PHASE II REPORT

OAKLEY WATER SUPPLY PROJECT

LEVEL II - FEASIBILITY STUDY

FOR

WYOMING WATER DEVELOPMENT COMMISSION

1515 Ninth Street
Rock Springs, Wyoming 82901

Phone (307) 362-7519
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PHASE II REPORT

I  INTRODUCTION AND SUMMARY


The Oakley Project Area is located approximately two miles south of Kemmerer, Wyoming. It consists of homes and development in the Quarry and Oakley Subdivisions and three other homes situated on individual lots outside of the subdivisions, as shown on Sheet 3 of the Drawings. There is a total of 20 lots in the area considered for water service.

The homes in the study area presently obtain their water from shallow private wells. The quantity and quality of these groundwater supplies varies greatly and, for the most part, the quality is very poor. Consequently, the homeowners are intent on obtaining a better supply. Additionally, water is not available for fire protection and there has been one instance where property has been lost to fire because of this deficiency.

Three alternatives were evaluated in Phase I of the study to provide water to the Oakley Area. They were:
1) Connecting a pipeline to the Kemmerer water system to convey water to Oakley.

2) Development of a groundwater source.

3) Improving water quality with individual residential water treatment/softening units.

Alternates 2 and 3 were dropped from further consideration. Alternate 1 was selected for further study and ultimately three different variations were examined for supplying water from Kemmerer to Oakley. These three alternates are:

**Alternate "A"** - Constructing an 8 inch diameter transmission pipeline from Kemmerer to Oakley and installing a distribution system with adequate capacity for fire flows.

**Alternate "B"** - Constructing a 4 inch diameter transmission pipeline from Kemmerer to a 50,000 gallon water storage tank near Oakley. A distribution system would connect to the water storage tank to serve Oakley, with sufficient capacity to meet fire flow demands and fire hydrants would be installed for fire protection.

**Alternate "C"** - Constructing a 4 inch diameter transmission pipeline from Kemmerer to Oakley with a distribution system consisting of 4 inch diameter pipe. No fire hydrants would be installed and there would be no provision for fire fighting capabilities.

2
Several meetings were held during the Phase II effort that significantly affected the work and influenced the cost figures. They are listed as follows:

1) A public meeting on August 23, 1989.

2) Workshop with Oakley residents on Sept. 27, 1989.

3) Meeting with DEQ on November 15, 1989.

4) Meeting with Farmers Home Administration (FmHA) on November 21, 1989.

5) Meeting with representatives of Kemmerer Water Department on November 28, 1989.

Estimated total monthly water costs for the three alternates to meet existing conditions (20 lots) assuming 67% grant and 33% loan from the WWDC for construction of a transmission pipeline are as follows:

<table>
<thead>
<tr>
<th>Alternate</th>
<th>100 gal. per capita per day</th>
<th>300 gal. per capita per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>$150.72</td>
<td>$207.42</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>$106.84</td>
<td>$163.54</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>$ 92.23</td>
<td>$148.93</td>
</tr>
</tbody>
</table>
These figures could be reduced to the those in the following tabulation by receiving a 75% grant and 25% loan from WWDC.

<table>
<thead>
<tr>
<th>Alternate</th>
<th>100 gal. per capita per day</th>
<th>300 gal. per capita per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>$142.45</td>
<td>$194.15</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>$ 98.88</td>
<td>$155.58</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>$ 85.94</td>
<td>$142.64</td>
</tr>
</tbody>
</table>

The costs could be further reduced if a more favorable water pricing program was adopted by the City of Kemmerer.

Cost figures were also developed on the assumption that Oakley annexed to the City of Kemmerer. This would reduce their water costs in four ways:

1) The connection fee would not apply - $25,000 for Alternate "A" and $10,000 for Alternates "B" and "C".

2) A large meter would not be required - $7,500 for Alternate "A" and $3,000 for Alternates "B" and "C".
3) The monthly fixed charge for each large meter would not apply - $1,192.80 per month for Alternate "A" and $340.00 per month for Alternates "B" and "C". (Instead a monthly charge of $4.26 per residence would be applied.)

4) Water rates would drop from $2.70 per 1000 gallons to $1.75 per 1000 gallons.

The following total monthly costs would result if all other costs remained the same and the 20 Oakley lots are annexed to the City of Kemmerer.

<table>
<thead>
<tr>
<th>Alternate</th>
<th>100 gal. per capita per day</th>
<th>300 gal. per capita per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>$69.07</td>
<td>$105.82</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>$69.48</td>
<td>$106.23</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>$54.87</td>
<td>$91.62</td>
</tr>
</tbody>
</table>

There are probably other costs in the form of tax assessments, etc., and other criteria that may apply to Oakley concerning annexation that have not been identified nor addressed in this study and Report.
The cost figures given in the above table assume a 67% grant and 33% loan from the Wyoming Water Development Commission to construct the transmission pipeline for each of the three alternatives.

The distribution system was assumed to be funded by the Wyoming Farm Loan Board with a 50% grant and 50% loan in all cases for each alternate. Funding from the Farmers Home Administration was also investigated, however, it is very unlikely that Oakley would qualify for a FmHA grant. They could secure a loan from FmHA to cover the loan portion of Wyoming Farm Loan Board funding at a more attractive interest rate that could reduce monthly costs by about $1.00 per month per residence.
II PHASE II - MEETINGS

The work that was completed in the Phase II effort evolved from the Phase I Study and several meetings that significantly influenced the study and cost figures. The meetings are listed as follows:

1) A public meeting on August 23, 1989.

2) Workshop with Oakley residents on Sept. 27, 1989.

3) Meeting with DEQ on November 15, 1989.

4) Meeting with Farmers Home Administration (FmHA) on November 21, 1989.

5) Meeting with representatives of Kemmerer Water Department on November 28, 1989.

The public meeting was held on August 23, 1989 in Kemmerer to present the findings of the Phase I Study to the Oakley Water Association. A large number of Oakley people attended, together with Andy Kasehagen, Director - Lincoln County Office of Planning and Development, Joe Bleumel, Lincoln County Attorney, Patrick Erger of Wyoming Water Development Commission, Pete Dana of Johnson-Fermelia Co. Inc. (JFCo), and Robert E. Johnson, JFCo Project Manager.

The three alternatives investigated in Phase I and their related costs were presented to the Oakley Water Association by Patrick Erger, Pete Dana and Robert Johnson. The Phase I Report is bound in Appendix F to this Report.
The Water Association conducted a poll after the public meeting to select the course of action to be pursued in the Phase II Study. The poll lead to investigating the following alternatives in Phase II:

1) An 8 inch diameter pipeline from Kemmerer to Oakley with full fire flow capacity and related distribution system and facilities.

2) A smaller sized pipeline to satisfy immediate culinary needs with no provisions for fire flows or fire protection.

These selected alternatives were outlined in a letter to WWDC from the Oakley Water Association on August 31, 1989. This letter also suggested that a less formal workshop be held in the near future to discuss the issues at hand and information needed to proceed with the formation of a Water District.

The workshop was held in Oakley at the home of Bill Wilson on September 27, 1989. Although fewer Oakley residents were in attendance at this meeting than at the public meeting, a great deal was discussed concerning the Phase I study and what should be accomplished in the Phase II effort.

Two important points were adopted in this workshop for inclusion in Phase II as follows:

1) Monthly costs per lot were to be calculated for 15, 20, 25, and 30 lots being served in the project.
2) Alternate sources of funding were to be investigated, such as FmHA.

The ramifications of the two water supply systems were discussed with Bill Locke of the Wyoming Department of Environmental Quality, Water Quality Division, and Patrick Erger of WWDC in Lander on November 15, 1989. This was done because the Wyoming DEQ must issue a permit for construction and no planning was to be pursued that would not ultimately get the approval of the DEQ.

The DEQ observations were set out in a letter to Patrick Erger on November 16, 1989. (A copy of this letter can be found in Appendix E.) The letter identified two different size transmission lines -- 4 inch and 8 inch. The 8 inch diameter, as shown in Phase I, would be adequate to provide capacity for fire flows. The 4 inch supply line would not provide capacity for fire flows and the 4 inch diameter is the smallest pipe size that is certified by the American Water Works Association (AWWA).

A third alternative is also described in the DEQ letter that would employ a 4 inch supply line and a water storage tank, and a distribution system sized to provide fire protection. This alternative was selected as one of the alternatives for further study.

These three alternatives are referred to as A, B, and C hereinafter.

The workshop held on September 27, 1989 lead to the commitment to investigate alternate sources of funding. Three sources of funding are considered:
1) Wyoming Water Development Commission
2) Wyoming Farm Loan Board
3) Farmers Home Administration

Funding criteria for WWDC and the Wyoming Farm Loan Board were applied in the Phase I and Phase II work. It was therefore necessary to investigate FmHA funding to see if water costs could thereby be reduced.

Patrick Erger met with Ed Chase of the FmHA in Cheyenne on November 21, 1989. Grants are available from FmHA provided that certain median household income criteria are met. A grant could be obtained if the median household income for Oakley residents is less than $19,342 per year. Depending on the accounting procedures used to evaluate the median household income, it is doubtful that these median household income figures exceed those of the Oakley residents.

Also, loans are available from FmHA at an annual interest rate of 7%. The payback terms vary as follows:

1) Non-Profit Water Co. ............. 40 years.
2) Water and Sewer District ....... 30 years.
3) Improvement and Service District .......... 25 years.

The annual interest rate of 7% is one and a half percent less than that charged for the loan portion of Wyoming Farm Loan Board funding. The reduction in monthly costs, of course, would be dependent on the payback term according to the type of entity ultimately formed as referenced above. The water rates would be about $1.00 per month less at 7% funding under a 30 year term, as allowed for a water and sewer district.
The total monthly water costs considered under Phase II are very dependent on what charges would be levied and payable to Kemmerer. Therefore a meeting was held with Vean Taylor of the Kemmerer Water Department on November 28, 1989 to get an update on what Kemmerer might charge to supply water to Oakley. She advised JFCo that the following charges and rates were being considered for adoption by the Kemmerer City Council:

<table>
<thead>
<tr>
<th>Diameter of Pipeline</th>
<th>Connection Fee</th>
<th>Monthly Serv. Chrg.</th>
<th>Water Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inch</td>
<td>$10,000.00</td>
<td>$340.80</td>
<td>$2.70/1000 gal</td>
</tr>
<tr>
<td>8 inch</td>
<td>$25,000.00</td>
<td>$1192.80</td>
<td>$2.70/1000 gal</td>
</tr>
</tbody>
</table>

The figures are considerably higher than those used in the Phase I Study and they were formally adopted by the City of Kemmerer on December 4, 1989, as confirmed by telephone conversation with Mr. Steve Golnar, City Administrator, on December 12, 1989.

These increased costs offset all reductions in cost that can be achieved by downsizing the pipeline to 4 inch without providing fire protection, as shown for Alternate "C" hereinafter.
III ALTERNATE "A"

Alternate "A" considers constructing a transmission pipeline and facilities to deliver water from the Kemmerer water system to the Oakley residents to meet all fire flow requirements and domestic demands.

This alternative includes connecting an 8 inch diameter pipeline to an existing 12 inch diameter pipeline in the Kemmerer distribution system at the northeast corner of the intersection of U. S. Highways 30 and 189, as shown on Sheet 1 of the Drawings. The 8 inch diameter pipeline would be installed from this point to the Oakley area, generally parallel with U.S. Highway 30, as shown on the Drawings. The pipeline would be constructed outside of the highway right-of-way fence from approximately Station 59+48 to Station 85+75, and would veer away from the right-of-way fence at Station 102+67 to a point near the Union Pacific Railroad. The lands outside of the highway right-of-way belong to Pittsburg and Midway Coal Mining and an easement for placement of the pipeline will need to be obtained.

The pipeline would then cross under the railroad, cross the Hams Fork River, and continue back into the highway right-of-way. A permit to cross the railroad would have to be obtained from the Union Pacific Railroad. Additionally, a permit from the U. S. Army Corps of Engineers will have to be acquired for construction to cross the Hams Fork River.

A distribution system as shown on the Drawings, would also have to be built to supply Kemmerer water to the residents of Oakley. The distribution system would consist of a 6 inch diameter pipeline as required by DEQ regulations, and would
include fire hydrants positioned pursuant to the South Lincoln Fire District's recommendations. Fire flows are assumed at two 250/gpm fire streams (total 500/gpm) which can easily be met with the 6 inch pipeline. Storage is required equal to the average daily demand - approximately 35,000 gallons. This storage is assumed to be satisfied by available storage in Kemmerer's Green Hill Reservoir.

The Capital Cost for these facilities is estimated as follows:

**TRANSMISSION PIPELINE** *

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Construction Costs</td>
<td>$297,829.00</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td>$29,782.90</td>
</tr>
<tr>
<td>Sub Total</td>
<td>$327,611.90</td>
</tr>
<tr>
<td>Plus: 15% Contingency</td>
<td>$49,141.79</td>
</tr>
<tr>
<td>Connection Charge to City of Kemmerer</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>Permits</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>Final Design (8%)</td>
<td>$26,208.95</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td><strong>$428,962.64</strong></td>
</tr>
</tbody>
</table>

**DISTRIBUTION SYSTEM** **

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Construction Costs</td>
<td>$57,650.00</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td>$5,765.00</td>
</tr>
<tr>
<td>Sub Total</td>
<td>$63,415.00</td>
</tr>
<tr>
<td>Plus: 15% Contingency</td>
<td>$9,512.25</td>
</tr>
<tr>
<td>Final Design (8%)</td>
<td>$5,073.20</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td><strong>$78,000.45</strong></td>
</tr>
</tbody>
</table>

**TOTAL PROJECT COST**                                **$494,786.10**

* Detailed Cost Estimate in Appendix A, page 1.
** Detailed Cost Estimate in Appendix A, page 2.
A detailed breakdown is presented in the Appendix, however their characteristics and features are described below.

The following monthly cost components were calculated for Alternate "A":

2. Capital Costs - Distribution System.
3. Meter Reading and Billing Costs by Oakley.

1. **Capital Costs - Transmission Pipeline**

These costs include the $25,000 connection charge to Kemmerer, pipeline and appurtenances, permits, easements, highway and railroad boring, and a river crossing, together with 10% for engineering and 15% for contingencies. (See Appendix A - Page 1.)

Sixty-seven percent (67%) of the capital cost is contemplated in the form of a grant and thirty-three percent (33%) of the cost in the form of a loan to be paid back to the Wyoming Water Development Commission over 30 years at 4% interest. The loan payback is calculated at $7,510.21 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

- 15 lots .................. $ 45.48
- 20 lots .................. $ 34.11
- 25 lots .................. $ 27.29
- 30 lots .................. $ 22.74
2. **Capital Costs - Distribution System**

These costs include the construction of a 6 inch diameter distribution system with appurtenances and fire hydrants, as shown in the Drawings. They also include 10% for engineering costs and 15% for construction contingencies. (See Appendix A - Page 2.)

The distribution system, however, is assumed to be funded by the Wyoming Farm Loan Board which requires a 50% grant and 50% loan. The loan portion is amortized at 8.5% interest over an assumed repayment term of 30 years to correspond with the term of the Transmission Pipeline cost. The loan repayment is calculated at $3,352.71 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

<table>
<thead>
<tr>
<th>Number of Lots</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$20.16</td>
</tr>
<tr>
<td>20</td>
<td>$15.12</td>
</tr>
<tr>
<td>25</td>
<td>$12.10</td>
</tr>
<tr>
<td>30</td>
<td>$10.08</td>
</tr>
</tbody>
</table>

3. **Meter Reading and Billing**

This cost element is developed on the assumption that Oakley hires a person part-time to read meters and prepare billings, to work a total of 12 hours per month at $15.00 per hour. Vehicle costs were estimated at 8 hours per month at $10.00 per hour, and supplies at $10.00 per month.
The total monthly expense for this is $270.00, (see Appendix A - Page 3) which would be allocated per lot as follows, depending on the number of lots served as shown:

- 15 lots ................ $ 18.00
- 20 lots............... $ 13.50
- 25 lots ............... $ 10.80
- 30 lots .............. $ 9.00

4. Monthly Variable and Fixed Costs Payable to Kemmerer

A fixed monthly charge for an 8 inch meter of $1,192.80 would be payable to Kemmerer. (See Appendix A - Page 4.) This charge, allocated per lot, is as follows:

- 15 lots............... $ 79.52
- 20 lots............... $ 59.64
- 25 lots............... $ 47.71
- 30 lots............... $ 39.76

A water rate of $2.70 per 1000 gallons would also be billed by Kemmerer which is 1.5 times that charged for Kemmerer residents. The following monthly costs would be incurred, assuming 3.5 persons per lot and 30 days per month and a daily per capita per day use of 100 or 300 gallons.

\[
\begin{align*}
100 \text{ G/C/D} & \equiv 2.70/1000 \text{ gal} = 28.35 \\
300 \text{ G/C/D} & \equiv 2.70/1000 \text{ gal} = 85.05
\end{align*}
\]

Total monthly costs per residence for Alternate "A" are summarized on the follow table.
### OAKLEY WATER PROJECT

**PHASE II - ALTERNATE "A"**

**TOTAL MONTHLY COSTS**

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission Pipeline</td>
<td>$45.48</td>
<td>$34.11</td>
<td>$27.29</td>
<td>$22.74</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$20.16</td>
<td>$15.12</td>
<td>$12.10</td>
<td>$10.08</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$18.00</td>
<td>$13.50</td>
<td>$10.80</td>
<td>$9.06</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$79.52</td>
<td>$59.64</td>
<td>$47.71</td>
<td>$39.76</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$28.35</td>
<td>$28.35</td>
<td>$28.35</td>
<td>$28.35</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$85.05</td>
<td>$85.05</td>
<td>$85.05</td>
<td>$85.05</td>
</tr>
</tbody>
</table>

**TOTAL COSTS:**

<table>
<thead>
<tr>
<th></th>
<th>100 G/C/D</th>
<th>200 G/C/D</th>
<th>300 G/C/D</th>
<th>400 G/C/D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>$191.51</td>
<td>$150.72</td>
<td>$126.25</td>
<td>$109.99</td>
</tr>
<tr>
<td>b)</td>
<td>$248.21</td>
<td>$207.42</td>
<td>$182.95</td>
<td>$166.69</td>
</tr>
</tbody>
</table>
This alternative considers constructing a 4 inch diameter transmission pipeline from Kemmerer water system to intersect with the 8 inch diameter distribution pipeline. The 8 inch distribution pipeline serves as a dual purpose supply and distribution line from the 50,000 gallon storage tank near Oakley. Additionally, an 8 inch diameter pipeline continues through the Oakley area, as shown on the Drawings. The 4 inch diameter pipeline would follow the same general alignment as that of the transmission pipeline referenced in Alternate "A". A distribution system would be supplied by the tank that would have sufficient size, capacity and appurtenances to meet fire flow requirements.

The distribution system would consist of a 6 inch diameter pipeline in conformance with DEQ regulations and would include fire hydrants positioned in conformance with Alternate "A".

The Capital Cost for these facilities is estimated as follows:

**TRANSMISSION PIPELINE AND TANK**

*Estimated Construction Costs...... $297,053.50

Plus 10% Engineering................ 29,705.35

Sub Total............... $326,758.85

Plus: 15% Contingency............ 49,013.83

Connection Charge to
City of Kemmerer.......... 10,000.00

Permits...................... 1,000.00

Final Design (8%)........... 26,140.71

**TOTAL COST......... $412,913.39**

**DISTRIBUTION SYSTEM**

Estimated Construction Costs...... $ 57,650.00
Plus 10% Engineering............... 5,765.00
Sub Total........... $ 63,415.00

Plus: 15% Contingency.............. 9,512.25
Final Design (8%)............... 5,073.20

**TOTAL COST** ........ $ 78,000.45

**TOTAL PROJECT COST** ....... $490,913.84

** Detailed Cost Estimate in Appendix B, page 7.

The following monthly cost components were calculated for Alternate "B":


2. Capital Costs - Distribution System.

3. Meter Reading and Billing Costs by Oakley.

1. **Capital Costs - Transmission Pipeline and Storage Tank**

These costs include the $10,000 connection charge to Kemmerer, pipeline with appurtenances, storage tank, permits, easements, highway and railroad boring, and a river crossing, together with 10% for engineering and 15% for contingencies. (See Appendix B - Page 6.)

Sixty-seven percent (67%) of the capital cost is contemplated in the form of a grant and thirty-three percent (33%) of the cost in the form of a loan to be paid back to the Wyoming Water Development Commission over 30 years at 4% interest. The loan payback is calculated at $7,348.58 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

- 15 lots .................. $ 43.78
- 20 lots .................. $ 32.83
- 25 lots .................. $ 26.27
- 30 lots .................. $ 21.89

2. **Capital Costs - Distribution System**

These costs include the construction of a 6 inch diameter distribution system with appurtenances and fire hydrants, as shown in the Drawings. They also include 10% for engineering and 15% for contingencies. (See Appendix B - Page 7.)
The distribution system, however, is assumed to be funded by the Wyoming Farm Loan Board which requires a 50% grant and 50% loan. The loan portion is amortized at 8.5% interest over an assumed repayment term of 30 years to correspond with the term of the Transmission Pipeline costs. The loan repayment is calculated at $3,352.71 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$20.16</td>
</tr>
<tr>
<td>20</td>
<td>$15.12</td>
</tr>
<tr>
<td>25</td>
<td>$12.10</td>
</tr>
<tr>
<td>30</td>
<td>$10.08</td>
</tr>
</tbody>
</table>

3. **Meter Reading and Billing**

These monthly costs are the same as those given in Alternate "A" as follows:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$18.00</td>
</tr>
<tr>
<td>20</td>
<td>$13.50</td>
</tr>
<tr>
<td>25</td>
<td>$10.80</td>
</tr>
<tr>
<td>30</td>
<td>$9.00</td>
</tr>
</tbody>
</table>

4. **Monthly Variable and Fixed Costs Payable to Kemmerer**

A fixed monthly charge for a 4 inch meter of $340.80 would be payable to Kemmerer. This charge, allocated per lot, is as follows:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Monthly Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$22.72</td>
</tr>
<tr>
<td>20</td>
<td>$17.04</td>
</tr>
<tr>
<td>25</td>
<td>$13.63</td>
</tr>
<tr>
<td>30</td>
<td>$11.36</td>
</tr>
</tbody>
</table>
A water rate of $2.70 per 1000 gallons would also be billed by Kemmerer. The following monthly costs would be incurred, assuming 3.5 persons per lot and 30 days per month and a daily per capita per day use of 100 or 300 gallons.

\[
\begin{align*}
100 \text{ G/C/D} & \times \$2.70/1000 \text{ gal} = \$28.35 \\
300 \text{ G/C/D} & \times \$2.70/1000 \text{ gal} = \$85.05
\end{align*}
\]

Total monthly costs per residence for Alternate "B" are summarized on the following table.
# OAKLEY WATER PROJECT

**PHASE II - ALTERNATE "B"**

## TOTAL MONTHLY COSTS

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission Pipeline</td>
<td>$ 43.78</td>
<td>$ 32.83</td>
<td>$ 26.27</td>
<td>$ 21.89</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$ 20.16</td>
<td>$ 15.12</td>
<td>$ 12.10</td>
<td>$ 10.08</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$ 18.00</td>
<td>$ 13.50</td>
<td>$ 10.80</td>
<td>$ 9.06</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$ 22.72</td>
<td>$ 17.04</td>
<td>$ 13.63</td>
<td>$ 11.36</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$ 28.35</td>
<td>$ 28.35</td>
<td>$ 28.35</td>
<td>$ 28.35</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$ 85.05</td>
<td>$ 85.05</td>
<td>$ 85.05</td>
<td>$ 85.05</td>
</tr>
</tbody>
</table>

**TOTAL COSTS:**

<table>
<thead>
<tr>
<th></th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 100 G/C/D</td>
<td>$133.01</td>
<td>$106.84</td>
<td>$ 91.15</td>
<td>$ 80.74</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$189.71</td>
<td>$163.54</td>
<td>$147.85</td>
<td>$137.44</td>
</tr>
</tbody>
</table>
This alternative involves the construction of a transmission pipeline and distribution system of sufficient capacity to meet domestic needs only. No fire protection is provided. A 4 inch diameter transmission pipeline and distribution system is considered because 4 inch diameter pipe is the smallest pipe that is available with American Water Works Association (AWWA) certification of performance, materials and quality.

The transmission pipeline would follow the same alignment as in Alternate "A". The distribution system would have the same configuration as in Alternates "A" and "B"; however fire hydrants would be deleted from the distribution system and 4 inch diameter pipe would be used. Additionally, the Wyoming DEQ has indicated that 4 inch diameter pipeline will be acceptable provided that the system excludes fire hydrants.

The Capital Cost for these facilities is estimated as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRANSMISSION PIPELINE</strong></td>
<td></td>
</tr>
<tr>
<td>Estimated Construction Costs</td>
<td>$233,213.50</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td>23,321.35</td>
</tr>
<tr>
<td>Sub Total</td>
<td>$256,534.85</td>
</tr>
<tr>
<td>Plus: 15% Contingency</td>
<td>38,480.23</td>
</tr>
<tr>
<td>Connection Charge to City of Kemmerer</td>
<td>10,000.00</td>
</tr>
<tr>
<td>Permits</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Final Design (8%)</td>
<td>20,522.79</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td>$326,537.87</td>
</tr>
</tbody>
</table>

* Detailed Cost Estimate in Appendix C, page 11.
DISTRIBUTION SYSTEM **

Estimated Construction Costs...... $ 28,150.00
Plus 10% Engineering............... 2,815.00
Sub Total............... $ 30,965.00
Plus: 15% Contingency............ 4,644.75
   Final Design (8%)............. 2,477.20
   TOTAL COST ........ $ 38,086.95

TOTAL PROJECT COST ........ $364,624.82

** Detailed Cost Estimate in Appendix C, page 12.

The following monthly cost components were calculated for Alternate "C":

2. Capital Costs - Distribution System.
3. Meter Reading and Billing Costs by Oakley.
1. Capital Costs - Transmission Pipeline

These costs include the $10,000 connection charge to Kemmerer, pipeline appurtenance, permits, easements, highway and railroad boring, and a river crossing, together with 10% for engineering and 15% for contingencies. (See Appendix C - Page 11.)

Sixty-seven percent (67%) of the capital cost is contemplated in the form of a grant and thirty-three percent (33%) of the cost in the form of a loan to be paid back to the Wyoming Water Development Commission over 30 years at 4% interest.

