City should continue with their existing meter replacement program. The City has replaced approximately seventy percent of the residential meters.
- **Leak Detection Survey** – The City should conduct another leak detection survey after the above improvements have been complete. The survey should focus on the areas where leaks were detected previously. Additionally, the survey work should be done at night, if possible. Bingen is located in an area with extreme background noise that can affect the reliability of the leak detection. SR 14, SR 141, the creek and railroad all contribute to noise that can interfere with the survey. If the work is done at night, highway and railroad noise will be minimal and the results should be more accurate.
- **AWWA Water Audit** – AWWA has a free water audit software that can be downloaded online in Microsoft Excel format. The audit provides alternative ways to view water loss within the City and does not require compliance from customers.
- **Water Audit** – As a last resort, a water audit should be done with the City's largest water users, SDS Lumber and Underwood Fruit. SDS Lumber has already indicated that they are willing to participate in such a study. A water audit would entail walking through each industry and assigning a water volume to each use.
- **Request 20 percent DSL Standard** – Under WAC 246-290-820, water systems with less than 500 connections are allowed up to 20 percent DSL if they meet certain requirements. As of the 2008 WSP, the City serves 400 connections. The City may wish to approach DOH to discuss the recommendations in this report and develop a mutually agreeable plan that could allow a relaxation of the DSL standard applied to the Bingen water system.

**APPENDIX A**

**LEAK DETECTION SURVEY,  
LEAK MASTERS, JULY 2010**

City of Bingen

Leak Survey summary

7/12/10 thru 7/15/10

To Jan Brending

City of Bingen

P.O. Box 607

Bingen Washington 98605

Phone 509-493-2122

Fax 509-493-1391

E mail [bingen@gorge.net](mailto:bingen@gorge.net)

From Leak Masters LLC

E-mail [leakmasters10@yahoo.com](mailto:leakmasters10@yahoo.com)

This is a short summary of what I found while doing your leak survey. I have given you the schematics of the locations where I heard leak noises. They show what type of equipment we use and what type of soil cover and other specifics.

The location at the abandoned mill had a very loud noise on the main valve in the vault just prior to the old meter. Dave operated the valve and the noise changed a lot. I think that the valve itself is letting water flow thru it and out into the old piping at the mill. The next location that we heard a loud noise was at the old Henderson house. This was on an old galvanized line that went out into an old field where a house used to be. Dave operated this valve and was able to make the leak noise change a lot. This also appears that the valve is not able to shut completely and is letting water out into the old piping in the ground.

The third area that I heard a very loud leak noise was at the intersection of Alder and Lincoln just out front of the veterinarian clinic. I could hear noise on the main valve out in front of the clinic and on the services going down the road to the creek, And then a lot of noise in the creek. There is a lot of background noise because of the flowing water in the creek. And having the pipe exposed and up against the large rocks makes it an area that can transmit a lot of background noise. This makes it much harder to get a location with the correlator because of the vibration along the rocks that the pipe is touching. I also listened on the other side of the creek, on the only other valve we could find that was close enough to be able to use as a contact point. It was a lot quieter. Pipe configuration was not clear as the valves that show on your map do not shut off the main. We had to go all the way down several blocks to find the only other valve on the system. I ran the correlator on this line from one side of the creek to the valve in front of the veterinarian clinic and the computer picked a location about 42-45 feet from this valve going towards the creek. I tried another contact point from the creek up to the valve in the road in front of the clinic and came up to within one foot of the previous mark. I did it a third time and it also came up to the same location in the road. I ran the I-mic on the road and could hear noise all along the pipe. This line may have more than one leak in it.

The last location I heard any leak noise was at Lois lane and oak. This is the line that feeds down the highway from the town next door. It has a PRV at the start of the line and is making a loud noise all the way down the line. This noise is the same as a leak noise. I did run the correlator on this line from the shut off valve at the bottom of the hill up to several services. The correlator did try to lock onto a spot at the corner of lois lane and oak. I ran the correlator from several locations and it came to this point each time. This appears to be an old meter box that has been abandoned. The prv at the start of this line may be interfering with the computer as this makes a lot of noise in the old steel line. Also the traffic noise is extremely severe, making it impossible to ground mic this location.

The intersection of willow and steuben had a loud noise on only one valve in the road and on a few of the services like pilot knob and dickey farms office. The line configuration on this area is not clear. The map showing the valves in the road do



not match what is actually out in the road. There is a main line coming down from the water towers that has an 8X6 reducer on it at the point of the valve where I can hear a noise. I cannot run the correlator on this because we are not sure what line we need to be on. Also the noise I hear may just be the reducer.

I listened on all of the hydrants and the main valves in the roads. I also listened on services to the homes or business. Several of the blocks have different lines to the homes and different lines to the hydrants. The only areas that I could hear any leak noises were on the above mentioned spots. Thank you for the opportunity to serve you; if you need any further assistance please don't hesitate to call.

