COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

RECEIVED
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PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF NORTHERN KENTUCKY WATER DISTRICT FOR APPROVAL OF CONSTRUCTION AND ISSUANCE OF A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE PURCHASE AND INSTALLATION OF AUTOMATED METER READING EQUIPMENT	)))))))	CASE NO. 2008- 00119

APPLICATION

Northern Kentucky Water District (NKWD), by counsel, petitions for an order approving the acquisition and installation of automated meter reading equipment pursuant to KRS 278.020.

In support of the application, the following information is provided:

1. NKWD's office address is 2835 Crescent Springs Rd., Erlanger, KY 41018-0640. Its principal officers are listed in its current Annual Report on page 6, which is filed with the Commission as are its prior years Reports;

2. NKWD is a non-profit water district organized under Chapter 74 and has no separate articles of incorporation;

3. A description of NKWD's water system and its property stated at original cost by accounts is contained in its 2006 Annual Report, which is incorporated by reference. The 2007 Report will be filed by May 1, 2008 and will be filed as Exhibit E when available.

4. NKWD serves retail customers in Kenton, Boone and Campbell Counties and sells water at wholesale to non-affiliated water distribution systems in Kenton, Boone, Pendleton and Campbell Counties.

5. It proposes to acquire and install automated meter reading equipment as described in Exhibit A. The facilities include approximately 81,000 transmitters and antenna as well as related equipment and software. (Because no construction is involved Maps, Plans and Drawings for the facilities are not applicable. Specifications and Bid Documents are provided in Exhibit A). The District is financing the estimated $7,500,000 cost with $800,000 approved in Case No. 2005-00148 (exhibit O, project 104) and $800,000 approved in Case No. 2007-00135 (exhibit O, project 106). The remaining $5.9 million will be financed with Bond Anticipation Notes (BANS) or a low interest loan from the Kentucky Infrastructure Authority. The District has applied for the loan, but has not received notice of approval.

6. The construction is in the public interest and is required to allow NKWD to continue to provide adequate service to its customers. The project will provide enhanced meter reading and customer service options. The project, its cost, need and other details are contained in Exhibit A.

7. The total project cost is approximately $7,5000,000. See Exhibit A.

8. Easements and rights of way are not required, see Exhibit B.

9. This service will not compete with any other utility in the area.

10. The proposed project, identified in Exhibit A, is scheduled to begin construction on PSC approval, estimated to be June, 2008 and be completed within one year. Board approval of the project was given on March 24, 2008, attached as Exhibit C. Bid information is included with Exhibit C. Bids expire on May 15, 2008.

11. No new franchises are required. No DOW permit is required. See Exhibit B.

12. Construction descriptions are in Exhibit A and Bid Documents. Facts relied on to justify the public need are included in the project descriptions in Exhibit A. Based on the analysis included with Exhibit A, the installation of the automated facilities will result in significant monetary savings to the District.

13. Maps of the area showing location of the proposed facilities are in Exhibit A.

14. The construction costs will be funded by the 2006 Bonds, 2007 BAN and KIA loan or additional BANS.

15. Estimated operating costs for operation and maintenance, depreciation and debt service after construction are shown in Exhibits A and D.

16. A description of the facilities and operation of the system are in Exhibit A.

17. A full description of the route, location of the project, description of construction and related information is in Exhibit A.

18. The start date for construction; proposed in-service date; and total estimated cost of construction at completion are included in Exhibit B.

19. CWIP at end of test year is listed in Exhibit E.

20. Plant retirements are listed in Exhibit B and E. No salvage values are included as booked.

21. The use of the funds and need for the facilities is justified based on a the engineering report included as Exhibit A

22. No rate adjustment is being proposed.

23. The following information is provided in response to 807 KAR 5:001 (8):

a. Articles of Incorporation – None. NKWD is a statutorily created water district under KRS Chapter 74;

24. The following information is supplied pursuant to 807 KAR 5:001(9):

a. Facts relied upon to show that the application is in the public interest: See Exhibit A.

25. The following information is provided as required by 807 KAR 5:001 (11):

a. A general description of the property is contained in the Annual Report, Exhibit E.

b. No stock is to be issued; No bonds are to be issued in this case;

c. There is no refunding or refinancing;

d. The proceeds of the financing are to construct the property described in Exhibit A

e. The par value, expenses, use of proceeds, interest rates and other information is not applicable because no bonds are being issued at this time.

26. The following exhibits are provided pursuant to 807 KAR 5:001 (11)(2):

a. There are no trust deeds. All notes, indebtedness and mortgages are included in Exhibits F and G.

b. Property is to be constructed is described in Exhibit A.

27. The following information is provided pursuant to 807 KAR 5:001(6):

a. No stock is authorized.

b. No stock is issued.

c. There are no stock preferences.

d. Mortgages are listed in Exhibit F.

e. Bonds are listed in Exhibit F.

f. Notes are listed in Exhibit F.

g. Other indebtedness is listed in Exhibit F.

h. No dividends have been paid.

i. Current balance sheet; income statement and debt schedule are attached as Exhibit G.

k. The facilities being constructed will be reflected in USoA Account 334 "Meters and Meter Installations" as shown in Exhibit D.

807 KAR 5:001:

Section 8(1)	Full name and post office address of applicant and a reference to the particular provision of law requiring Commission approval.	Application
Section 8(2)	The original and 10 copies of the application with an additional copy for any party named therein as an interested party.	Yes
Section 8(3)	If applicant is a corporation, a certified copy of the Articles of Incorporation and all amendments thereto or if the articles were filed with the PSC in a prior proceeding, a reference to the style and case number of the prior proceeding.	Not a corporation
Section 9(2)	(a) The facts relied upon to show that the proposed new construction is or will be required by public convenience or necessity.	Ex. A
	(b) Copies of franchises or permits, if any, from the proper public authority for the proposed new construction or extension, if not previously filed with the commission.	Ex. B
	(c) A full description of the proposed location, route, or routes of the new construction or extension, including a description of the manner in which same will be constructed, and also the names of all public utilities, corporations, or persons with	Ex. A

	whom the proposed new construction or extension is likely to compete.	
	(d) Three (3) maps to suitable scale (preferably not more than two (2) miles per inch) showing the location or route of the proposed new construction or extension, as well as the location to scale of any like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of such other facilities.	Ex. A
	(e) The manner, in detail, in which it is proposed to finance the new construction or extension.	Application
	(f) An estimated cost of operation after the proposed facilities are completed.	Ex. A and D
KRS 322.340	Engineering plans, specifications, plats and report for the proposed construction. The engineering documents prepared by a registered engineer, requires that they be signed, sealed, and dated by an engineer registered in Kentucky.	N/A

For these reasons, the District requests authorization to construct the facilities and any other order or authorization that may be necessary to obtain Commission approval for construction.

SUBMITTED BY

John N. Hughes
124 W. Todd St.
Frankfort, KY 40601

Attorney for Northern
Kentucky Water District

NORTHERN KENTUCKY WATER DISTRICT

Project

Automated Meter Reading

Kenton and Campbell Counties

184-0311

Automated Meter Reading

Project 184-0311

ProjectDescription:

The proposed project includes a retrofit installation of approximately 81,000 transmitters and antenna in the meter setting to support an automated meter reading system. Along with the transmitters, the reading system consists of drive-by radio reading equipment and software.

The estimated cost of the total project is $7,500,000.

Bids were opened on September 20, 2007. The bids expired March 18, 2008 as additional time was needed to evaluate the responses. The contractor, Badger Meter, Inc. has agreed to extend its bid until May 15, 2008 (see attached letter).

Badger Meter, Inc.

4545 W. Brown Deer Road
Milwaukee, Wisconsin 53223

P.O. Box 245036
Milwaukee, WI 53224-9536 (414) 355-0400

March 26, 2008

Northern Kentucky Water District
Attn: Mark Lofland
2835 Crescent Springs Road
Erlanger, KY 41018

Subject: Amendment for Bid for Automatic Meter Reading System

Dear Mr. Lofland:

This letter is attached to and becomes a part of our bid to furnish an Automatic Meter Reading System.

Pursuant to our conversation this morning, we agree to extend the pricing on our bid of September 20, 2007 until May 15, 2008.

In the event you have any questions concerning this bid, please contact me at the above address or:

Telephone - 1-800-876-3837 Ext. 15895
Fax - 414-371-5981
E-Mail - bids@badgermeter.com

Badger appreciates this opportunity to meet your metering needs.

Sincerely,
BADGER METER, INC.

Pamela G. Stokke-Ceci
Assistant Secretary

Enclosures

TRAVELERS

Date: March 25, 2008

BID BOND EXTENSION

Bidder: Badger Meter, Inc.
Surety: Travelers Casualty and Surety Company of America
Owner: Northern Kentucky Water District

Travelers Casualty and Surety Company of America agrees to extend the attached bid bond to May 15, 2008.

TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA

Tracy K. Matthews; Attorney-In-Fact

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
Seaboard Surety Company
St. Paul Fire and Marine Insurance Company

St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 216337 Certificate No. 001540711

KNOW ALL MEN BY THESE PRESENTS: That Seaboard Surety Company is a corporation duly organized under the laws of the State of New York, that St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, that Farmington Casualty Company, Travelers Casualty and Surety Company, and Travelers Casualty and Surety Company of America are corporations duly organized under the laws of the State of Connecticut, that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc. is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Daniel J. Kwiecinski, Daniel J. Sapiro, Kathleen A. Crary, Kathleen A. Yoss, Wendy S. Miller, Lisa M. Slakes, and Tracy K. Matthews

of the City of Milwaukee, State of Wisconsin, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 11th day of May, 2006.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
Seaboard Surety Company
St. Paul Fire and Marine Insurance Company

St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: George W. Thompson, Senior Vice President

On this the 11th day of May, 2006, before me personally appeared George W. Thompson, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2011.

MARIE C. TETREAULT NOTARY PUBLIC CONNECTICUT

Marie C. Tetreault, Notary Public

58440-8-06 Printed in U.S.A.

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kori M. Johanson, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 25th day of March, 20 21.

Kori M. Johanson, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.stpaultravelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

NORTHERN KENTUCKY WATER DISTRICT
Automated Meter Reading
184-0311

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ENGINEERING REPORTS AND INFORMATION

Project Map

Meter Reading Feasibility Study Report

Specifications prepared by HDR Engineers titled "Automated Meter Reading" dated July 2007

Northern Kentucky
Water District

The following items are included in this section:

- Service Area Map
- Meter Reading Feasibility Study Report prepared by HDR Engineers dated July 2005
- Bid specifications prepared by HDR Engineers titled "Automated Meter Reading" dated July 23, 2007.