The loan payback is calculated at $5,825.68 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$34.62</td>
</tr>
<tr>
<td>20</td>
<td>$25.96</td>
</tr>
<tr>
<td>25</td>
<td>$20.77</td>
</tr>
<tr>
<td>30</td>
<td>$17.31</td>
</tr>
</tbody>
</table>

2. Capital Costs - Distribution System

These costs include the construction of a 4 inch diameter distribution system with appurtenances. No fire hydrants are included. The distribution system is shown in the Drawings. Cost figures also include 10% for engineering and 15% for contingencies. (See Appendix C - Page 12.)
The distribution system, however, is assumed to be funded by the Wyoming Farm Loan Board which requires a 50% grant and 50% loan. The loan portion is amortized at 8.5% interest over an assumed repayment term of 30 years to correspond with the term of the Transmission Pipeline costs. The loan repayment is calculated at $1,632.45 per year which computes to a monthly cost per lot or residence household, depending on the number of lots, as shown:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$9.84</td>
</tr>
<tr>
<td>20</td>
<td>$7.38</td>
</tr>
<tr>
<td>25</td>
<td>$5.91</td>
</tr>
<tr>
<td>30</td>
<td>$4.92</td>
</tr>
</tbody>
</table>

3. **Meter Reading and Billing**

These monthly costs are the same as those given in Alternates "A" and "B" as follows:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$18.00</td>
</tr>
<tr>
<td>20</td>
<td>$13.50</td>
</tr>
<tr>
<td>25</td>
<td>$10.80</td>
</tr>
<tr>
<td>30</td>
<td>$9.00</td>
</tr>
</tbody>
</table>
4. *Monthly Variable and Fixed Costs Payable to Kemmerer*

These costs are the same as for Alternate "B" as follows:

- 15 lots ................. $ 22.72
- 20 lots .................. $ 17.04
- 25 lots .................. $ 13.63
- 30 lots .................. $ 11.36

A water rate of $2.70 per 1000 gallons would also be billed by Kemmerer. The following monthly costs would be incurred, assuming 3.5 persons per lot and 30 days per month and a daily per capita per day use of 100 or 300 gallons.

- $100 G/C/D @ $2.70/1000 gal = $ 28.35
- $300 G/C/D @ $2.70/1000 gal = $ 85.05

Total monthly costs per residence for Alternate "C" are summarized on the following table.
OAKLEY WATER PROJECT
PHASE II - ALTERNATE "C"

TOTAL MONTHLY COSTS

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission Pipeline</td>
<td>$34.62</td>
<td>$25.96</td>
<td>$20.77</td>
<td>$17.31</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$9.84</td>
<td>$7.38</td>
<td>$5.91</td>
<td>$4.92</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$18.00</td>
<td>$13.50</td>
<td>$10.80</td>
<td>$9.06</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$22.72</td>
<td>$17.04</td>
<td>$13.63</td>
<td>$11.36</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$28.35</td>
<td>$28.35</td>
<td>$28.35</td>
<td>$28.35</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$85.05</td>
<td>$85.05</td>
<td>$85.05</td>
<td>$85.05</td>
</tr>
<tr>
<td>TOTAL COSTS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$113.53</td>
<td>$92.23</td>
<td>$79.46</td>
<td>$71.00</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$170.23</td>
<td>$148.93</td>
<td>$136.16</td>
<td>$127.70</td>
</tr>
</tbody>
</table>
VI  SUMMARY OF MONTHLY COSTS

Monthly costs for the three alternatives are summarized on the following table:
OAKLEY WATER PROJECT

SUMMARY OF MONTHLY WATER COSTS

(WWDC 67% GRANT - 33% LOAN - TRANSMISSION LINE)

<table>
<thead>
<tr>
<th>NUMBER OF LOTS</th>
<th>ALTERNATE</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;A&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;C&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>100 G/C/D</td>
</tr>
<tr>
<td>15</td>
<td>$191.51</td>
<td>$248.21</td>
<td>$133.01</td>
<td>$189.71</td>
<td>$113.53</td>
</tr>
<tr>
<td>20</td>
<td>$150.72</td>
<td>$207.42</td>
<td>$106.84</td>
<td>$163.54</td>
<td>$ 92.23</td>
</tr>
<tr>
<td>25</td>
<td>$126.25</td>
<td>$182.95</td>
<td>$ 91.15</td>
<td>$147.85</td>
<td>$ 79.46</td>
</tr>
<tr>
<td>30</td>
<td>$109.99</td>
<td>$166.69</td>
<td>$ 80.74</td>
<td>$137.44</td>
<td>$ 71.00</td>
</tr>
</tbody>
</table>
VII PERMITS, EASEMENTS AND/OR RIGHT-OF-WAYS

There are four different agencies, companies, or entities that must be dealt with to secure permits, easements, and/or right-of-ways to construct the project. They are:

1. Wyoming Highway Department
2. Union Pacific Railroad
3. Pittsburg and Midway Coal Mining
4. United States Army Corps of Engineers

1. Wyoming Highway Department

A permit must be obtained from the Wyoming Highway Department to get authorization to construct the pipeline in the right-of-way of U. S. Highway 30 and to bore under it and the Highway 30-189 Business Loop. Detailed construction plans should be submitted to the Wyoming Highway Department when they become available showing the location and details of construction for pipeline placement and borings. A traffic control plan should also be submitted. This information should be submitted to:

Wyoming Highway Department
P. O. Box 1260
Rock Springs, WY  82902

Attention:  Mr. Don Kinder, P.E.
2. **Union Pacific Railroad**

A license must be obtained from the Union Pacific Railroad to perform work in their right-of-way. The Union Pacific licensing procedures are as follows:

**UNION PACIFIC SYSTEM LICENSE PROCEDURES**

1. If it is necessary for you to enter the Railroad Company's property for surveying in order for you to complete the required application, a "Permit To Be On Railroad Property for Utility Survey" must be executed and returned following the instructions in the permit.

2. Union Pacific's Operating Department is the initial contact for all Pipe/Wire Line requests. Applications should be submitted to:

   R. E. Jackson, Jr.  
   Manager - Contracts  
   Union Pacific Railroad Company  
   1416 Dodge Street, Room 1100  
   Omaha, Nebraska 68179

3. Upon receipt of your application, we will forward a post card to you acknowledging receipt, advising you the Railroad Company's initial identification number it has assigned, and advising the person you should contact for further inquiries.

4. Office hours are 8:00 AM to 5:00 PM, Central Time Zone, Monday through Friday.

5. Agreements will be required for all crossings of the right-of-way. A consent form agreement will be granted for crossings in a public way. Union Pacific has in excess of 90,000 licenses in effect system-wide.

6. Generally, agreement processing time will be 45 to 60 days. Please allow sufficient lead time for document handling prior to desired construction date. Before construction begins, agreements must be executed by Licensee and returned to this office. Verbal authorizations will not be permitted or granted. Generally, a minimum of 48 hours advance notice after execution of an agreement, will be required prior to entry.

7. License fees must be submitted at the time you execute and return the agreement.

**NOTE:** APPLICATIONS WILL ONLY BE ACCEPTED THAT ARE PREPARED ON OUR STANDARD APPLICATION FORM ATTACHED HERETO AS EXHIBIT "A".

Application Blanks, Exhibits, Detailed Instructions and other pertinent information and material are bound Appendix I.
3. **Pittsburg and Midway Coal Mining**

Pittsburg and Midway Coal Mining (PMCM) owns the land that the pipeline must cross outside of highway and railroad right-of-ways, as shown on the Drawings. An easement will have to be obtained from them at the following address:

Pittsburg and Midway Coal Mining  
c/o Richard M. Murphy - Tax Agent  
6400 South Fiddlers Green Circle  
Englewood, CO 80111

4. **United States Army Corps of Engineers**

A 404 Permit will have to be obtained from the U. S. Army Corps of Engineers (USCOE) for construction in the Hams Fork River Channel. The USCOE Regulatory Program Applicant Information Booklet form is bound in Appendix G to this Report. Application for Department of the Army Permit forms are bound in Appendix H. The Wyoming USCOE contact person is:

Edwin A. (Ed) Gooley  
Environmental Resource Specialist  
U. S. Army Corps of Engineers  
1225 Market Street, Room 102  
Riverton, WY 82501  
Phone: (307) 856-5283
VIII COMMENTS - CONSTRUCTION

All pipe, components, materials, appurtenances, fittings, and installation and testing procedures should comply with American Water Works Association Standards and Criteria.

Utilities should be located and marked by utility personnel prior to construction. An existing television cable is located within the pipeline alignment from approximately Station 120+00 to Station 129+00. This cable can be temporarily rerouted during construction and replaced in its present location after construction is completed. Sufficient advance notice must be given to the cable owner so that it can be temporarily rerouted. This cable is owned by Vantage Cable Associates, Inc. - phone number 879-3811.

Pipe should be buried a minimum depth of six feet to the top of pipe because of frost penetration during extreme winter weather. Groundwater will possibly be encountered from Station 105+00 to Station 115+50, which will require trench dewatering measures. Trenching in rock may be encountered from Station 115+50 to Station 128+00.

The crossing of the Hams Fork River will require construction of a coffer dam and trench dewatering to install the pipe halfway across the river. The coffer dam will be removed after the first half of the crossing is completed and another dam constructed to accommodate construction of the second half. The river will then be diverted across the pipeline installed during the first phase.
Construction should be scheduled in the late summer or fall when flow in the Hams Fork is at low levels to simplify crossing construction.

These operations will require a U. S. Army Corps of Engineers 404 Permit.
As stated earlier in this Report, there are four cost components for each of the three alternates evaluated:

2. Capital Costs - Distribution System.
3. Meter Reading and Billing Costs by Oakley.

1. Capital Costs - Transmission Pipeline

Capital costs for the transmission pipeline are assumed to be funded by the Wyoming Water Development Commission as follows:

Grant ............... 67%
Loan ............... 33%

The terms of the loan portion are 4% interest over a 30 year repayment period. The loan portion would be paid by water revenues generated from the Oakley residences.

2. Capital Costs - Distribution System

The capital costs for the distribution system are assumed to be funded by a Wyoming Farm Loan Board grant and loan:

Grant ............... 50%
Loan ............... 50%
This loan would also be repaid out of monthly water revenues at 8.5% interest annually over a 30 year repayment term.

Funding this portion of the project will require the preparation and submittal of an application for funding to the Wyoming Farm Loan Board. The Farm Loan Board meets twice a year -- in January and July. Applications must be received by the Board 90 days in advance of their meeting. The application must therefore be in Cheyenne by mid April to be considered in July and by mid October to be acted upon in the January meeting.

3. Meter Reading and Billing Costs by Oakley

These costs would be paid directly out of monthly water revenues.

4. Variable and Fixed Monthly Costs Payable to Kemmerer

These costs will also be paid directly out of monthly water revenues.
ECONOMIC ANALYSIS

The Summary of Monthly Water Costs shown in the table on page 30 indicates that water rates would vary from a low of $92.23 (Alternate "C" - 100 G/C/D), to a high of $150.72 (Alternate "A" - 100 G/C/D) if the 20 lots in Oakley undertake any of the projects described in the alternates. These are very high water rates.

The following table gives monthly water rates charged by a few small communities throughout Wyoming having a population of less than 300:

<table>
<thead>
<tr>
<th>Community</th>
<th>Monthly Charge 100 G/C/D (1)</th>
<th>Monthly Charge 300 G/C/D/ (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearmont</td>
<td>$ 8.14</td>
<td>$ 9.91</td>
</tr>
<tr>
<td>Kaycee</td>
<td>$ 25.65</td>
<td>$ 36.30</td>
</tr>
<tr>
<td>Kirby</td>
<td>$ 35.82</td>
<td>$ 78.29</td>
</tr>
<tr>
<td>Manderson</td>
<td>$ 12.75</td>
<td>$ 23.25</td>
</tr>
<tr>
<td>Opal</td>
<td>$ 20.00</td>
<td>$ 62.00</td>
</tr>
<tr>
<td>Yoder</td>
<td>$ 10.66</td>
<td>$ 22.21</td>
</tr>
<tr>
<td>Average</td>
<td>$ 18.84</td>
<td>$ 38.66</td>
</tr>
</tbody>
</table>

(1) Source: Wyoming Association of Municipalities
The above figures demonstrate a very wide range in water rates which are dependent on the availability and proximity of a water source and the extent of the facilities needed to deliver the water to the user. Also, the financial resources of the user have a direct impact on his ability to pay.

This would indicate that a water project could be undertaken that would carry with it water costs higher than the average shown in the foregoing table. Oakley residents could probably repay water project costs that would produce total water charges of from $30.00 to $50.00 per month for amounts of 100 gallons per capita per day.

Water usage of 100 gallons per capita per day would require that the existing individual wells continue to be used to provide water for lawns, livestock, etc., which would require additional monetary outlay by each homeowner to operate and maintain their domestic wells.
XI  ANNEXATION TO THE CITY OF KEMMERER

The corporate limits of the City of Kemmerer are very close to Oakley. (See Sheet 3 of the Drawings.) In fact, the proposed pipeline would lie within the City of Kemmerer for the greater part of its length. Therefore, it is conceivable that Oakley could annex to the City of Kemmerer. This would reduce their water costs by doing away with the $25,000 connection charge and $7,500 meter cost and fixed monthly charge of $1,192.80 by Kemmerer for Alternate "A", and the $10,000 connection charge, $3,000 meter cost, and fixed monthly charge of $340.00 for Alternates "B" and "C".

Additionally, water rates would drop from $2.70 per 1000 gallons to $1.75 per 1000 gallons and a meter charge of $4.26 per month would be billed to each Oakley residence.

A detailed breakdown of these revised costs are shown on pages 21 to 29 in Appendix E and summarized as follows:

ALTERNATE "A"
REVISED CAPITAL COSTS RESULTING FROM ANNEXING

TRANSMISSION PIPELINE *
Estimated Construction Costs...... $290,329.00
Plus 10% Engineering.............. 29,032.90
Sub Total............. $319,361.90
Plus: 15% Contingency............ 47,904.29
Permits......................... 1,000.00
Final Design (8%).............. 25,548.95
TOTAL COST ........ $393,815.14

DISTRIBUTION SYSTEM **

Estimated Construction Costs...... $ 57,650.00
Plus 10% Engineering............... 5,765.00
     Sub Total............... $ 63,415.00
Plus:  15% Contingency............ 9,512.25
       Final Design (8%)......... 5,073.20
     TOTAL COST ........ $ 78,000.45

TOTAL PROJECT COST ....... $459,638.59

** Detailed Cost Estimate in Appendix E, page 22.

The table on the following page presents a summary of the total monthly costs for Alternate "A" that would result if Oakley annexed to the City of Kemmerer.

The figures in this table indicate a $4.26 charge for each residential meter and a water rate of $1.75 per 1000 gallons, which is the current in-city water rate.
**OAKLEY WATER PROJECT**  
**PHASE II - ALTERNATE "A"**  
**TOTAL MONTHLY COSTS**

**ANNEXATION TO KEMMERER**

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1) Transmission (1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipeline</td>
<td>$41.75</td>
<td>$31.31</td>
<td>$25.05</td>
<td>$20.89</td>
</tr>
<tr>
<td><strong>2) Distribution System</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$20.16</td>
<td>$15.12</td>
<td>$12.10</td>
<td>$10.08</td>
</tr>
<tr>
<td><strong>3) Meter Reading and Billing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>4) Fixed Costs to Kemmerer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
</tr>
<tr>
<td><strong>5) Variable Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
</tr>
</tbody>
</table>

**TOTAL COSTS:**

<table>
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<tr>
<th></th>
<th>100 G/C/D</th>
<th>200 G/C/D</th>
<th>300 G/C/D</th>
<th>400 G/C/D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 100 G/C/D</td>
<td>$84.55</td>
<td>$69.07</td>
<td>$59.79</td>
<td>$53.61</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$121.30</td>
<td>$105.82</td>
<td>$96.54</td>
<td>$90.36</td>
</tr>
</tbody>
</table>

(1) Assumes 67% Grant 33% Loan
ALTERNATE "B"
REVISED CAPITAL COSTS RESULTING FROM ANNEXING

TRANSMISSION PIPELINE AND TANK *

Estimated Construction Costs...... $294,053.50
Plus 10% Engineering................ 29,405.35
Sub Total................ $323,458.85
Plus: 15% Contingency............. 48,518.83
Permits.......................... 1,000.00
Final Design (8%)............. 25,876.71
TOTAL COST ........ $398,854.39

DISTRIBUTION SYSTEM **

Estimated Construction Costs...... $ 57,650.00
Plus 10% Engineering............... 5,765.00
Sub Total................ $ 63,415.00
Plus: 15% Contingency............ 9,512.25
Final Design (8%)............ 5,073.20
TOTAL COST ........ $ 78,000.45

TOTAL PROJECT COST ........ $476,854.84

** Detailed Cost Estimate in Appendix E, page 25.
A summary of total monthly costs that might be anticipated if Oakley annexed to the City of Kemmerer and pursued Alternate "B" is presented in the following table:

The following costs include a $4.26 monthly meter charge for each residence and a water rate of $1.75 per 1000 gallons.
## OAKLEY WATER PROJECT
### PHASE II - ALTERNATE "B"
### TOTAL MONTHLY COSTS

#### ANNEXATION TO KEMMERER

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission (1) Pipeline</td>
<td>$42.29</td>
<td>$31.72</td>
<td>$25.37</td>
<td>$21.14</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$20.16</td>
<td>$15.12</td>
<td>$12.10</td>
<td>$10.08</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
</tr>
</tbody>
</table>

| TOTAL COSTS:                                   |         |         |         |         |
| a) 100 G/C/D                                  | $85.09  | $69.48  | $60.11  | $53.86  |
| b) 300 G/C/D                                  | $121.84 | $106.23 | $96.86  | $90.61  |

(1) Assumes 67% Grant 33% Loan
ALTERNATE "C"

REVISED CAPITAL COSTS RESULTING FROM ANNEXING

TRANSMISSION PIPELINE *

Estimated Construction Costs ...... $230,213.50
Plus 10% Engineering.............. 23,021.35
Sub Total.................. $253,234.85
Plus: 15% Contingency............ 37,985.23
Permits.......................... 1,000.00
Final Design (8%).............. 20,258.79
TOTAL COST ........ $312,478.87

DISTRIBUTION SYSTEM **

Estimated Construction Costs ...... $28,150.00
Plus 10% Engineering.............. 2,815.00
Sub Total.................. $30,965.00
Plus: 15% Contingency............ 4,644.75
Final Design (8%).............. 2,477.20
TOTAL COST ........ $38,086.95

TOTAL PROJECT COST ........ $350,565.82

* Detailed Cost Estimate in Appendix E, page 27.
** Detailed Cost Estimate in Appendix E, page 28.

The following table presents a summary of the total monthly costs for Alternate "C" that would result if Oakley annexed to the City of Kemmerer.

47
**OAKLEY WATER PROJECT**  
**PHASE II - ALTERNATE "C"**  
**TOTAL MONTHLY COSTS**

**ANNEXATION TO KEMMERER**

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission (1) Pipeline</td>
<td>$33.13</td>
<td>$24.85</td>
<td>$19.88</td>
<td>$16.56</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$9.84</td>
<td>$7.38</td>
<td>$5.91</td>
<td>$4.92</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
</tr>
<tr>
<td><strong>TOTAL COSTS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$65.61</td>
<td>$54.87</td>
<td>$48.43</td>
<td>$44.12</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$102.36</td>
<td>$91.62</td>
<td>$85.18</td>
<td>$80.87</td>
</tr>
</tbody>
</table>

(1) Assumes 67% Grant 33% Loan
The foregoing costs include a $4.26 monthly meter charge for each residence and a water rate of $1.75 per 1000 gallons.

The total monthly cost for each of the three alternatives are given in the following tabulation which assumes a usage factor of 100 gallons per capita per day and 20 lots being served in the area annexed to Kemmerer:

<table>
<thead>
<tr>
<th>ALTERNATE</th>
<th>TOTAL MONTHLY WATER COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>$ 69.07</td>
</tr>
<tr>
<td>&quot;B&quot;</td>
<td>$ 69.48</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>$ 54.87</td>
</tr>
</tbody>
</table>

There are other cost factors and conditions that must be looked at in considering annexation to the City of Kemmerer which are not evaluated in this study and Report.

The pipeline that is proposed crosses lands that belong to Pittsburg and Midway Mining. These lands lie within the City limits of Kemmerer and would in all probability benefit from the construction of the pipeline if water service might be available to their lands in the future. Therefore, if annexation is a possibility, the creation of an Improvement District or Assessment District including Pittsburg and Midway Mining lands should be discussed with both Pittsburg and Midway Mining and the City of Kemmerer with the objective to spread the cost of the pipeline over a greater area, thereby reducing water costs to the Oakley residents.
The following table indicates that monthly water costs could vary from a low of $71.00 to a high of $246.92, depending on number of lots served, usage, and the alternate selected. Even the lower figure of $71.00 is still a very high monthly water cost.
OAKLEY WATER PROJECT

SUMMARY OF MONTHLY WATER COSTS

(WWDC 67% GRANT - 33% LOAN - TRANSMISSION LINE)

<table>
<thead>
<tr>
<th>NUMBER OF LOTS</th>
<th>ALTERNATE</th>
<th></th>
<th>ALTERNATE</th>
<th></th>
<th>ALTERNATE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td></td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
</tr>
<tr>
<td>15</td>
<td>$191.51</td>
<td>$218.21</td>
<td>$133.01</td>
<td>$189.71</td>
<td>$113.53</td>
<td>$170.23</td>
</tr>
<tr>
<td>20</td>
<td>$150.72</td>
<td>$207.42</td>
<td>$106.84</td>
<td>$163.54</td>
<td>$ 92.23</td>
<td>$148.93</td>
</tr>
<tr>
<td>25</td>
<td>$126.25</td>
<td>$182.95</td>
<td>$ 91.15</td>
<td>$147.85</td>
<td>$ 79.46</td>
<td>$136.16</td>
</tr>
<tr>
<td>30</td>
<td>$109.99</td>
<td>$166.69</td>
<td>$ 80.74</td>
<td>$137.44</td>
<td>$ 71.00</td>
<td>$127.70</td>
</tr>
</tbody>
</table>
There are two possible ways to reduce these costs:

1. Obtain a WWDC loan/grant mix of a 75% grant and 25% loan.

2. Negotiating with Kemmerer for a reduction in their fixed monthly charge and water rates.

3. Funding from FmHA was also considered as a means to reduce costs, as they can provide a loan to pay the loan portion of the Wyoming Farm Loan Board monies at 1.5% less annual interest. This lower interest rate would reduce water costs by about $1.00 per month.

Greater reduction in monthly water costs could be achieved by obtaining a 75% grant and 25% loan from the WWDC for capital construction costs of the transmission pipeline. This is demonstrated by the following figures:
OAKLEY WATER PROJECT

MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT 25% LOAN

ALTERNATE "A"

TRANSMISSION LINE

Capital Cost ...................... $ 428,962.64
25% Loan.......................... $ 107,240.66
Annual Cost
@ 4% Interest 30 years........ $ 6,201.73

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Lots</td>
<td>$45.48</td>
<td>$34.45</td>
<td>$11.03</td>
</tr>
<tr>
<td>20 Lots</td>
<td>$34.11</td>
<td>$25.84</td>
<td>$ 8.27</td>
</tr>
<tr>
<td>25 Lots</td>
<td>$27.29</td>
<td>$20.67</td>
<td>$ 6.62</td>
</tr>
<tr>
<td>30 Lots</td>
<td>$22.74</td>
<td>$17.23</td>
<td>$ 5.51</td>
</tr>
</tbody>
</table>
OAKLEY WATER PROJECT

MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT 25% LOAN

ALTERNATE "B"

TRANSMISSION LINE

Capital Cost......................... $ 412,913.39

25% Loan.......................... $ 103,228.35

Annual Cost

@ 4% Interest 30 years....... $ 5,969.70

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Lots</td>
<td>$43.78</td>
<td>$33.16</td>
<td>$10.62</td>
</tr>
<tr>
<td>20 Lots</td>
<td>$32.83</td>
<td>$24.87</td>
<td>$ 7.96</td>
</tr>
<tr>
<td>25 Lots</td>
<td>$26.27</td>
<td>$19.90</td>
<td>$ 6.37</td>
</tr>
<tr>
<td>30 Lots</td>
<td>$21.89</td>
<td>$16.58</td>
<td>$ 5.31</td>
</tr>
</tbody>
</table>

COMPARISON - COST PER LOT
OAKLEY WATER PROJECT

MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT  25% LOAN

ALTERNATE "C"

TRANSMISSION LINE

Capital Cost......................... $ 326,537.87
25% Loan.......................... $ 81,634.47

Annual Cost
@ 4% Interest 30 years....... $ 4,720.92

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>$34.62</td>
<td>$26.23</td>
<td>$ 8.39</td>
</tr>
<tr>
<td>20</td>
<td>$25.96</td>
<td>$19.67</td>
<td>$ 6.29</td>
</tr>
<tr>
<td>25</td>
<td>$20.77</td>
<td>$15.74</td>
<td>$ 5.03</td>
</tr>
<tr>
<td>30</td>
<td>$17.31</td>
<td>$13.11</td>
<td>$ 4.20</td>
</tr>
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</table>
OAKLEY WATER PROJECT

SUMMARY OF REVISED MONTHLY WATER COSTS

(WWDC 75% GRANT - 25% LOAN - TRANSMISSION LINE)

<table>
<thead>
<tr>
<th>NUMBER OF LOTS</th>
<th>ALTERNATE</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;A&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;C&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>100 G/C/D</td>
</tr>
<tr>
<td>15</td>
<td>$180.48</td>
<td>$237.18</td>
<td>$122.39</td>
<td>$179.09</td>
<td>$105.14</td>
</tr>
<tr>
<td>20</td>
<td>$142.45</td>
<td>$199.15</td>
<td>$98.88</td>
<td>$155.58</td>
<td>$85.94</td>
</tr>
<tr>
<td>25</td>
<td>$119.63</td>
<td>$176.33</td>
<td>$84.78</td>
<td>$141.48</td>
<td>$74.43</td>
</tr>
<tr>
<td>30</td>
<td>$104.48</td>
<td>$161.18</td>
<td>$75.43</td>
<td>$132.13</td>
<td>$66.80</td>
</tr>
</tbody>
</table>
The foregoing table shows the resulting total monthly water costs achieved by a 25% loan to construct the transmission pipeline. The lowest water cost that would result from a 25% loan for the transmission pipeline under existing conditions (20 Lots) and water consumption of 100 gallons per capital per day is $85.94 per month per lot.

This figure could be further reduced if Oakley could negotiate lower water rates and lower monthly fixed costs from the City of Kemmerer.

For example, the Phase I Report included an analysis which considered costs to Kemmerer that are directly affected by the quantity of water that would be delivered to Oakley. This analysis is shown in Appendix I - (the Appendix to the Phase I Report) on page 3. A rate of $2.25/1000 gallons was calculated by applying the Kemmerer cost factors affected by the amount of water delivered to Oakley. Dividing the $2.25/1000 gal by $1.75/1000 gal (the in-City costs to Kemmerer residents), a ratio of 1.29 results, which is considerably less than the 1.54 factor that has just recently been adopted by Kemmerer.

The fixed monthly cost in Kemmerer for a standard residential water meter is $4.26/month. Multiplying this by the number of lots in Oakley (20) results in a total of $85.20, whereas the monthly charge for a 4 inch meter to serve Oakley is $340.80. This monthly charge for the 4 inch meter computes to $17.04 per lot per month, which is four times higher than that charged in Kemmerer.
XIII RECOMMENDATIONS

The following recommendations are made:

1) Pursue negotiations with the City of Kemmerer to reduce monthly water rates.

2) Pursue efforts jointly with Lincoln County, Kemmerer, Diamondville, and Opal to create a Joint Powers Water Board.

3) Undertake discussions with the City of Kemmerer concerning annexation to determine other costs to Oakley residents to do so and identify constraints that may exist.