Kevin Brown Leak Masters LLC

1-866-973-3537

# LEAK MASTERS, LLC

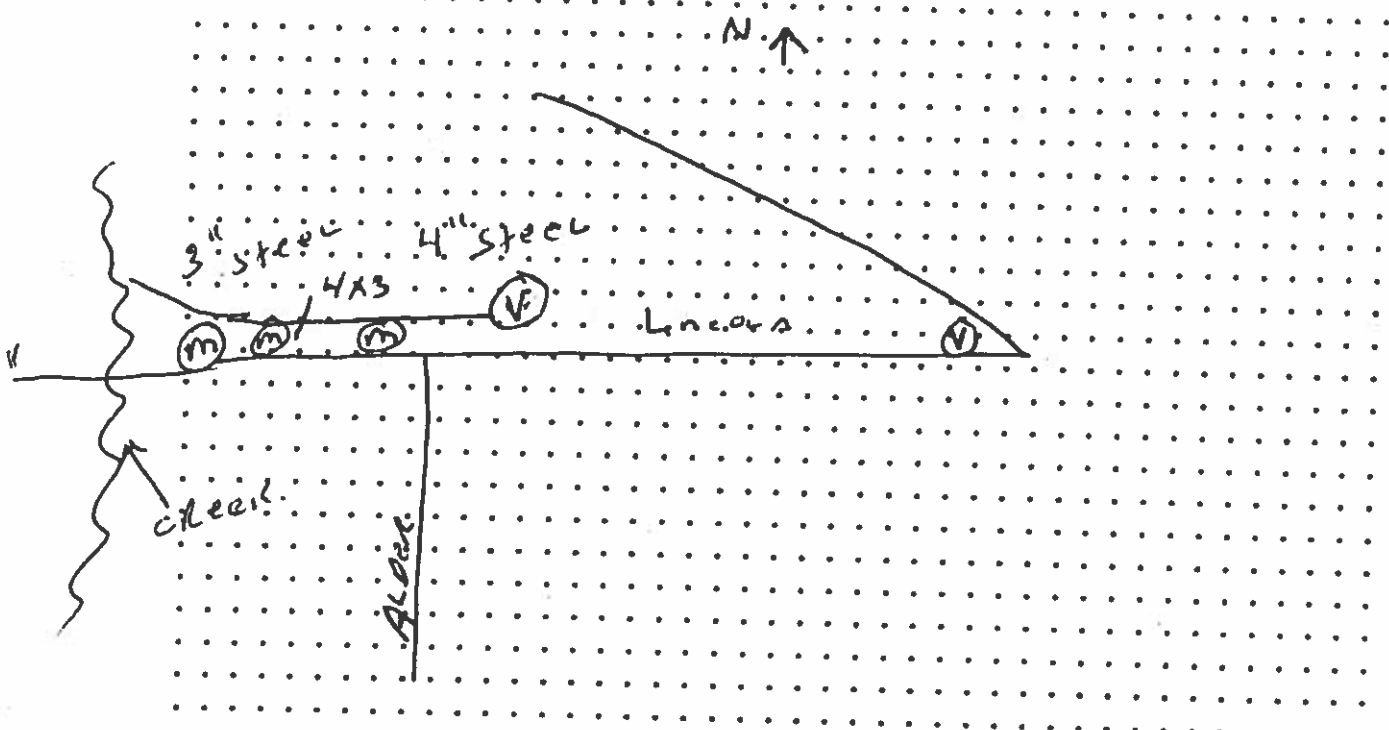
1-866-973-3537

## LEAK REPORT

CLIENT: Bingen REPORT NO. \_\_\_\_\_

LOCATION: \_\_\_\_\_ MAP NO. \_\_\_\_\_ DATE: 7-13-10

TYPE OF LEAK		TYPE OF COVER	
MAIN	<input checked="" type="checkbox"/> SERVICE / HOUSE SIDE	BLACK TOP	<input checked="" type="checkbox"/>
HYDRANT	<input type="checkbox"/> SERVICE / STREET SIDE	CONCRETE	<input type="checkbox"/>
VALVE	<input type="checkbox"/> OTHER	SOIL / GRAVEL	<input checked="" type="checkbox"/>



Equipment used:  S30     ACCUCORR     L-MIC.    ↑  
 ← N →

Legend: LEAK- XXX WATER LINE — — — VALVE (V)    HYDRANT (H)    CURB BOX (C)  
 EXCAVATE AND REPAIR     REPAIR / REPLACE     REPAIR / REPLACE HYDRANT

LEAK LOCATION MARKED: YES  NO     EST. LEAKAGE: > 5  5-25  < 25  GPM

- REMARKS:
- CLOSED CURB / METER VALVE, LEAK STOPPED     TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS
  - LEAK LOCATED AT CURB / METER PIT VALVE     TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED
  - NOT SURE OF LINE CONFIGURATION     LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE
  - ACCESS TO SYSTEM CONTACTS LIMITED     ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK

Very Loud At Valves - Also Loud On All 3 meter services - across Lincoln - Also Loud on valve on each end of Run.