2835 Crescent Springs Rd Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

Case No. 2008-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
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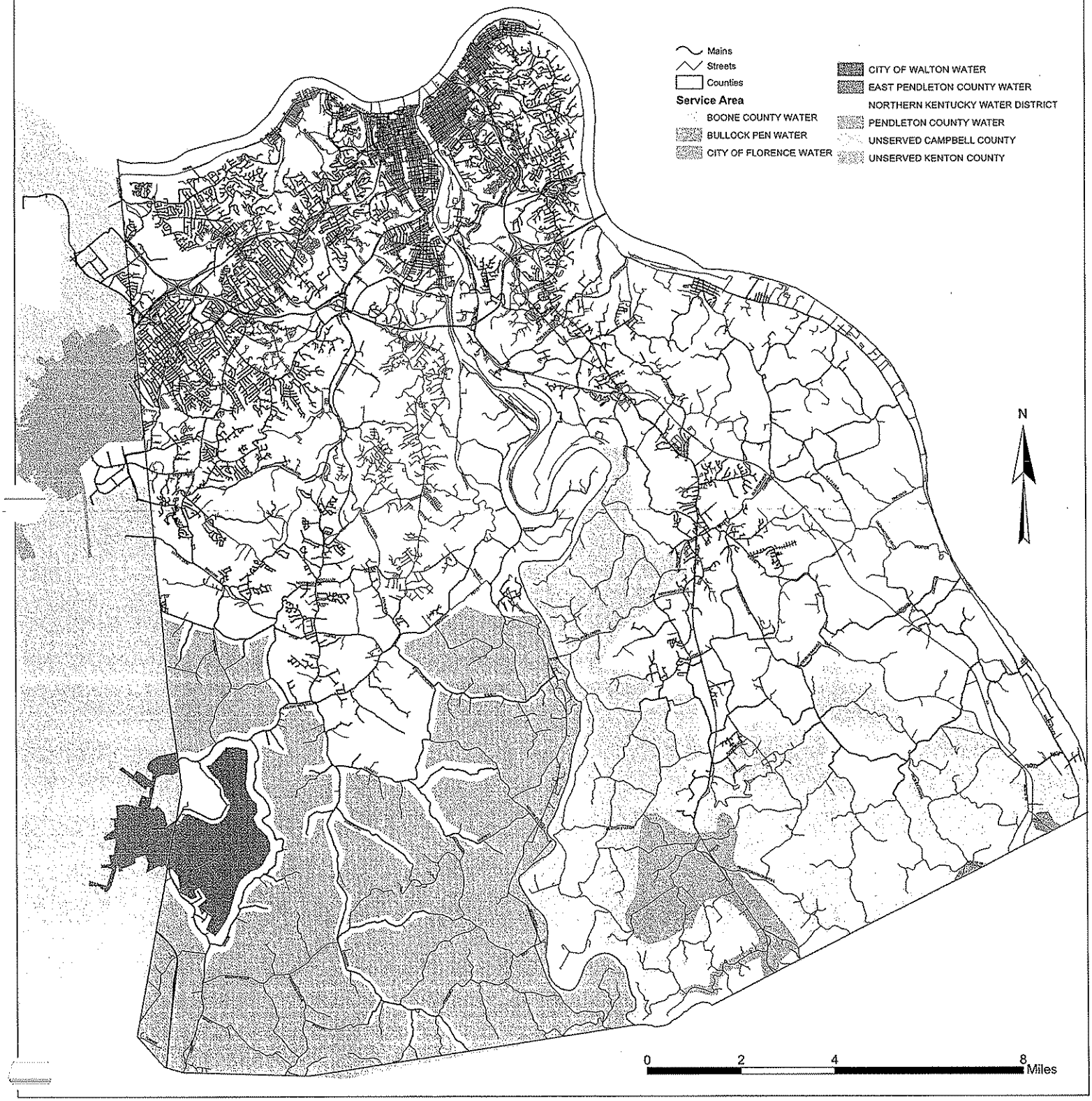
Project Map

Northern Kentucky Water District



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NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

Meter Reading Feasibility Study

I. Executive Summary

A. Background

HDR was engaged by Northern Kentucky Water District (District or NKWD) to conduct a meter reading feasibility study. NKWD Management, mindful of the District's Mission, Vision, and Values, wanted to ensure that its meter reading operations, and any investment in meter reading technology would provide the best overall solution, consistent with the District's long-range, strategic planning efforts. HDR was retained to provide the District with an independent, objective assessment of the NKWD's current meter reading operation to:

- Measure meter reading performance
- Present a comparison of meter reading alternatives
- Recommend the most efficient, cost effective meter reading system

B. Study Approach

The study was conducted in four phases:

1. Assessment of NKWD's current meter reading operation
2. Presentation of current and future meter reading technologies
3. Analysis of alternatives
4. Recommendations of preferred meter reading approach

Assessment of the District's current meter reading operation was conducted through meetings with NKWD Management, interviews of key personnel impacted by meter reading activities, analysis of NKWD meter reading and billing operating and financial data, and benchmark comparisons to local and national water utilities.

After performing the assessment, HDR presented four meter reading alternatives to NKWD Management for preliminary consideration. These alternatives - presented in no particular order of preference - were:

- ✓ Touch read
- ✓ Walk-by radio frequency automatic meter reading (Walk-by AMR, or Walk-by)
- ✓ Drive-by radio frequency automatic meter reading (Drive-by AMR, or Drive-by)
- ✓ Fixed Network radio frequency automatic meter reading (Fixed Network AMR, or Fixed Network).

Analysis of these alternatives was conducted after several discussions and meetings with NKWD Management. It was mutually agreed that HDR should conduct cost-model comparisons of four different scenarios over both a 10 and 15-year planning horizon. The cost comparison was conducted using a net present value (NPV) cost model developed specifically for the District[1]. In each of the four scenarios, AMR alternatives were compared against a District-wide touch read system. The four scenarios analyzed are presented below.

Scenario 1: Invest in AMR while maintaining current meter reading/billing frequencies, and the current 10-year test/meter replacement schedule over 10 and 15-year planning horizons.

Scenario 2: Invest in AMR while maintaining current meter reading/billing frequencies with an accelerated 3-year AMR deployment schedule over 10 and 15-year planning horizons.

Scenario 3: Invest in AMR while adopting monthly reading/billing for all accounts, through the current 10-year test/meter replacement schedule over 10 and 15-year planning horizons.

Scenario 4: Invest in AMR while adopting monthly reading/billing for all accounts through an accelerated 3-year AMR deployment schedule over 10 and 15-year planning horizons.

Before moving to the presentation of findings and recommendations, it is important to note an important item about HDR's analysis that makes it different than other meter reading alternative studies. HDR has prepared a cost analysis of meter reading, and does not considering any revenue gains from replacing meters. Most other studies of this kind give credit to meter reading for gains in meter accuracy. This credit is not appropriate when deciding upon meter reading technology, especially when considering that the District has an aggressive meter replacement program already in place. With this being said, HDR does believe that if a utility is changing out meters, in most cases, it is acceptable if not prudent to install AMR technology.

HDR also felt a meter reading cost-based approach was appropriate for the District as it has a very good meter replacement program, and it appears there would be little gain in revenue from meter replacement. The one exception to this would be the City of Newport which is scheduled for meter replacement within the next two years.

Another item to note is that this analysis does not consider most of the soft cost (and benefits) that might be attributed to AMR. These could include reduction in calls to customer service, improved collection rates, decreased delinquency rates, and enhanced customer service. The main reason for excluding these soft costs (and benefits) is the lack of documented empirical evidence to quantify the impact of AMR in this area.

C. Analysis and Findings

Before presenting the results of the analysis, a presentation of major assumptions and a brief description on how the model works are appropriate. It is assumed that the entire system will be touch read at the beginning of the planning period; meter growth in the District will be 1.3% over both the 10 and 15-year planning horizons; labor related costs (salary and benefits) will increase more rapidly than technology costs; and the District's cost of capital (discount factor) is 6% as explained in footnote (1).

[1] In this case, net present value is the future cost of meter reading operations and capital investment presented in current dollars. It takes into account the time value of money where in order to have $1.06 available to pay for operations and capital one year from today, the District would need to invest $1.00 at 6% annual interest. The model extends this concept by calculating the amount of money, invested at an annual rate of 6%, needed today to cover meter reading operations and capital costs over both 10 and 15-year planning horizons.

The model works by first calculating the number of full-time equivalent employees (FTE's) required to provide meter reading activities. Once the number of FTE's is determined, the model calculates cost by multiplying the number of FTE's by appropriate unit costs for various operating and capital expense categories. A more complete description and understanding of this process can be gained by reviewing model results presented in Appendices C and D.

The primary benefit of AMR is realized through reduction of meter reading FTE's and related meter reading equipment (vehicles and meter reading devices). As AMR is deployed, fewer FTE's are required to read meters. Therefore, the more quickly AMR is deployed, the faster the District realizes cost savings. As the planning horizon is extended, the large capital cost of AMR equipment is offset by this reduction in FTE's.

Scenarios 1 and 2

Figure 1 presents the NPV cost comparisons for current meter reading and billing frequency considering both a 10-year and an accelerated AMR deployment (Scenarios 1 and 2). For both 10 and 15-year planning horizons, the results indicate that the District's anticipated touch read system operation offers the lowest NPV cost alternative.

NPV Costs of Scenarios 1 and 2

Level of Service	Touch Read	Walk-by	Drive-by	Fixed Network
Current reading and billing, 10-year horizon, 10-year AMR deployment	$18,321,548	$21,981,447	$21,197,469	$22,754,859
Current reading and billing, 15-year horizon, 10-year AMR deployment	$25,667,564	$29,060,094	$27,796,044	$29,181,644
Current reading and billing, 10-year horizon, 3-year AMR deployment	$18,321,548	$22,383,010	$21,377,544	$22,825,894
Current reading and billing, 15-year horizon, 3-year AMR deployment	$25,667,564	$29,461,657	$27,976,119	$29,252,679

Figure 1

Figure 2 shows annual operating costs of the four meter reading alternatives. It is important to note that while Touch Read offers the lowest NPV cost, it is not the lowest annual operating cost alternative. Inspection of Figure 2 shows that Touch Read has the highest annual operating cost of any alternative through the entire planning horizon (both 10 and 15-year). In fact, by the end of the 15-year planning horizon Drive-by total annual cost is about $500,000 less than Touch Read.

This result occurs due to the fact that as the number of meters increases, more FTE's will be required to provide meter reading services using the Touch Read system. With AMR, no new employees need to be hired to read the expanded District. Also as the length of the planning horizon increases, the impact caused by the faster escalating labor costs becomes apparent.

Annual Meter Reading Operating Costs
(Current Reading/Billing)

	Year 1	Year 5	Year 10	Year 15
Touch Read	$1,780,615	$2,125,235	$2,653,062	$3,314,605
Mobile Walk	$1,718,382	$2,053,389	$2,477,831	$3,098,236
Mobile Drive-by	$1,719,032	$1,979,401	$2,288,069	$2,878,406
Fixed Radio	$1,737,742	$1,915,206	$2,222,703	$2,800,094

Figure 2

Scenarios 3 and 4

The next two scenarios consider meter reading costs associated with monthly meter reading. Discussions with NKWD Management revealed that the District may be considering moving to monthly meter reading and billing. Figure 3 presents the NPV cost comparisons for monthly meter reading and billing frequency considering both a 10-year and an accelerated AMR deployment.