4) Continue with measures that will ultimately lead to the creation of an Oakley Water District or other entity that has the legal power to enter into a contract with the Wyoming Water Development Commission, et al.
PHASE II

APPENDIX
# Phase II Appendix

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Alternate &quot;A&quot; Cost Estimates</td>
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</tr>
<tr>
<td>B. Alternate &quot;B&quot; Cost Estimates</td>
<td>6</td>
</tr>
<tr>
<td>C. Alternate &quot;C&quot; Cost Estimates</td>
<td>11</td>
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<tr>
<td>D. Monthly Water Costs</td>
<td>17</td>
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<tr>
<td>75% Grant-25% Loan/Transmission Line</td>
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<tr>
<td>E. Revised Monthly Costs - Annexation to Kemmerer</td>
<td>21</td>
</tr>
<tr>
<td>F. Letter from DEQ</td>
<td>30</td>
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<tr>
<td>G. USCOE Regulatory Program</td>
<td>32</td>
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<td>H. USCOE Permit Application</td>
<td>55</td>
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<tr>
<td>I. Union Pacific Railroad License Procedures</td>
<td>57</td>
</tr>
<tr>
<td>J. Phase I Report and Appendix</td>
<td>72</td>
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<tr>
<td>K. Phase I Drawings</td>
<td></td>
</tr>
<tr>
<td>L. Phase II Drawings</td>
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</table>
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

8" DIAMETER TRANSMISSION LINE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 8&quot; dia. Pipeline</td>
<td>15,233 LF</td>
<td>$13.00</td>
<td>$198,029.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>10 EA</td>
<td>$1000.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>3. Pressure Red. Valve</td>
<td>1 EA</td>
<td>$3000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>4. Air Relief Valves</td>
<td>6 EA</td>
<td>$300.00</td>
<td>$1,800.00</td>
</tr>
<tr>
<td>5. Boring</td>
<td>200 LF</td>
<td>$150.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>6. Trench in Rock</td>
<td>1,100 LF</td>
<td>$25.00</td>
<td>$27,500.00</td>
</tr>
<tr>
<td>7. Easements</td>
<td></td>
<td>Lump Sum</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>8. Meter</td>
<td></td>
<td>Lump Sum</td>
<td>$7,500.00</td>
</tr>
<tr>
<td>9. River Crossing</td>
<td>250 LF</td>
<td>$60.00</td>
<td>$15,000.00</td>
</tr>
</tbody>
</table>

Sub Total $297,829.00

Plus 10% Engineering $29,782.90

Sub Total $327,611.90

Plus: 15% Contingency $49,141.79
Connection Charge 25,000.00
Permits 1,000.00
Final Design (8%) 26,208.95

TOTAL PROJECT COST $428,962.64

33% Loan $141,557.67
Annual Cost - 4% Interest for 30 Years $8,186.28

Cost/Lot/Month: 15 Lots $45.48
20 Lots $34.11
25 Lots $27.29
30 Lots $22.74
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

CAPITAL COSTS - DISTRIBUTION SYSTEM

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 6&quot; dia. Pipeline</td>
<td>1,700 LF</td>
<td>$ 12.50</td>
<td>$ 21,250.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>8 EA</td>
<td>$ 800.00</td>
<td>$ 6,400.00</td>
</tr>
<tr>
<td>3. Boring</td>
<td>100 LF</td>
<td>$ 150.00</td>
<td>$ 15,000.00</td>
</tr>
<tr>
<td>4. Fire Hydrants</td>
<td>10 EA</td>
<td>$1500.00</td>
<td>$15,000.00</td>
</tr>
</tbody>
</table>

Sub Total $ 57,650.00

Plus 10% Engineering $ 5,765.00

Sub Total $ 63,415.00

Plus 15% Contingency $ 9,512.25
Plus Final Design (8%) $ 5,073.20

TOTAL PROJECT COST $ 78,000.45

50% Loan $ 39,000.23

Annual Cost - 8.5% Interest for 30 Years $ 3,628.97

Cost/Lot/Month:
- 15 Lots $ 20.16
- 20 Lots $ 15.12
- 25 Lots $ 12.10
- 30 Lots $ 10.08
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

METER READING AND BILLING BY OAKLEY

METER READING

4 hrs/month @ $15.00 = $ 60.00

BILLING

8 hrs/month @ $15.00 = $ 120.00

VEHICLE

8 hrs/month @ $10.00 = $ 80.00

SUPPLIES

= $ 10.00

TOTAL MONTHLY COST = $ 270.00

COST PER LOT PER MONTH:

15 Lots $ 18.00
20 Lots $ 13.50
25 Lots $ 10.80
30 Lots $ 9.00
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

VARIABLE AND FIXED COSTS

PAYABLE TO KEMMERER (MONTHLY)

FIXED COSTS: $1,192.80

15 Lots $ 79.52
20 Lots $ 59.64
25 Lots $ 47.71
30 Lots $ 39.76

VARIABLE COSTS:

* 100 G/C/D @ $2.70/1000 Gal = $ 28.35
* 300 G/C/D @ $2.70/1000 Gal = $ 85.05
**OAKLEY WATER PROJECT**

**PHASE II - ALTERNATE "A"**

**TOTAL MONTHLY COSTS**

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
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<tbody>
<tr>
<td>1) Transmission Pipeline</td>
<td>$ 45.48</td>
<td>$ 34.11</td>
<td>$ 27.29</td>
<td>$ 22.74</td>
</tr>
<tr>
<td>2) Distribution System</td>
<td>$ 20.16</td>
<td>$ 15.12</td>
<td>$ 12.10</td>
<td>$ 10.08</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$ 18.00</td>
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<td>4) Fixed Costs to Kemmerer</td>
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<td>$ 39.76</td>
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<td>5) Variable Costs Payable to Kemmerer</td>
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<td>b) 300 G/C/D</td>
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**TOTAL COSTS:**

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<td>$248.21</td>
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APPENDIX B

ALTERNATE 'B'

COST ESTIMATES
## COST ESTIMATE: OAKLEY WATER PROJECT

**PHASE II - ALTERNATE "B"**

**TRANSMISSION LINE AND TANK**

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<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
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<td>12,753 LF</td>
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<td>2. 8&quot; dia. Pipeline</td>
<td>3,000 LF</td>
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<td>3. Storage Tank 50,000 gal.</td>
<td>1 EA</td>
<td>Lump Sum</td>
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<td>4. Valves</td>
<td>12 EA</td>
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<td>5. Pressure Red. Valve</td>
<td>1 EA</td>
<td>$1500.00</td>
<td>$1,500.00</td>
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<tr>
<td>6. Air Vacuum Relief Valves</td>
<td>6 EA</td>
<td>$1000.00</td>
<td>$6,000.00</td>
</tr>
<tr>
<td>7. Boring</td>
<td>200 LF</td>
<td>$125.00</td>
<td>$25,000.00</td>
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<tr>
<td>8. Trench in Rock</td>
<td>1,700 LF</td>
<td>$25.00</td>
<td>$42,500.00</td>
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<td>9. Easements</td>
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<td>Lump Sum</td>
<td>$5,500.00</td>
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<tr>
<td>10. Meter</td>
<td></td>
<td>Lump Sum</td>
<td>$3,000.00</td>
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<tr>
<td>11. River Crossing</td>
<td>200 LF</td>
<td>$75.00</td>
<td>$15,000.00</td>
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</table>

| Plus 10% Engineering | Sub Total | $297,053.50 |
| Plus: 15% Contingency | Sub Total | $326,758.85 |
| Connection Charge | 10,000.00 |
| Permits | 1,000.00 |
| Final Design (8%) | 26,140.71 |

TOTAL PROJECT COST: $412,913.39

| 33% Loan | $136,261.42 |
| Annual Cost - 4% Interest for 30 Years | $7,880.00 |

Cost/Lot/Month: 15 Lots $43.78
20 Lots $32.83
25 Lots $26.27
30 Lots $21.89
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "B"

CAPITAL COSTS - DISTRIBUTION SYSTEM

<table>
<thead>
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<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
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</thead>
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<tr>
<td>1. 6&quot; dia. Pipeline</td>
<td>1,700 LF</td>
<td>$ 12.50</td>
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<td>2. Valves</td>
<td>8 EA</td>
<td>$ 800.00</td>
<td>$ 6,400.00</td>
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<tr>
<td>3. Boring</td>
<td>100 LF</td>
<td>$ 150.00</td>
<td>$ 15,000.00</td>
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<tr>
<td>4. Fire Hydrants</td>
<td>10 EA</td>
<td>$1500.00</td>
<td>$ 15,000.00</td>
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Sub Total $ 57,650.00

Plus 10% Engineering

Sub Total $ 63,415.00

Plus 15% Contingency

Plus Final Design (8%)

Sub Total $ 9,512.25

Sub Total $ 5,073.20

TOTAL PROJECT COST $ 78,000.45

50% Loan $ 39,000.23

Annual Cost - 8.5% Interest for 30 Years $ 3,628.97

Cost/Lot/Month:

15 Lots $ 20.16
20 Lots $ 15.12
25 Lots $ 12.10
30 Lots $ 10.08
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "B"

METER READING AND BILLING BY OAKLEY

METER READING

4 hrs/month @ $15.00 = $ 60.00

BILLING

8 hrs/month @ $15.00 = $ 120.00

VEHICLE

8 hrs/month @ $10.00 = $ 80.00

SUPPLIES

= $ 10.00

TOTAL MONTHLY COST = $ 270.00

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Cost</th>
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<tr>
<td>15</td>
<td>$18.00</td>
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<tr>
<td>20</td>
<td>$13.50</td>
</tr>
<tr>
<td>25</td>
<td>$10.80</td>
</tr>
<tr>
<td>30</td>
<td>$ 9.00</td>
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COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "B"

VARIABLE AND FIXED COSTS
PAYABLE TO KEMMERER (MONTHLY)

FIXED COSTS: $340.80

15 Lots $22.72
20 Lots $17.04
25 Lots $13.63
30 Lots $11.36

VARIABLE COSTS:

* 100 G/C/D @ $2.70/1000 Gal = $28.35
* 300 G/C/D @ $2.70/1000 Gal = $85.05
OAKLEY WATER PROJECT

PHASE II - ALTERNATE "B"

TOTAL MONTHLY COSTS

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
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<th>20 LOT</th>
<th>25 LOT</th>
<th>30 LOT</th>
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<tr>
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<td>$43.78</td>
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<td>$21.89</td>
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<td>2) Distribution System</td>
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<tr>
<td>3) Meter Reading and Billing</td>
<td>$18.00</td>
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<td>4) Fixed Costs to Kemmerer</td>
<td>$22.72</td>
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<td>5) Variable Costs Payable to Kemmerer:</td>
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<tr>
<td>a) 100 G/C/D</td>
<td>$28.35</td>
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<tr>
<td>b) 300 G/C/D</td>
<td>$85.05</td>
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TOTAL COSTS:

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<th>300 G/C/D</th>
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<tbody>
<tr>
<td>a) 100 G/C/D</td>
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<td>$106.84</td>
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APPENDIX C

ALTERNATE 'C'

COST ESTIMATES
COST ESTIMATE:  OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

4" DIAMETER TRANSMISSION LINE

<table>
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<td>2. Valves</td>
<td>10 EA</td>
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<td>3. Air Vacuum Relief Valves</td>
<td>6 EA</td>
<td>$1000.00</td>
<td>$ 6,000.00</td>
</tr>
<tr>
<td>4. Boring</td>
<td>200 LF</td>
<td>$ 125.00</td>
<td>$ 25,000.00</td>
</tr>
<tr>
<td>5. Trench in Rock</td>
<td>1,100 LF</td>
<td>$ 25.00</td>
<td>$ 27,500.00</td>
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<td>6. Easements</td>
<td></td>
<td></td>
<td>$ 5,000.00</td>
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<tr>
<td>7. Meter</td>
<td>1 EA</td>
<td>$3000.00</td>
<td>$ 3,000.00</td>
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<td>8. River Crossing</td>
<td>250 LF</td>
<td>$ 60.00</td>
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Sub Total                       $233,213.50

Plus 10% Engineering            $ 23,321.35

Sub Total                       $256,534.85

Plus: 15% Contingency  
Connection Charge $ 10,000.00
Permits $ 1,000.00
Final Design (8%) $20,522.79

TOTAL PROJECT COST             $326,537.87

33% Loan                       $107,757.50
Annual Cost - 4% Interest for 30 Years $ 6,231.62

Cost/Lot/Month:  
15 Lots $ 34.62
20 Lots $ 25.96
25 Lots $ 20.77
30 Lots $ 17.31
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

4" DIAMETER DISTRIBUTION LINE

<table>
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<td>Pipeline</td>
<td>1,500 LF</td>
<td>$ 10.50</td>
<td>$ 15,750.00</td>
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<td>2. Valves</td>
<td>6 EA</td>
<td>$ 400.00</td>
<td>$ 2,400.00</td>
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<td>3. Boring</td>
<td>100 LF</td>
<td>$ 100.00</td>
<td>$ 10,000.00</td>
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<td>Sub Total $ 28,150.00</td>
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<td>Plus 10% Engineering $ 2,815.00</td>
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<td>Sub Total $ 30,965.00</td>
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<td>Plus 15% Contingency $ 4,644.75</td>
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<td>TOTAL PROJECT COST $ 38,086.95</td>
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50% Loan $ 19,043.48

Annual Cost - 8.5% Interest for 30 Years $ 1,772.00

Cost/Lot/Month: 15 Lots $ 9.84
                20 Lots $ 7.38
                25 Lots $ 5.91
                30 Lots $ 4.92
COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

METER READING AND BILLING BY OAKLEY

METER READING

4 hrs/month @ $15.00 = $ 60.00

BILLING

8 hrs/month @ $15.00 = $ 120.00

VEHICLE

8 hrs/month @ $10.00 = $ 80.00

SUPPLIES

= $ 10.00

TOTAL MONTHLY COST = $ 270.00

COST PER LOT PER MONTH:

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<td>$ 10.80</td>
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<td>30</td>
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COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

VARIABLE AND FIXED COSTS

PAYABLE TO KEMMERER (MONTHLY)

**FIXED COSTS:** $340.80

- 15 Lots $22.72
- 20 Lots $17.04
- 25 Lots $13.63
- 30 Lots $11.36

**VARIABLE COSTS:**

* 100 G/C/D @ $2.70/1000 Gal = $28.35

* 300 G/C/D @ $2.70/1000 Gal = $85.05
<table>
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<td>2) Distribution System</td>
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<td>4) Fixed Costs to Kemmerer</td>
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OAKLEY WATER PROJECT

SUMMARY OF MONTHLY WATER COSTS

(WWDC 67% GRANT – 33% LOAN – TRANSMISSION LINE)

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<td>&quot;B&quot;</td>
<td>&quot;C&quot;</td>
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<td>$170.23</td>
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<td>$ 80.74</td>
<td>$137.44</td>
<td>$ 71.00</td>
<td>$127.70</td>
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APPENDIX D

MONTHLY WATER COSTS
75% GRANT - 25% LOAN
TRANSMISSION LINE
OAKLEY WATER PROJECT

REVISED - MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT 25% LOAN

ALTERNATE "A"

TRANSMISSION LINE

Capital Cost......................... $ 428,962.64

25% Loan.......................... $ 107,240.66

Annual Cost
@ 4% Interest 30 years....... $ 6,201.73

COST PER LOT PER MONTH:

<table>
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<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
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<tr>
<td>30</td>
<td>$22.74</td>
<td>$17.23</td>
<td>$ 5.51</td>
</tr>
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OAKLEY WATER PROJECT

MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT  25% LOAN

ALTERNATE "B"

TRANSMISSION LINE

Capital Cost......................... $ 412,913.39
25% Loan.......................... $ 103,228.35

Annual Cost
@ 4% Interest 30 years....... $ 5,969.70

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Lots</td>
<td>$43.78</td>
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<td>$10.62</td>
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<td>20 Lots</td>
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<td>$24.87</td>
<td>$ 7.96</td>
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<td>25 Lots</td>
<td>$26.27</td>
<td>$19.90</td>
<td>$ 6.37</td>
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<tr>
<td>30 Lots</td>
<td>$21.89</td>
<td>$16.58</td>
<td>$ 5.31</td>
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</tbody>
</table>
OAKLEY WATER PROJECT

MONTHLY WATER COST

TRANSMISSION LINE CAPITAL COSTS

75% GRANT  25% LOAN

ALTERNATE "C"

TRANSMISSION LINE

Capital Cost ...................... $ 326,537.87
25% Loan ......................... $ 81,634.47

Annual Cost
@ 4% Interest 30 years ....... $ 4,720.92

COST PER LOT PER MONTH:

<table>
<thead>
<tr>
<th>No. Lots</th>
<th>33% Loan</th>
<th>25% Loan</th>
<th>Cost Reduction</th>
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<tbody>
<tr>
<td>15</td>
<td>$34.62</td>
<td>$26.23</td>
<td>$ 8.39</td>
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<tr>
<td>20</td>
<td>$25.96</td>
<td>$19.67</td>
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<td>25</td>
<td>$20.77</td>
<td>$15.74</td>
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<td>30</td>
<td>$17.31</td>
<td>$13.11</td>
<td>$ 4.20</td>
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OAKLEY WATER PROJECT

SUMMARY OF REVISED MONTHLY WATER COSTS

(WWDC 75% GRANT - 25% LOAN - TRANSMISSION LINE)

<table>
<thead>
<tr>
<th>NUMBER OF LOTS</th>
<th>ALTERNATE</th>
<th></th>
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<tr>
<td></td>
<td>&quot;A&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;C&quot;</td>
<td>&quot;A&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;C&quot;</td>
</tr>
<tr>
<td></td>
<td>100 G/C/D</td>
<td>100 G/C/D</td>
<td>100 G/C/D</td>
<td>300 G/C/D</td>
<td>300 G/C/D</td>
<td>300 G/C/D</td>
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<tr>
<td>15</td>
<td>$180.48</td>
<td>$122.39</td>
<td>$122.39</td>
<td>$179.09</td>
<td>$105.14</td>
<td>$161.84</td>
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<td>20</td>
<td>$142.45</td>
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<td>$98.88</td>
<td>$155.58</td>
<td>$85.94</td>
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<tr>
<td>25</td>
<td>$119.63</td>
<td>$84.78</td>
<td>$84.78</td>
<td>$141.48</td>
<td>$74.43</td>
<td>$131.13</td>
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<tr>
<td>30</td>
<td>$104.48</td>
<td>$75.43</td>
<td>$75.43</td>
<td>$132.13</td>
<td>$66.80</td>
<td>$123.50</td>
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</table>
APPENDIX E

REVISED MONTHLY COSTS -

ANNEXATION TO KEMMERER
ANNEXATION TO CITY OF KEMMERER

COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

8" DIAMETER TRANSMISSION LINE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 8&quot; dia. Pipeline</td>
<td>15,233 LF</td>
<td>$13.00</td>
<td>$198,029.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>10 EA</td>
<td>$1000.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>3. Pressure Red. Valve</td>
<td>1 EA</td>
<td>$3000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>4. Air Relief Valves</td>
<td>6 EA</td>
<td>$300.00</td>
<td>$1,800.00</td>
</tr>
<tr>
<td>5. Boring</td>
<td>200 LF</td>
<td>$150.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>6. Trench in Rock</td>
<td>1,100 LF</td>
<td>$25.00</td>
<td>$27,500.00</td>
</tr>
<tr>
<td>7. Easements</td>
<td></td>
<td>Lump Sum</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>8. River Crossing</td>
<td>250 LF</td>
<td>$60.00</td>
<td>$15,000.00</td>
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</tbody>
</table>

Sub Total $290,329.00

Plus 10% Engineering

Sub Total $319,361.90

Plus: 15% Contingency

$47,904.29
Permits $1,000.00
Final Design (8%) $25,548.95

TOTAL PROJECT COST $393,815.14

33% Loan $129,959.00
Annual Cost - 4% Interest for 30 Years $7,515.53

Cost/Lot/Month: 15 Lots $41.75
20 Lots $31.31
25 Lots $25.05
30 Lots $20.89
ANNEXATION TO CITY OF KEMMERER

COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "A"

CAPITAL COSTS - DISTRIBUTION SYSTEM

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 6&quot; dia. Pipeline</td>
<td>1,700 LF</td>
<td>$12.50</td>
<td>$21,250.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>8 EA</td>
<td>$800.00</td>
<td>$6,400.00</td>
</tr>
<tr>
<td>3. Boring</td>
<td>100 LF</td>
<td>$150.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>4. Fire Hydrants</td>
<td>10 EA</td>
<td>$1500.00</td>
<td>$15,000.00</td>
</tr>
</tbody>
</table>

Sub Total $57,650.00

Plus 10% Engineering $5,765.00

Sub Total $63,415.00

Plus 15% Contingency $9,512.25

Plus Final Design (8%) $5,073.20

TOTAL PROJECT COST $78,000.45

50% Loan $39,000.23

Annual Cost - 8.5% Interest for 30 Years $3,628.97

Cost/Lot/Month: 15 Lots $20.16
                        20 Lots $15.12
                        25 Lots $12.10
                        30 Lots $10.08
## OAKLEY WATER PROJECT
### PHASE II - ALTERNATE "A"
#### TOTAL MONTHLY COSTS

<table>
<thead>
<tr>
<th>ANNEXATION TO KEMMERER</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
</table>
| 1) Transmission (1)
  Pipeline     | $41.75   | $31.31   | $25.05   | $20.89   |
| 2) Distribution System | $20.16   | $15.12   | $12.10   | $10.08   |
| 3) Meter Reading and Billing | $0.00    | $0.00    | $0.00    | $0.00    |
| 4) Fixed Costs to Kemmerer | $4.26    | $4.26    | $4.26    | $4.26    |

5) Variable Costs Payable to Kemmerer:
   a) 100 G/C/D | $18.38 | $18.38 | $18.38 | $18.38 |
   b) 300 G/C/D | $55.13 | $55.13 | $55.13 | $55.13 |

<table>
<thead>
<tr>
<th>TOTAL COSTS:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 100 G/C/D</td>
<td>$84.55</td>
<td>$69.07</td>
<td>$59.79</td>
<td>$53.61</td>
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<tr>
<td>b) 300 G/C/D</td>
<td>$121.30</td>
<td>$105.82</td>
<td>$96.54</td>
<td>$90.36</td>
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</table>

(1) Assumes 67% Grant 33% Loan
# Annexation to City of Kemmerer

## Cost Estimate: Oakley Water Project

**Phase II - Alternate "B"**

**Transmission Line and Tank**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4&quot; dia. Pipeline</td>
<td>12,753 LF</td>
<td>$ 9.50</td>
<td>$121,153.50</td>
</tr>
<tr>
<td>2. 8&quot; dia. Pipeline</td>
<td>3,000 LF</td>
<td>$ 13.00</td>
<td>$ 39,000.00</td>
</tr>
<tr>
<td>3. Storage Tank 50,000 gal.</td>
<td>1 EA</td>
<td>Lump Sum</td>
<td>$ 30,000.00</td>
</tr>
<tr>
<td>4. Valves</td>
<td>12 EA</td>
<td>$ 700.00</td>
<td>$ 8,400.00</td>
</tr>
<tr>
<td>5. Pressure Red. Valve</td>
<td>1 EA</td>
<td>$1500.00</td>
<td>$ 1,500.00</td>
</tr>
<tr>
<td>6. Air Vacumn Relief Valves</td>
<td>6 EA</td>
<td>$1000.00</td>
<td>$ 6,000.00</td>
</tr>
<tr>
<td>7. Boring</td>
<td>200 LF</td>
<td>$ 125.00</td>
<td>$ 25,000.00</td>
</tr>
<tr>
<td>8. Trench in Rock</td>
<td>1,700 LF</td>
<td>$ 25.00</td>
<td>$ 42,500.00</td>
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<tr>
<td>9. Easements</td>
<td></td>
<td>Lump Sum</td>
<td>$ 5,500.00</td>
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<tr>
<td>10. River Crossing</td>
<td>200 LF</td>
<td>$ 75.00</td>
<td>$ 15,000.00</td>
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</table>

Plus 10% Engineering

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Total</td>
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<tr>
<td>Plus:</td>
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<td></td>
<td>$29,405.35</td>
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<tr>
<td>15% Contingency</td>
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<td>$ 48,518.83</td>
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<tr>
<td>Permits</td>
<td></td>
<td></td>
<td>1,000.00</td>
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<tr>
<td>Final Design (8%)</td>
<td></td>
<td></td>
<td>25,876.71</td>
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</table>

**Total Project Cost**

$398,854.39

33% Loan

$131,621.95

Annual Cost - 4% Interest for 30 Years

$ 7,611.70

Cost/Lot/Month:

<table>
<thead>
<tr>
<th>Lots</th>
<th>Price</th>
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<tbody>
<tr>
<td>15</td>
<td>$ 42.29</td>
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<td>20</td>
<td>$ 31.72</td>
</tr>
<tr>
<td>25</td>
<td>$ 25.37</td>
</tr>
<tr>
<td>30</td>
<td>$ 21.14</td>
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</table>
ANNEXATION TO CITY OF KEMMERER

COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "B"

CAPITAL COSTS - DISTRIBUTION SYSTEM

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 6&quot; dia. Pipeline</td>
<td>1,700 LF</td>
<td>$12.50</td>
<td>$21,250.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>8 EA</td>
<td>$800.00</td>
<td>$6,400.00</td>
</tr>
<tr>
<td>3. Boring</td>
<td>100 LF</td>
<td>$150.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>4. Fire Hydrants</td>
<td>10 EA</td>
<td>$1,500.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Sub Total</td>
<td></td>
<td></td>
<td>$57,650.00</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td></td>
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<td>$5,765.00</td>
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<td>Sub Total</td>
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<tr>
<td>Plus 15% Contingency</td>
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<td>Plus Final Design (8%)</td>
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</tr>
<tr>
<td>TOTAL PROJECT COST</td>
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<td>$78,000.45</td>
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</table>

50% Loan $39,000.23

Annual Cost - 8.5% Interest for 30 Years $3,628.97

Cost/Lot/Month:
- 15 Lots $20.16
- 20 Lots $15.12
- 25 Lots $12.10
- 30 Lots $10.08
# Oakley Water Project
## Phase II - Alternate "B"
### Total Monthly Costs

---

**Annexation to Kemmerer**

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>15 Lots</th>
<th>20 Lots</th>
<th>25 Lots</th>
<th>30 Lots</th>
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<tbody>
<tr>
<td>1) Transmission (1) Pipeline</td>
<td>$42.29</td>
<td>$31.72</td>
<td>$25.37</td>
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<td>2) Distribution System</td>
<td>$20.16</td>
<td>$15.12</td>
<td>$12.10</td>
<td>$10.08</td>
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<tr>
<td>3) Meter Reading and Billing</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
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<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
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<td>5) Variable Costs</td>
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<tr>
<td>Payable to Kemmerer:</td>
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<tr>
<td>a) 100 G/C/D</td>
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<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
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<tr>
<td>b) 300 G/C/D</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
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**Total Costs:**

<table>
<thead>
<tr>
<th></th>
<th>100 G/C/D</th>
<th>300 G/C/D</th>
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</thead>
<tbody>
<tr>
<td>a) 100 G/C/D</td>
<td>$85.09</td>
<td>$121.84</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$69.48</td>
<td>$106.23</td>
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</table>