FIELD TECH: KEVIN BROWN

ASSISTANT: JAY

# LEAK MASTERS, LLC

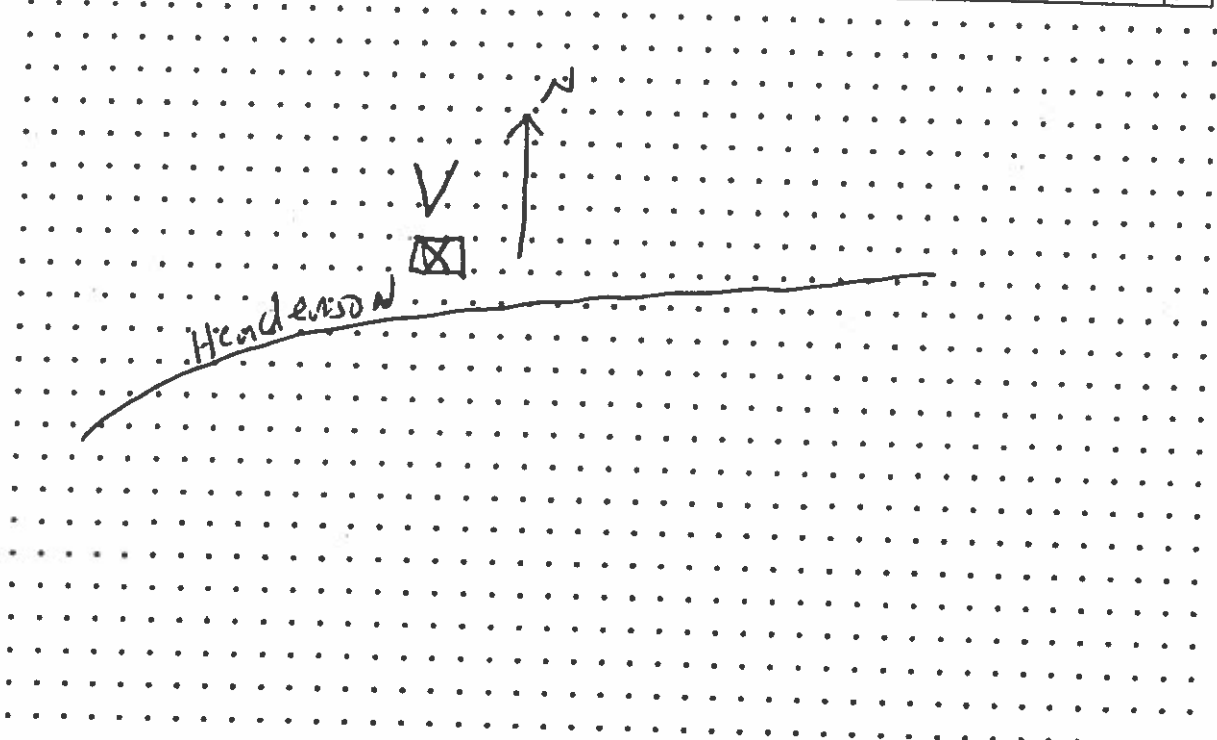
1-866-973-3537

## LEAK REPORT

CLIENT: Bingen REPORT NO. \_\_\_\_\_

LOCATION: SPS LUMBER MAP NO. \_\_\_\_\_ DATE: 7-12-10

TYPE OF LEAK		TYPE OF COVER	
MAIN	<input checked="" type="checkbox"/> SERVICE / HOUSE SIDE	BLACK TOP	<input type="checkbox"/>
HYDRANT	<input type="checkbox"/> SERVICE / STREET SIDE	CONCRETE	<input type="checkbox"/>
VALVE	<input checked="" type="checkbox"/> OTHER	SOIL / GRAVEL	<input checked="" type="checkbox"/>



Equipment used:  S30     ACCUCORR     L-MIC.    ↑  
← N →

Legend: LEAK- XXX WATER LINE — — — VALVE (V)    HYDRANT (H)    CURB BOX (C)  
 EXCAVATE AND REPAIR     REPAIR / REPLACE     REPAIR / REPLACE HYDRANT  
 LEAK LOCATION MARKED: YES  NO     EST. LEAKAGE: > 5  5-25  < 25  GPM

REMARKS:  
 CLOSED CURB / METER VALVE, LEAK STOPPED     TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS  
 LEAK LOCATED AT CURB / METER PIT VALVE     TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED  
 NOT SURE OF LINE CONFIGURATION     LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE  
 ACCESS TO SYSTEM CONTACTS LIMITED     ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK  
 Heard Leak noise on old abandoned  
1 1/2" line to old mill - old valve leaking  
BT. Does not shut off.