Inspection of Figure 3 reveals that Drive-by is now the lowest NPV cost alternative for three of the four comparisons, and Fixed Network is the second least cost alternative. Over a 15-year planning horizon, Drive-by and Fixed Network are significantly less than Touch Read. The reason this occurs is that when increasing meter reading and billing frequency, the District will need to hire as many as three times the number of meter reading FTE's to support monthly meter reading. AMR technology eliminates the need to hire additional meter reading FTE's when increasing meter reading and billing frequency.

NPV Costs of Scenarios 3 and 4

Level of Service	Touch Read	Walk-by	Drive-by	Fixed Network
Monthly reads, 10-year horizon, 10-year AMR deployment	$39,549,979	$42,366,256	$40,124,769	$41,679,352
Monthly reads, 15-year horizon, 10-year AMR deployment	$58,840,335	$60,397,229	$56,444,969	$57,829,536
Monthly reads, 10-year horizon, 3-year AMR deployment	$39,549,979	$41,964,215	$38,725,634	$40,173,984
Monthly reads, 15-year horizon, 3-year AMR deployment	$58,840,335	$59,985,342	$55,029,189	$56,305,748

Figure 3

Figure 4 presents the annual operating costs of the four meter reading alternatives for scenarios 3 and 4. Inspection of Figure 4 shows that Touch Read has the highest annual operating cost of any alternative through the entire planning horizon (both 10 and 15-year). In fact, by the end of the 15-year planning horizon Drive-by total annual cost is about $1,500,000 less than Touch Read. This result occurs due to the fact that as the District converts to monthly meter reading and billing more FTE's will be required to provide meter reading services using the Touch Read system. With AMR, no new employees need to be hired to read the expanded District. Also as the length of the planning horizon increases, the impact caused by the faster escalating labor costs becomes apparent. The cost savings associated with Drive-by and Fixed Network are even greater as the impacts of inflation and customer growth are considered over a longer planning horizon.

Annual Meter Reading Operating Costs
(Monthly Reading/Billing)

	Year 1	Year 5	Year 10	Year 15
Touch Read	$2,139,737	$5,556,964	$7,046,631	$8,929,857
Mobile Walk	$2,077,673	$5,337,086	$6,516,244	$8,178,559
Mobile Drive-by	$2,078,773	$5,113,687	$5,879,757	$7,428,782
Fixed Radio	$2,096,863	$5,048,553	$5,814,390	$7,350,471

Figure 4

A ranking of the analysis results of the four scenarios is presented in the table below. A rank of 1 indicates the lowest NPV cost alternative. Touch Read is the lowest cost alternative in five of the eight comparisons. Reviewing this table reveals that Drive-by AMR is the lowest cost alternative in three of the eight comparisons, and is the second lowest cost alternative in the remaining five. Fixed Network systems are ranked as the second lowest cost alternative under two of the four monthly meter reading analyzes.

Cost Ranking of Meter Reading Alternatives

Scenarios	Planning Horizon	Touch Read	Walk-By	Drive-by	Fixed Network
1 – Current reading frequency and 10-year AMR deployment	10 years	1	3	2	4
	15 years	1	3	2	4
2 – Current reading frequency with 3 year AMR deployment	10 years	1	3	2	4
	15 year	1	4	2	3
3 – Monthly reading with 10-year AMR deployment	10 years	1	4	2	3
	15 years	3	4	1	2
4 – Monthly reading with 3 year AMR deployment	10 years	2	4	1	3
	15 years	3	4	1	2

Figure 5

While it appears that Touch Read is the least cost, and subsequently the best meter reading alternative for the District, NKWD should strongly consider the annual operating costs of each meter reading alternative. As pointed out previously, Touch Read has the highest annual operating cost of any alternative.

D. Recommendation

The following recommendation is made after assessment of current NKWD operations; comparison of four meter reading alternatives over 10 and 15-year planning horizons considering 10-year and a 3-year accelerated AMR deployment; along with extensive discussions and interviews with NKWD Management and employees. **HDR recommends that the District move toward either a Drive-by or Fixed Network radio frequency AMR system. Further, HDR suggests that the District undertake an accelerated deployment of AMR over 3 years in order to realize the greatest cost savings. These recommendations may need to be tailored to conform to the District's budgetary constraints.** Generally, HDR presents the following advantages to either a Drive-by or Fixed Network AMR system.

1. Allows the District to reduce manpower thereby gaining better control over escalating labor costs.
2. Employs technology to meet the resource needs created by an increasing customer base
3. Provides flexibility to increase meter reading and billing frequency without adding employees
4. Presents the potential to increase revenue and improve customer service
5. Enhances the capability to perform consumption analysis, peaking trends, and improved distribution modeling.

The next step in this process would be to develop specifications and solicit Drive-by and/or Fixed Network AMR proposals from meter reading vendors. Vendors should be asked to complete proposals for both a selective and accelerated system-wide AMR deployment. While HDR is confident that AMR is the best meter reading alternative for the District, it is not in a position at this time to determine which AMR system or vendor provides the best solution. This determination can only be accomplished after reviewing proposals and pricing from meter reading vendors. HDR suggests the following general procurement and implementation approach.

- Allow one Bid package to address both Drive-by and Fixed Network radio frequency solutions increasing competition and allowing creative alternatives.
- The Bid and vendor selection process should stress the value of open architecture. Reading system should be able to read multiple makes of meters, while minimizing RF device inventory requirements.
- From now until the AMR solution decision is made, the District should continue with its current meter replacement program using AMR compatible meters while reducing the current meter inventory.
- Once an AMR technology solution decision is made, establish a team to identify and implement strategies that will maximize this AMR investment.

By following these recommendations, HDR is confident that NKWD will install, and operate the lowest cost meter reading system that meets the future needs and requirements of the District.

E. Acknowledgement

HDR wishes to acknowledge the contributions made by the NKWD staff members and their valuable assistance to the consulting team. Their participation, guidance and oversight was much appreciated. HDR looks forward to providing any additional services required by the District in implementing the above noted recommendations.

II. Assessment of NKWD Meter Reading Operations

A. Introduction

The objective of this study was to provide Northern Kentucky Water District (District) with an assessment of current meter reading practices, and an analysis of various meter reading technologies. While there were no apparent, immediate concerns or issues, the District wanted a guide to ensure that its current, and more importantly, future meter reading process provided the most cost effective and reliable results to its customers. The first phase of this study was an assessment of the current meter reading process; the results of which are presented in this Section.

B. NKWD Meter Reading History

The Northern Kentucky Water District has for a number of years engaged in an aggressive meter testing and change-out program. In addition, the District has embraced advancements in meter technology moving to the current touch read system to offset the demand of an ever increasing number of active accounts. There are presently only 11% of the District's meters that are not read through touch read technology. Many of these accounts have meters located inside a customer's home.

Touch read technology was implemented by the District through several different programs. First, touch read was installed through the District's routine meter change-out program. The Public Service Commission of Kentucky requires that residential meters be removed and tested every ten (10) years. Through this testing NKWD found the older meters in the service area generally loose a certain level of accuracy. When meters were pulled and tested, NKWD installs touch-read technology.

The second touch read implementation program came through the acquisition of other smaller water utilities. In many cases meter change-out, maintenance, and testing were usually neglected. In these cases new meters were installed with touch read capability.

A third program was implemented by District staff that realized the practice of retaining and using a homeowner's key entrusted to the care of the District was more of a liability than benefit. To eliminate this liability, a large-scale meter change-out utilizing touch read meters was undertaken so that these keys could be returned to the homeowner.

A forth program was undertaken to respond to "confined space" regulations. The District replaced or converted larger meters with touch read technology so that employee's no longer had to enter into a large vault or meter pit to collect readings.

The end result of the use of the touch-read technology has been the reduction of meter reading staff by fifty percent (50%) over the last eight to ten years. This staff reduction has occurred while the District has grown significantly. Another benefit of touch read is a substantial increase in productivity and meter reading accuracy. Productivity has risen from 150 meters to somewhere between 400 and 500 meter readings per day with a reading accuracy of over 99%. Combined with the reduced liability of managing thousands of home-owners keys, and eliminating confined space entries, adoption of touch read technology has been successful.

In keeping with its mission, NKWD is looking into the next meter reading technology—automatic meter reading (AMR). AMR meters have been introduced into the system with some success, but the installations have been too few and far between to measure its true benefit. The current

AMR meters installed are read using a hand-held device with limited transmitter range. Clearly, these meters are faster to read than touch read, but the main reason for these installations was employee safety. Current AMR installations are concentrated in heavy traffic areas so that employees do not have to stop on busy routes to collect readings. NKWD is aware that major technology advancements have occurred in AMR that improve its performance and reliability.

C. Current Process and System

Meter Reading Process

There are currently over 79,630 meters that must be read regularly to prepare customer invoices. Roughly 60% of these meters are manufactured by Sensus Metering Systems, Inc. with the remainder manufactured by Neptune Technology Group, Inc. Approximately 97% of these accounts are read quarterly with the remainder read monthly.

NKWD employees collect over 345,700 meter readings per year as shown in Figure 6 below. Meter readings are taken by two different groups within NKWD: Meter Reading and Field Service.

The Meter Reading Group is responsible for the regular quarterly and monthly reads. Meter Readers capture over 336,400 meter readings in support of customer invoicing. There are five full-time Meter Readers capturing regular meter readings. When not gathering routine meter readings, meter readers assist with customer requested meter readings and other activities.

In addition to these regular readings, NKWD takes customer requested meter readings. These customer requested readings are for account closings (final reads), and billing disputes. It is estimated that the District responds to over 9,300 customer requested readings. The Field Service Group handles customer requested readings in addition to its other duties such as meter installations, service disconnections, collections, and customer leak detection. There are eight Field Service Representatives that respond to customer requested meter readings, but on average, two or three Field Service Representatives are performing this task on a daily basis.

Total Annual Meter Readings

	Annual Meter Readings
Meter Readers	336,400
Field Service	9,300
Total Annual Reads	345,700

Figure 6

In total, there are seven full-time equivalent employees (FTE's) providing meter reading services throughout NKWD as shown in the table below.

Full-time Equivalent Meter Reading Personnel

	FTE's
Meter Readers	5
Field Service	2
Total FTE's	7

Figure 7

Meter Reading System

NKWD captures meter readings through four different reading methods: manual, pin, touch-read, and automatic meter reading (AMR). The vast majority of NKWD meters are read through an encoder register connected to a touch pad using a Sensus hand-held interrogator (interrogator). The interrogator reads both the Sensus and Neptune meters. There are approximately 64,770 touch-read meters in the system.

Next in number are manual reads. There are approximately 8,000 accounts that are read manually. These readings are recorded by Meter Readers keypunching the reading manually into the interrogator. The District is on schedule to upgrade these manual reads to touch-read by the end of 2006.

Pin reads are third in number with almost 6,500 accounts read in this manner. Located in the City of Newport, these meters with pin reads are scheduled to be replaced in the next two years.

The fewest number of accounts are read using the Sensus' AMR RadioRead System. Meter readings are captured using a hand-held, radio interrogator. The reading is sent through a meter interface unit (MIU, called MXU by Sensus) connected to an encoder register. There are 360 AMR-MXU meters concentrated in the newer monthly sub-district section of the District.