(1) Assumes 67% Grant  33% Loan
ANNEXATION TO CITY OF KEMMERER

COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

4" DIAMETER TRANSMISSION LINE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4&quot; dia. Pipeline</td>
<td>15,233 LF</td>
<td>$ 9.50</td>
<td>$144,713.50</td>
</tr>
<tr>
<td>2. Valves</td>
<td>10 EA</td>
<td>$ 700.00</td>
<td>$ 7,000.00</td>
</tr>
<tr>
<td>3. Air Vacuum Relief Valves</td>
<td>6 EA</td>
<td>$1000.00</td>
<td>$ 6,000.00</td>
</tr>
<tr>
<td>4. Boring</td>
<td>200 LF</td>
<td>$ 125.00</td>
<td>$ 25,000.00</td>
</tr>
<tr>
<td>5. Trench in Rock</td>
<td>1,100 LF</td>
<td>$ 25.00</td>
<td>$ 27,500.00</td>
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<tr>
<td>6. Easements</td>
<td></td>
<td>Lump Sum</td>
<td>$ 5,000.00</td>
</tr>
<tr>
<td>8. River Crossing</td>
<td>250 LF</td>
<td>$ 60.00</td>
<td>$ 15,000.00</td>
</tr>
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</table>

Sub Total $230,213.50

Plus 10% Engineering

Sub Total $253,234.85

Plus: 15% Contingency

Permits $37,985.23
Final Design (8%) 1,000.00

20,258.79

TOTAL PROJECT COST $312,478.87

33% Loan $103,118.03
Annual Cost - 4% Interest for 30 Years $ 5,963.32

Cost/Lot/Month: 15 Lots $ 33.13
20 Lots $ 24.85
25 Lots $ 19.88
30 Lots $ 16.56
ANNEXATION TO CITY OF KEMMERER

COST ESTIMATE: OAKLEY WATER PROJECT

PHASE II - ALTERNATE "C"

4" DIAMETER DISTRIBUTION LINE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4&quot; dia. Pipeline</td>
<td>1,500 LF</td>
<td>$ 10.50</td>
<td>$ 15,750.00</td>
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<td>2. Valves</td>
<td>6 EA</td>
<td>$ 400.00</td>
<td>$ 2,400.00</td>
</tr>
<tr>
<td>3. Boring</td>
<td>100 LF</td>
<td>$ 100.00</td>
<td>$ 10,000.00</td>
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<tr>
<td></td>
<td></td>
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<td><strong>Sub Total $ 28,150.00</strong></td>
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<tr>
<td>Plus 10% Engineering</td>
<td></td>
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<td><strong>Plus 10% Engineering $ 2,815.00</strong></td>
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<td></td>
<td></td>
<td></td>
<td><strong>Sub Total $ 30,965.00</strong></td>
</tr>
<tr>
<td>Plus 15% Contingency</td>
<td></td>
<td></td>
<td><strong>Plus 15% Contingency $ 4,644.75</strong></td>
</tr>
<tr>
<td>Plus Final Design (8%)</td>
<td></td>
<td></td>
<td><strong>Plus Final Design (8%) $ 2,477.20</strong></td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST</strong></td>
<td></td>
<td></td>
<td><strong>$ 38,086.95</strong></td>
</tr>
</tbody>
</table>

50% Loan $ 19,043.48

Annual Cost - 8.5% Interest for 30 Years $ 1,772.00

Cost/Lot/Month: 
15 Lots $ 9.84
20 Lots $ 7.38
25 Lots $ 5.91
30 Lots $ 4.92
<table>
<thead>
<tr>
<th>COST ELEMENT</th>
<th>15 LOTS</th>
<th>20 LOTS</th>
<th>25 LOTS</th>
<th>30 LOTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Transmission (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipeline</td>
<td>$33.13</td>
<td>$24.85</td>
<td>$19.88</td>
<td>$16.56</td>
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<tr>
<td>2) Distribution System</td>
<td>$9.84</td>
<td>$7.38</td>
<td>$5.91</td>
<td>$4.92</td>
</tr>
<tr>
<td>3) Meter Reading and Billing</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>4) Fixed Costs to Kemmerer</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
<td>$4.26</td>
</tr>
<tr>
<td>5) Variable Costs Payable to Kemmerer:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 G/C/D</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
<td>$18.38</td>
</tr>
<tr>
<td>b) 300 G/C/D</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
<td>$55.13</td>
</tr>
</tbody>
</table>

**TOTAL COSTS:**

| a) 100 G/C/D                       | $65.61   | $54.87   | $48.43   | $44.12   |
| b) 300 G/C/D                       | $102.36  | $91.62   | $85.18   | $80.87   |

(1) Assumes 67% Grant 33% Loan
# Oakley Water Project

## Summary of Monthly Water Costs

### Annexation to Kemmerer

<table>
<thead>
<tr>
<th>Number of Lots</th>
<th>Alternate</th>
<th>100 G/C/D</th>
<th>300 G/C/D</th>
<th>100 G/C/D</th>
<th>300 G/C/D</th>
<th>100 G/C/D</th>
<th>300 G/C/D</th>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>&quot;A&quot;</td>
<td>$84.55</td>
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APPENDIX F

LETTER FROM DEQ
November 16, 1989

Wyoming Water Development Commission
ATTN: Mr. Patrick Erger
Herschler Building
Cheyenne, WY 82002

RE: Proposed Oakley Water Supply Project

Dear Mr. Erger:

In accordance with your request at our meeting on Wednesday, November 15, 1989, I have drafted this letter to clarify Water Quality Rules and Regulations (WQRR) regarding water systems. The following comments are offered for your consideration:

- All watermains, including those not designed to provide fire protection shall be designed by a hydraulic analysis based on flow demands and pressure requirements. The normal working pressure in a distribution system shall be not less than 35 psi and shall maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow.

- Any watermain smaller than 6" diameter shall be justified by a hydraulic analysis that considers future water usage.

- Only watermains designed to carry fire flows shall have hydrants attached to them.

With these restrictions in mind, I believe there are three alternatives available to service the referenced subdivision.

1) An 8" diameter supply line with 6" and 8" diameter distribution lines. This system could include fire hydrants and be designed to provide for fire flow.

2) A smaller size (4") supply line routed to a water storage tank (future) with 6" and 8" diameter distribution lines. This system could also provide fire protection.

3) A smaller size (4") supply line with smaller size distribution lines. This system could not provide fire protection.
I hope this information is adequate and helps you in the design of a proper water system to service Oakley.

Sincerely,

Bill Locke, P.E.
Southwest District Engineer

cc: Robert Johnson, Johnson-Fermelia Co., Inc.
APPENDIX G

USCOE REGULATORY PROGRAM
INTRODUCTION

This pamphlet is designed to assist you in applying for a Department of the Army permit from the Corps of Engineers. The pamphlet is not intended to be a complete description of all aspects of the permit program, but will provide general information of a non-technical nature and specific guidance on how to complete a permit application. Full explanation of the program may be found in Title 33 Code of Federal Regulations, Parts 320 through 330. These regulations are available for review at the Corps of Engineers District offices listed at the back of this pamphlet. Answers to technical questions and detailed information about special aspects of the program that pertain to your geographical area and your proposed activity may also be obtained from Corps of Engineers District offices.

John F. Wall
Major General, USA
Director of Civil Works
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Authority for the Regulatory Program

The U.S. Army Corps of Engineers has been regulating activities in the nation's waters since 1890. Until the 1960's the primary purpose of the regulatory program was to protect navigation. Since then, as a result of laws and court decisions, the program has been broadened so that it now considers the full public interest for both the protection and utilization of water resources.

The regulatory authorities and responsibilities of the Corps of Engineers are based on the following laws:

- **Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)** prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers.

- **Section 404 of the Clean Water Act (33 U.S.C. 1344).** Section 301 of this Act prohibits the discharge of dredged or fill material into waters of the United States without a permit from the Corps of Engineers.

- **Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413)** authorizes the Corps of Engineers to issue permits for the transportation of dredged material for the purpose of dumping it into ocean waters.

Other laws may also affect the processing of applications for Corps of Engineers permits. Among these are the National Environmental Policy Act, the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Deepwater Port Act, the Federal Power Act, the Marine Mammal Protection Act, the Wild and Scenic Rivers Act, and the National Fishing Enhancement Act of 1984.
Explanation of Some Commonly Used Terms

Certain terms which are closely associated with the regulatory program are explained briefly in this section. If you need more detailed definitions, refer to the Code of Federal Regulations (33 CFR Parts 320 through 330) or contact a Corps district regulatory office.

Activity(ies) as used in this pamphlet includes structures (for example a pier, wharf, bulkhead, or jetty) and work (which includes dredging, disposal of dredged material, filling, excavation or other modification of a navigable water of the United States).

Navigable Waters of the United States are those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark and/or are presently used, or have been used in the past or may be susceptible to use to transport interstate or foreign commerce. These are waters that are navigable in the traditional sense where permits are required for certain activities pursuant to Section 10 of the Rivers and Harbors Act. This term should not be confused with the term Waters of the United States below.

Waters of the United States is a broader term than navigable waters of the United States defined above. Included are adjacent wetlands and tributaries to navigable waters of the United States and other waters where the degradation or destruction of which could affect interstate or foreign commerce. These are the waters where permits are required for the discharge of dredged or fill material pursuant to Section 404 of the Clean Water Act.

Pre-application Consultation is one or more meetings between members of the district engineer's staff and an applicant and his agent or his consultant. A pre-application consultation is usually related to applications for major activities and may involve discussion of alternatives, environmental documents, National Environmental Policy Act procedures, and development of the scope of the data required when an environmental impact statement is required.

Public Hearings may be held to acquire information and give the public the opportunity to present views and opinions. The Corps may hold a hearing or participate in joint public hearings with other Federal or state agencies. The district engineer may specify in the public notice that a hearing will be held. In addition, any person may request in writing during the comment period that a hearing be held. Specific reasons must be given as to the need for a hearing. The district engineer may attempt to resolve the issue informally or he may set the date for a public hearing. Hearings are held at times and places that are convenient for the interested public. Very few applications involve a public hearing.

The Public Interest Review is the term which refers to the evaluation of a proposed activity to determine probable impacts. Expected benefits are balanced against reasonably foreseeable detriments. All relevant factors are weighed. Corps policy is to provide applicants with a timely and carefully weighed decision which reflects the public interest.

Public Notice is the primary method of advising interested public agencies and private parties of the proposed activity and of soliciting comments and information necessary to evaluate the probable impact on the public interest. Upon request, anyone's name will be added to the distribution list to receive public notices.

Waterbody is a river, creek, stream, lake, pool, bay, wetland, marsh, swamp, tidal flat, ocean, or other water area.
Questions That Are Frequently Asked

Various questions are often asked about the regulatory program. It is hoped that these answers will help you to understand the program better.

Q. When should I apply for a Corps permit?
A. Since two to three months is normally required to process a routine application involving a public notice, you should apply as early as possible to be sure you have all required approvals before your planned commencement date. For a large or complex activity that may take longer, it is often helpful to have a "pre-application consultation" or informal meeting with the Corps during the early planning phase of your project. You may receive helpful information at this point which could prevent delays later. When in doubt as to whether a permit may be required or what you need to do, don't hesitate to call a district regulatory office.

Q. I have obtained permits from local and state governments. Why do I have to get a permit from the Corps of Engineers?
A. It is possible you may not have to obtain an individual permit, depending on the type or location of work. The Corps has many general permits which authorize minor activities without the need for individual processing. Check with your Corps district regulatory office for information on general permits. When a general permit does not apply, you may still be required to obtain an individual permit.

Q. What will happen if I do work without getting a permit from the Corps?
A. Performing unauthorized work in waters of the United States or failure to comply with terms of a valid permit can have serious consequences. You would be in violation of Federal law and could face stiff penalties, including fines and/or requirements to restore the area.

Enforcement is an important part of the Corps regulatory program. Corps surveillance and monitoring activities are often aided by various agencies, groups, and individuals, who report suspected violations. When in doubt as to whether a planned activity needs a permit, contact the nearest district regulatory office. It could save a lot of unnecessary trouble later.

Q. How can I obtain further information about permit requirements?
A. Information about the regulatory program is available from any Corps district regulatory office. Addresses and telephone numbers of offices are listed at the back of this pamphlet. Information may also be obtained from the water resource agency in your state.

Q. Why should I waste my time and yours by applying for a permit when you probably won't let me do the work anyway?
A. Nationwide, only three percent of all requests for permits are denied. Those few applicants who have been denied permits usually have refused to change the design, timing, or location of the proposed activity. When a permit is denied, an applicant may redesign the project and submit a new application. To avoid unnecessary delays pre-application conferences, particularly for applications for major activities, are recommended. The Corps will endeavor to give you helpful information, including factors which will be considered during the public interest review, and alternatives to consider that may prove to be useful in designing a project.
Q. What is a wetland and what is its value?
A. Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas. A significant natural resource, wetlands serve important functions relating to fish and wildlife; food chain production; habitat; nesting; spawning; rearing and resting sites for aquatic and land species; protection of other areas from wave action and erosion; storage areas for storm and flood waters; natural recharge areas where ground and surface water are interconnected; and natural water filtration and purification functions.

Although individual alterations of wetlands may constitute a minor change, the cumulative effect of numerous changes often results in major damage to wetland resources. The review of applications for alteration of wetlands will include consideration of whether the proposed activity is dependent upon being located in an aquatic environment.

Q. How can I design my project to eliminate the need for a Corps permit?
A. If your activity is located in an area of tidal waters, the best way to avoid the need for a permit is to select a site that is above the high tide line and avoids wetlands or other waterbodies. In the vicinity of fresh water, stay above ordinary high water and avoid wetlands adjacent to the stream or lake. Also, it is possible that your activity is exempt and does not need a Corps permit or that it has been authorized by a nationwide or regional general permit. So, before you build, dredge or fill, contact the Corps district regulatory office in your area for specific information about location, exemptions, and regional and nationwide general permits.
General

The application form used to apply for a permit is Engineer Form 4345, Application for a Department of the Army Permit. You can obtain the application from one of the Corps of Engineers district regulatory offices listed in the back of this pamphlet. Some offices may use a slightly modified form for joint processing with a state agency; however, the required information is basically the same. It is important that you provide complete information in the requested format. If incomplete information is provided, processing of your application will be delayed. This information will be used to determine the appropriate form of authorization, and to evaluate your proposal. Some categories of activities have been previously authorized by nationwide or regional permits, and no further Corps approvals are required. Others may qualify for abbreviated permit processing, with authorizations in the form of letters of permission, in which a permit decision can usually be reached in less than 30 days. For other activities, a Public Notice may be required to notify Federal, state, and local agencies, adjacent property owners, and the general public of the proposal to allow an opportunity for review and comment or to request a public hearing. Most applications involving Public Notices are completed within four months and many are completed within 60 days.

The district engineer will begin to process your application immediately upon receipt of all required information. You will be sent an acknowledgement of its receipt and the application number assigned to your file. You should refer to this number when inquiring about your application. Your proposal will be reviewed, balancing the need and expected benefits against the probable impacts of the work, taking into consideration all comments received and other relevant factors. This process is called the public interest review. The Corps goal is to reach a decision regarding permit issuance or denial within 60 days of receipt of a complete application. However, some complex activities, issues, or requirements of law may prevent the district engineer from meeting this goal.

For any specific information on the evaluation process, filling out the application forms, or the status of your application, you should contact the regulatory branch of the Corps of Engineers district office which has jurisdiction over the area where you plan to do the work.
Typical Processing Procedure for a Standard Individual Permit

1. Preapplication consultation (optional)
2. Applicant submits ENG Form 4345 to district regulatory office*
3. Application received and assigned identification number
4. Public notice issued (within 15 days of receiving all information)
5. 15 to 30 day comment period depending upon nature of activity
6. Proposal is reviewed** by Corps and:
   - Public
   - Special interest groups
   - Local agencies
   - State agencies
   - Federal agencies
7. Corps considers all comments
8. Other federal agencies consulted, if appropriate
9. District engineer may ask applicant to provide additional information
10. Public hearing held, if needed
11. District engineer makes decision
12. Permit issued
    or
    Permit denied and applicant advised of reason

* A local variation, often a joint federal-state application form may be submitted.
** Review period may be extended if applicant fails to submit information or due to requirements of certain laws.
Evaluation Factors

The decision whether to grant or deny a permit is based on a public interest review of the probable impact of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on items such as:

- conservation
- economics
- aesthetics
- general environmental concerns
- wetlands
- cultural values
- fish and wildlife values
- flood hazards
- floodplain values
- food and fiber production
- navigation
- shore erosion and accretion
- recreation
- water supply and conservation
- water quality
- energy needs
- safety
- needs and welfare of the people
- considerations of private ownership

The following general criteria will be considered in the evaluation of every application:

- the relative extent of the public and private need for the proposed activity;
- the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed activity; and
- the extent and permanence of the beneficial and/or detrimental effects which the proposed activity is likely to have on the public and private uses to which the area is suited.

Section 404(b) (1) of the Clean Water Act

If your project involves the discharge of dredged or fill material, it will be necessary for the Corps to evaluate your proposed activity under the Section 404(b)(1) guidelines prepared by the Environmental Protection Agency. The guidelines restrict discharges into aquatic areas where less environmentally damaging, practicable alternatives exist.
Forms and Permits

The following forms apply to the permit process:

Application

The form that you will need to initiate the review process is ENG Form 4345 or a joint Federal-state application that may be available in your state. The appropriate form may be obtained from the district regulatory office which has jurisdiction in the area where your proposed project is located.

Individual Permits

An individual permit may be issued as either ENG Form 1721, the standard permit, or as a Letter of Permission.

☐ A standard permit is one processed through the typical review procedures, (see page 7) which include public notice, opportunity for a public hearing, and receipt of comments. It is issued following a case-by-case evaluation of a specific activity.

☐ If work is minor or routine with minimum impacts and objections are unlikely, then it may qualify for a Letter of Permission (LOP). An LOP can be issued much more quickly than a standard permit since an individual public notice is not required. The District Engineer will notify you if your proposed activity qualifies for an LOP.

General Permits

In many cases the formal processing of a permit application is not required because of general permits already issued to the public at large by the Corps of Engineers. These are issued on a regional and nationwide basis.

Separate applications may not be required for activities authorized by a general permit; nevertheless, reporting may be required. For specific information on general permits, contact a district regulatory office.

ENG Form 4336

The third form, ENG Form 4336, is used to assist with surveillance for unauthorized activities. The form, which contains a description of authorized work, should be posted at the site of an authorized activity. If the Corps decides it is appropriate for you to post this form, it will be furnished to you when you receive your permit.

Fees. Fees are required for most permits. $10.00 will be charged for a permit for a non-commercial activity; $100.00 will be charged for a permit for a commercial or industrial activity. The district engineer will make the final decision as to the amount of the fee. Do not send a fee when you submit an application. When the Corps issues a permit, you will be notified and asked to submit the required fee payable to the Treasurer of the United States. No fees are charged for transferring a permit from one property owner to another, for Letters of Permission, or for any activities authorized by a general permit or for permits to governmental agencies.
Instructions for Preparing an Application

The instructions given below, together with the sample application and drawings, should help in completing the required application form. If you have additional questions, do not hesitate to contact the district regulatory office.

Block Number 1. Application Number.
Leave this block blank. When your completed application is received, it will be assigned a number for identification. You will be notified of the number in an acknowledgement letter. Please refer to this number in any correspondence or inquiry concerning your application.

Block 2. Name and address of applicant(s). Fill in name, mailing address, and telephone number(s) for all applicants. The telephone number(s) should be a number where you can be reached during business hours. If space is needed for additional names, attach a sheet of white, \(8\frac{1}{2} \times 11\) inch paper labeled “Block 2 Continued.”

Block 3. Name, address and title of authorized agent. It is not necessary to have an agent represent you; however, if you do, fill in the agent’s name, address, title and telephone number(s). If your agent is submitting and signing the application, you must fill out and sign the Statement of Authorization in Block 3.

Block 4. Detailed description of proposed activity. The written description and the drawings are the most important parts of the application. If there is not enough space in Block 4, (a), (b) or (c) attach additional sheet(s) of white, \(8\frac{1}{2} \times 11\) inch paper labeled “Block 4 Continued.”

a. Activity. Describe the overall activity. Give the approximate dimensions of structures, fills, excavations (lengths, widths, heights or depths).

b. Purpose. Describe the purpose, need and intended use (public, private, commercial, or other use) of the proposed activity. Include a description of related facilities, if any, to be constructed on adjacent land. Give the date you plan to begin work on the activity and the date work is expected to be completed.

c. Discharge of Dredged or Fill Material. If the activity will involve the discharge of dredged or fill material, describe the type (rock, sand, dirt, rubble, etc.), quantity (in cubic yards), and mode of transportation to the discharge site.

Block 5. Names and addresses of adjoining property owners, lessees, etc. whose property adjoins the waterbody. List complete names, addresses and zip codes of adjacent property owners (both public and private), lessee, etc., whose property also adjoins the waterbody or wetland, in order that they may be notified of the proposed activity. This information is usually available at the local tax assessor office. If more space is needed attach a sheet of white, \(8\frac{1}{2} \times 11\) inch paper labeled “Block 5 Continued.”

Block 6. Waterbody and location on waterbody where activity exists or is proposed. Fill in the name of the waterbody and the river mile (if known) at the location of the activity. Include easily recognizable landmarks on the shore of the waterbody to aid in locating the site of the activity.

Block 7. Location and land where activity exists or is proposed. This information is used to locate the site. Give the street address of the property where the proposed activity will take place. If the site does not have a street address, give the best descriptive location (name or waterbody), names and/or numbers of roads or highways, name of nearest community or town, name of county and state, and directions, such as 2 miles east of Brown’s Store on Route 105.
Do not use your home address unless that is the location of the proposed activity. Do not use a post office box number.

**Block 8. Information about completed activity.** Provide information about parts of the activity which may be complete. An activity may have been authorized by a previously issued permit, may exist from a time before a Corps permit was required or may be constructed on adjacent upland.

**Block 9. Information about approvals or denials by other government agencies.** You may need approval or certification from other Federal, interstate, state, or local government agencies for the activity described in your application. Applications you have submitted, and approvals, certifications, or disapprovals that you have received should be recorded in Block 9. It is not necessary to obtain other Federal, state, and local permits before applying for a Corps of Engineers permit.

**Block 10. Signature of applicant or agent.** The application must be signed in Block 10 by the owner, lessee, or a duly authorized agent. The person named in Block 3 will be accepted as the officially designated agent of the applicant. The signature will be understood to be affirmation that the applicant possesses the requisite property interest to undertake the proposed activity.
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 104 of the Clean Water Act, and Section 101 of the Marine Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information on this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. APPLICATION NUMBER: To be assigned by Corps.

2. NAME AND ADDRESS OF APPLICANT

Fred R. Harris
852 West Branch Road
Blue Harbor, Maryland 21705

Telephone no. during business hours
A/C 1 (Residence)
A/C 1 (Office)

Statement of Authorization: I hereby designate and authorize

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

None

Telephone no. during business hours
A/C 1 (Residence)
A/C 1 (Office)

Signature of Authorized Agent to act in my behalf as my
agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

4. DETAILED DESCRIPTION OF PROPOSED ACTIVITY

4a. ACTIVITY

Build timber bulkhead and pier and fill.

4b. PURPOSE

To provide boat access and prevent erosion of shoreline at my place of residence.

4c. DISCHARGE OF DREDGED OR FILL MATERIAL

Approximately 200 cubic yards of upland fill will be placed between new bulkhead and existing shoreline.
5. NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSORS, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

Mary L. Clark
850 West Branch Road
Blue Harbor, Maryland 21703
(301) 585-8830

Harry N. Hampton
854 West Branch Road
Blue Harbor, Maryland 21703
(301) 585-3676

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

West Branch of the Haven River on Blue Harbor.

7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

ADDRESS:

852 West Branch Road

STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

King Edward, Maryland 21703

COUNTY STATE ZIP CODE

Town of Blue Harbor

LOCAL GOVERNING BODY WITH JURISDICTION OVER

8. Is any portion of the activity for which authorization is sought new construction?

☐ YES ☐ NO

If answer is "Yes" give reasons, month and year the activity was completed, indicate the existing work on the drawings.

9. List all approvals or certifications and denials received from other federal, interstate, state, local agencies or other activities described in this application.

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<th>ISSUING AGENCY</th>
<th>TYPE APPROVAL</th>
<th>IDENTIFICATION NO.</th>
<th>DATE OF APPROVAL</th>
<th>DATE OF DENIAL</th>
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<td>Zoning</td>
<td>BH25172</td>
<td>6/30/82</td>
<td>6/30/82</td>
</tr>
<tr>
<td>Md DNR</td>
<td>Certification</td>
<td>DNR258WQ</td>
<td>6/13/82</td>
<td>8/12/82</td>
</tr>
</tbody>
</table>

10. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

[Signature]

Oct. 15, 1982

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.
General Information

Three types of drawings—Vicinity, Plan, and Elevation—are required to accurately depict activities (See sample drawings on pages 16 and 17).

Submit one original, or good quality copy, of all drawings on 8½ x 11 inch white paper (tracing cloth or film may be used). Submit the fewest number of sheets necessary to adequately show the proposed activity. Drawings should be prepared in accordance with the general format of the samples, using block style lettering. Each page should have a title block. See check list below. Drawings do not have to be prepared by an engineer, but professional assistance may become necessary if the project is large or complex.

Leave a 1-inch margin at the top edge of each sheet for purposes of reproduction and binding.

In the title block of each sheet of drawings identify the proposed activity and include the name of the body of water; river mile (if applicable); name of county and state; name of applicant; number of the sheet and total number of sheets in set; and date the drawing was prepared.

Since drawings must be reproduced, use heavy dark lines. Color shading cannot be used; however, dot shading, hatching, or similar graphic symbols may be used to clarify line drawings.

Vicinity Map

The vicinity map you provide will be printed in any public notice that is issued and used by the Corps of Engineers and other reviewing agencies to locate the site of the proposed activity. You may use an existing road map or U.S. Geological Survey topographic map (scale 1:24,000) as the vicinity map. Please include sufficient details to simplify locating the site from both the waterbody and from land. Identify the source of the map or chart from which the vicinity map was taken and, if not already shown, add the following:

- location of activity site (draw an arrow showing the exact location of the site on the map).
- latitude, longitude, river mile, if known, and/or other information that coincides with Block 6 on the application form.
- name of waterbody and the name of the larger creek, river, bay, etc., that the waterbody is immediately tributary to.
- names, descriptions and location of landmarks.
- name of all applicable political (county, parish, borough, town, city, etc.) jurisdictions.
- name of and distance to nearest town, community, or other identifying locations.
- names or numbers of all roads in the vicinity of the site.
- north arrow.
- scale.

Plan View

The plan view shows the proposed activity as if you were looking straight down on it from above. Your plan view should clearly show the following:

- Name of waterbody (river, creek, lake, wetland, etc.) and river mile (if known) at location of activity.
- Existing shorelines.
- Mean high and mean low water lines and maximum (spring) high tide line in tidal areas.
- Ordinary high water line and ordinary low water line if the proposed activity is located on a non-tidal waterbody.
☐ Average water depths around the activity.
☐ Dimensions of the activity and distance it extends from the high water line into the water.
☐ Distances to nearby Federal projects, if applicable.
☐ Distance between proposed activity and navigation channel, where applicable.
☐ Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.
☐ Location of any wetlands (marshes, swamps, tidal flats, etc.)
☐ North arrow.
☐ Scale.
☐ If dredged material is involved, you must describe the type of material, number of cubic yards, method of handling, and the location of fill and spoil disposal area. The drawing should show proposed retention levees, weirs, and/or other means for retaining hydraulically placed materials.
☐ Mark the drawing to indicate previously completed portions of the activity.