FIELD TECH: KEVIN BROWN

ASSISTANT: Dave

# LEAK MASTERS, LLC

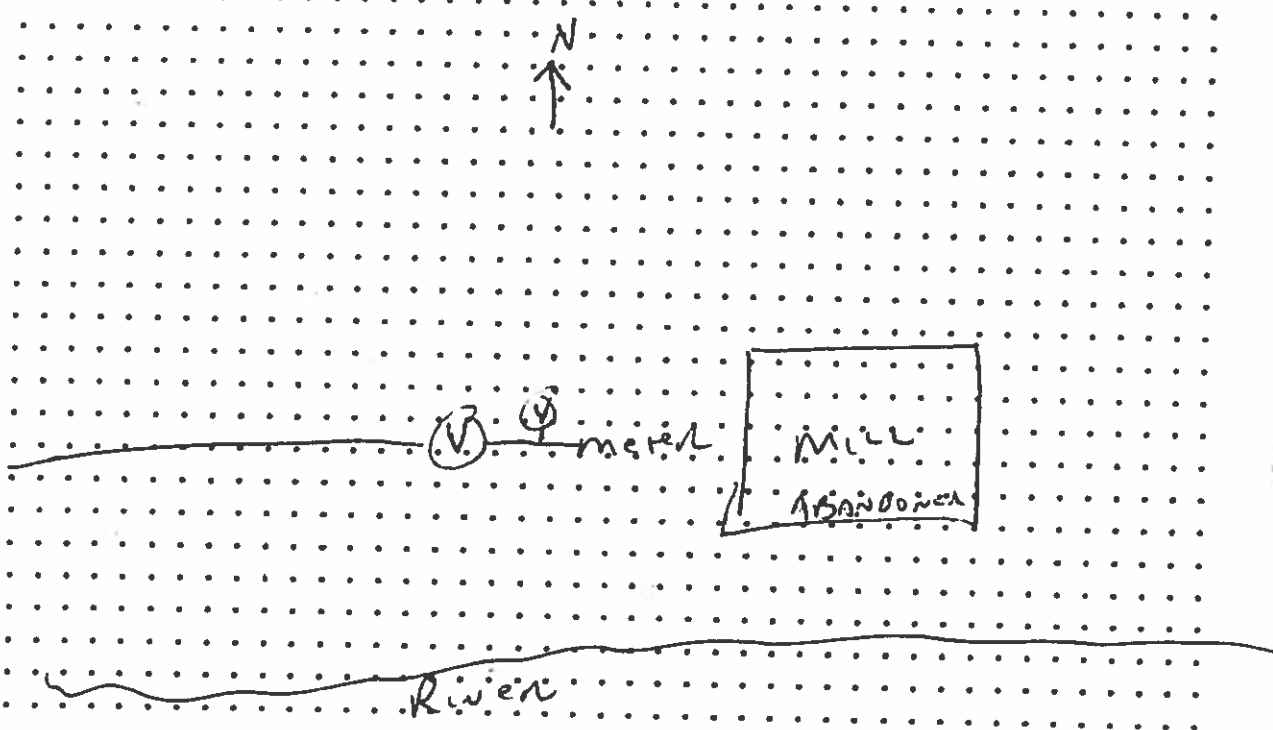
1-866-973-3537

## LEAK REPORT

CLIENT: Bingen REPORT NO. \_\_\_\_\_

LOCATION: \_\_\_\_\_ MAP NO. \_\_\_\_\_ DATE: 7-12-10

TYPE OF LEAK		TYPE OF COVER	
MAIN	<input checked="" type="checkbox"/> SERVICE / HOUSE SIDE	BLACK TOP	<input type="checkbox"/>
HYDRANT	<input type="checkbox"/> SERVICE / STREET SIDE	CONCRETE	<input type="checkbox"/>
VALVE	<input checked="" type="checkbox"/> OTHER	SOIL / GRAVEL	<input checked="" type="checkbox"/>



Equipment used:  S30     ACCUCORR     L-MIC    ↑  
N  
↓

Legend: LEAK- XXX WATER LINE — — — VALVE (V)    HYDRANT (H)    CURB BOX [C]  
 EXCAVATE AND REPAIR     REPAIR / REPLACE     REPAIR / REPLACE HYDRANT  
 LEAK LOCATION MARKED: YES  NO     EST. LEAKAGE: > 5  5-25  < 25  GPM

REMARKS:  
 CLOSED CURB / METER VALVE, LEAK STOPPED     TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS  
 LEAK LOCATED AT CURB / METER PIT VALVE     TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED  
 NOT SURE OF LINE CONFIGURATION     LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE  
 ACCESS TO SYSTEM CONTACTS LIMITED     ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK  
Reese mill - main valve - loud leak noise may be valve not shutting properly. Operated valve but noise continued