Accounts by Meter Reading Type

Read Type	Accounts
Touch	64,770
Manual	8,000
Pin	6,500
AMR-MXU	360
Total	79,630

Figure 8

The reading process for all types of reads is straight-forward, and follows a series of relatively simple steps. First the account information is retrieved from the District's customer information system (CIS). Next the account information is transferred in batch form to a PC running Sensus AutoRead Software (Sensus PC). This software takes the CIS account information, and "reconfigures" it so that it can be uploaded to the Interrogators. It should be noted that all meter read types are loaded to the hand-held in this manner.

The meter reader then takes the loaded interrogator and captures the meter reading. Once finished reading, all the captured meter reading information is downloaded from the interrogator back into the Sensus PC. The meter reading information is then configured into a batch file to be transferred back to the CIS where it will be used to prepare regular customer invoices.

The process just described is carried out on a daily basis. The number of accounts loaded into the interrogator typically represents one day's work for a meter reader.

Customer requested meter reads are conducted differently. A Service Order is created by Account Service, and forward to the Field Services group. A Field Service Representative takes the Service Order and takes a meter reading using a Sensus PocketPro interrogator. This device does not hold the meter readings as in the case of the hand-held interrogator. The meter reading is recorded on the Service Order, and the Service Order is returned to Account Service. Account Service uses the reading to prepare a final bill, make a customer billing adjustment, or respond to a customer inquiry. It should be noted that since the meter reading is recorded manually - both by the Field Service Representative and Account Service, there is an increased chance for mistakes.

D. Productivity and Cost

Productivity

Water utility touch-read averages vary depending upon population density, service territory topography, and touch pad location. Taking these variables into consideration, it would be expected that NKWD Meter Readers would average between 300 and 600 meter readings per day. Based on meter reading productivity records, meter readers record on average between 400 to 500 reads per day. By this measure, the District's meter reading performance is in-line with water utility touch-read averages.

Field Service productivity is more difficult to compare as there is less industry information available. The number of field service calls per day is also impacted by population density, topography, and touch-pad location. Added to these variables are complexity of the service call and location of the service work. For example some utilities require that a final meter reading be taken from the meter not just through the touch-pad. Also billing disputes may require visual inspection, and reading of the meter.

Considering these variables it would be expected that NKWD Field Service Representatives should make 18 to 30 meter-related service calls each day. Review of records and discussion with the Field Service Representative Supervisor indicates approximately 25 field service calls are made on average per day. Again the District is in-line or above water utility productivity averages. A summary of meter reading and field service activity is presented below. The water utility averages presented are based upon HDR's experience, data from meter reading vendors, and operating statistics from other water utilities.

Industry Comparison to NKWD Meter Reading Productivity

	NKWD	Water Utility Average
Daily Touch pad Per Meter Reader Productivity	400 – 500	300 to 600
Daily Per Field Service Call Productivity	18 – 30	12-24

Figure 9

Cost

Reading, Field Service, and Account Service operating costs per meter read were calculated by dividing the respective component of the District's 2005 Fiscal Year Budget, by the number of annual meter readings and field service readings previously presented. The following table displays the cost analysis results.

NKWD Average Cost per Meter Reading

	Annual Budget	Reads and/or Service Calls	Cost per Read and/or Service Call
Meter Reading	$337,700	336,400	$1.00
Field Service Reads*	$191,675	9,300	$20.61
Account Service **	$1,309,950	345,700	$3.79
Total/Average	$1,839,325	345,700	$5.32

* Field Service Call budget is assumed to be 25% of total Field Service's annual budget
** Account Service budget assumes that work is directly related to meter reading or field service meter reading calls.

Figure 10

Comparison of meter reading cost must be carefully made as the impacts on meter reading and field service productivity vary greatly from system to system. With this being said, the District's cost per regular meter reading is at the low end of the municipal water utility range of $0.90 to $1.25. A comparison of field service cost per read cannot be provided as there is not enough detailed municipal utility information to separate these costs. The District's total cost per read of $5.72 compares very favorably to other municipal utilities. HDR has seen costs ranging from as low as $4.50 ranging to $10.00 or more per read.

E. Employee Interviews

HDR interviewed selected employees that are most impacted by meter reading, and customer requested field service readings. The interviews were conducted on March 22, 2005; results were consolidated; and then presented to the interview participants on March 23. Each consolidated item was discussed by the group after which time a ranking of priorities/concerns was conducted by allowing each interviewee to cast a vote or votes for the areas of greatest concern.

The purpose of these interviews was to identify concerns or problems not identified through HDR's assessment. The interviews also provide an opportunity for those employees most affected by meter reading and field service calls to "weigh-in" on the process. A summary of the items of greatest concern are presented below. The full results of these interviews are presented in the Meeting Notes contained in Appendix A.

There were four major service performance areas around which concerns or problems were grouped. They were: Meter Management, Meter Reading, Customer Service and Billing, and General. The top priority or priorities in each of these performance areas along with the number of votes received are presented in the table below.

Summary of Employee Meter Reading Priorities

Area	Item	Votes
Meter Management	Need to replace Newport meters	11
Meter Reading	Standardization of meter reading equipment/technology	8
Meter Reading	Cost per read comparison (benchmark to other utilities)	7
Meter Reading	Concern about Meter Reader and Field Service Rep safety	4
Customer Service	Equalizing of the number of accounts in billing cycles	3
Customer Service	Reduction in field service calls and work orders	3
General	GIS mapping of meter locations	5
General	Appropriate implementation schedule for selected meter reading system	4
General	Comparison of existing meter reading technologies	3
General	Decision on meter reading technology	2

Figure 11

Review of this table indicates that employees impacted by meter reading and field service readings are eager to seek standardization of meter reading technology that is implemented in the most cost affective manner. They also are looking for a meter reading system that will improve productivity through realignment of meter routes, and the reduction of time to complete field service calls. An interesting off-shoot is the GIS mapping of meter locations. While installing a new meter reading system will not automatically result in GIS mapping of meters, the task can be easily incorporated into the installation of any new meter reading devices. Two major benefits of mapping include better tracking and location of meter assets, and enhanced productivity for meter repairs and installation.

F. Benchmark Comparison

Benchmarking is a useful management guidance tool, but needs to be approached with caution. There are many areas of variability between water utilities. Meter location, geography, topography, weather, costs and standards of living are just some of the variables that can affect the validity of benchmarking comparisons.

National Benchmark Comparison

For a national benchmark comparison, HDR referenced results of a recent survey conducted by the Ascent Group in 2004. The survey was based on the responses of 47 utilities ranging in size from 3,750 meters to 4.5 million. The survey was a mix of water/wastewater, gas, and electric utilities. In part, the Ascent Group in this benchmarking study was attempting to:

- Evaluate meter reading tactics and strategies
- Identify meter reading best practices
- Present the range of meter reading performance
- Reveal how utilities are using technology to reduce costs and improve performance

The full white paper presenting the Ascent Group's results is included as Appendix B only the pertinent results are summarized here. Best Performing Companies were rated on their relative results in delivering low cost meter reading, high productivity and high service (low errors/skips). Utilities that were considered Best Performing were also interviewed, and metering practices analyzed to identify factors that contributed to their performance. Following are some of the relevant findings the "Best Performing Companies."

- AMR was used selectively to address difficult to access accounts with consideration to system-wide implementation in the future.
- It is important to continuously reorder meter readers routes to achieve optimum productivity, especially during AMR system deployment.
- Clear and concise performance measures are essential to maximize meter readers productivity.
- Formal and informal incentive/reward programs will encourage improved performance.
- A combination of classroom and on-the-job training allows meter readers to achieve standard levels of performance more quickly (60 days as opposed to 80 on average).

The study participants noted that AMR implementation remains their "top plan for the future", while taking intermediate steps to improve operations. Approximately 30% of the utilities were actively pursuing a partial deployment of AMR, whereas 20% were planning a company wide ARM program. Of the respondents, 40% of the participants were piloting or investigating AMR with the remainder pursuing route optimization strategies.

Regional Comparison

A survey of water utilities operating in closer proximity to the District indicates an almost unanimous adoption of AMR. Of the following nine utilities, five either have AMR or are moving towards full-scale AMR deployment within the next few years. Two of the utilities are in pilot testing, but anticipate full-scale AMR deployment. The remaining two are still using touch read systems, and did not indicate a move towards AMR. A summary of this survey is presented in the following table

Summary of Regional Utility Meter Reading Survey

Utility Location	Contact Person	Number of Meters	Meter Type	Notes/Comments
Boone County Water	Terry Masters	20,000	Badger	All of their meters are radio read except for large meters in pits, they are manual read. They use the Orion reading system.
Cincinnati Water	Kevin Moore	280,000	Neptune	They presently have 100,000 Neptune AMR units installed with a goal of total AMR within the next two years.
Columbus Water	Mike Vance	800,000	Badger/Amco	They use the ITRON reading system. They presently read quarterly with all of their meters being touch read.
Florence Water	Barry Miller	8,000	Sensus	They have around 800 Sensus AMR units installed with a goal of total AMR within 5 years.
Hamilton, OH	Katrina Vanderpool	25,000	Badger	They are changing their water, gas and electric meter to AMR with a goal of total AMR within the next year.
Indianapolis Water	Vanessa Cook	300,000		They presently read bi-monthly with all of their meters being read manually.
KY American	Bill Buckner	112,000	Neptune	Two AMR pilots, one with 3,000 Badger meters/Itron MXU's, and the other with 14,000 Neptune meters. They are looking into all AMR within the next 3-4 years. Will use Neptune as they thought it performed better.
Louisville Water	Vicky Bauscher	292,000	Neptune	AMR pilot presently 7,000 meters installed; all Neptune. Looking into full scale deployment.
Nashville-Metro	Gary Ragland	167,000	Sensus	They presently have 50,000 Sensus AMR units installed with a goal of total AMR within 10 years.

Figure 12

Benchmark Summary

Based on the results of these national and regional surveys, the movement towards AMR is overwhelming with the vast majority of water utilities that are considering a change in meter reading process opting for system-wide deployment in five years or less. Regarding best meter reading practices, the District is employing several of those noted above, namely selective use of AMR technology, meter reading rerouting, and meter reading training.

While HDR attempted to gather current data on cost per meter reading, the results were too widely dispersed to make one-on-one comparisons, due to the lack of standardized formulas among utilities. As a result, it was decided not to compare to the cost of the District's current meter reading operation to other utilities as this comparison could be misleading. Instead, cost comparisons of alternative meter reading methods available to the District are presented in the next section.

III. Comparison of Meter Reading Technologies

This section of the report reviews the various meter reading technologies available to water utilities, and begins with a brief overview of the history of AMR meter reading technologies. It follows with discussion of the four most common meter reading approaches. Emerging technologies such as electric wire and cable that do not have sufficient market penetration or proven field experience will not be discussed in detail.

A. AMR Historical Overview

One of the first significant advancements towards automatic meter reading was the development of the remote meter reading system. This enabled the meter reading on the water meter register to be recorded via a drive cable or wire to a mechanical totalizer device. This device could be installed in a more accessible location than the water meter itself. For inside set meters, this meant location on the outside of a building. For pits and vault set locations, this meant a location outside of the pit or vault or underneath the lid. This resolved the significant increase in access issues caused by fewer residential customers being home during normal utility meter reading hours. It also eliminated the problems associated with confined space entry.