Elevation and/or Cross Section View

The elevation and/or cross section view is a scale drawing that shows the side, front, or rear of the proposed activity. If a section view is shown, it represents the proposed structure as it would appear if cut internally for display. Your elevation should clearly show the following:

☐ Water elevations as shown in the plan view.

☐ Water depth at waterward face of proposed activity or, if dredging is proposed, dredging and estimated disposal grades.

☐ Dimensions from mean high water line (in tidal waters) for proposed fill or float, or high tide line for pile supported platform. Describe any structures to be built on the platform.

☐ Cross section of excavation or fill, including approximate side slopes.

☐ Graphic or numerical scale.

☐ Principal dimensions of the activity.

Notes on Drawings*

☐ Names of adjacent property owners who may be affected. Complete names and addresses should be shown in Block 5 on ENG Form 4345.

☐ Legal property description: Number, name of subdivision, block and lot number. Section, Township and Range (if applicable) from plot, deed or tax assessment.

☐ Photographs of the site of the proposed activity are not required; however, pictures are helpful and may be submitted as part of any application.

*Drawings should be as clear and simple as possible (i.e., not too "busy").
SAMPLE DRAWINGS FOR A PERMIT APPLICATION

NO. 2: THE DRAWINGS SUBMITTED NEED NOT BE PREPARED BY A PROFESSIONAL DRAFTSMAN AS IN THESE SAMPLES.

NOTE:
CHANNEL IS APPROX. 1000 FEET FROM PROPOSED PIER

PROPOSED PIER AND MOORING PILING

15' FROM PIN TO PIER

20" Ø OAK TREE WITH NAIL AND RED MARKER

LOT 26

LOT 25

PROPOSED BULKHEAD 180° AND FILL

PIN O 182.00

TOP OF APPROX. EXIST BANK

NOTES:
1. ALL DEPTHS BASED ON MLW = 0.00 FT.
2. FILTER CLOTH WILL BE USED BEHIND BULKHEAD
3. BULKHEAD TO BE PLACED BEHIND FRINGE WETLANDS
4. APPROX. 200 CU. YDS. OF UPLAND FILL

PLAN VIEW

PROPOSED BULKHEAD PIER AND FILL

IN: WEST BRANCH HAVEN RIVER
AT: BLUE HARBOR
COUNTY OF: KING EDWARD
STATE: MD
APPLICATION BY: FRED R. HARRIS
852 WEST BRANCH ROAD
BLUE HARBOR, MD 21703
SHEET 1 OF 2 DATE 10-16-82

REV. 11-28-82
PROPOSED BULKHEAD AND FILL

- 2" x 6" deck
- 2" x 8" caps and stringers
- 8" pile 16' long with 10' in ground
- 8" pile 20' long with 12' in ground
- 2-10" piles on 6' centers to be left standing 4' above deck
- 2-10" mooring pilings on 10' centers to be left standing 7' above MHW

NOTE:
1. All timber (including pier) pressure and chemical treated
2. All hardware (including pier) hot dipped galvanized
3. Bulkhead to be placed behind fringe wet lands
4. Approx. 200 cu. yds. of upland fill
5. With 5' above and 11' below surface

PURPOSE: PREVENT EROSION AND PROVIDE BOATING ACCESS

DATUM: MLW

ADJACENT PROPERTY OWNERS:
1. MARY L. CLARK
2. HARRY N. HAMPTON
3. 

SECTION VIEWS

FRED R. HARRIS
852 WEST BRANCH ROAD
BLUE HARBOR, MD 21703

PROPOSED BULKHEAD PIER AND FILL

IN: WEST BRANCH HAVEN RIVER
AT: BLUE HARBOR
COUNTY OF: KING EDWARD STATE: MD
APPLICATION BY: FRED R. HARRIS

SHEET 2 OF 2 DATE 10-16-82

REV. II-28-82
Note: In Iowa the eastern bank of the Missouri River is regulated by the Omaha office.
Address correspondence to:

The District Engineer
U.S. Army Engineer District
Please include attention line in address.

ALASKA
P.O. Box 898
Anchorage, AK 99506-0898
Attention: NPACO-RF
907/773-2712

ALBUQUERQUE
P.O. Box 1580
Albuquerque, NM 87103-1580
Attention: SWACO-OR
505/766-2776

Baltimore
P.O. Box 1715
Baltimore, MD 21203-1715
Attention: NABOP-R
301/962-3670

Joint application with New York, Maryland

BUFFALO
1776 Niagara Street
Buffalo, NY 14207-3199
Attention: NBCO-S
716/876-5454 x2313

Joint application with New York

CHARLESTON
P.O. Box 919
Charleston, SC 29402-0919
Attention: SACCO-P
803/724-4330

CHICAGO
219 S. Dearborn Street
Chicago, IL 60604-1797
Attention: NCCCO-R
312/353-6428

Joint application with Illinois

DETROIT
P.O. Box 1027
Detroit, MI 48231-1027
Attention: NCECO-L
313/226-2218
Joint application with Michigan

FT. WORTH
P.O. Box 17300
Ft. Worth, TX 76102-0300
Attention: SWFOD-O
817/334-2681

GALVESTON
P.O. Box 1229
Galveston, TX 77553-1229
Attention: SWGCO-R
409/766-3925

HUNTINGTON
502 8th Street
Huntington, WV 25701-2070
Attention: ORHOP-F
304/529-5487
Joint application with West Virginia

HONOLULU
Building 230, Fort Shafter
Honolulu, HI 96858-5440
Attention: PODCO-O
808/438-9258

JACKSONVILLE
P.O. Box 4970
Jacksonville, FL 32232-0019
Attention: SAJR-D
904/791-1659
Joint application with Florida, Virgin Islands

KANSAS CITY
700 Federal Building
601 E. 12th Street
Kansas City, MO 64106-2896
Attention: MRKOD-P
816/374-3645

LITTLE ROCK
P.O. Box 867
Little Rock, AR 72203-0867
Attention: SWLCO-P
501/378-5295

LOS ANGELES
P.O. Box 2711
Los Angeles, CA 90053-2325
Attention: SPLCO-R
213/688-5606

LOUISVILLE
P.O. Box 59
Louisville, KY 40201-0059
Attention: ORLOP-F
502/582-5452

Joint application with Illinois

MEMPHIS
Clifford Davis Federal Building
Room B-202
Memphis, TN 38103-1894
Attention: LMMCO-G
901/521-3471
Joint application with Missouri, Tennessee, Kentucky

MOBILE
P.O. Box 2288
Mobile, AL 36628-00001
Attention: SAMOP-S
205/690-2658
Joint application with Mississippi

NASHVILLE
P.O. Box 1070
Nashville, TN 37202-1070
Attention: ORNOR-F
615/251-5181
Joint application with TVA, Tennessee, Alabama
NEW ORLEANS
P.O. Box 60267
New Orleans, LA
70160-0267
Attention: LMNOD-S
504/838-2255

NEW YORK
26 Federal Plaza
New York, NY 10278-0090
Attention: NANOP-R
212/264-3996

NORFOLK
803 Front Street
Norfolk, VA 23510-1096
Attention: NAOOP-P
804/446-3652
Joint application with Virginia

OMAHA
P.O. Box 5
Omaha, NE 68101-0005
Attention: MROOP-N
402/221-4133

PHILADELPHIA
U.S. Custom House
2nd and Chestnut Street
Philadelphia, PA
19106-2991
Attention: NAPOP-R
215/597-2812

PITTSBURGH
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186
Attention: ORPOP-F
412/644-4204
Joint application with New York

PORTLAND
P.O. Box 2946
Portland, OR 97208-2946
Attention: NPPND-RF
503/221-6995
Joint application with Oregon

ROCK ISLAND
Clock Tower Building
Rock Island, IL 61201-2004
Attention: NCROD-S
309/788-6361 x6370
Joint application with Illinois

SACRAMENTO
650 Capitol Mall
Sacramento, CA 95814-4794
Attention: SPKCO-O
916/440-2842

ST. LOUIS
210 Tucker Blvd., N
St. Louis, MO 63101-1986
Attention: LMSOD-F
314/263-5703
Joint application with Illinois, Missouri

ST. PAUL
1135 USPO & Custom House
St. Paul, MN 55101-1479
Attention: NCSCO-RF
612/725-5819

SAN FRANCISCO
211 Main Street
San Francisco, CA 94105-1905
Attention: SPNCO-R
415/974-0416

SAVANNAH
P.O. Box 889
Savannah, GA 31402-0889
Attention: SASOP-F
912/944-5347
Joint application with Georgia

SEATTLE
P.O. Box C-3755
Seattle, WA 98124-2255
Attention: NPSOP-RF
206/764-3495
Joint application with Idaho

TULSA
P.O. Box 61
Tulsa, OK 74121-0061
Attention: SWTOD-RF
918/581-7261

VICKSBURG
P.O. Box 60
Vicksburg, MS 39180-0060
Attention: LMKOD-F
601/634-5276
Joint application with Mississippi

WALLA WALLA
Building 602
City-County Airport
Walla Walla, WA
99362-9265
Attention: NPWOP-RF
509/522-6718
Joint application with Idaho

WILMINGTON
P.O. Box 1890
Wilmington, NC 28402-1890
Attention: SAWCO-E
919/343-4511
Joint application with North Carolina

The Division Engineer
U.S. Army Engineer Division

NEW ENGLAND
424 Trapelo Road
Waltham, MA 02254-9149
Attention: NEDOD-R
617/647-8338
Joint application with Massachusetts, Maine
APPENDIX H

USCOE PERMIT APPLICATION
The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

---

1. APPLICATION NUMBER (To be assigned by Corps)

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

   Telephone no. during business hours

   A/C ( ) ________________________ (Residence)
   A/C ( ) ________________________ (Office)

   Statement of Authorization: I hereby designate and authorize ___________________________ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.

   SIGNATURE OF APPLICANT
   DATE

4. DETAILED DESCRIPTION OF PROPOSED ACTIVITY

   4a. ACTIVITY

   4b. PURPOSE

   4c. DISCHARGE OF DREDGED OR FILL MATERIAL
5. Names and addresses of adjoining property owners, lessees, etc., whose property also adjoins the waterway.

6. Waterbody and location on waterbody where activity exists or is proposed.

7. Location on land where activity exists or is proposed.

   Address:

   Street, road, route or other descriptive location:

   County  State  Zip Code

   Local governing body with jurisdiction over site.

8. Is any portion of the activity for which authorization is sought now complete?  □ YES  □ NO

   If answer is "Yes" give reasons, month and year the activity was completed. Indicate the existing work on the drawings.

9. List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharges or other activities described in this application.

   Issuing agency  Type approval  Identification no.  Date of application  Date of approval  Date of denial

10. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

   Signature of applicant  Date

   Signature of agent  Date

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.
APPENDIX I

UNION PACIFIC RAILROAD

LICENSE PROCEDURES
UNION PACIFIC SYSTEM LICENSE PROCEDURES

1. If it is necessary for you to enter the Railroad Company's property for surveying in order for you to complete the required application, a "Permit To Be On Railroad Property For Utility Survey" must be executed and returned following the instructions in the permit.

2. Union Pacific's Operating Department is the initial contact for all Pipe/Wire Line requests. Applications should be submitted to:

   R. E. Jackson, Jr.
   Manager - Contracts
   Union Pacific Railroad Company
   1416 Dodge Street, Room 1100
   Omaha, Nebraska 68179

3. Upon receipt of your application, we will forward a post card to you acknowledging receipt, advising you the Railroad Company's initial identification number it has assigned, and advising the person you should contact for further inquiries.

4. Office hours are 8:00 AM to 5:00 PM, Central Time Zone, Monday through Friday.

5. Agreements will be required for all crossings of the right-of-way. A consent form agreement will be granted for crossings in a public way. Union Pacific has in excess of 90,000 licenses in effect system-wide.

6. Generally, agreement processing time will be 45 to 60 days. Please allow sufficient lead time for document handling prior to desired construction date. Before construction begins, agreements must be executed by Licensee and returned to this office. Verbal authorizations will not be permitted or granted. Generally a minimum of 48 hours advance notice after execution of an agreement, will be required prior to entry.

7. License fees must be submitted at the time you execute and return the agreement.

NOTE: APPLICATIONS WILL ONLY BE ACCEPTED THAT ARE PREPARED ON OUR STANDARD APPLICATION FOR ATTACHED HERETO AS EXHIBIT "A".
APPLICATION

1). Name of Licensee: ____________________________
   (Name to be shown on Document)

   a). If a corporation - ____________________________
      (Exact Name of Corporation)

      a corporation of the State of ____________________
      (State of Incorporation)

      NOTE: The corporate name of a company should be exactly as stated in
      its Articles of Incorporation.

      Type of Corporation, if other than a normal business corporation (this
      MUST be shown):

      ____________________________
      (Municipal, quasi-municipal, body politic, etc.)

   b). If an Individual - ____________________________
      (Name of Individual)

      of ____________________________
      (City & State)

   c). If an individual or corporation doing business under a trade name:

      ____________________________
      (Doing Business As or Trade Name)

   d). If a partnership - ____________________________
      (Name of Partnership)

      a partnership consisting of:

      ____________________________
      ____________________________

      and ____________________________

      all of ____________________________
      (City & State)

2). Name and mailing address of individual to whom instrument is to be sent for
   execution:

      ____________________________
      (Name & Address)

3). Address (billing address) to be shown on document if different than that
   shown in Item 2.

      ____________________________
      (Address)
4). Name and phone number of individual to contact in event of questions:

                                                                                                       FAX 

                                                                                                       #

5). Permanent or Temporary Installation -

If Temporary, estimated term -

6). Location of installation -

                        (City & State)

                                  ft.  (N),(S),(E), or (W) of the (N),(S),(E),(W), or (Center) line of

                                      Section    , Range    , Township    .

7). Installation is located within a dedicated street: (No) (Yes)

If yes, please name the dedicated street:

8). New installation, relocation or modification of existing installation?

9). Additional information pertinent to this installation:

10). If an encroachment, who will be served?

                      (Railroad, Railroad Tenant, General Public, etc.)

11). Do you have an existing agreement at this location with the Railroad

     Company which is to be affected by this request?

       (No) (Yes), Railroad Company Contract Number: 

12). Will construction be by a Contractor? (No) (Yes)

     If yes, name of Contractor:

     Address:

     Corporate Status:

     Name and Phone Number of individual to contact in the event of questions:
APPLICATION FOR ENCASED NON-FLAMMABLE PIPELINE CROSSING

NOTE: ALL AVAILABLE DIMENSIONS MUST BE FILLED IN TO PROCESS THIS APPLICATION.

STEEL CASING WALL THICKNESS CHART

<table>
<thead>
<tr>
<th>MINIMUM DIAMETER OF THICKNESS CASING PIPE</th>
<th>WALL THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; OR LESS</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>3/8&quot; OVER 12&quot;-18&quot;</td>
<td>7/16&quot; OVER 18&quot;-24&quot;</td>
</tr>
<tr>
<td>7/16&quot; OVER 22&quot;-28&quot;</td>
<td>9/16&quot; OVER 24&quot;-30&quot;</td>
</tr>
<tr>
<td>1/2&quot; OVER 28&quot;-34&quot;</td>
<td>5/8&quot; OVER 30&quot;-36&quot;</td>
</tr>
<tr>
<td>5/8&quot; OVER 34&quot;-40&quot;</td>
<td>7/8&quot; OVER 40&quot;-48&quot;</td>
</tr>
<tr>
<td>OVER 48&quot; MUST BE APPROVED BY R.R. CO.</td>
<td></td>
</tr>
</tbody>
</table>

FORMULA TO FIGURE CASING LENGTH WITH ANGLE OF CROSSING OTHER THAN 90°

\[ B = \frac{A \times \sin \alpha}{\sin A} \]

FIBER CABLE:

MINIMUM YIELD STRENGTH OF 35,000 PSI.

EXHIBIT "A"

PACIFIC RAILROAD CO.

M.P.:

ENCEASED PIPELINE CROSSING FOR

APPLICANT:

AT:

RR FILE NO.:

DATE:

WARNING

IN ALL OCCASIONS, U.P. COMMUNICATIONS DEPARTMENT MUST BE CONTACTED IN ADVANCE OF ANY WORK TO DETERMINE EXISTENCE AND LOCATION OF FIBER OPTIC CABLE.

PHONE: 1-800-336-9193
EXAMPLES OF FIXED OBJECTS AND HOW TO IDENTIFY EACH

2007' 7.5" N.
(SHOW DISTANCE ALONG CENTER OF TRACK FROM PROPOSED CONSTRUCTION TO DESCRIBED OBJECT)

WEST FACE EAST BACKWALL
BRIDGE NO. 621.95

125 ft. 9.1"
(SHOW DISTANCE ALONG CENTER OF TRACK FROM PROPOSED CONSTRUCTION TO CENTER LINE INTERSECTION OF EXISTING CULVERT)

EXISTING 21" CMP CULVERT NO. 121.50

2310' 8.1"
(SHOW DISTANCE ALONG CENTER OF TRACK FROM PROPOSED CONSTRUCTION TO CENTER LINE INTERSECTION OF ROAD CROSSING)

CENTER LINE INTERSECTION MAIN STREET
UTAH DOT NO. 812 443 T

EXAMPLES OF SWITCH AREAS
B. FOR NONFLAMMABLE SUBSTANCES

1. SCOPE

Pipelines included under these specifications are those installed to carry steam, water or any nonflammable substance which from its nature or pressure might cause damage if escaping on or in the vicinity of Railroad property.

2. INSTALLATION

Pipelines under railroad track and right-of-way shall be encased in a larger pipe or conduit installed as indicated in Fig. 2.

3. CARRIER PIPE

Carrier pipe inside the casing under the railroad track and right-of-way shall be of good construction approved by the Chief Engineer of the Railroad.

4. CASING PIPE

Casing pipe and joints may be of any conduit construction approved by the Railroad's Chief Engineer and shall be capable in its entirety of withstanding the load of Railroad roadbed, track and traffic; also shall be constructed so as to prevent leakage of any matter from the casing or conduit throughout its length under track and Railroad right-of-way. The casing shall be installed so as to prevent the formation of a waterway under the Railroad.

Casing shall be installed with even bearing throughout its length and shall slope to one end.

Wall thickness of the casing must be no less than that specified in the attached steel casing pipe wall thickness chart.

The inside diameter of the casing shall be no less than 2 inches greater than largest outside diameter of carrier pipe, joints or couplings.

5. CATHODIC PROTECTION

Where cathodic protection is used on the carrier pipe, a flush test box constructed specifically for this purpose will be provided with test wires attached to casing wall and carrier pipe, as shown in Fig. 2.

6. SEALS

The ends of the casing shall be suitably sealed to outside of carrier pipe against the intrusion of foreign material which might prevent ready removal of the carrier pipe.
7. DEPTH OF CASING

The top of the casing pipe shall be below the frost line, and its closest point shall not be less than 4.5 feet below base of railroad rail. On other portions of the Railroad right-of-way where casing is not directly beneath any track the depth from the surface of the ground and from bottom of ditches to top of casing, shall not be less than 3 feet. Where it is not possible to secure the above depths, special construction shall be used as approved by the Railroad's Chief Engineer.

8. LENGTH OF CASING

Casing shall extend at least 30 feet or 2(D)+20 feet, (where "D" equals depth of the bottom of the casing below Railroad subgrade), whichever is greater, each side from (measured at right angles to) centerline of outside track. The casing is to extend beyond the limit of the Railroad right-of-way as required to obtain the specified length. If additional tracks are constructed in the future, the casing shall be correspondingly extended at the utility's expense.

9. JACKING PITS

Jacking pits shall be a minimum of 30 feet from the centerline of track.

10. SHUT-OFF VALVES

Where warranted by special local conditions and when mutually agreed to by the Railroad Company and the owner of the pipeline, accessible emergency shut-off valves shall be installed within effective distances at each side of the crossing.

11. LOCATION

Pipelines shall, where practicable, be located to cross tracks at approximately right angles thereto and said crossing shall not be closer than 50 feet to any portion of any Railroad bridge, building, or other important structure.

Pipelines and casing pipe shall be at least 16 feet (vertically) from aerial electric wired and shall be suitably insulated from underground conduits carrying electric wires on Railroad right-of-way.

12. TOPOGRAPHY

Where practicable, pipelines shall be located where the ground surface slopes downward away from the railroad tracks. Also, when large capacity pipes are located where the ground surface ascends above the railroad roadbed, there must be sufficient adjacent opening under the tracks to carry off the material in event of rupture.

13. RESTORATION OF RIGHT-OF-WAY
Upon completion of the pipeline installation work, all rubbish, excess materials, temporary structures and equipment are to be removed and the Railroad's right-of-way cleaned and restored to the satisfaction of the Railroad's Chief Engineer or his authorized representative. Disturbed areas shall be seeded or otherwise protected to control erosion as specified by the Chief Engineer of the Railroad.

14. APPROVAL OF PLANS

Plans for a proposed pipeline shall be submitted to and meet the approval of the Chief Engineer of the Railroad or his authorized representative before work is begun and all work on Railroad right-of-way, including the supporting of the track or roadbed, shall be subject to his inspection and direction. All costs incurred shall be borne by the utility.
APPLICANT'S PIPELINE CROSSING CHECKLIST

1). Must comply with Common Standard No. 1029 specifications. (Previously disclosed in the application).

2). If casing diameter is greater than 42-inches, proposal must be approved by the Chief Engineer.

3). If carrier pipe is R.C.P. or C.M.P., the proposal must be approved by the Chief Engineer.

4). Minimum of 50-feet from the end of any railroad bridge, centerline of any culvert or (*) switch area to the centerline of the pipeline crossing.

5). If carrier pipe is made of plastic (PVC) and commodity is flammable, steel casing must extend completely across the Railroad Company's right-of-way.

6). If carrier pipe is made of plastic (PVC) and commodity is non-flammable, the casing must extend the greater of 30-feet or 2(Diameter) + 20-feet from the centerline of the nearest trackage, when measured at right angles.

7). If pipeline is uncased and commodity is flammable, carrier pipe is to be made of steel, buried a minimum of 11-feet below the base of rail and 5-feet below ground line, for its entire length across the Railroad Company's right-of-way.

8). A Signal Representative, from the Railroad Company, must be present during installation if railroad signals are in the vicinity of the proposed crossing.

9). No parallel encroachments on the Railroad Company's right-of-way.

10). Applicant should thoroughly review the application and contact the Railroad Company at telephone number 1-800-336-9193 to determine if fiber optic cable is buried on the subject right-of-way.

(*) Note: Switch area is in the area between the Point of Switch and the Point of Frog on a turnout.
NOTE 1. CASING TO EXTEND BEYOND THE CENTER LINE OF TRACK AT RIGHT ANGLES THE GREATER OF 20 + 20 FT. OR 45 FT., AND BEYOND LIMIT OF RAILROAD RIGHT-OF-WAY IF NECESSARY TO PROVIDE PROPER LENGTH OUTSIDE OF TRACK.

2. MARKER TO INDICATE LOCATION OF PIPE LINE AT RIGHT-OF-WAY LINE. IN ADDITION, MARKERS SHALL BE INSTALLED AT MINIMUM 500-FT. INTERVALS ALONG PIPE LINE ENCROACHMENTS AND AT LOCATIONS OF MAJOR CHANGE OF DIRECTION.

3. ALL HORIZONTAL DISTANCES TO BE MEASURED AT RIGHT ANGLES FROM CENTER LINE OF TRACK.

FIG. 1

NOTE 1. SEAL NOT REQUIRED IF CASING ENDS ABOVE GROUND WHERE DRAINAGE IS AVAILABLE.

2. CASING TO EXTEND BEYOND THE CENTERLINE OF TRACK AT RIGHT ANGLES THE GREATER OF 20 + 20 FT. OR 30 FT. AND BEYOND LIMIT OF RAILROAD RIGHT-OF-WAY IF NECESSARY TO PROVIDE PROPER LENGTH OUTSIDE OF TRACK.

FIG. 2
NOTE 1. REQUISITES FOR CARRIER LINE PIPE SHALL APPLY FROM RIGHT-OF-WAY TO RIGHT-OF-WAY.

NOTE 2. MARKER TO INDICATE LOCATION OF PIPE LINE AT RIGHT-OF-WAY LINE. IN ADDITION, MARKERS SHALL BE INSTALLED AT MINIMUM 500-FT. INTERVALS ALONG PIPE LINE ENCROACHMENTS AND AT LOCATIONS OF MAJOR CHANGE OF DIRECTION.

FIG. 3
# STEEL CASING PIPE WALL THICKNESS CHART

<table>
<thead>
<tr>
<th>Minimum Thickness</th>
<th>Diameter of Casing Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; (0.250&quot;)</td>
<td>12&quot; or less</td>
</tr>
<tr>
<td>5/16&quot; (0.3125&quot;)</td>
<td>over 12&quot; - 18&quot;</td>
</tr>
<tr>
<td>3/8&quot; (0.375&quot;)</td>
<td>over 18&quot; - 22&quot;</td>
</tr>
<tr>
<td>7/16&quot; (0.4375&quot;)</td>
<td>over 22&quot; - 28&quot;</td>
</tr>
<tr>
<td>1/2&quot; (0.50&quot;)</td>
<td>over 28&quot; - 34&quot;</td>
</tr>
<tr>
<td>9/16&quot; (0.5625&quot;)</td>
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</tr>
<tr>
<td>5/8&quot; (0.625&quot;)</td>
<td>over 42&quot; - 48&quot;</td>
</tr>
</tbody>
</table>

This chart is only for smooth steel casing pipes with minimum yield strength of 35,000 PSI.

Casing pipes larger than 48" diameter or with any portion deeper than 20' shall be submitted to Chief Engineer of the Railroad for approval.

Office of Chief Engineer
Union Pacific Railroad Company
Omaha, Nebraska

February 25, 1988
PERMIT TO BE ON RAILROAD PROPERTY FOR UTILITY SURVEY

RECATALS:

1. The undersigned party seeking permission to be on Railroad property is hereinafter called "Permittee".

2. Due to the nature of Railroad operations, Railroad property can be a dangerous place for people and/or property. Railroad's safety rules and practices shall be strictly observed and followed at all times while on Railroad property.

WHEREAS, Permittee desires to obtain temporary permission to enter and be on or about the tracks and/or property of the UNION PACIFIC RAILROAD COMPANY and/or MISSOURI PACIFIC RAILROAD COMPANY, (hereinafter called "Railroad"), for the purpose of performing a civil engineering survey work to locate existing and/or proposed utility lines, without the use of vehicles and/or machinery on Railroad's property; and

WHEREAS the Railroad is willing to allow the Permittee temporary permission to be on or about it's premises for the purpose aforesaid on the terms and conditions stated herein:

NOW THEREFORE, Railroad grants to Permittee temporary permission to be on or about the tracks and/or property of the Railroad for the purpose above stated, subject to the following conditions:

1. Before exercising any privilege under the permission herein given, Permittee shall contact the Railroad's Superintendent, as listed on the attached sheet, having jurisdiction over the property involved.

2. Permittee shall become familiar with and strictly observe Railroad's safety rules and all other rules, regulations, or directions of Railroad's Superintendent or his representatives.

3. Permittee shall agree to the terms and conditions of this instrument, and shall so evidence by his execution of same.

4. The above recited permission is granted solely upon the condition that Permittee shall and hereby does agree to indemnify, protect and save harmless Railroad from any and all loss or damage that Railroad may sustain or become liable for, caused by, resulting from, or by reason of any injury to or death of any persons whomsoever, or destruction of property of any kind to whomsoever belonging, howsoever suffered or caused in or incident to or in connection with the aforesaid work on Railroad's property hereinabove referred to.