FIELD TECH: KEVIN BROWN

ASSISTANT: \_\_\_\_\_

# LEAK MASTERS, LLC

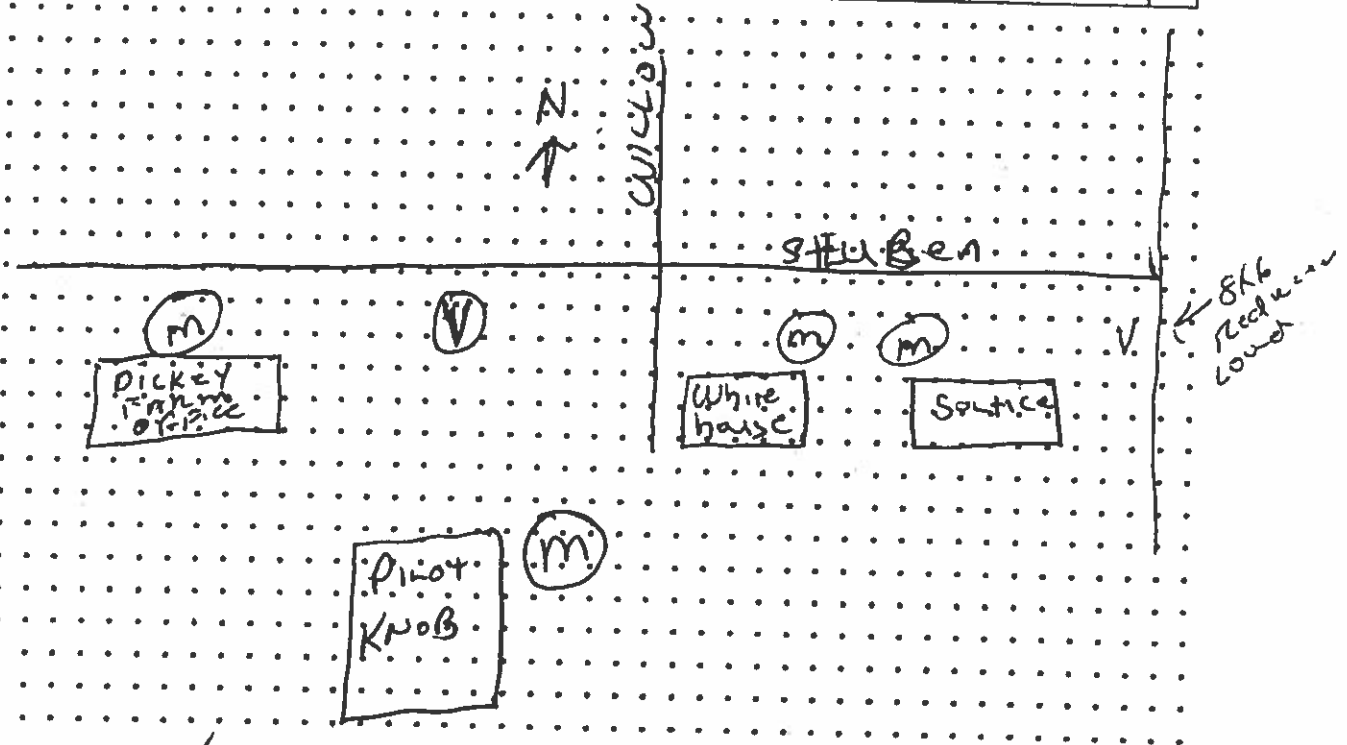
1-866-973-3537

## LEAK REPORT

CLIENT: Binger REPORT NO. \_\_\_\_\_

LOCATION: \_\_\_\_\_ MAP NO. \_\_\_\_\_ DATE: 7-12

TYPE OF LEAK		TYPE OF COVER	
MAIN	SERVICE / HOUSE SIDE	BLACK TOP	
HYDRANT	SERVICE / STREET SIDE	CONCRETE	
VALVE	OTHER	SOIL / GRAVEL	



Equipment used:  S30     ACCUCORR     L-MIC     N

Legend: LEAK- XXX WATER LINE --- VALVE (V) HYDRANT (H) CURB BOX (C)  
 EXCAVATE AND REPAIR     REPAIR / REPLACE     REPAIR / REPLACE HYDRANT  
 LEAK LOCATION MARKED: YES  NO  EST. LEAKAGE: >5  5-25  <25  GPM ?

REMARKS:  
 CLOSED CURB / METER VALVE, LEAK STOPPED     TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS  
 LEAK LOCATED AT CURB / METER PIT VALVE     TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED  
 NOT SURE OF LINE CONFIGURATION     LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE  
 ACCESS TO SYSTEM CONTACTS LIMITED     ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK  
 Loud Noises At all three locations  
 Pipe configuration not shown on map - mix of plastic steel copper  
 ONLY contact points are valve and meter services at Bingers