The visual outside reading device had several reliability issues that resulted in the inside meter register reading being different than the outside device. Many of these problems stemmed from the lack of maintenance/replacement of the outside device. Water intrusion was also a common problem particularly in pit situations. As a result of these problems there were minimal applications of this technology.

To address the mechanical visual outside reading device problems, a direct outside reading system (touch read) was developed. The development of the encoder register, which allowed the register to be electronically interrogated, laid the platform for AMR. A reading device was plugged into a set of pins or touch pad containing an induction coil that would capture the reading directly from the meter register. These devices also had some problems with bent pins or non-numeric characters when the register was interrogated. However, their reliability and lack of maintenance requirements made them a popular replacement of the mechanical outside reading device. Advances in register sealing systems also enabled these devices to be more reliably deployed in pit and vault situations, improving reading productivity and addressing confined space issues.

After the outside reading device, the next most significant advance in automated meter reading came with the development of the "electronic" meter reading book. Manual read and early touch read systems required writing the meter reading in route books or on mark sense cards. This manual entering of readings created opportunities for reading errors. The "electronic" meter reading book enabled reading information to be loaded onto these handheld devices and the reading information to be captured with little or no human intervention. Manual entry into the handhelds resulted in some errors, but significantly less than route books or mark sense cards.

For touch read systems, handheld devices have progressed to point where readings are captured without any meter reading data entry by the meter reader. These devices significantly improved the read to bill processing time and reduced reading errors. Though the capture of meter reading data was automated, **the touch type technology is not considered "automatic meter reading".**

The first commercially viable leap to automatic meter reading came with the development of the phone-based meter reading system. Phone read systems are operated as either dial in-bound or dial outbound systems. The dial in-bound system was based upon the meter's interface device initiating a call on a pre-programmed basis to the water utility. If the line was in use at the

time of the call, it would attempt to call later. Phone company cooperation was not needed for this method of reading, and the utility was not charged by the phone company for the call.

The outbound system approach required the utility to initiate the call to the meter, which was done on a pre-programmed automated basis as well. This approach required phone company cooperation resulting in an additional charge for phone number administration and call usage for each account.

Phone read technology gained early success for large commercial and industrial accounts that needed monthly meter reading, and in utilities that were looking to significantly reduce meter reading costs. This technology suffered from perceived privacy issues, and the lack of third party cooperation from the phone company. Phone read systems deployment was all but eliminated as radio systems and cell phone networks were introduced into the market. In fact many early adopters of the phone read system have converted to or in the process of converting to radio frequency AMR systems.

The next generation AMR system was Radio Frequency (RF). RF systems are currently offered as mobile or fixed network. The mobile system enables the meter reader to capture the meter reading by driving by or walking by the account. Walk-by systems do not provide significant productivity gains over touch read as meter readers must be in close proximity to the meter interface unit to "capture" a reading. Drive-by units due to its increased transmitter power and driving speed offer significant productivity gains on the order of at least ten times or more compared to touch read.

The fixed network system provides an additional layer of automation in that meter readings are brought back directly to the utility on a fixed collection network that is deployed for this specific purpose. Similar to phone read systems, some fixed network systems make use of existing networks such as electric power lines, cell phone, and cable.

Radio Frequency systems were initially adopted in the gas and electric utility industry because gas and electricity rates were 3 to 5 times greater than water rates that prompted movement to more frequent meter reading and billing. The same drivers that confronted gas and electric utilities have created the need to move to a higher level of reading automation in the water industry. As a result, the water industry is now experiencing a higher growth rate in AMR than other industries. While RF system meter reading has been available to water utilities for nearly 15 years, it is only recently that it has become the technology of choice for water utilities.

Most water utility early adopters of AMR systems were accounts with inside set meters. However, in the late 1990's and continuing today, AMR has been adopted by accounts with sizable, if not exclusive pit/vault set applications. Mobile RF solutions have been deployed in Houston, TX, Richmond, VA, Charlotte, NC, Montgomery, AL, and Memphis, TN to name a few. Cincinnati, OH is nearing completion of a mobile RF system implementation. The District of Columbia Water and Sewer Authority is wrapping up the largest fixed network deployment in the water industry. A fixed network solution is currently underway for Corpus Christie, TX for both water and gas meters. Bid specifications have recently been released for Kansas City, MO for its 160,000 inside/outside water accounts. Specifications and request for proposals are pending for both Henrico County, VA and Atlanta, GA.

B. Manual Meter Reading

Manual meter reading requires the meter reader to visually obtain the meter reading directly from the meter register located on the meter or from a visual reading device which means the meter reader must physically gain access to the meter register or reading device. These

readings are typically entered into a handheld "electronic" meter reading device that downloads reading data to the billing system.

Relative to the other meter reading systems on the market, visual read systems have the lowest capital cost. The water meter and standard/generator registers are staples in the industry and their manufacture is highly automated. Operating and maintenance cost of this metering system is also relatively low. The meter body, regardless of the reading technology is the same throughout. The meter itself has a good history of reliability and when failure does occur, it is generally more cost effective to replace the meter then it is to repair it. The meter register has also increased in reliability with the advancement of sealing techniques. Moisture under the dial face, which obscures the meter reading rarely occurs. Operating and maintenance costs do increase with the use of the generator register and visual read remotes.

The low initial capital cost and ongoing operating and maintenance costs of visually read systems are greatly offset by the labor cost needed to collect the reading. Productivity rates are constrained by geography, density, access, weather, and most notably by the physical ability of the meter reader. Depending upon the system used for processing the meter reading, reading errors lead to additional customer service and field costs. Manual systems typically have the lowest productivity rates, and highest reading error rates. For industrial and commercial accounts, reading productivity, depending on the factors noted above could be in the 50 to 100 reads per day range, and in some cases require two meter readers in confined space situations. For residential accounts, inside set meters with visual remotes would see productivity rates in the 350 to 400 reads per day area, whereas pit setting could be in the 300 to 500 range. Any increase in meter reading frequency would require a sizeable increase in labor.

Reliability issues for the manual reading system revolve around the ability of the meter reader to gain access to the meter or reading device, and to accurately record the usage, assuming the reading device was in sync with the meter register. Lack of access normally results in an estimated bill, which can lead to a string of additional services such as billing dispute investigation, meter re-read, and re-billing. An inaccurate reading leads to a demand for the additional services just noted, and in addition a possible meter test as well.

C. Touch Read

Touch read systems enable the meter reader to gather the meter reading through an outside meter reading device (touch pad) connected to the meter register. Unlike the mechanical, visual read remote system, the touch read system allows for direct interrogation of the meter register. As with the manual system, the meter reader must visit every account site to obtain the meter reading from the touch read device. Readings are collected when contact is made between the handheld reading device and the outside reading device (or pad).

Additional capital costs associated with this reading system are the encoder register and the outside reading device. The encoder register electronically stores the meter reading and provides the current meter reading at time of interrogation. This reading system also provides for tamper detection should the wire between the meter's register and the outside reading device be disconnected or cut.

Many of the same labor costs apply to the touch read system as the manual read system. The touch read system, in a pit application will increase reading productivity compared to manual read, but the range is limited. Typically a touch read system in a pit application might increase productivity in the 10% to 20% range. This range might increase if a high percentage of the pits are constantly submerged in water and have to be pumped prior to reading. Further productivity may be gained from route optimization and meter reader incentive systems. However, the

productivity ceiling is limited, and as the number of meter readings increases, more readers will be required, increasing labor costs.

Operating costs for the touch read system will increase over the manual read system depending upon the failure rate of the encoder register. While the encoder register has a decent reliability record, there have been reported incidences of manufacturing failures that have resulted in non-numeric readings. The non-numeric reading does cause an estimated bill to be sent or perhaps a re-read. Some utilities have established procedures where a field service call is not made until two consecutive non-numeric reads have taken place. Similar to the manual read system, anything that results in an estimated bill results in additional customer service cost.

Touch read systems have proven to be a reliable alternative to the visual outside reading device. They have been effective at addressing confined space issues, and the outside reading pad is virtually maintenance free with no moving parts. The encoder register provides a stepping stone to more automated forms of meter reading discussed below.

D. Mobile Radio

The mobile radio system enables the meter reader to collect meter readings while walking or driving by a meter equipped with an RF reading device. The mobile reading system requires the addition of an RF reading device (also called a meter interface unit or MIU) to the encoder meter register. The RF device is powered by a battery, and can either be an absolute encoder or digital encoder. The type of encoder might impact the RF device that is used.

As additional electronic components are added to the metering system, operating and capital costs will rise. Electronics have a failure rate, typically in the area of less than 1% per year. However, the major operations cost driver for an AMR system is the battery life of the RF device. The longer the battery life and life of the RF device, the more cost effective it becomes.

Additional benefits accrue in situations where the meter life is in lockstep with the RF device life so that both the meter and MIU can be replaced at the same time. RF device products are being offered with an estimated battery life of 10 to 20 years. Warranty coverage becomes an important component of owning and operating an AMR system so it is important to clearly define warranty terms ahead of implementation. Additional costs will be involved for coverage beyond the standard warranty.

RF devices operate in two different transmitting modes. Some systems are always transmitting and the reading device just happens to "bump into" the reading signal. These systems have a lower production cost because only signal sending electronics is needed. The battery life for such products is approximately 10 years, though some companies offer longer battery-life guarantees. The other transmitting mode requires the RF device to be "woken up" to transmit the meter reading data. The battery life for these systems is in the 18 to 20 year range. These systems are generally more expensive because they contain sending and receiving electronics, but the additional service life may offset the additional capital cost.

Operation costs might also include software licensing and upgrade fees, maintenance of reading equipment, and FCC licensing fees. Reading systems are offered in both licensed and unlicensed frequencies. Unlicensed frequencies operate in the 900 MHz range, and compete for space with other RF operated consumer products which may cause some problems in "capturing" meter readings. Licensed systems provide the utility with its own unique operating frequency that eliminates the interference issues associated with unlicensed frequency, thus making the system more reliable. There is an annual fee for these licensed products. Most manufacturers will assist with the licensing process.

The meter reading productivity for a mobile RF system is significantly better than visual or touch read systems. The actual productivity achieved by a utility is based upon many, ever-changing factors such as meter population density, location of the RF device, weather, temporary obstructions, and average driving speed. Typically, drive-by reading productivity has been in the range of 5,000 to 10,000 reads per day, but current systems are demonstrating significantly higher reading performance. Some utilities read during late evening hours or off peak traffic hours to improve reading productivity even more. Given the initial capital cost of a mobile collector unit, it is better suited for high volume, repetitive work.

The RF handheld reading devices have a typical reading productivity of 800 to 1,500 reads per day. Typically these devices become part of an AMR strategy used in special and final readings. It is typically more cost effective to use the mobile, drive-by collector for routine meter reading functions and reserve the special and final readings for the handheld collectors. Special and final readings occur at various locations throughout the service territory and may average a few hundred per day, depending upon the size of the utility. It may be more cost effective from an operations standpoint to have this division of labor and equipment than using a mobile collector.