5. Upon completion of your work, but in no event later than the last day of the term of this agreement, Permittee will remove all of his tools, equipment, and other property of any kind whatsoever, and restore...
Railroad's property to substantially the same condition that existed prior to the performance of your work hereunder.

6. This permit may be revoked at any time by the Railroad, but if not revoked, shall expire at the end of the last date written below.

UNION PACIFIC RAILROAD COMPANY
MISSOURI PACIFIC RAILROAD COMPANY

By: ____________________________
Director Contracts & Real Estate

___________________________________________
(Company Name)

___________________________________________
(Street Address)

___________________________________________
(City, State, Zip)

By: ________________________________

Title: ________________________________

Date of Survey(s): _________________ thru ________________

Location of Survey: __________________________________________

24 Hour Telephone Number: ____________________________

NOTE TO SUPERINTENDENT:
EACH person to go on the property MUST SIGN. (Place additional signatures on the back side of EACH COPY).
Return Railroad's Copy to Room 1100 - Omaha.
<table>
<thead>
<tr>
<th>Service Unit</th>
<th>Superintendent</th>
<th>Phone Number</th>
<th>Mailing Address</th>
<th>Service Unit Directory</th>
<th>Revised March 6, 1989</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>R. L. Clarkson</td>
<td>622-1969</td>
<td>210 No. 13th St., 16th Floor, St. Louis, MO 63103</td>
<td>1026636</td>
<td>622-3134</td>
</tr>
<tr>
<td>St. Louis</td>
<td>D. K. Barnes</td>
<td>622-1149</td>
<td>210 No. 13th St., 16th Floor, St. Louis, MO 63103</td>
<td>1026636</td>
<td>622-3134</td>
</tr>
<tr>
<td>Missouri</td>
<td>K. C. Packard</td>
<td>245-2795</td>
<td>2801 Rock Creek Parkway, No. Kansas City, MO 64117</td>
<td>1926634</td>
<td>245-2366</td>
</tr>
<tr>
<td>Kansas City</td>
<td>C. O. Malone</td>
<td>246-2700</td>
<td>2801 Rock Creek Parkway, No. Kansas City, MO 64117</td>
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<tr>
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<td>G. O. Everett</td>
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<td>Wichita</td>
<td>B. D. Banion</td>
<td>268-9456</td>
<td>2645 New York Ave., Wichita, KS 67219</td>
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<td>M. M. Connolly</td>
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<tr>
<td>North Platte</td>
<td>T. E. Simon</td>
<td>532-4226</td>
<td>4601 West Front St., North Platte, NE 69103</td>
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<td>D. D. Tholen</td>
<td>778-3332</td>
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<td>Wyoming</td>
<td>B. M. Brown</td>
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<td>121 West 15th St., Cheyenne, WY 82001</td>
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<tr>
<td>Memphis</td>
<td>R. H. Chance</td>
<td>722-4953</td>
<td>1021 Melrose St., Memphis, TN 38114</td>
<td>1132821</td>
<td>722-4911</td>
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<tr>
<td>Arkansas</td>
<td>R. G. Lang</td>
<td>373-2100</td>
<td>1000 West 6th Street, No. Little Rock, AR 72114</td>
<td>1026650</td>
<td>373-2193</td>
</tr>
<tr>
<td>No. Little Rock</td>
<td>S. L. Hefley</td>
<td>373-2140</td>
<td>1000 West 6th Street, No. Little Rock, AR 72114</td>
<td>1026651</td>
<td>373-2145</td>
</tr>
<tr>
<td>Red River</td>
<td>R. L. Short</td>
<td>236-2951</td>
<td>905 East Pacific Ave., Longview, TX 75602</td>
<td>1123801</td>
<td>878-4640</td>
</tr>
<tr>
<td>Fort Worth</td>
<td>L. A. Roach</td>
<td>878-4540</td>
<td>P.O. Box 9857, Fort Worth, TX 76107</td>
<td>1023801</td>
<td>878-4640</td>
</tr>
<tr>
<td>Texas</td>
<td>S. R. Searle</td>
<td>878-4554</td>
<td>P.O. Box 9857, Fort Worth, TX 76107</td>
<td>1023801</td>
<td>878-4640</td>
</tr>
<tr>
<td>Palestine</td>
<td>J. E. Dennis</td>
<td>350-7660</td>
<td>24125 Aldine Westfield Road, Spring, TX 77373</td>
<td>1625002</td>
<td>350-7593</td>
</tr>
<tr>
<td>San Antonio</td>
<td>F. A. Lopez</td>
<td>921-4101</td>
<td>1711 Quintana Road, PO Drawer F, San Antonio, TX 78211</td>
<td>1223822</td>
<td>921-4128</td>
</tr>
<tr>
<td>Houston</td>
<td>P. L. Tucker</td>
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<td>24125 Aldine Westfield Road, Spring, TX 77373</td>
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<td>Louisiana</td>
<td>P. N. Crabtree</td>
<td>338-2801</td>
<td>P.O. Box 9, Addis, LA 70710</td>
<td>1026653</td>
<td>338-2803</td>
</tr>
<tr>
<td>Green River</td>
<td>W. T. Farr</td>
<td>236-5332</td>
<td>P.O. Box 1592, Pocatello, ID 83204</td>
<td>1519495</td>
<td>236-5214</td>
</tr>
<tr>
<td>Pocatello</td>
<td>P. C. Wyatt</td>
<td>236-5201</td>
<td>P.O. Box 1592, Pocatello, ID 83204</td>
<td>1026606</td>
<td>236-5214</td>
</tr>
<tr>
<td>Nampa</td>
<td>C. E. O'Hara</td>
<td>465-8371</td>
<td>1313 One Street North, Nampa, ID 83651</td>
<td>1026617</td>
<td>465-8313</td>
</tr>
<tr>
<td>Spokane</td>
<td>R. W. Butler</td>
<td>536-5207</td>
<td>P.O. Box 3206, Spokane, WA 99220</td>
<td>1026656</td>
<td>536-5205</td>
</tr>
<tr>
<td>Sea/Port</td>
<td>J. L. Riney</td>
<td>269-2332</td>
<td>2745 No. Interstate Ave., Portland, OR 97227-1607</td>
<td>1326605</td>
<td>249-2270</td>
</tr>
<tr>
<td>Feather River</td>
<td>D. R. Lyon</td>
<td>942-5200</td>
<td>833 East 8th St., Stockton, CA 95206</td>
<td>9261100</td>
<td>942-4760</td>
</tr>
<tr>
<td>Nevada</td>
<td>J. E. Bridger</td>
<td>595-3314</td>
<td>406 West 1st South, Salt Lake City, UT 84101</td>
<td>1219488</td>
<td>595-3554</td>
</tr>
<tr>
<td>Utah</td>
<td>D. M. Wheeler</td>
<td>595-3332</td>
<td>406 West 1st South, Salt Lake City, UT 84101</td>
<td>1026670</td>
<td>595-3554</td>
</tr>
<tr>
<td>California</td>
<td>A. A. Chacon</td>
<td>725-2332</td>
<td>5500 Ferguson Drive, Los Angeles, CA 90022</td>
<td>1726604</td>
<td>725-2377</td>
</tr>
</tbody>
</table>
APPENDIX J

PHASE I REPORT

AND APPENDIX
PHASE I REPORT

OAKLEY
WATER SUPPLY PROJECT
LEVEL II - FEASIBILITY STUDY
FOR

WYOMING WATER DEVELOPMENT COMMISSION

1515 Ninth Street
Rock Springs, Wyoming 82901
Phone (307) 362-7519

AUGUST 1989
# INDEX

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<td>II</td>
<td>MEETINGS</td>
<td>5</td>
</tr>
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<td>6</td>
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<td>33</td>
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<td>VII</td>
<td>CONCLUSIONS AND RECOMMENDATIONS</td>
<td>36</td>
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</table>

# APPENDIX

A. Cost Estimates

B. Well Sample Results

C. Hydraulic Gradients

D. Information on Water Treatment Equipment
I. INTRODUCTION


The Oakley Project area is located about two miles south of Kemmerer, Wyoming. It consists of homes and development in the Quarry and Oakley Subdivisions and three other homes situated on individual lots outside of the subdivisions, as shown on Sheet 3 of the Drawings. There is a total of 20 lots in the area considered for water service.

The homes in the study area presently obtain their water from shallow private wells. The quantity and quality of these groundwater supplies varies greatly and for the most part, the quality is very poor. Consequently, the homeowners are intent on obtaining a better supply. Additionally, water is not available for fire protection and there has been one instance where property has been lost to fire because of this deficiency.

The objectives of the study were to evaluate the feasibility of importing water from either the City of Kemmerer or the Town of Diamondville; developing a groundwater supply from the Nugget Formation; and evaluating the possibilities of treating the water from existing private wells.
The alternatives to be considered for importing a supply from Kemmerer involved studying:

1. Connecting to an existing 12" diameter pipeline supplying a fire hydrant at the intersection of Highways 30 and 189.

2. Connecting to a 10" diameter pipeline that feeds Diamondville at the intersection of Canyon Road and the Highway 30-189 Business Loop.

Two points of connection to the Diamondville water system were to be evaluated:

1. Connecting at the Diamondville tankage.
2. Connecting to the system in the Southland Addition.

In addition to conducting a study of the Nugget Formation, an assessment was to be undertaken for the individual landowner water wells.

During the early phases of the study effort, several of these options were dropped or deleted from the program. The connection to the Kemmerer System at the Canyon Road/ Highway 30-189 Business Loop was removed from consideration because it was felt that the higher head available at the Highway 30-189 intersection was more desirable and its location would allow easy and good access to a pipeline alignment in the Highway 30 right-of-way. (See Sheets 1 and 2 of the Drawings.)

Both Diamondville alternatives were abandoned because they would involve dealing with a third party - Diamondville. Regardless of which alternative for a surface supply was considered, it would be mandatory to deal with the City of Kemmerer because Kemmerer treats and supplies water to Diamondville. Therefore, a direct connection to the Kemmerer System was considered to avoid a three-party agreement if a surface water supply proved to be feasible.
The Nugget Formation as a source for groundwater supply was evaluated up to a point before opting for a plan to evaluate a supply from the Frontier Formation. This change in plan was undertaken because of the possibility of developing a supply from the Frontier at much less cost. Costs would be reduced by a factor greater than ten.

Therefore this Report focuses on: Connecting to the Kemmerer System at the 12 inch diameter pipeline on the northeast corner of the intersection of Highways 30 and 189. Two options are considered under this scheme:

Option 1 - Obtain water and operations, meter reading, and billing services from the City of Kemmerer.

Option 2 - Obtain water only from the City of Kemmerer. All other services would be provided by the Oakley District.

A groundwater source was evaluated from the Frontier Formation, however, this evaluation is not complete because a test well would have to be completed to confirm the assumptions made herein relative to this option. Also, considerable information is presented in the groundwater section (Alternate "B") of this Report.

The results of quality analysis of water from the private domestic wells is presented herein, together with a scheme and their related costs to treat each domestic supply by installing filters, water softeners, and reverse osmosis units. This alternate would only treat the well water to a limited extent and would not provide volumes of water necessary for fire protection.
The three alternates described above are referenced in this Report as follows:

Alternate "A" - Connecting to the Kemmerer Water Supply - Options 1 and 2.

Alternate "B" - Development of Groundwater.

Alternate "C" - Reverse Osmosis and Softening Units for Existing Well Water.

The relative monthly costs per home for these three alternates are estimated as follows:

<table>
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<tr>
<th>ALTERNATE</th>
<th>ESTIMATED MONTHLY WATER COST PER RESIDENCE</th>
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<tr>
<td></td>
<td>100 G/C/D</td>
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<tr>
<td>A. Connect to Kemmerer System - Option 1</td>
<td>$ 71.89</td>
</tr>
<tr>
<td></td>
<td>Kemmerer Provides All Services</td>
</tr>
<tr>
<td>B. Develop Water Well</td>
<td>$ 65.11</td>
</tr>
<tr>
<td>C. Individual In-House Water Treatment Units*</td>
<td>$ 58.00*</td>
</tr>
</tbody>
</table>

* Provides no Fire Protection and quantity per capita per day is not given.
MEETINGS

A project Scoping Meeting was held in Kemmerer on June 23, 1989. The following persons were in attendance at this meeting:

George Zebre
Commissioner, Wyoming Water Development Commission

John Jackson
Wyo. Water Dev. Commission Staff

Patrick Erger
" "

Jon Wade
" "

Dick Stockdale
State Engineer's Office

Bill Wilson
Oakley Water Association

Tom Lozier
" "

Andy Kasenhagen
Lincoln County Planner

Joe Bluemel
Lincoln County Attorney

Kent Smith
Director of Public Works, Kemmerer

Wayne L. Johnson
Johnson-Fermelia Co. Inc. (JFCo)

Robert E. Johnson
" "

George (Pete) Dana
" "

Another meeting was held on June 30, 1989 with representatives of Kemmerer and the South Lincoln Fire District. The following were in attendance:

Marty Gunder
Mayor of Kemmerer

Steve Golnar
Kemmerer City Administrator

Tim Gaughan
Fire Chief and Kemmerer Councilman

Kent Smith
Kemmerer Director of Public Works

Robert E. Johnson
Johnson-Fermelia Co. Inc.

Kent Smith left his position with the City of Kemmerer shortly after this meeting. Subsequently, the Consultant was advised that Vean Taylor would serve as the staff contact person with the City of Kemmerer.
A third meeting was held in the Kemmerer City Hall on July 25, 1989 attended by:

Patrick Erger  Wyoming Water Development Commission  
Steve Golnar  Kemmerer City Administrator  
Vean Taylor  City of Kemmerer  
Robert E. Johnson  Johnson-Fermelia Co. Inc.

Several other meetings and discussions were held with Oakley people, Lincoln County personnel, and City of Kemmerer staff during the course of the work and all representations made herein have been discussed to some degree with the parties involved.

III ALTERNATE "A" – CONNECTION TO KEMMERER SYSTEM

This alternate involves evaluation of connecting to an existing 12 inch diameter pipeline on the northeast corner of the intersection of U.S. Highways 30 and 189, as shown on Sheet 1 of the Drawings. An 8 inch diameter pipeline would be installed from this point to the Oakley area, inside the Highway 30 right-of-way fence. Wyoming DEQ regulations mandate a minimum pipeline diameter of 8 inches in cases where a single source supply pipeline serves a public water system.

Connecting to an existing pipeline at the intersection of Highway 30-189 Business Loop and Canyon Road was also considered early in the study. However, this idea was dropped because the higher available head and better access to the U.S. Highway 30 right-of-way alignment from the connecting point at the Highway 30-189 intersection. Although slightly more pipeline is required, there is less need to obtain right-of-way across lands between the Canyon Road connecting point and the Highway 30 right-of-way.
A limited analysis of the impact on the Kemmerer water system from connecting at the Highway 30-189 intersection was performed at the request of Vean Taylor of the City of Kemmerer. This analysis evaluated pressure loss from the demands to supply Oakley and the impact of storage at Kemmerer's Green Hill Reservoir. The analysis indicated that the reduction in pipeline pressure would be minimal in delivering water to Oakley to meet all domestic needs and fire flows. Storage capacity in the Green Hill Reservoir would be adequate to meet the requirements of Oakley. DEQ regulations stipulate that storage would have to be available to supply the average daily demands. Fire storage is not required by Oakley because average daily demands are less than 50,000 gallons. Average daily demands for Oakley are estimated at about 35,000 gallons in applying an average daily per capita demand of 500 gallons and assuming 3.5 persons per residence. Five hundred gallons per day per capita is conservative.

However, additional storage requirements may have to be provided to satisfy future growth in Kemmerer. Construction of a storage facility in Oakley may therefore be necessary at some future date if growth occurs in Kemmerer.

A transmission pipeline and distribution system, as shown on the Drawings, would have to be built to supply Kemmerer water to the residents of Oakley.

The distribution system would consist of a 6 inch diameter pipeline as required by DEQ regulations and would include fire hydrants positioned pursuant to the South Lincoln Fire District's recommendations. Fire flows are assumed at two-250 gallons per minute fire streams (total 500 gpm) which can easily be met with the 6 inch diameter pipeline.
Storage is required equal to the average daily demands -- about 35,000 gallons. This storage is assumed to be satisfied by available storage in Kemmerer's Green Hill Reservoir.

The Capital Cost for these facilities are estimated at:

<table>
<thead>
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<th>Cost</th>
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<tr>
<td>Transmission Pipeline</td>
<td>$371,900.00</td>
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<tr>
<td>Distribution System</td>
<td>69,125.00</td>
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<td><strong>Total Capital Cost</strong></td>
<td><strong>$441,025.00</strong></td>
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</table>

The above figures include 10% for engineering design costs, 15% for contingencies, and a $25,000.00 connection charge by the City of Kemmerer. A detailed breakdown is presented in the Appendix to this Report.

Two options were evaluated under this Alternate:

**Option 1** - considers obtaining water from the City of Kemmerer and having them provide maintenance, operations, meter reading and billing services.

**Option 2** - considered only obtaining the water from the City of Kemmerer and Oakley would perform all maintenance, operation, meter reading and billing services.

The following cost components were estimated for Alternate "A" - Option 1:

3. Costs Payable to City of Kemmerer.
4. Total Monthly Costs.
A detailed breakdown of these costs is provided in the Appendix, however their characteristics and features are described below.

1. **Capital Costs - Transmission Pipeline**

These costs include the $25,000 connection charge to Kemmerer, pipeline appurtenances, highway and railroad boring and a river crossing, together with 10% for engineering and 15% for contingencies.

Thirty-three percent (33%) of the capital costs is assumed to be in the form of a loan to be paid back to the State over 30 years at 4% interest. The loan portion is therefore amortized which computes to a cost per lot or residence of $29.60 per month.

2. **Capital Costs - Distribution System**

These costs include the construction of a 6 inch diameter distribution system with appurtenances and fire hydrants, as shown in the Drawings. They also include 10% for engineering and 15% for contingencies.

The distribution system, however, is assumed to be funded by the Wyoming Farm Loan Board which requires a 50% grant and 50% loan. The loan portion must be amortized at 8.5% interest over an assumed repayment term of 30 years to correspond with the term of the Transmission Pipeline.

The capital costs were therefore apportioned accordingly and a cost per residence of $13.40 per month was calculated to repay the loan as described above.
3. **Costs Payable to the City of Kemmerer Under Option 1**

As stated earlier, Option 1 assumes that the City of Kemmerer forces would operate and maintain the transmission pipeline and distribution system, read meters and provide billing services. The City of Kemmerer provides water to the Town of Diamondville under the following cost structure:

<table>
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<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Base Rate</td>
<td>$4.26/single meter/month</td>
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<tr>
<td>Water Charge</td>
<td>$1.75/1000 gallons</td>
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</table>

The following assumptions were made in calculating charges by Kemmerer under Option 1.

a. The meter charge would be increased by $1.00 per meter -- from $4.26 to $5.26 to cover added costs to read the meters in Oakley.

b. The water charge would be increased by calculating the added charges based on available cost data and increased demand on the applicable service. These costs and services were drawn from *Water, Wastewater, Sanitation Rate Study*, prepared by Kent R. Smith, Kemmerer Director of Public Works, dated April 25, 1988 and revised May 1, 1988.

The services and costs that would be impacted by the increased water demands by Oakley are:
Water Plant Operation and Maintenance  $106,049.00

Water Meter Maintenance  8,130.00

Total  $114,179.00/year

Average annual water quantity delivered in Kemmerer is 220,000,000 gallons.

Estimated total annual water use in Oakley equals 7,665,000 gallons (assuming 300 gal/capita/day) or a 3.5% increase in Kemmerer water deliveries.

Applying the 3.5% increase to the affected amounts (3.5 of $114,179.00) = $3,996.00 per year.

Applying this amount to Oakley water deliveries would compute to $0.50/1000 gal. This would then be added to the water charge levied by Kemmerer: $1.75 + $0.50 = $2.25. The water charge to Oakley users would then be $2.25/1000 gallons. Monthly water costs per residence would be:

- Use of 100 gal/capita/day  $28.89
- Use of 300 gal/capita/day  $76.14
Total monthly water costs to Oakley residents under Alternate "A" - Option 1 are therefore estimated as follows:

**CAPITAL COSTS**

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Transmission Line</td>
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</tr>
<tr>
<td>Distribution System</td>
<td>$13.40</td>
</tr>
</tbody>
</table>

**VARIABLE COSTS TO KEMMERER/MONTH**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D</td>
<td>$28.89</td>
</tr>
<tr>
<td>300 G/C/D</td>
<td>$76.14</td>
</tr>
</tbody>
</table>

**TOTAL COSTS PER MONTH - ALTERNATE "A" - OPTION 1**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D</td>
<td>$71.89</td>
</tr>
<tr>
<td>300 G/C/D</td>
<td>$119.14</td>
</tr>
</tbody>
</table>

The following cost components were estimated for Alternate "A" - Option 2:

3. Meter Reading and Billing Costs.
4. Variable Costs Payable to Kemmerer.
5. Total Monthly Costs.
Costs for Items 1 and 2 are the same for Option 2 as for Option 1. Item 3. "Meter Reading and Billing Costs", assumes that Oakley hires a part time person to read meters and prepare billing to work a total of 12 hours per month at $15.00 per hour. Vehicle costs were estimated at 8 hours per month at $10.00 per hour; and supplies at $10.00 per month. The total monthly expense for this effort would total $270.00 or $13.50 per residence per month.

Item 4, "Variable Costs Payable to Kemmerer", would be based on the $1.75 rate per 1000 gallons billed by Kemmerer, which equals $8.38 per residence per month for 100 gallons per capita per day; and $55.13 per month for 300 gallons per capita per day.

Again, 3.5 persons per residence are assumed in making these calculations.

Total monthly costs per residence for Alternate "A" - Option 2 are summarized as follows:

<table>
<thead>
<tr>
<th>CAPITAL COSTS</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Transmission Line</td>
<td>$ 29.60</td>
</tr>
<tr>
<td>Distribution System</td>
<td>$ 13.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>METER READING AND BILLING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Total</td>
<td>$ 13.50</td>
</tr>
<tr>
<td></td>
<td>$ 56.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VARIABLE COSTS PAYABLE TO KEMMERER/MONTH</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D @ $1.75/1000 gal</td>
<td>$ 18.38</td>
</tr>
<tr>
<td>300 G/C/D @ $1.75/1000 gal</td>
<td>$ 55.13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL COSTS PER MONTH - ALTERNATE &quot;A&quot; - OPTION 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D</td>
<td>$ 74.88</td>
</tr>
<tr>
<td>300 G/C/D</td>
<td>$ 111.63</td>
</tr>
</tbody>
</table>
The Nugget Formation was investigated as a potential source of groundwater, however it was dropped from consideration when it became apparent that drilling into the Frontier Formation may be a more attractive approach. The Nugget is from 6,000 to 7,000 feet deep at Oakley, whereas the Frontier is at a depth of about 250 feet under the Hams Fork River just west of the Oakley Project area. The Frontier also has good potential for recharge in the area so it was targeted as a potential source for groundwater development.

Although the groundwater investigation has determined that the Frontier Formation is more attractive for potential development than the Nugget Formation, the geological aspects of each are presented herein.

**Nugget Formation:**

The Nugget Formation of Upper Triassic Age consists principally of massive, cross-bedded aeolian sandstones and minor quartzites. It ranges in thickness from 600 to 1100 feet in the Kemmerer region. In the Oakley area, the Nugget is projected to be 800-900 feet thick and buried to a depth of 6,000-7,000 feet (Plate 2, MSM, ref. 3). The dip of formations at the surface is 20 degrees W-NW and the strike is N-S to slightly NE-SW.

The existence of a low angle thrust fault from the west, called the Darby Thrust Fault, is found in the area and its surface expression is located 2-3 miles east of Oakley. Because it is a low angle fault, it has no structural effect on deeply lying strata such as the Nugget.
A single outcrop of Nugget is found in Sections 30 and 31, Township 20 North, Range 115 West. The outcrop, located by photogeology, is 5 miles south and 3.5 miles east of the Oakley Project Area. Here the strike is N-S and the dip is approximately 25 degrees to the West.

Over the balance of the area east of Oakley, the Nugget subcrops against the Tertiary deposits of the western Green River Basin. Studies of the outcrops of the Nugget Formation in areas from 12 to 35 miles north of Oakley indicate good porosities and permeabilities but subsurface porosities obtained from drill stem tests find ranges of from 10-20 percent. Studies of cores of the Nugget from the Davis Oil Co., Oyster Gap No. 1 Well in T 32 N, R 115 W, show the Nugget sand to be well cemented and have no visible porosity.

Transmissivities at depth are considerably less in drill stem tests than those in near surface zones due to depth of burial and lesser fracture potential with such depth. Near surface fracturing accounts for the comparatively high yields (75-2000 gpm) of the springs from the Nugget Formation in Townships 30 and 31 North, Range 116 West.

Water quality data from the Nugget in the Oakley area is nonexistent. However, in areas 12 to 30 miles north of Oakley, the Nugget water quality is good, ranging from 150-300 Mg/L of calcium bicarbonate type water. In the Oakley area higher dissolved solid content is expected because of inactive recharge at depth.

Recharge of the Nugget in the Oakley area is principally from subsurface sources because the Nugget is not exposed at the surface within a radius of several miles.
in any direction from Oakley. The nearest known Nugget outcrop is the only surface area where the formation recharge can occur. That outcrop (located earlier in the text) is only one mile long and one-half mile wide, providing very little areal extent for rainfall recharge. Although the possibility of recharge from the overlying Twin Creek Limestone exists, it cannot be depended upon to provide quantities or qualities of water to saturate or at least recharge the Nugget Formation at depths.

Conclusions
The potential for development of a Nugget Formation water well is low because of the following:

a) The formation is buried to a depth of 6,000+ feet and possibly to a depth of close to 7,000 feet. Dip projections and extrapolations from the single existing outcrop of Nugget in the general area indicate that the top of the Nugget Formation to be approximately 6,440 feet below ground level. No evidence whatsoever exists which may even indicate that the Nugget Formation may be closer to the surface than previous investigations and reports have stated.

b) The quality of subsurface water in the Nugget is unknown in the Oakley area. However, since surface recharge areas for the formation are virtually nonexistent in the vicinity of the Oakley area, any water in the Nugget has had a long residence time and is in a relatively passive state. This residence time and lack of fresh water recharge would indicate that the quality at such
considerable depth may possibly not meet the specifications for domestic potability. It is recognized that the Nugget consists principally of aeolian quartz sand and quartzite which are relatively inert and it may be that good water does exist in the Nugget at depth.

c) The available volumes of water in the Nugget would be subject to porosities and permeabilities of the formation with depth. Scattered oil field drill stem tests indicate good porosity and permeability in the Nugget so that volume may not be a negative criteria. However, artesian pressures and specific hydrostatic data are unknown and water from the formation may have to be pumped a considerable vertical distance from the aquifer's artesian level to the surface.

d) The expense of drilling even a slim 6,500 foot test well in the Oakley Subdivision would be a costly undertaking. The estimated cost of a test well would be in excess of $200,000.00 with no guarantee of success. If a sufficient supply were to be found, the cost for completing the test hole as a production well would be an additional 80 to 100 thousand dollars. Additional costs would be a pump, electrical power, and plumbing at about $20,000.00.

e) Even if the quality of water in the Nugget proved to be adequate for domestic use and
the quantity of water was adequate for pumping all the water that could be used, the cost of drilling a pilot hole and completing it as a production well would be prohibitive on a cost per residence basis for the Oakley Subdivision as compared to the cost of a Frontier Sandstone test well. If the same Nugget well were to be drilled and successfully completed for a municipality, the costs could be spread over a much higher residence number and reduce the unit cost.