FIELD TECH: KEVIN BROWN

ASSISTANT: Jay

# LEAK MASTERS, LLC

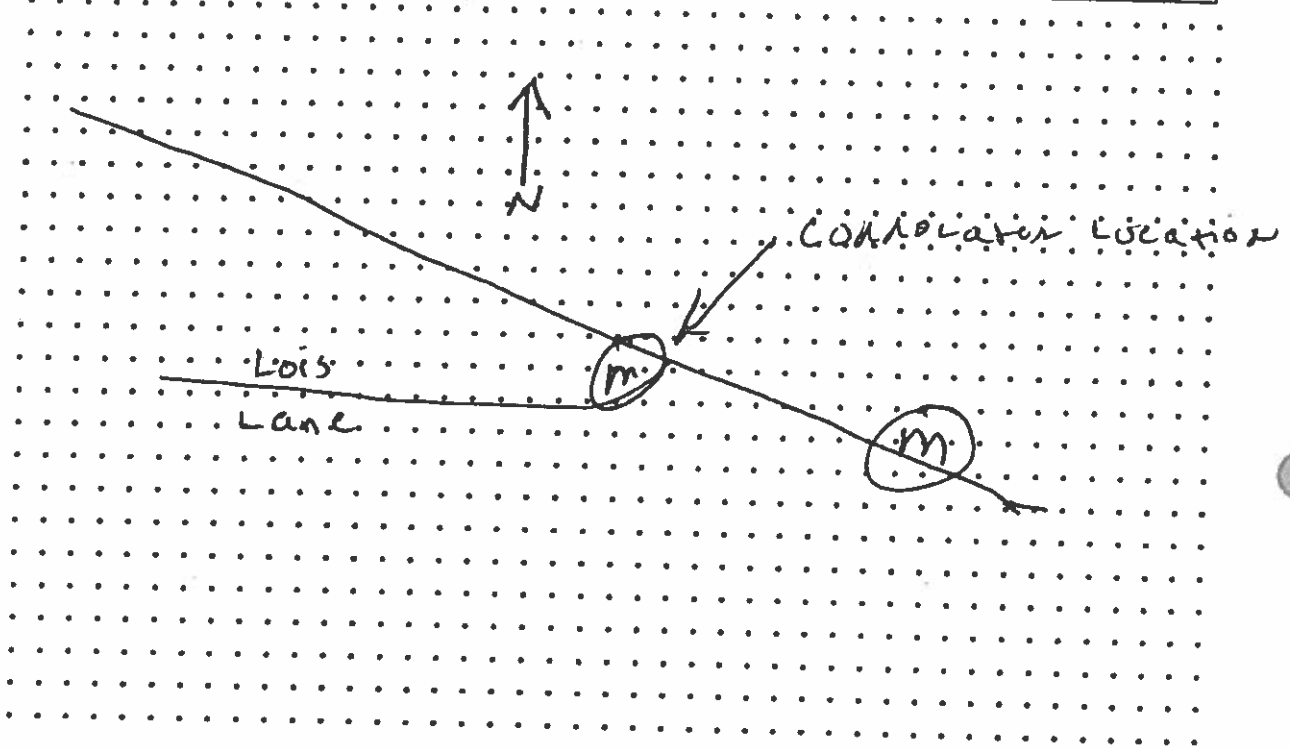
1-866-973-3537

## LEAK REPORT

CLIENT: \_\_\_\_\_ REPORT NO. \_\_\_\_\_

LOCATION: Lois Lane/OAK MAP NO. \_\_\_\_\_ DATE: 7-15-10

TYPE OF LEAK		TYPE OF COVER	
MAIN	<input checked="" type="checkbox"/> SERVICE / HOUSE SIDE	BLACK TOP	<input checked="" type="checkbox"/>
HYDRANT	<input type="checkbox"/> SERVICE / STREET SIDE	CONCRETE	<input type="checkbox"/>
VALVE	<input type="checkbox"/> OTHER	SOIL / GRAVEL	<input checked="" type="checkbox"/>



Equipment used:  S30  ACCUCORR  L-MIC. ↑  
← N →

Legend: LEAK- XXX WATER LINE — — — VALVE (V) HYDRANT (H) CURB BOX (C)  
 EXCAVATE AND REPAIR  REPAIR / REPLACE  REPAIR / REPLACE HYDRANT  
 LEAK LOCATION MARKED: YES  NO  EST. LEAKAGE: > 5  5-25  < 25  GPM

- REMARKS:
- CLOSED CURB / METER VALVE, LEAK STOPPED
  - LEAK LOCATED AT CURB / METER PIT VALVE
  - NOT SURE OF LINE CONFIGURATION
  - ACCESS TO SYSTEM CONTACTS LIMITED
  - TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS
  - TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED
  - LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE
  - ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK

Heard loud leak noise at abandoned meter on corner of Lois Lane and Oak - ran correlator and it picked up leak noise at this location from 1-4 feet out to 6-11 feet - there is also a lot of background noise from traffic and the PKU at top of hill