AMR reading reliability is in the 98%+ or better. Many specifications have this requirement built into the purchase agreement. The initial reading reliability rate may be less during the early stages of implementation, normally for non-product related issues. For example meter readers getting used to the equipment and reading routes may result in lower reading rates. There may be some RF device location issues that might be affecting the range of the device. This problem occurs with higher frequency in large meter/vault locations than in residential and small commercial accounts. Temporary obstruction issues such as cars parked on or near the RF device, or the device being under water will also affect transmission range and the reading rate. Such items will need to be addressed and accounted for prior to pursing equipment related issues with the vendor.

Following manufacturer's installation instructions is an important consideration for reading reliability, especially in a pit set environment. For cast iron lids, maximum reading range is obtained by installing the RF device through the lid. If plastic or polymer concrete lids are used, the RF device may be installed below the lid without significantly affecting reading range. Reading range claims for RF product need to be tempered with how it will actually affect the meter reading process. There maybe some degradation in the reading distance over time. However, unless the signal strength is so great that it enables the utility to consistently reduce its total drive time or mileage, the extra range may not be operationally beneficial.

E. Fixed Radio

Fixed radio systems offer a truly fully automatic meter reading capability. The meter reading is "captured" through a system of collectors that transmits the meter reading back to the utility location. The RF devices are programmed to send the readings to the utility on at least a daily basis.

Additional capital costs for this reading system include an array of collectors and repeaters positioned throughout the service territory. The number of collection units required is mainly dependent upon the topography of the area. Typically collectors are placed upon public buildings, power poles, or water towers. A specialized system server for collecting the reading data and software for its operation is needed as well - adding to the initial cost of this option.

Additional operating costs include FCC licensing fees, cellular fees for the transmission of readings from the data collectors to the utility, hardware and software licensing fees and memory and software upgrades, if not included in the licensing fees. Optional monitoring fees,

where the vendor is replicating the data received by the utility, is an additional service that is available. Depending upon the location of collection units, owners of buildings and power poles may require some form of compensation for use of those facilities.

The reading productivity of the fixed network system is basically unlimited. As long as there is sufficient memory and software capacity in the collection and utility based components, the utility can collect as much usage data as it wants without sending a meter reader or other personnel into the field.

Regarding reliability, fixed network systems have the same RF device reliability ratings and issues as the mobile systems. During initial project start up, some adjustments may need to be made, including relocation of the RF device to get more reliable, consistent readings. Due to temporary obstructions, meter readings at a property can be missed for several days. Meter reading policies should be established as to when to make an investigative field service call to address these missed readings. Non-numeric reads are a slight possibility with fixed network systems.

Communication with the fixed network RF device can be one way or two-way. One way systems receive data from the RF device. Two way systems can communicate with the device, for example to initiate a demand reading or reprogram the reading frequency.

F. Technology review

Near-term

AMR manufacturers, those that solely manufacture AMR devices, like Itron, Hexagram and Datamatic, have been providing devices that are compatible with various metering products for many years. Meter manufacturers that have manufactured, or marketed their own line of proprietary meter reading products have been branching out to make their RF devices more compatible with other vendors' meters. Meter manufacturers have also been developing their own lines of drive-by and fixed network products in order to add value to their metering product line. Meter manufacturers are building more capabilities into their encoder registers to address the movement towards fixed network systems. Additional capabilities have also been built into some drive-by systems to provide more than a single day's reading when interrogated. As a result, utilities may be offered more equipment choices, and more competitive prices.

Another promising development is "high powered" fixed network systems. These systems result in significantly less collection device infrastructure. Depending upon the size and topographical conditions of the utility, these fixed network systems may be priced at or close to mobile drive-by systems.

In the near term, the market should still expect a continued level of proprietary products from AMR and meter vendors. A certain level of compatibility may exist with some equipment manufacturers, but utilities should be cautioned as certain system hardware and software will not have a high degree of interoperability.

Five to ten years

Even with the advent of "high powered" fixed network systems, which is still proprietary there is continued movement to making use of existing public networks. Public networks include phone lines, cable, power lines, cellular phone, and the Internet. Efforts have been underway on how to tap these existing networks cost effectively to offer the utility a more cost-effective AMR alternative. Cost effective gateways into these networks are being developed. For example, short hop radio that will enable the water meter reading to send its signal to the electric meter

for use by power line carrier systems. Satellite reading systems may be perfected in this time frame as well.

It is a difficult choice to decide whether to wait for the "latest and greatest" or make the AMR investment now. The consumer electronics market (personal computers, cell phones, MP3 players, etc.) contributes to this confusion when we observe overnight technology and capability changes. The analysis conducted in the following section will provide a financial framework for this crucial investment decision.

IV. Analysis and Findings

This section of the report will analyze four suggested meter reading alternatives over four different scenarios. The relative impacts that various meter reading options have upon the District's current meter reading operation will also be addressed. The first part of this section focuses on the bigger picture in which this investment decision will be made.

A. Transaction Approach vs. Strategic Initiative

Automatic Meter Reading is a significant investment. Complicating this investment decision is other challenges confronting the utility that are competing for the same capital dollars. Some of these competitive challenges include water quality regulation, infrastructure replacement, security issues, and resource availability. These issues are creating enormous financial, management, staffing, and administrative challenges that must be balanced by the municipal utility.

Compounding the investment decision challenge is the issue of rate increases. A recent AWWA newsletter published the results of water and wastewater rate increases for 75 utilities from 1996 to 2004. It showed that water and wastewater rates rose at an annual rate of 8.36% compared to the CPI rate of 2.31%. The message is that consumers will be paying a higher proportion of their incomes for water resource services, and for some customers water usage may become an affordability issue.

More frequent customer billing may help ease this rate shock. The District's rates have increased significantly since 1997, and future increases are anticipated to be in the 5 to 6% range. The average monthly bill for a residential customer is $26.22 with projected bills anticipated to be in the $33 to $38 range.

Funding sources for the capital investments and operation improvements needed to meet these challenges is also in question. Even though 90% of respondents to a poll published March 7, 2005 noted that clean and safe water is a national issue that deserves federal investment, federal and state loans, and grant sources may be reduced or eliminated.

It is clear that the almost all of the funds required to support municipal utility capital investment will come from the utility's rate payers. Establishing and maintaining a meaningful, partnering relationship with rate payers and local stakeholders might be the best method for receiving the resource support needed by the District. An important consideration in making an AMR decision, and perhaps a particular AMR investment, is linking the District's Vision, Value, Mission and Goals to the features and benefits that AMR has to offer. This may move the AMR investment decision from one that is transactional to one that is strategic. As the business case model helps build the hard cost justification for AMR, there are also considerable soft cost areas that deserve consideration such as minimizing liability risk by providing a safer means to collect meter readings.

B. Alternatives Considered

Four reading alternatives were compared: Touch-read, Walk-by mobile radio frequency (Walk-by), Drive-by mobile radio frequency (Drive-by), and Fixed Network radio frequency (Fixed Network). A comparison matrix of these alternatives is presented below with Walk-by and Drive-by shown as mobile radio.

Cost and General Comparison of Meter Reading Alternatives

	Touch Read	Mobile Radio	Fixed Radio
Equipment			
Interface Equipment	Touch pad connected via wire to an encoder register	Meter interface unit (MIU)) connected to an encoder register via wire or integrated to meter register.	Meter interface unit connected to an encoder register via wire or integrated to meter register.
Reading Device	Hand-held interrogator	Hand-held interrogator or drive-by unit (laptop)	System of collectors and repeaters
Hardware Cost	Touch pad: $10 - $15 Hand-held: $2500 - $3000	MIU: $40 - $100 Hand-held: $3500 - $5000 Drive-by: $25,000 - $40,000	MIU: $80 - $110 Collectors and repeaters cost vary significantly
Installation Cost	Approximately 15 to 20 minutes of labor for pit set meters and 30 to 40 minutes for inside set meters. Large meters higher.	Approximately 15 to 20 minutes of labor for pit set meters and 30 to 40 minutes for inside set meters. Large meters higher.	Approximately 15 to 20 minutes of labor for pit set meters and 30 to 40 minutes for inside set meters. Large meters higher.
Useful Life	Basically unlimited	10 to 20 years depending upon battery life/or replaceable battery. Warranty 5 years, with extensions at higher cost	15 to 20 years depending upon battery life/or replaceable battery. Warranty 5 years, with extensions at higher cost
System Maintenance and Operating Costs	Maintenance service contracts for handheld readers and reading software. Encoder register replacement.	Maintenance service contracts for collection devices, reading software and programming devices. Licensing fees with some products. Encoder register replacement, RF device and collector maintenance.	Maintenance service contracts for collection devices, reading software and programming devices Licensing fees with some products. Encoder register replacement, RF device and collector maintenance. Fees for location of collection devices possible and for sending readings from collectors to utility.

Figure 13

Cost and General Comparison of Meter Reading Alternatives (continued)

	Touch Read	Mobile Radio	Fixed Radio
Pros and Cons			
Advantages	*Cheaper capital cost *Visual contact with reading device *Utility presence maintained in service area	*Higher productivity than touch read. *Fewer meter readers required than touch read *Enables movement to more frequent reading & billing with minor capital and operating cost *Utility presence maintained in service area *Reduced site visits for re-reads and customer requested reads	*Highest reading productivity *No meter readers required *Enables movement to more frequent reading and billing at no additional capital or operating cost *Site visit not needed for re-reads or customer requested reads. *Enables proactive leak detection and customer notification. *Enables customized billing cycles and bill consolidation *Provides nearly immediate notification of tampering *Provides data for resource, meter, and rate management functions *Can adapt to system growth with minor capital costs *Caps meter reading and related operating costs
Disadvantages	*More frequent reading and billing requires additional staffing and support. *Reading cost subject to inflation and wage adjustments *System growth requires additional staffing *Re-reads and customer requested reads are labor intensive	*Higher capital cost than touch read, but less than fixed radio. *Reads impacted by radio reception limitations *More expensive to maintain than Touch Read *Migration path to fixed network may be more expensive than purchasing fixed network initially	*Highest initial cost *Slightly more expensive to maintain than mobile radio

Figure 13 (continued)

C. Operation Impacts

Investment in meter reading technology will impact operations for the next 10 to 20 years. This extended service period makes it difficult to predict changes in meter reading technology within that time frame. We can look at the past as an indicator, but that may cause us to miss or fall short of what future demands may be. Flexibility and growth are two important criteria when considering meter reading technologies, and generate the following questions. Does the system provide flexibility for future requirements, and if not, what will it cost to provide operating flexibility? Can the system keep pace with growth issues, such as the number of accounts, expansion of territory, and other resources needed to support that growth?

The following chart identifies several operational parameters that are commonly affected by the meter reading system. Some of these parameters have defined, hard costs associated with

them that will be addressed in the financial model, and other parameters have less well defined soft costs that will require further research to quantify costs.