Conversely, if either the quality or quantity of water were inadequate to meet minimum requirements for Oakley, then the effort to develop that groundwater source would be called a failure and the residents and the State would have thrown those funds away. In addition, since inadequate data is available to support the location of a 6,500 foot water well in Oakley, the Consultant would be remiss in his responsibilities to the contract to recommend a drilling location or to encourage expenditure of drilling funds without some certainty of success.

Thus a recommendation to drill a Nugget well on a potential chance for success cannot be made in good conscience. In order to recommend a Nugget Formation test well, the Consultant would have to have substantiated evidence indicating that the well would have a high percent chance of success. At present, the evidence does not exist so the chance of success is not high.
Although a possibility that the Nugget Formation may produce the required domestic volumes and qualities of water, it is recommended that the proposal to drill a test water well into the Nugget Formation in the Oakley Subdivision should be eliminated from further consideration for this project because the cost of approximately $10,000 per residence for just a test well and an additional $6,000 cost for a completed well (not including the storage or distribution system) would be too great an expense compared to a test well of the Frontier Sandstone.

**Frontier Sandstone:**

The search for a subsurface source of potable water in quantities large enough to serve the Oakley Subdivision led to the consideration of the Frontier Formation. The outcrop of the Oyster Ridge Sandstone Member, herein called the Frontier Sandstone, is found just west of Oakley and from this investigation, may be a source to satisfy the requirements of the subdivision.

Two geological investigation trips were made to study the outcrops and subsurface potential within short distances of Oakley as a part of the study effort. Other target aquifers in the immediate area were considered for ground water potential for test/production well development since the Nugget Formation has been rejected by this report as a viable target. The Frontier Sandstone was the next most attractive aquifer for investigation. Other potential water-producing strata were also considered.
Between the Cretaceous Frontier Formation and the Nugget Formation and in descending order, the stratigraphy includes the Aspen Shale, Bear River Formation, Gannet Group, Stump and Preuss Sandstones and the Twin Creek Limestone. Records from the Wyoming State Engineer's Office indicate one well completed in the Aspen Shale for 15 gpm and one well completed in the Bear River Formation. No wells have been reported to have been completed in any of the other strata listed above.

The Twin Creek Limestone supplies water to springs existing north of the general Kemmerer area. An oil and gas test well about 16-17 miles north of Kemmerer encountered flows of 100 gpm from the Twin Creek Limestone.

The five stratigraphic zones could be logged and tested during the drilling of a deep Nugget test well, but at this time are not considered prime targets for subsurface water development due to lack of data specific to the Oakley Subdivision area. In other areas of the Overthrust Belt, the Bear River Formation and Gannett Group contain low yields of up to 15 gpm for minor aquifers and 75 gpm for the Lakota and Belcher members of the Gannet Group (Ahern, 1).

Well development for Oakley is restricted to short distances from the subdivision because of economic and financial restrictions. Costs for water well drilling and a pipeline from the well to a storage tank would have to be less than or equal to the cost of a pipeline from Kemmerer to the storage tank.
The initial trip to Kemmerer was for geological reconnaissance and developing limits within which further studies should be conducted. The second trip involved detailed geologic investigation which determined the specific potential for drilling a test/production well into the Frontier Sandstone at a point west of the outcrop, yet within economical distances of the water storage tank necessary for Oakley.

Figure 1 is a map of the area just west of Oakley and within the limits where a test well should be placed. It shows the 2 lines of cross-section in Figures 2 and 3 and the location of a Frontier Sandstone test well.

Figure 2 is the A-A' cross-section north of the cross-section in Figure 3. It identifies the area of the Frontier Sandstone where it has been incised by erosion of the Ham's Fork. The incised area would drain any directly updip water contained in the sandstone and would preclude any hydrostatic recharge available from updip drainage.

The Frontier Sandstone subcrops under the valley floor and recharge would occur only by the Hams Fork over a distance of less than 1/4 mile. In the situation of the second cross-section (Figure 3), recharge occurs, (1) by rain and snow occurs on the outcrop where the Frontier Sandstone is exposed; (2) by the Hams Fork north of the cross-section (see Figure 2); and (3) by the Ham's Fork where the stream crosses the outcrop southwest of US Highway 30 at the southwest corner of the Oakley Subdivision.

Figure 3 is a cross-section showing the geologic structure and stratigraphy of the area from a point on
PROPOSED TEST WATER WELL

AREA OF INCISED FRONTIER SANDSTONE

PROPOSED STORAGE TANK LOCATION

APPROXIMATE STRIKE LINE, TOP OF FRONTIER SANDSTONE

1/4 MILE 1520 FEET SCALE

FIGURE 1
CROSS-SECTION A-A' SHOWING INCISED FRONTIER SANDSTONE NORTHWEST OF OAKLEY

FIGURE 2
RECHARGE OCCURS UP DIP EAST FROM THIS POINT WHERE THE TOP OF THE FRONTIER IS EXPOSED.

CROSS-SECTION B-B' SHOWING TEST WELL LOCATION AND DEPTH TO TOP AND BOTTOM - FRONTIER SANDSTONE

FIGURE 3
the Frontier Sandstone outcrop west of Oakley to where a test well of the Frontier Sandstone Member could be drilled.

The Frontier Formation of Cretaceous age consists of sandstone, shale, siltstone and coal. It is divided into the upper, middle and lower units. The upper unit contains tan sandstone, lignitic shale and the Kemmerer No. 1 Coal Bed. The Middle Member is composed of white to tan sandstone, dark shale and the Willow Creek No. 5 Coal Bed near its base. The most prominent strata in this member is a 40 to 60 foot continuous sandstone zone known as the Oyster Ridge Sandstone Member (called the Frontier Sandstone). The lower unit is made up of thin brown and white sandstone beds, tan siltstone and dark grey shale.

Microscopic examination of samples from the outcrop of the Frontier Sandstone on the ridge directly above Oakley show that the section consists of the following:

**Sample 1** - From top 2 feet of outcrop at the crest of the power line road, where the beds are fractured. Sandstone, white to tan, rare medium brown, fine grained, streaks and zones contain black grains of carbonaceous material, quartz grains, subangular to subrounded, medium to well sorted, non-calcareous, silty cement, medium to well cemented, fair to good porosity, trace iron stain.

**Sample 2** - From a point 5 feet above base of massive cross-bedded sandstone located on the ridge directly above Oakley. Sandstone, white to
tan, very fine to fine grained, subrounded, well sorted, matrix has blebs and bars of calite, fractures contain crystalline calcite, calcareous and silty cement, medium to well cemented, fair to good porosity, trace iron stain.

The Frontier Sandstone outcrops along the western side of the Oakley Subdivision where the dip is measured to be 21° to the west and the strike to be N 2° E. North along the crest of the Oyster Ridge the dip is 18° to the west northwest and the strike is N 10° E.

The upper portion of the Frontier Sandstone is fractured at the surface with 2 major and 1 minor set of fracture traces. This same pattern is probably tectonically derived and is expected to continue into the subsurface to a limited extent but at least to the extent of the depth of the test well. These fractures increase the potential for groundwater storage and transmissibility. The lower portion of the Frontier Sandstone is more massive in nature but still has potential for fracturing but to a lesser degree than in the upper portion.

**Hydrogeology**

No wells have been completed in the Frontier Sandstone in the specific area under investigation, and no Frontier water wells exist in the perimeter area of less than 2 miles from Oakley. Three ground water reports of the general area (1, 2 & 3) indicate that Frontier wells produce water in the Cumberland area south of Oakley. Such wells have been reported to produce from 5 to 100 gpm but averaging 30 to 50 gpm.
Production rates in the Oakley area will depend on subsurface fracture frequency, porosity, and permeability. The reported values for the parameters range from 8 to 25 porosity and transmissivities from 10-30 gpd/ft.

Data on Frontier Sandstone water quality is scarce since no wells are available for sampling but information reports the quantity to be potable to marginally potable where tested.

North of Kemmerer, Frontier Formation water quality is reported ranging from 366-503 Mg/L TDS. In the subsurface of the Lazeart syncline, the water is sodium bicarbonate type and ranges from 750-1500 Mg/L TDS. However fresh water influx from outcrops and streams would provide better quality in near surface aquifers. The shallow depth of the test well and the 2-fold recharge potential indicate that the water should be better at the near surface depths than at greater depths within the aquifer at the test well location.

**Location** – The proposed well should be located just north of Highway 30 and just west of the Hams Fork at the base of the highway bank. This location will take advantage of potential stream recharge both north and south of the location. It should also receive recharge from outcrops of the Frontier Sandstone south of the incised area shown in Figure 1.

**Design** – A test well to the Frontier Sandstone must exclude the subsurface water in the alluvial deposits in the Hams Fork drainage and the water contained in the Kemmerer No. 1 Coal Bed and the remainder of the unit of the Upper Frontier Formation. A well design is
proposed in Figure 4. The intermediate casing should be set several feet into the Frontier Sandstone to assure that only the Frontier Sandstone is tested. The 4 inch casing should be sealed with either cement or volclay to prevent contamination from other water sources.

Overlying shales and coal could be expected to contribute water of lesser quality to the total water column if the hole were allowed to be completed as open hole throughout or at least below the influence of the alluvial or vadose water zone. Surface casing set in bedrock will eliminate such water from the water column. An artesian water level in the well can be expected because of the comparatively steep dip of the Frontier Sandstone but the water level will be determined only by testing.

General depth of the well is projected from the outcrop to subsurface using 21° as dip and elevation from topographic map control. The hole should penetrate the entire thickness of the Frontier Sandstone to expose the maximum thickness of the potential water-bearing zone in the well. Open hole below the casing should be sufficient for testing. Depths to the top of the Frontier Sandstone are projected to be between 270 and 300 feet and the thickness to be drilled should be 50' - 55' to penetrate true thickness of 45 feet.

Test drilling should be conducted with a rotary rig using air or air/foam to make detection of aquifer or water bearing/producing zones readily apparent. However, if too much water is encountered in uphole strata, a water or water/mud system may be reverted to
FRONTIER FORMATION TEST WELL IN THE FRONTIER SANDSTONE WELL DESIGN

8"-9" SURFACE HOLE
7" SURFACE CASING

6" HOLE
4" CASING

SUBMERSIBLE PUMP

3 5/8" HOLE

FIGURE 4
for attaining desired depth. Testing should be accomplished with a pump adequate for producing 30-50 gpm from depths of 270-300 feet. The testing procedure will consist of a step test with 3 or 4 steps, then a constant rate test of a minimum of 48 hours, followed by a 98% recovery test.

Two samples will be taken for quality analysis; the first at the midway point and the second at the end of the constant rate test. The samples will be sent to a qualified laboratory for a complete analysis according to EPA primary and secondary standards, including radionuclides.

Assuming a successful test, the hole should be reamed, proper casing set and cemented from bottom to top, and a pump set to produce the required volume of water.

A pipeline and pump from the well to a storage tank placed on the ridge west of Oakley would provide a dependable supply of water for the present homes and also for limited expansion of the Oakley area. A level area in a cul-de-sac in the Frontier Sandstone on Oyster Ridge is present at the southern end of the ridge at about the 7000 foot elevation level. A pump would be necessary to lift the well water about 150-170 feet from the wellhead to the storage tank. The tank could be situated at a lower level on the ridge if necessary, but a suitable area must be found or constructed.

Preliminary projected drilling costs for the test hole are less than $20,000 and management and on-site geology costs would be added. The straight line distance from the well to the storage area on Oyster Ridge is about 1800 feet.
A distribution system to all homes should be designed and costed as part of the systems planning.

The Frontier Sandstone has a fair to good potential for producing quantities of water from a well drilled and completed in the full section of continuous sandstone in the Frontier Sandstone which outcrops just west of Oakley.

From this and other studies, the Frontier Sandstone could be expected to produce 30-50 gpm continuously. However, after the storage tank is initially filled, the well need not be pumped continually on a 24-hour-per-day basis. The storage tank will provide water for both domestic use and for fire control. A well drilled and completed in the Frontier Sandstone will not satisfy requirements for a large municipality but would provide adequate water (with storage tank) for the Oakley Subdivision residents at present and for expansion of the subdivision within limits.

The quality of water from the Frontier Sandstone at depths of 250-300 feet is unknown at present; however, the chances for its potability are good because of its proximity to the surface and to its 2 sources of recharge. Waters within the Frontier Sandstone are most likely in an active rather than passive state.

Drilling and testing a small (6" diameter) water test hole of about 325 feet in depth in the Frontier Sandstone is recommended, at a location less than 0.5 mile west of Oakley and on the west side of Ham's Fork. If successful, this water source would be more cost effective on a per residence basis than a pipeline built from the Kemmerer area to Oakley.
References:


The following cost components were estimated for Alternate "B" - detailed information is contained in the Appendix:

5. Meter Reading and Billing.

1. **Capital Costs for Well and Transmission Line**

These costs include: well, pump and pump house; six inch diameter transmission pipeline from well to storage tank; 50,000 gallon storage tank; appurtenances and related items of work. Total Capital Costs are estimated at $230,522.00, of which 33% is assumed to be in the form of a loan amortized over 30 years at a 4% interest rate.

This calculates to a monthly rate of $18.35 per residence.

2. **Capital Costs for Distribution System**

These costs are the same as those for Alternate "A" - Options 1 and 2, which are $6.30 per month per lot.

3. **Power Costs for Pump**

Power costs are based on Utah Power and Light Company's Electric Service Schedule No. 6 - General Service Single Meter. Demands were calculated assuming a total pumping
head of 300 feet (actual pumping head cannot be determined until a test well is drilled). A flow rate of 70 gallons per minute driven by a 7.5 H.P. motor with an overall pump/motor efficiency of 75% (wire to water) was assumed to deliver 630,000 gallons per month to the storage tank to supply 300 gallons per capita per day to the service area.

Total monthly power costs were thus calculated at $5.36 per residence.

4. **System Maintenance and Operation**

These costs were determined assuming a part time maintenance person 10 hours per month at $15.00 per hour; vehicle at 10 hours per month at $10.00 per hour; and supplies expensed at $25.00 per month. Total monthly operation and maintenance costs would be $275.00 or $13.75 per residence per month.

5. **Meter Reading and Billing**

These costs would be the same as those for Alternate "A" - Option 2 or $13.50 per month per lot.
Total costs for Alternate "B" - Development of Groundwater are summarized as follows:

**CAPITAL COSTS**

- Well and Transmission Line: $19.10
- Distribution System: $13.40

**POWER COSTS**

- $5.36

**SYSTEM MAINTENANCE**

- $13.75

**METER READING AND BILLING**

- $13.50

**TOTAL COSTS PER MONTH - ALTERNATE "B"**

- FRONTIER FORMATION WELL

  300 G/C/D: $65.11
Well samples were taken from 13 of the existing wells and analyzed for chemical constituents. A tabulation of these analyses is included in the Appendix to the Report.

The tabulation was given to two businesses in Rock Springs who sell reverse osmosis and water softening equipment who were asked to provide an estimate of the type and cost of equipment to treat the well water being considered. One business did not respond. The other provided information and costs for Culligan Aqua Sensor water conditioning units and reverse osmosis drinking water systems, pre-filtering units, and maintenance/servicing costs. These costs are summarized as follows:

1. Mark 812 Aqua Sensor Water Softening Units $1,475.00 each

2. Reverse Osmosis Drinking Water Systems $975.00 each

3. Pre-filtering Units $109.07 each

Total Cost per Residence $2,559.00

Assuming a life of 15 years for each of these units, and amortizing the capital cost at 10% per year, yields an equivalent annual cost of $337.00 per year, or $28.00 per month.

Servicing and maintenance costs are estimated at $21.00 per month and the cost for electricity is set at about $9.00 per month. This results in a total estimated monthly cost of $58.00.
The daily capacity of these units is not stated: brochures and information describing them are included in the Appendix. Furthermore, no fire protection is afforded under Alternate "C".

The above costs are for units to treat the water having median quality as presented in the tabulation in the Appendix. Some residences may require less treatment while one residence may require two softeners and a larger R.O. unit than quoted. Each one will be sized according to the quality of the particular well water to be conditioned and treated.

Costs for this Alternate are summarized below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Capital Cost for Units at 10% for 15 years</td>
<td>$28.00</td>
</tr>
<tr>
<td>Monthly Servicing and Maintenance Cost</td>
<td>$21.00</td>
</tr>
<tr>
<td>Monthly Power Cost</td>
<td>$ 9.00</td>
</tr>
<tr>
<td><strong>Total Monthly Cost</strong></td>
<td><strong>$58.00</strong></td>
</tr>
</tbody>
</table>

The installation of individually owned and operated water softening equipment will, however, create a complication relative to forming any kind of a water district. EPA regulations prohibit their use in conjunction with consideration of developing a district public water supply.

Thirteen private, domestic water well were sampled for water quality analysis. All are considered unsuitable for human consumption according to EPA Standards. Wyoming Department of Agriculture Standards indicate that eight wells are unsuitable for livestock use, and all but one are unfit for lawn and garden irrigating.
An appraisal of each individual well is not presented herein; however, work is continuing on an assessment of each private well in regard to:

1. Geology/Stratigraphy
2. Construction
4. Quality Considering Wyoming Department of Agriculture Standards for:
   a. Human Consumption
   b. Livestock Use
   c. Irrigation of Lawns and Gardens
5. Maps and Permits

The results of this work will be presented in a "Supplement" to this Report at a date in the near future.

VI SUMMARY OF MONTHLY COSTS

The Alternates considered are as follows:

ALTERNATE "A"  -  OPTION 1

This option considers construction of an 8 inch diameter transmission pipeline from the Kemmerer distribution system to Oakley within the U.S. Highway 30 right-of-way. The transmission pipeline would connect into the Kemmerer system at the northeast corner of the intersection of U. S. Highways 30 and 189.

A distribution system would be constructed to deliver water within Oakley.
Maintenance of facilities would be contracted out as necessary, however, meter reading and billing services would be provided by the City of Kemmerer.

Each property owner in Oakley would have to bear the cost of his own service line and water meter. These costs are not reflected in the cost figures presented in this Report, nor has a connection fee been considered.

**ALTERNATE "A" - OPTION 2**

All facilities considered in Option 1 would also be constructed under this Option. The only difference is that Oakley would provide meter reading and billing services rather than Kemmerer.

**ALTERNATE "B"**

This Alternate involves drilling and developing a production well in the Frontier Formation as shown on the Drawings.

A test well would have to be drilled into the Frontier before drilling and completing a production well. The cost of the test well is estimated at $18,266.00. A breakdown of this cost is presented in the Appendix to this Report. The monthly cost figures presented herein do not include any repayment of the costs for the test well because it is assumed that the test well would be funded under a Wyoming Water Development Commission grant.
ALTERNATE "C"

This plan involves the treatment and conditioning of water from each of the existing individual domestic wells to improve water quality. This would be done by installing water conditioning and reverse osmosis water treatment equipment. Such a program would provide no fire protection to the community. The cost of purchasing, maintaining and servicing the equipment would be borne entirely by the homeowners involved.

COMPARATIVE COSTS

The comparative costs for Alternates "A", "B" and "C" are summarized below.

| ALTERNATE                                      | ESTIMATED MONTHLY WATER COST PER RESIDENCE |
|                                                | 100 G/C/D | 300 G/C/D |
| A. Connect to Kemmerer System - Option 1      |           |           |
| Kemmerer Provides All Services                | $ 71.89   | $119.14   |
| Option 2 - Oakley                            |           |           |
| Reads Meters and Bills Users                  | $ 74.88   | $111.63   |
| B. Develop Water Well                         |           | $ 65.11   |
| C. Individual In-House Water Treatment Units* |           | $ 58.00*  |

* Provides no Fire Protection and quantity per capita per day is not given.
VII CONCLUSIONS AND RECOMMENDATIONS

Alternate "C" - Reverse Osmosis and Softening Units for Existing Well Water offers the least expensive course of action for the members of the Oakley Water Users Association; however, this Alternate falls short in the area of fire protection and may not satisfy the needs of the homeowners.

As stated earlier, a "Supplement" to this Report will be submitted assessing each private well in regard to:

1. Geology/Stratigraphy
2. Construction
4. Quality Considering Wyoming Department of Agriculture Standards for:
   a. Human Consumption
   b. Livestock Use
   c. Irrigation of Lawns and Gardens
5. Maps and Permits

It is recommended that Alternate "B" - Development of Groundwater, be pursued further if the residents of Oakley reject Alternate "C".

Alternate "B" would require drilling a test well before proceeding further. The cost of the test well is estimated at $18,266.00.
PHASE I

APPENDIX
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" - CAPITAL COSTS

Connection to Kemmerer System

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 8&quot; Dia. Pipeline</td>
<td>15,060 L.F.</td>
<td>$ 12.00</td>
<td>$180,720.00</td>
</tr>
<tr>
<td>2. Valves</td>
<td>10 Each</td>
<td>$1000.00</td>
<td>10,000.00</td>
</tr>
<tr>
<td>3. Air Relief Valves</td>
<td>6 Each</td>
<td>$ 300.00</td>
<td>1,800.00</td>
</tr>
<tr>
<td>4. Boring</td>
<td>200 L.F.</td>
<td>$ 150.00</td>
<td>30,000.00</td>
</tr>
<tr>
<td>5. Trenching in Rock</td>
<td>1,100 L.F.</td>
<td>$ 25.00</td>
<td>27,500.00</td>
</tr>
<tr>
<td>9. Connection to City of Kemmerer</td>
<td>Lump Sum</td>
<td></td>
<td>25,000.00</td>
</tr>
<tr>
<td>10. Meter</td>
<td>Lump Sum</td>
<td></td>
<td>7,500.00</td>
</tr>
<tr>
<td>11. River Crossing</td>
<td>250 L.F.</td>
<td>$ 60.00</td>
<td>15,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL $297,520.00</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td></td>
<td></td>
<td>29,752.00</td>
</tr>
<tr>
<td>Plus 15% Contingency</td>
<td></td>
<td></td>
<td>44,628.00</td>
</tr>
<tr>
<td>TOTAL PROJECT COST</td>
<td></td>
<td></td>
<td>$371,900.00</td>
</tr>
</tbody>
</table>

33% Loan                             | $122,727.00 |
Annual Cost @ 4% Interest for 30 Years| $7,097.00    |
Cost Per Lot Per Month                | $29.60      |
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" AND "B" CAPITAL COSTS

DISTRIBUTION SYSTEM

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 6&quot; Dia. Pipeline</td>
<td>1,800 L.F.</td>
<td>$ 10.50</td>
<td>$ 18,900.00</td>
</tr>
<tr>
<td>2. Boring</td>
<td>100 L.F.</td>
<td>$ 150.00</td>
<td>15,000.00</td>
</tr>
<tr>
<td>3. Fire Hydrants</td>
<td>10 Each</td>
<td>$1500.00</td>
<td>15,000.00</td>
</tr>
<tr>
<td>4. Valves</td>
<td>8 Each</td>
<td>$ 800.00</td>
<td>6,400.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td>Plus 10% Engineering</td>
<td></td>
<td></td>
<td>5,530.00</td>
</tr>
<tr>
<td>Plus 15% Contingency</td>
<td></td>
<td></td>
<td>8,295.00</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST</strong></td>
<td></td>
<td></td>
<td><strong>$ 69,125.00</strong></td>
</tr>
</tbody>
</table>

50% Loan $ 34,563.00
Annual Cost @ 8.5% Interest for 30 Years $ 3,216.00
Cost Per Lot Per Month $ 13.40
COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" VARIABLE COSTS PAYABLE TO KEMMERER

Option 1 (Sheet 1)

METER CHARGE

Cost Per Lot/Month = $ 5.26

INCREASED COST

Total Yearly Use - Oakley
@ 300 G/C/D = 7,665,000 gal.