FIELD TECH: KEVIN BROWN

ASSISTANT: DAVE

# LEAK MASTERS, LLC

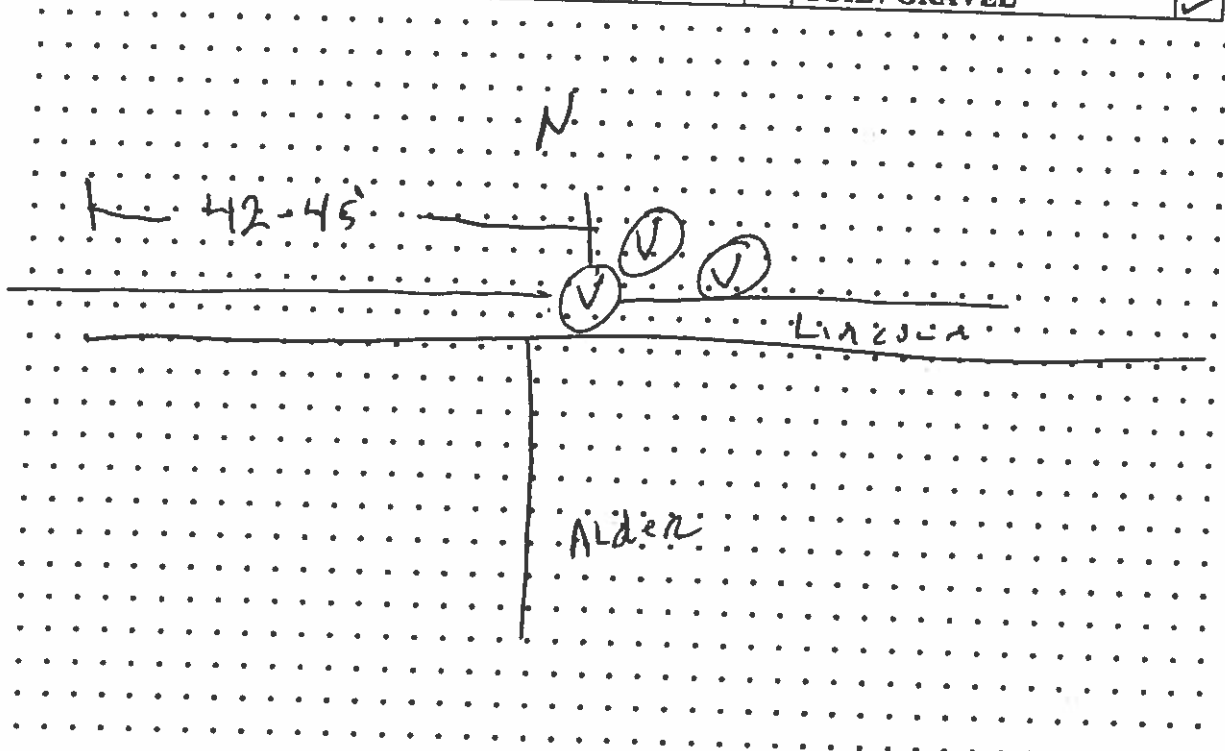
1-866-973-3537

## LEAK REPORT

CLIENT: Bingen REPORT NO. \_\_\_\_\_

LOCATION: Alder and Lincoln MAP NO. \_\_\_\_\_ DATE: 7-14-10

TYPE OF LEAK		TYPE OF COVER	
MAIN	<input checked="" type="checkbox"/> SERVICE / HOUSE SIDE	BLACK TOP	<input checked="" type="checkbox"/>
HYDRANT	<input type="checkbox"/> SERVICE / STREET SIDE	CONCRETE	<input type="checkbox"/>
VALVE	<input type="checkbox"/> OTHER	SOIL / GRAVEL	<input checked="" type="checkbox"/>



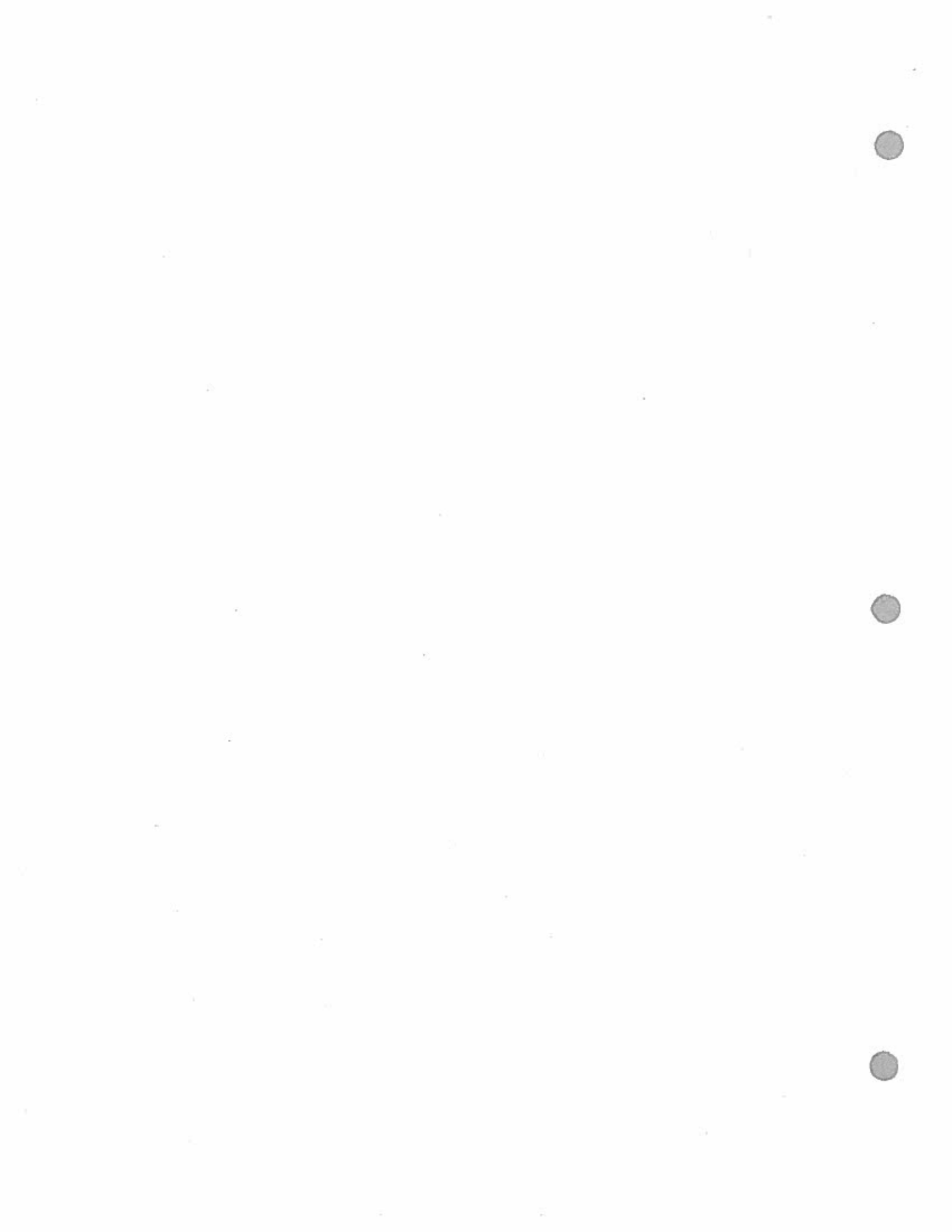
Equipment used:  S30     ACCUCORR.     L-MIC.    ↑  
 ← N →