Operational Comparison of Meter Reading Alternatives

	Touch Pad	Mobile Radio	Fixed Radio
Meter reading frequency	Increase in frequency requires additional labor. Bi-monthly reading requires 4+ readers and monthly reading requires 8+ readers, unless routing and incentives increase productivity	Monthly reading possible with 1 meter reader. Depending on configuration of growth, one additional day of reading for every 6% to 9% of growth. Add collector after growth reaches 100,000 to 120,000 accounts	Several readings per day *without any meter reading* staff
Meter reading effort	250 to 600 reads/ person/day	5,000 to 10,000 reads/ person/day and higher	No meter readers
Eliminate estimated bills	Dependent upon meter reader capturing a read/visiting the property	Dependent upon meter reader capturing a read/visiting the property	Almost all, unless reading system at meter location is not functioning a few days prior to billing date
Reduce re-reads & customer requested field service calls	15 to 30 per day/man	30 to 100 per day/man	Unlimited
Customer Service transaction times	2 business days	1 to 2 business days	1 business day
Proactive high-bill tracking and notification	Whatever can be done from monthly readings. Too few data points to develop meaningful trend information.	Same as touch pad, unless additional reading done for high-bill tracking purposes. RF device with profiling capability provides daily usage and leak detection	Single to multiple daily reads enable this function
Tamper & theft of service	Sets tamper flag if wire is cut or disconnected from register. Pick up at time of reading or report	Sets tamper flag if wire is cut or disconnected from register. Pick up at time of reading or report	Identifies tamper same day and sends to collector unit. Utility able to identify next business day.
Customize reading/billing dates	Account must stay within designated billing cycle	Account must stay within designated billing cycle	Complete flexibility in establishing billing cycle to meet account needs. Rules and priorities need to be established.
Bill consolidation	Only for accounts within same reading cycle	Only for accounts within same reading cycle	Can be extended to accounts regardless of cycle
Provide consumption profiles for high bill investigations and conservation	Some capability, depending on system	Some capability, depending on system, including on site information	Daily information available. Web access possible.

Figure 14

Operational Comparison of Meter Reading Alternatives (continued)

Ability to monitor for leaks in customer's premises	Whatever can be done from monthly readings. Too few data points to develop meaningful trend information.	Same as touch pad, unless additional reading done for high-bill tracking purposes. Encoder with logging capability provides daily usage and leak detection. Some systems set flag for continuous usage	Single to multiple daily reads enable this function
Monitor for compliance with conservation or watering restrictions	No. Must police compliance manually.	No, unless special reading is conducted	Able to monitor compliance remotely
Support unaccounted-for water studies	Limited	More than Touch Read, but less than fixed	Provides daily, detailed data
Support inflow/infiltration studies, hydraulic modeling	Limited	More than Touch Read, but less than fixed	Provides daily, detailed data
Support cost of service rate modeling	Limited	More than Touch Read, but less than fixed	Provides daily, detailed data
Improve resource planning	Limited	More than Touch Read, but less than fixed	Provides daily, detailed data

Figure 14 (continued)

D. Compatibility Issues

An important consideration in making an AMR investment is the level of open architecture that the District is interested in achieving. As noted earlier, the options for AMR are limited depending upon the open architecture of the RF devices. For example, the meter and meter register are normally produced by the same manufacturer, though several makes of meters may still be deployed throughout the system. The RF device, collection devices and the software are normally produced by the same manufacturer creating "zones" of proprietary product. A complicating factor may arise when the RF device is connected to the meter register. In the District's situation, with most of the meters located in pit applications, a factory potted, pre-wired register and RF device assembly offers the greatest level of reliability. It is important to review this issue during the product evaluation process.

Another important consideration in making an AMR investment is the ability to interface with other utility systems or software applications. While this may have been an issue in the past, these concerns have been mitigated as reading and meter manufacturers are working to standardize software protocol. The benefits of open architecture include the ability to use more than one meter vendor's product with existing utility systems and applications. The District will need to determine what value to place upon open architecture. That final decision may not be made until the AMR procurement evaluation process is completed.

The level of open architecture that the District is able to achieve is related to the amount of the existing meter base, and its connected encoder register that will be retained versus what will be replaced. The less existing product that remains in the system, the more opportunity there will

be for other vendors to offer competitive solutions. In other words, considering meters other than Sensus and Neptune should increase the likelihood that the District will implement the most cost effective meter reading solution.

The following two tables present a compatibility comparison between the various major meter brands and AMR systems that are currently on the market. Figure 15 is for mobile RF systems and Figure 16 is for Fixed Network Systems.

Compatibility of Major AMR and Meter Manufacturers for Mobile RF Systems

AMR	Meter Brand			
Brand	Sensus	Neptune	Badger	AMCO
Sensus – Radio Read	Yes	Yes	No(1)	No(1)
Neptune – R900	Yes	Yes	No	No(1)
Badger – ORION	Yes(2)	Yes(2)	Yes	Yes – digital & Scancoder
AMCO – TRACE	No(3)	No(3)	Yes – RTR No–ADE(3)	Yes – digital encoder
Itron – ERT	Yes	Yes	Yes	Yes

(1) Sensus is developing technology to read Badger register. Sensus and Neptune can read AMCO registers per AMCO.
(2) Badger recently introduced a universal ORION RF device that is capable of reading selected Sensus/Neptune and AMCO encoders. Different device needed to read Badger's digital encoder.
(3) AMCO in process of imbedding Sensus protocol into its encoders.

Figure 15

Compatibility of Major AMR and Meter Manufacturers for Fixed Network Systems

AMR	Meter Brand			
Brand	Sensus	Neptune	Badger	AMCO
Sensus – Nexus	Yes	Yes	No	No(3)
Neptune – R900 Micro	Yes	Yes	No	No(3)
Badger – Galaxy	No – not for initial release	No – not for initial release	Yes	No – not for initial release
Hexagram – Star(1)	Yes	Yes	Yes	Yes
Itron – Fixed 2.5(2)	Yes	Yes	Yes	Yes

(1) Hexagram is marketed directly, through AMCO, and other meter vendors. Different RF device is needed for absolute and digital encoders.
(2) Itron Fixed Network 2.5 uses one RF device for either absolute or digital encoders.
(3) Sensus and Neptune can read AMCO registers per AMCO.

Figure 16

E. Account Service and Billing Considerations

The Account Service and Billing costs incurred, and the benefits that accrue by adopting AMR are not easily quantified. In any sense the means to calculate the impact on Account Service activities lies outside the scope of this project.

In general terms, the cost of account services and billing is not affected by AMR. Account services and billing costs will increase dramatically if billing frequency is increased to monthly. If

NKWD were to implement AMR, and not change bill frequency, HDR forecasts no Account Service cost savings or increased customer revenue because the number of meter readings and bills issued per year will not change.

If the District increases bill frequency moving to bi-monthly or monthly billing, Account Service costs will increase. The most obvious is bill printing and postage cost which will almost triple. Additional Account Service staff will need to be added to handle the review of an increased number of meter readings associated with bill preparation. Also more Account Service staff will be needed to handle an increased number of customer requested meter readings. These requests will probably not triple, but there will be more requests than received under quarterly billing.

While there will be an improvement in productivity related to Field Service meter readings, HDR does not forecast a decrease in Account Service cost because the number of customer requested meter readings will not decrease.

HDR has accounted for the increased cost of Account Service through the increase in meter readings. As the number of meter readings increases, the cost of providing customer service increases at the same rate. Using this proxy, the Account Service operating cost associated with monthly billing is triple that of quarterly billing. The District is encouraged to undertake a more complete investigation of Account Service and Billing costs related to increased bill frequency from quarterly to monthly.

F. Cost Analysis of Alternatives

There are an almost infinite number of possible meter reading alternatives due to the number and complexity of the variables. HDR analyzed the cost impacts of four meter reading alternatives: Touch Read, Walk-by radio frequency (Walk-by), Drive-by radio frequency (Drive-by), and Fixed Network radio frequency (Fixed Network) using a cost model specifically developed for the District.

The financial model provides the District with a tool to run additional scenarios, changing variables to test the "sensitivity" of results. The model results are extremely sensitive to meter equipment pricing, particularly the cost of the meter interface unit. The price of the meter interface had a large impact on the results. Reducing the price of the meter interface unit changed significantly the NPV ranking of alternatives. The rate of deployment and meter reading productivity also impacted the ranking of results. For this reason, the District is encouraged to investigate the cost of meter reading equipment more thoroughly through a competitive bidding process.

There are many soft cost and non-economic factors to apply to an AMR technology decision. However, by focusing on the financial model results first, the relative cost effectiveness of each meter reading technology can be examined. HDR forecasted the operating and capital cost for each reading alternative, using both quarterly and monthly meter reading frequency over 10 and 15-year planning horizons. The net present value (NPV) of costs associated with each alternative was calculated to form the basis of the cost analysis comparison[2]. It should be noted that while HDR calls it quarterly meter reading, in actuality the District reads about 3% of its accounts monthly.

[2] In this case, net present value is the future cost of meter reading operations and capital investment presented in current dollars. It takes into account the time value of money where in order to have $1.06 available to pay for operations and capital one year from today, the District would need to invest $1.00 at 6% annual interest. The model extends this concept by calculating the amount of money, invested at an annual rate of 6%, needed today to cover meter reading operations and capital costs over both 10 and 15-year planning horizons.

A summary of the analysis of quarterly meter reading costs is presented below. This table presents the analysis results of Scenarios 1 and 2. Review of the table indicates that the current Touch Read system is the lowest NPV cost in all four categories.

Current Read Net Present Value Cost Comparison

Level of Service	Touch Read	Walk-by	Drive-by	Fixed Network
Current reading and billing, 10-year horizon, 10-year AMR deployment	$18,321,548	$21,981,447	$21,197,469	$22,754,859
Current reading and billing, 15-year horizon, 10-year AMR deployment	$25,667,564	$29,060,094	$27,796,044	$29,181,644
Current reading and billing, 10-year horizon, 3-year AMR deployment	$18,321,548	$22,383,010	$21,377,544	$22,825,894
Current reading and billing, 15-year horizon, 3-year AMR deployment	$25,667,564	$29,461,657	$27,976,119	$29,252,679

Figure 17

The following graphs present an interesting comparison. The first graph displays total meter reading operating cost for a 10-year planning horizon. This cost includes Meter Reading, Field Service, and Account Service. The graph shows that Drive-by and Fixed Network offer the lowest operating cost per read over a 10-year planning horizon. The second graph adds capital expenditures of each alternative to operating cost. The results here show that Touch Read, Drive-by, and Fixed Network offer almost the same total cost per read by the end of the planning horizon.