Total Yearly Average - Kemmerer
= 220,000,000 gal.

\[
\frac{7,665}{220,000} = 0.035 \text{ or } 3.5\%
\]

Costs Allocated to Increased Demands
(per Kent Smith Report) (Annual Cost)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Operation and Maintenance</td>
<td>$106,049.00</td>
</tr>
<tr>
<td>Meter Maintenance</td>
<td>8,130.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$114,179.00</strong></td>
</tr>
</tbody>
</table>

\[
(0.035) \times ($114,179.00) = 3,996.00/Year
\]

\[
\frac{3996.00}{7665} = 0.50/1000 \text{ gal.} = $ 0.50
\]

**TOTAL COST PER 1000 GALLONS** = $1.75 + $0.50 = $ 2.25
COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" VARIABLE COSTS PAYABLE TO KEMMERER

Kemmerer Reads Meters and Bills

Option 1 - Sheet 2

WATER COSTS

Cost per Family per Month
(Payable to Kemmerer)

<table>
<thead>
<tr>
<th>G/C/D</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>$28.89</td>
</tr>
<tr>
<td>300</td>
<td>$76.14</td>
</tr>
</tbody>
</table>
COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" TOTAL MONTHLY COSTS (Option 1)
Kemmerer Provides Meter and Billing Service

CAPITAL COSTS

Transmission Line $ 29.60
Distribution System $ 13.40

VARIABLE COSTS TO KEMMERER/MONTH

100 G/C/D $ 28.89
300 G/C/D $ 76.14

TOTAL COSTS PER MONTH - ALTERNATE "A" - OPTION 1

100 G/C/D $ 71.89
300 G/C/D $ 119.14
COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "A" METER READING AND BILLING BY OAKLEY

(Option 2)

METER READING

4 hrs/month @ $15.00 = $ 60.00

BILLING

8 hrs/month @ $15.00 = $ 120.00

VEHICLE

8 hrs/month @ $10.00 = $ 80.00

SUPPLIES = $ 10.00

TOTAL MONTHLY COST = $ 270.00

COST PER LOT PER MONTH = $ 13.50
Revised August 22, 1989

COST ESTIMATE:  OAKLEY WATER PROJECT

ALTERNATE:  "A" TOTAL MONTHLY COSTS (Option 2)

Oakley Provides Meter and Billing Service

<table>
<thead>
<tr>
<th>CAPITAL COSTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Line</td>
<td>$ 29.60</td>
</tr>
<tr>
<td>Distribution System</td>
<td>$ 13.40</td>
</tr>
</tbody>
</table>

| METER READING AND BILLING         | $ 13.50        |

| Sub Total                         | $ 56.50        |

<table>
<thead>
<tr>
<th>VARIABLE COSTS PAYABLE TO KEMMERER/MONTH</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D @ $1.75/1000 gal</td>
<td>$ 18.38</td>
</tr>
<tr>
<td>300 G/C/D @ $1.75/1000 gal</td>
<td>$ 55.13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL COSTS PER MONTH - ALTERNATE &quot;A&quot; - OPTION 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 G/C/D</td>
<td>$ 74.88</td>
</tr>
<tr>
<td>300 G/C/D</td>
<td>$ 111.63</td>
</tr>
</tbody>
</table>
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "B" - PRODUCTION WELL
FRONTIER FORMATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reaming</td>
<td>270 L.F.</td>
<td>$12.00</td>
<td>$3,240.00</td>
</tr>
<tr>
<td>2. Casing</td>
<td>270 L.F.</td>
<td>$14.00</td>
<td>3,780.00</td>
</tr>
<tr>
<td>3. Drill through</td>
<td></td>
<td>$12.00</td>
<td>600.00</td>
</tr>
<tr>
<td>Cement Plug</td>
<td>50 L.F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Submersible Pump</td>
<td>1 Each</td>
<td>Lump Sum</td>
<td>7,000.00</td>
</tr>
<tr>
<td>5. Well Head</td>
<td>1 Each</td>
<td>Lump Sum</td>
<td>2,000.00</td>
</tr>
<tr>
<td>6. Well House and Power</td>
<td>1 Each</td>
<td>Lump Sum</td>
<td>10,000.00</td>
</tr>
</tbody>
</table>

TOTAL PROJECT COST $26,620.00
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "B" - CAPITAL COSTS

FRONTIER FORMATION WELL

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Well, Pump and Pump House</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lump Sum</td>
<td>$ 26,620.00</td>
</tr>
<tr>
<td>2. 6&quot; Dia. Pipeline</td>
<td>2,055 L.F.</td>
<td>$ 10.50</td>
<td>21,577.00</td>
</tr>
<tr>
<td>3. Storage Tank</td>
<td>1 Each</td>
<td></td>
<td>30,000.00</td>
</tr>
<tr>
<td>50,000 gal</td>
<td></td>
<td>Lump Sum</td>
<td></td>
</tr>
<tr>
<td>4. Boring under Railroad</td>
<td>100 L.F.</td>
<td>$ 150.00</td>
<td>15,000.00</td>
</tr>
<tr>
<td>5. River Crossing</td>
<td>250 L.F.</td>
<td>$ 60.00</td>
<td>15,000.00</td>
</tr>
<tr>
<td>6. 6&quot; Valves</td>
<td>3 Each</td>
<td>$ 800.00</td>
<td>2,400.00</td>
</tr>
<tr>
<td>7. Air Relief Valves</td>
<td>4 Each</td>
<td>$ 300.00</td>
<td>1,200.00</td>
</tr>
<tr>
<td>8. 8&quot; Dia. Pipeline</td>
<td>3,010 L.F.</td>
<td>$ 12.00</td>
<td>36,120.00</td>
</tr>
<tr>
<td>9. Trenching in Rock</td>
<td>1,600 L.F.</td>
<td>$ 25.00</td>
<td>40,000.00</td>
</tr>
<tr>
<td>10. 8&quot; Valves</td>
<td>4 Each</td>
<td>$1000.00</td>
<td>4,000.00</td>
</tr>
</tbody>
</table>

TOTAL $191,917.00

Plus 10% Engineering $19,192.00

Plus 15% Contingency $28,788.00

TOTAL PROJECT COST $239,897.00

33% Loan $ 79,166.00

Annual Cost @ 4% Interest for 30 Years $ 4,578.00

Cost Per Lot Per Month $ 19.10
ASSUME PUMPING

Hd = 300 ft.
Q = 70 gpm = 0.16 cfs
HP = \[
\frac{(0.16)(62.4)(300)}{550 \times (0.75)} = 7.26
\]
Say 7.5 HP
Total Pumpage/month = \[(20)(300)(3.5)(30) = 630,000 \text{ gal.}\]
Pump Hours = \[
\frac{630,000}{(70)(60)} = 150 \text{ hours}
\]
7.5 H.P = 5.60 KW
KW Hours = 839.25 KW

Service Charge = $18.20
Power @ 0.105302 x 839.25 = $88.96

TOTAL = $107.16

COST PER LOT PER MONTH = $5.36
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "B" - MAINTENANCE, METER READING AND BILLING
FRONTIER FORMATION WELL

MAINTENANCE

10 hrs/month @ $15.00 = $150.00

VEHICLE

10 hrs/month @ $10.00 = $100.00

SUPPLIES = $25.00

TOTAL MONTHLY COST = $275.00

COST PER LOT PER MONTH = $13.75

METER READING AND BILLING

COST PER LOT PER MONTH = $13.50
(See Sheet 6)
COST ESTIMATE:  OAKLEY WATER PROJECT

ALTERNATE:  "B" - TOTAL MONTHLY COSTS

FRONTIER FORMATION WELL

COST PER LOT PER MONTH

CAPITAL COSTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well and Transmission Line</td>
<td>$ 19.10</td>
</tr>
<tr>
<td>Distribution System (See Sheet 2)</td>
<td>$ 13.40</td>
</tr>
</tbody>
</table>

POWER COSTS

$ 5.36

SYSTEM MAINTENANCE

$ 13.75

METER READING AND BILLING

$ 13.50

TOTAL COSTS PER LOT PER MONTH - ALTERNATE "B" - FRONTIER FORMATION WELL

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 G/C/D</td>
<td>$ 65.11</td>
</tr>
</tbody>
</table>
Revised August 22, 1989

COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "B" - TEST WELL

FRONTIER FORMATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mobilization/ Demobilization</td>
<td>Lump Sum</td>
<td>$ 5,000.00</td>
</tr>
<tr>
<td>2.</td>
<td>Surface Hole</td>
<td>28 L.F.</td>
<td>$ 12.00</td>
</tr>
<tr>
<td>3.</td>
<td>Surface Casing Cemented in Place</td>
<td>30 L.F.</td>
<td>$ 10.00</td>
</tr>
<tr>
<td>4.</td>
<td>Rotary Drilling 6&quot; dia.</td>
<td>242 L.F.</td>
<td>$ 10.00</td>
</tr>
<tr>
<td>5.</td>
<td>Casing</td>
<td>270 L.F.</td>
<td>$ 8.00</td>
</tr>
<tr>
<td>6.</td>
<td>Rotary Drilling 3-5/8&quot; dia.</td>
<td>50 L.F.</td>
<td>$ 8.00</td>
</tr>
<tr>
<td>7.</td>
<td>Pump and Pump Test</td>
<td>1 Each</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>8.</td>
<td>Sampling</td>
<td>6 Each</td>
<td>$ 25.00</td>
</tr>
<tr>
<td>9.</td>
<td>Electric Log</td>
<td>1 Each</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>10.</td>
<td>Abandonment (if required)</td>
<td>1 Each</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>11.</td>
<td>Right to Access</td>
<td></td>
<td>Lump Sum</td>
</tr>
</tbody>
</table>

Sub Total Well Costs $ 15,266.00

Professional and Technical Services $ 3,000.00

TOTAL PROJECT COST $ 18,266.00
COST ESTIMATE: OAKLEY WATER PROJECT

ALTERNATE: "B" - COST TO DRILL 6" HOLE INTO NUGGET FORMATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mobilization/ Demobilization</td>
<td></td>
<td>Lump Sum</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>2. 14&quot; dia. Surface Hole</td>
<td>60 L.F.</td>
<td>$14.00</td>
<td>840.00</td>
</tr>
<tr>
<td>3. Surface Casing</td>
<td>60 L.F.</td>
<td>$14.00</td>
<td>840.00</td>
</tr>
<tr>
<td>4. Drilling</td>
<td>6,340 L.F.</td>
<td>$12.00</td>
<td>76,080.00</td>
</tr>
<tr>
<td>5. Casing</td>
<td>6,400 L.F.</td>
<td>$12.00</td>
<td>76,800.00</td>
</tr>
<tr>
<td>6. Drill Cement Shoe</td>
<td>200 L.F.</td>
<td>$10.00</td>
<td>2,000.00</td>
</tr>
<tr>
<td>7. Submersible Pump</td>
<td>1 Each</td>
<td>$4000.00</td>
<td>4,000.00</td>
</tr>
<tr>
<td>8. Step Tests/ Recovery Tests</td>
<td></td>
<td>Lump Sum</td>
<td>6,000.00</td>
</tr>
<tr>
<td>9. Water Sampling</td>
<td>2 Each</td>
<td>$100.00</td>
<td>200.00</td>
</tr>
<tr>
<td>10. Contingency - Power, Testing, Professional Services</td>
<td></td>
<td>Lump Sum</td>
<td>18,000.00</td>
</tr>
</tbody>
</table>

TOTAL PROJECT COST $199,760.00
Revised August 22, 1989

COST ESTIMATE:  OAKLEY WATER PROJECT

ALTERNATE:  "C" - INDIVIDUAL REVERSE OSMOSIS AND WATER SOFTENING UNITS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mark 812 Aqua Sensor - Water Softener</td>
<td>Each</td>
<td>$1475.00</td>
<td>$1,475.00</td>
</tr>
<tr>
<td>2. Reverse Osmosis Drinking Water System</td>
<td>Each</td>
<td>$975.00</td>
<td>975.00</td>
</tr>
<tr>
<td>3. Pre Filter Unit</td>
<td>Each</td>
<td>$109.95</td>
<td>109.95</td>
</tr>
</tbody>
</table>

TOTAL COST $2,559.95

Annual Cost @ 10% for 15 Years = $337.00

Monthly Cost $28.00
Monthly Cost - Servicing and Maintenance $21.00
Monthly Cost - Power $9.00

TOTAL COST PER LOT PER MONTH $58.00
**COST ESTIMATES: OAKLEY WATER PROJECT**

**COMPARATIVE COSTS - ALTERNATES "A", "B", AND "C"**

<table>
<thead>
<tr>
<th>ALTERNATE</th>
<th>ESTIMATED MONTHLY WATER COST PER RESIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 G/C/D</td>
</tr>
<tr>
<td>A. Connect to Kemmerer System - Option 1</td>
<td></td>
</tr>
<tr>
<td>Kemmerer Provides All Services</td>
<td>$71.89</td>
</tr>
<tr>
<td>Option 2 - Oakley Reads Meters and Bills Users</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$74.88</td>
</tr>
<tr>
<td>B. Develop Water Well</td>
<td></td>
</tr>
<tr>
<td>C. Individual In-House Water Treatment Units *</td>
<td></td>
</tr>
</tbody>
</table>

* Provides no Fire Protection and quantity per capita per day is not given.
## RESULTS OF THE WATER WELLS SAMPLED IN THE OAKLEY SUBDIVISION

<table>
<thead>
<tr>
<th>WELL OWNERS</th>
<th>SPECIFIC CONDUCTANCE</th>
<th>NITRATES</th>
<th>TOTAL DISSOLVED HARDNESS</th>
<th>SODIUM</th>
<th>SULFATES</th>
<th>TOTAL COLIFORM</th>
<th>GROSS ALPHATE</th>
<th>GROSS BETATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MICRO MHOS/CM</td>
<td>ppm</td>
<td>ppm (CaCO3)</td>
<td>ppm</td>
<td>ppm</td>
<td>100ml MF</td>
<td>pc/L</td>
<td>pc/L</td>
</tr>
<tr>
<td>LOZIER UP #1</td>
<td>1230</td>
<td>&lt;0.2</td>
<td>833</td>
<td>260</td>
<td>210</td>
<td>180</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>MILLER #2</td>
<td>3940</td>
<td>&lt;0.2</td>
<td>2670</td>
<td>100</td>
<td>930</td>
<td>1400</td>
<td>-</td>
<td>NS</td>
</tr>
<tr>
<td>DONNAFIELD #7</td>
<td>2340</td>
<td>&lt;0.2</td>
<td>1580</td>
<td>900</td>
<td>230</td>
<td>720</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>JETKOSKI #8</td>
<td>3030</td>
<td>&lt;0.2</td>
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**FOOT NOTES**

- ppm = PARTS PER MILLION
- * NITRATES = NO3 + NO2 AS N
HYDRAULIC GRADIENTS

ALTERNATE "A"

Hydraulic Gradient - Transmission Line

\[ Q = 500 \text{ gpm} \]

\[ S = \left( \frac{1.12 \times 0.011}{\frac{0.000614}{256}} \right)^2 \]

\[ S = \left( \frac{0.01232}{0.1572} \right)^2 \]

\[ S = 0.006 \]

\[ \Delta E_1 = (0.006)(15,000) = 92.2 \text{ ft.} \]

\[ Q = 70 \text{ gpm} \]

\[ S = 0.000125 \]

\[ \Delta E_1 = 0.000125 (15,000) \]

\[ = 1.87 \text{ ft.} \]
HYDRAULIC GRADIENTS

ALTERNATE "S"

Hydraulic Gradient - Well to Storage Tank

\[
Q = 70 \text{ gpm (est)} = 0.16 \text{ cfs}
\]

\[n = 0.11\]

\[d = 6"\]

\[S = \text{Slope Hydraulic Gradient}\]

\[Q = \frac{0.000614 \times d^{8/3} \times s^{1/2}}{n}\]

\[S = \left(\frac{Qn}{0.000614 \times d^{8/3}}\right)^2\]

\[S = \left(\frac{0.16 \times 0.11}{0.000614 \times 119}\right)^2\]

\[S = \left(\frac{0.00176}{0.07307}\right)^2\]

\[S = 0.00058\]

\[\Delta E1 = 0.00154 (2405) = 1.4 \text{ ft.}\]
HYDRAULIC GRADIENTS

ALTERNATE "E"

Hydraulic Gradient - Storage Tank to End of Transmission Line

\[ S = 70 \text{ gpm} \]

\[ (1.00 \text{ gpm/C} \times 3.5 = 3.5 \text{ gpm/residence} \times 3.5 \times 20 = 70 \text{ gpm}) \]

\[ = 0.16 \text{ cfs} \]

\[ n = 0.011 \]

\[ d = 2" \]

\[ S = \text{Slope Hydraulic Gradient} \]

\[ S = \left( \frac{0.16 \times 0.011}{0.000614 \times 256} \right)^2 \]

\[ S = \left( \frac{0.00176}{0.1572} \right)^2 \]

\[ S = 0.000125 \]

\[ \Delta E_l = 0.000125 \times 2300 = 0.3 \text{ ft.} \]

\[ Q = 500 \text{ gpm} = 1.12 \text{ cfs} \]

\[ S = \left( \frac{1.12 \times 0.011}{0.1572} \right)^2 \]

\[ S = 0.006 \]

\[ \Delta E_l = 0.006 \times 2300 = 14.2 \text{ ft.} \]
THE CULLIGAN AQUA-SENSOR
For state-of-the-art water conditioning.
Culligan technology revolutionizes water conditioning.

Culligan offers you the most advanced water conditioning technology available. Water conditioners that work efficiently, economically...and with very little attention from you. The Mark 59, Mark 512, Mark 89 and Mark 812 with Aqua-Sensor®

**How Aqua-Sensor® works for you.**

All water conditioners must periodically regenerate their softening material through a brine-rinsing process called *recharging.* For many automatic water conditioners, a timer controls recharging, so it takes place at fixed intervals.

But with a Culligan Aqua-Sensor® Water Conditioner, your conditioner recharges *only when it needs to.* A unique *solid-state sensing element* continually monitors the softening chamber and signals for recharging based on water usage and degree of water hardness. Your conditioner works more efficiently, and you use less salt.

**Conditioned water for better living.**

You’ll notice a big difference with conditioned water. Clothes laundered in it last longer, because there’s no soap residue to stain and weaken fibers. Dishes, glasses and cookware rinse to a sparkle. There’s no more dull, sticky film on shower tiles or bathtubs. Even your skin and hair will feel softer, because conditioning eliminates hard water impurities that clog pores and cause dryness.

Conditioning saves money, too. You can use less detergent, shampoo and other cleaners—you may not even need fabric softeners or hair conditioners. Since *all* your "working water" is automatically conditioned, you can stop using expensive rinse additives in your dishwasher or washing machine cycles.

**A good investment.**

Best of all, conditioned water puts an end to mineral deposit build-up in plumbing pipes and hot water heaters. You save on plumbing repairs, and your water heating costs could drop by as much as 29 percent!

Remember, when you buy a Culligan water conditioner with Aqua-Sensor®, it belongs to *you.* Take it with you wherever you move—Culligan reinstallation and service are always available from our 1350 dealers worldwide.

Here are some of the important quality features Culligan builds into every Aqua-Sensor® Water Conditioner.

1. **Solid-State Sensing Elements.** Monitors water hardness, and signals to the Aqua-Sensor® controller for recharge as needed.
3. **Cullex® Resin.** Long-lasting softening resin, stable and uniform to assure maximum water conditioning capacity.
4. **Salt Storage Container.** Thick wall construction minimizes distortion, bulging and malfunction of salt brining system. Plastic horizontal salt dissolver protects system against salt impurities, so you can use various grades of salt.
5. **Dubl-Safe™ Refill.** Hydraulic valve combined with positive mechanical float shut-off in salt container. Controls water refill into salt container.
6. **Stainless Steel Brackets.** No other water conditioners have these rugged non-corroding mounting brackets to relieve valve stress at the plumbing connection.
7. **Tank and Control Couplings.** For fast, easy replacement of control or mineral tank. Makes upgrading of equipment simple should your family’s water needs change.

Patented Versatile Timer—automatically regulates all cycles of operation including backwash, brine rinse and refill.

Aqua-Sensor® Controller—monitors electronic signals from hardness sensor in softening resin bed. When need for a recharge is detected, signal is stored and recharging occurs at a convenient time.

These two-tank conditioners can be conveniently installed in the basement, utility room, garage or other locations.

Pictured here: the Mark 89 Aqua-Sensor® unit, for households with demanding water conditioning requirements.
Count on Culligan for water you can trust, day after day.

Water conditioners with Aqua-Sensor® and other Culligan products are available only through your local Culligan dealer—the expert in water treatment systems for every household need. Culligan water systems are fully warranted, and with our prompt, courteous in-home service, you can be sure your system will always provide the conditioned water you need.

Ask your local Culligan dealer today for a water quality test and consultation. Discover the Culligan commitment to quality that's made us the leader for over 45 years.

THE CULLIGAN PROMISE
At Culligan, we understand that a water improvement system is an investment in your family's health and well-being. That's why our 1350 dealers worldwide don't just sell products—they sell water quality you can always count on. We stand behind our products with comprehensive warranties and our unequalled Culligan service. No matter where you live, you can depend on Culligan expertise to work for you—today and tomorrow.
THE CULLIGAN DRINKING WATER SYSTEM.

Makes water the healthiest drink in the house.
There's good reason to be concerned about your drinking water. It may contain undesirable or potentially dangerous impurities and contaminants. According to a report by the U.S. General Accounting Office, these pollutants may include chemical compounds which reach your water supply through careless use and disposal.

For drinking water you can trust, you need the Aqua-Cleer® Reverse Osmosis System from Culligan. Aqua-Cleer® provides one of the most effective drinking water treatment methods available—three-way filtration:

- Fine Filtration
- Reverse Osmosis mineral rejection with micro-filtering
- Carbon Adsorption

This system of filters significantly reduces even the most minute contaminant particles, including: asbestos, sediment, brackish water, mineral salts, sulfates, sodium, detergents, some pesticides and dissolved metals like barium, cadmium, lead and mercury.

The Aqua-Cleer® system will reduce chlorine levels in your drinking water. Water with less chlorine will taste better and is more appealing. The Aqua-Cleer® system also will help reduce trihalomethane.

The sensible alternative to bottled water.

The Aqua-Cleer® special faucet puts up to 150 gallons of crystal-clear drinking water at your fingertips every month. And the entire Aqua-Cleer® system fits easily under the sink, or in a crawl space, utility closet, basement, or other concealed location.

Best of all, the Aqua-Cleer® system costs less than home-delivered bottled water—and you'll never have to worry about storing or pouring from bulky bottles.

Water with 100 different uses.

Use water from your Aqua-Cleer® system whenever you need high quality water. You'll find that foods cooked in or mixed with this water taste better. And you'll enjoy the true flavor of coffee, tea, frozen fruit juice, and other mixed beverages. Aqua-Cleer® water is also ideal for aquariums and photographic developing.

Aqua-Cleer® features include:

1. Fine Filter. Removes particles such as sediment and dirt.
2. Carbon Pre-Filter. For more demanding water treatment needs. Insures longer life for Reverse Osmosis Unit.
3. Reverse Osmosis Membrane. Household water goes through the membrane. A major portion of dissolved impurities and virtually all suspended particles are discarded to drain. Unit has a non-corroding, quick-disconnect housing. (Additional units for greater capacity are optional.)
4. High Capacity Pressure Reservoir. Keeps plenty of healthy water available for drinking or cooking.

Optional hook-up sends water from your Aqua-Cleer® system to your icemaker for longer lasting, better tasting ice cubes.
A Culligan Aqua-Clear® System uses existing cold water lines, and fits easily under your sink, or in a utility closet or other concealed location. Pre-mounted cabinet model (shown here) also available.
Count on Culligan for water you can trust, day after day.

The Aqua-Cleen® Drinking Water System and other Culligan products are available only through your local Culligan dealer—the expert in water filtration systems for every household need. Culligan water systems are fully warranted, and with our prompt, courteous, in-home service, you can be sure your system will always provide the best drinking water possible.

Ask your local Culligan dealer today for a water quality test and consultation. You'll discover the Culligan commitment to quality that's made us the leader for nearly 50 years.

THE CULLIGAN PROMISE

At Culligan, we understand that a water improvement system is an investment in your family's health and well-being. That's why our 1350 dealers worldwide don't just sell products—they sell water quality you can always count on. We stand behind our products with comprehensive warranties and our unequaled Culligan service. No matter where you live, you can depend on Culligan expertise to work for you—today and tomorrow.

NOTICE: The product is designed to be used only on water known to be of acceptable bacterial quality. Periodic testing of private and non-municipal supplies is recommended.
INSTRUCTIONS FOR INSTALLATION OF THE R.O. Booster Kit TO THE H-8 SYSTEM

STEP 1.) The mounting board is premarked for the prefilter, postfilter and module housing. Mount the prefilter to the board, install and connect tubing to outlet of prefilter.

STEP 2.) Mount module housing to board. Inlet on module housing at bottom should be removed and teflon tape used to prevent leaks. DO NOT over tighten when re-installing fitting.

STEP 3.) Install tubing from discharge of pump to inlet of module. Remove capillary tube from top of module housing. With virgin razor blade, cut capillary tube at an angle leaving 3/4" of capillary tube. (NOTE: To remove capillary tube assembly see exploded view on page 2 of Drinking Water Systems Parts List-Culligan Manual. Loosen 2 screws at top of module housing and turn 1/8 turn to pull assembly out of housing. After removing, separate assembly for trimming.)

STEP 4.) Install Tee in Reservoir Tank, using teflon tape. Install reservoir cap and angel valve on 3/4 Tee using teflon tape, and set precharge and reservoir at 7 lbs. (NOTE: refer to page 11 for necessary connections to water supply and drain.) Hook together electrical connections from pump to pressure switch.

STEP 5.) Install & mount postfilter below pump on mounting board. Extra tubing along with fittings is furnished in KIT for carbon postfilter.

STEP 6.) Silicone glue rubber sponges at bottom of housing for vibration dampner.

STEP 7.) Refer to page 12 of Culligan Installation Instruction Manual on how to turn water supply to system. A 30/50 pressure switch is used (already assembled). Set pressure relief valve at 43 lbs. (Refer to Culligan Installation Instruction Manual page 12 on how to set pressure relief valve.) Turn on pump and adjust pressure relief valve. Remember water must be flowing in system before turning on pump.

This completes the necessary steps for the SUPER H-8 SYSTEM.

********** QUESTIONS, ANSWERS & TIPS **********

Question: How high T.D.S. will this R.O. system take care of?
Answer: We have a system out on a T.D.S. of 7,470 (sulphates 3500 mpl and sodium 2800 mpl). We have experienced high quality product water and no problems.

Question: Can you use a different pressure switch?
Answer: On high T.D.S. we use either a 30/50 or 40/60 pressure switch. This way the pump runs longer.

Question: Does water still go through the pump and membrane when the pump is not running?
Answer: Yes, this keeps the membrane flushed and will extend its life.

Question: How much water does this unit make?
Answer: On a unit we have on city water with a T.D.S. of 250 it will make 32 gallons per day. On another unit we have on T.D.S. of 1500 it produces 20 gallons per day. When you see the PRODUCT T.D.S. you will do a back flip!

Question: Will this pump system handle two modules?
Answer: YES
Questions, Answers & Tips

Question: What can we use this R.O. water for besides the spigot in the kitchen sink?
Answer: Icemakers, chilled water dispensers in refrigerators, swamp coolers, humidifiers, tractor batteries for the farm, steam irons and house plants.

Question: What can you do about pressure loss with ½" tubing to other parts of the house?
Answer: The nut on the inlet fitting has a plug in it when it is shipped so that buffer solution doesn't leak from housing. Take this nut and put it on the faucet water outlet fitting. Then use 3/8" tubing from reservoir to spigots, icemaker etc. Replace carbon postfilter with flavorgard water filter (part #4435-60). Also order with filter the following parts: #4491-80 bushing, #2292-15 bushing, #3030-37 3/8 to ½" reducer, and #4428-44 straight adaptor.

Question: Are there any safeguards for no water pressure to pump?
Answer: YES, use low pressure cut off switch. This can be included with KIT upon request.

Question: Can the membrane be cleaned and disinfected without using chlorine, since chlorine is prohibited on the H-8?
Answer: Yes, procedure is as follows: Remove prefilter from filter housing and add 4 oz. formaldehyde (37% drugstore type) and 4 oz. Solution A (from Culligan -Part #4428-63). Replace prefilter back in housing then disconnect product water tubing from reservoir tank. Turn water into system until solutions can be detected in waste and product lines. Now allow it to sit for two hours.

After two hours, flush system for two more hours, allowing product water and waste water to DRAIN.

Option testing: Usually two hours is enough to remove solutions from system. If you are in doubt, then you can use a CLINTEST which you can purchase from your drugstore at about the cost of $6.00. Follow test directions inside kit.

NOTE: In some instances after the solutions are put into R.O. there may be no water from the product line. DON'T DESPAIR - go ahead and let it sit for two hours. Usually this is a result of heavy scaling and possibly certain types of bacteria slime. After the two hours sitting time, and you hook the pump back up, it may take a few minutes to get product water.

***** WE HAVE HAD FANTASTIC RESULTS WITH THE R.O. BOOSTER SYSTEM AND IT IS THE GREATEST THING THAT HAS HAPPENED TO THE H-8 R.O. *****
APPENDIX K

PHASE I DRAWINGS
# OAKLEY WATER SUPPLY PROJECT

## PHASE I

prepared for

WYOMING WATER DEVELOPMENT COMMISSION

prepared by

JOHNSON-FERMELIA CO. INC.
CONSULTING ENGINEERS, ARCHITECTS AND SURVEYORS
Rock Springs, Wyoming

### DRAWING INDEX

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AUGUST 1989

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VICINITY MAP

SCALE 1" = 2000'

Reduction - Not To Scale
APPENDIX L

PHASE II DRAWINGS
OAKLEY WATER SUPPLY PROJECT

PHASE II

PRELIMINARY PIPELINE ALIGNMENT STA. 0+00 TO 52+50
PRELIMINARY PIPELINE ALIGNMENT STA. 52+50 TO 96+75
PRELIMINARY PIPELINE ALIGNMENT, & DISTRIBUTION SYSTEM STA. 96+75 TO 152+80.48
PRELIMINARY PIPELINE PROFILES

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VICINITY MAP

SCALE 1" = 2000'
ALTERNATE A & C

ALT. 'A' - PROFILE 8" DIA. LINE FROM KEMMERER
ALT. 'C' - PROFILE 4" DIA. LINE FROM KEMMERER

ALTERNATE B

ALT. 'B' - PROFILE 8" DIA. LINE TO STORAGE TANK & 8" DIA. TRANSMISSION LINE