Legend: LEAK- XXX WATER LINE --- VALVE (V)    HYDRANT (H)    CURB BOX (C)  
 EXCAVATE AND REPAIR     REPAIR / REPLACE     REPAIR / REPLACE HYDRANT  
 LEAK LOCATION MARKED: YES  NO     EST. LEAKAGE: > 5  5-25  < 25  GPM

REMARKS:  
 CLOSED CURB / METER VALVE, LEAK STOPPED     TIGHTENED HYDRANT OPERATING NUT, LEAK STILL EXISTS  
 LEAK LOCATED AT CURB / METER PIT VALVE     TIGHTENED HYDRANT OPERATING NUT, LEAK STOPPED  
 NOT SURE OF LINE CONFIGURATION     LEAK LOCATED AT SERVICE CORPORATION INTO MAIN LINE  
 ACCESS TO SYSTEM CONTACTS LIMITED     ADDITIONAL ACCESS REQUIRED TO LOCATE LEAK  
 Corrolator picked up leak noise two times at 42-45' from main valve. - pipe ALSO MAY have more than one break in it - corrolator showed possible other leaks. NOT SURE OF PIPE CONFIGURATION

FIELD TECH: KEVIN BROWN

ASSISTANT: JAY / DAVE





City of Bingen Public Works

Water Leak Repair Work Sheet

Location :

SW corner Lincoln St & Alder St.

Date : 8-12-10 Repair Personnel : David & Jay

Estimated GPM : 10 Gpm Estimated how long leaking: Years?

Estimated water loss : 3,225,600 gallons. This Year

Time spent on repair : 20 man hours.

List of materials used in repair :

Repair Band  
10 yards of fill material  
20 bags Asphalt Patch

How was leak discovered :

Leak Survey

When was leak discovered : 7-13-10

When was leak repair completed : 8-12-10 Except road patch

Other comments :

Leak looks like been going on for years.  
Will wait a couple of weeks before Patch Pavement to allow  
for settling of fill material.

City of Bingen Public Works  
Water Leak Repair Work Sheet

Location : Warner Road

Date : 7-23-10 Repair Personnel : David

Estimated GPM : 1 Estimated how long leaking: 2 years

Estimated water loss : 17,520 gallons.

Time spent on repair : 4 man hours.

List of materials used in repair :

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How was leak discovered :

Leak detection survey

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When was leak discovered : 7-15-10

When was leak repair completed : 7-23-10

Other comments :

Dug out valve found another valve that was not completely shut -

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City of Bingen Public Works  
Water Leak Repair Work Sheet

Location : 1401 E. Steuben Reese's Mdl

Date : 7-23-10 Repair Personnel : David

Estimated GPM : 2 Estimated how long leaking: 2 years

Estimated water loss : 35,040 gallons.

Time spent on repair : 2 hours man hours.

List of materials used in repair :  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How was leak discovered :  
Leak detection survey  
\_\_\_\_\_  
\_\_\_\_\_

When was leak discovered : 7-15-10

When was leak repair completed : 7-23-10

Other comments :  
leaking past valve, operated valve numerous times, flushed out seat.  
\_\_\_\_\_  
\_\_\_\_\_

City of Bingen Public Works

Water Leak Repair Work Sheet

Location :

PORT LAKEVIEW BLVD.

Date : 1-26-10 Repair Personnel : PORT ONLY

Estimated GPM : UNKNOWN Estimated how long leaking: ? UNKNOWN

Estimated water loss : UNKNOWN gallons.

Time spent on repair : 0 man hours.

List of materials used in repair :

2 COUPLINGS

1 piece pipe 6 in

How was leak discovered :

PORT FOUND IT. THEN R.P. 4 USED A LEAK DETECTOR TO FIND WHERE ON THE LINE THE LEAK WAS

When was leak discovered : 1-21-10

When was leak repair completed : 1-26-10

Other comments :

Port broke pipe when digging out. Had to shut off water mach.