Average Operating Cost per Read Comparison of Meter Reading Alternatives (Current Reading and Billing Frequency)

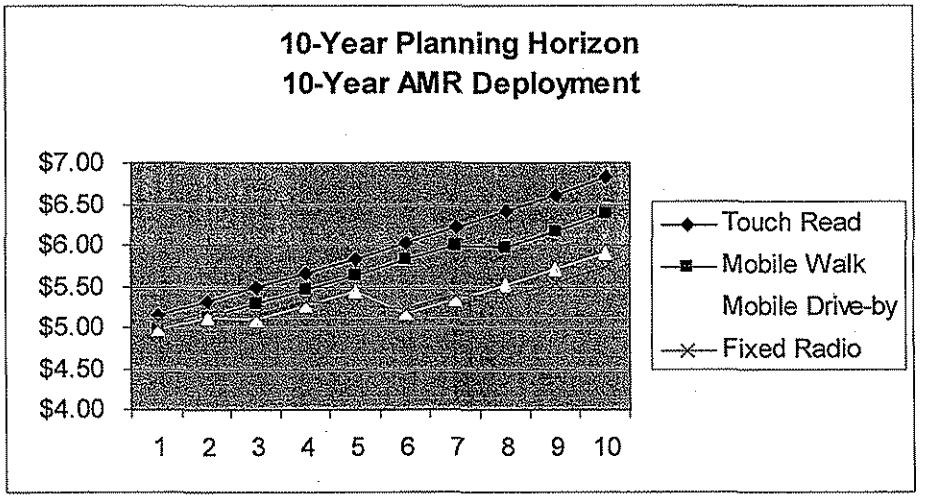


Figure 18

Average Total Cost per Read Comparison of Meter Reading Alternatives (Current Reading and Billing Frequency)

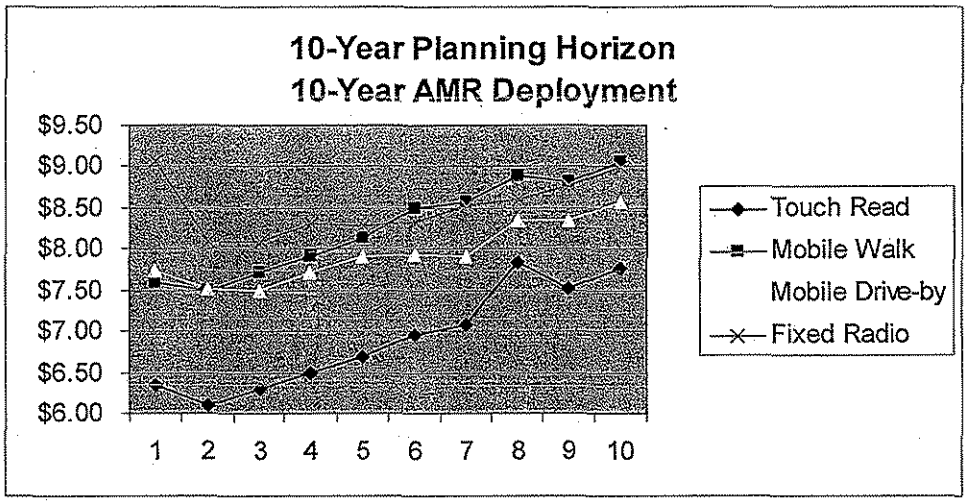


Figure 19

Graphs of a 15-year planning horizon present a different result. For both operating and total cost per read, Drive-by and Fixed Network offer the lowest cost per read with the Fixed Network option being slightly less than Drive-by as shown in the following graphs.

Average Operating Cost per Read Comparison of Meter Reading Alternatives (Current Reading and Billing Frequency)

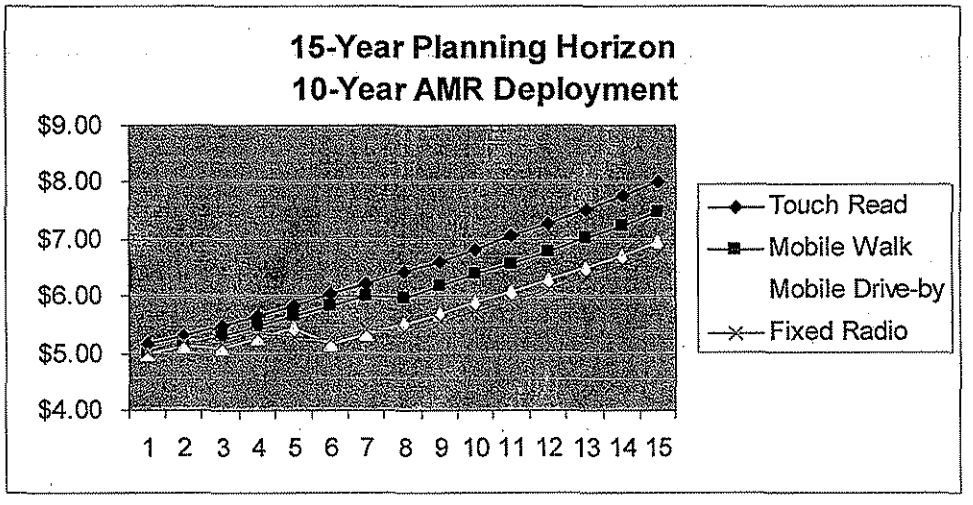


Figure 20

Average Total Cost per Read Comparison of Meter Reading Alternatives
(Current Meter Reading and Billing)

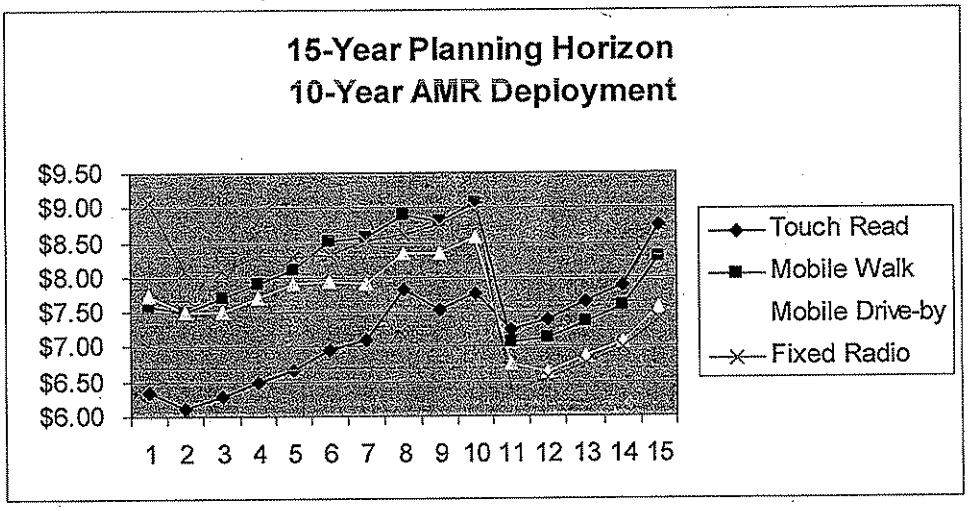


Figure 21

A summary of the analysis of monthly meter reading costs (Scenarios 3 and 4) is presented below. Review of the table indicates that Drive-by is the lowest NPV cost alternative in three of four categories with Fixed Network second in two of four comparisons.

Monthly Read Net Present Value Cost Comparison

Level of Service	Touch Read	Walk-by	Drive-by	Fixed Network
Monthly reads, 10-year horizon, 10-year AMR deployment	$39,549,979	$42,366,256	$40,124,769	$41,679,352
Monthly reads, 15-year horizon, 10-year AMR deployment	$58,840,335	$60,397,229	$56,444,969	$57,829,536
Monthly reads, 10-year horizon, 3-year AMR deployment	$39,549,979	$41,964,215	$38,725,634	$40,173,984
Monthly reads, 15-year horizon, 3-year AMR deployment	$58,840,335	$59,985,342	$55,029,189	$56,305,748

Figure 22

The following graphs display cost per read comparisons of monthly reading alternatives. The first graph displays total meter reading operating cost for a 10-year planning horizon with a 10-year AMR deployment. Again, this cost includes Meter Reading, Field Service, and Account Service. The graph shows that Drive-by and Fixed Network offer the lowest operating cost per read over a 10-year planning horizon with Fixed Network costing less per year by the end of the planning period. The second graph adds capital expenditures of each alternative to operating cost. The results here show that Drive-by and Fixed Network offer almost the same total cost per read by the end of the period.

Average Operating Cost per Read Comparison of Meter Reading Alternatives (Monthly Meter Reading)

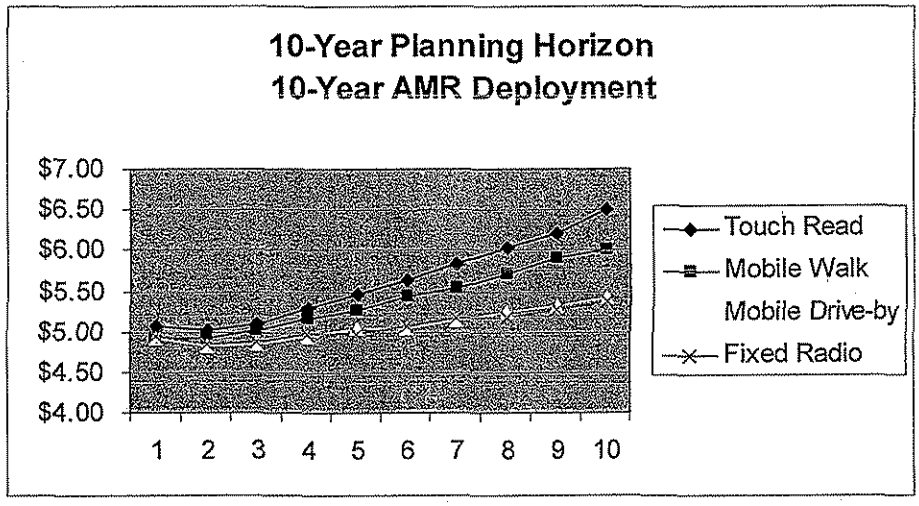


Figure 23

Average Total Cost per Read Comparison of Meter Reading Alternatives *(Monthly Meter Reading)*

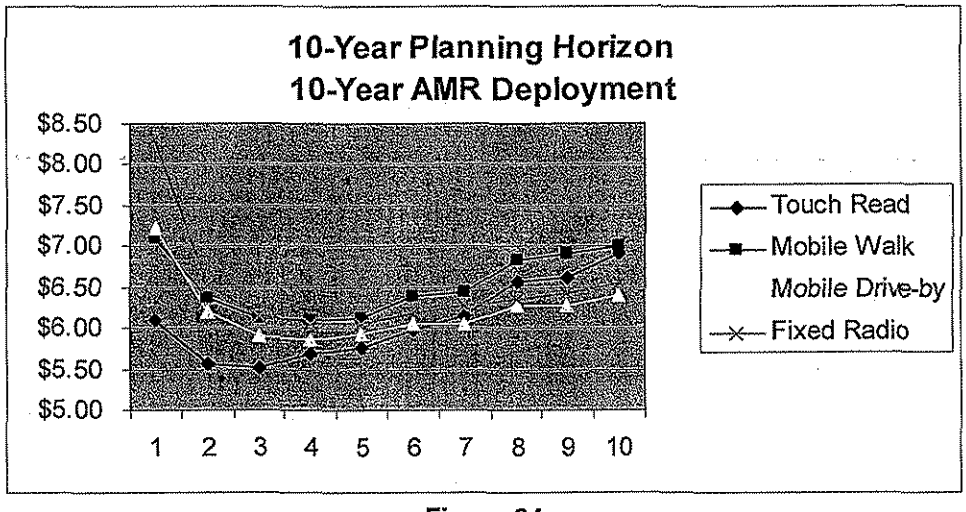


Figure 24

When comparing alternatives for monthly reading over a 15-year planning horizon, the order of results does not change. The cost per read spread between Drive-by and Fixed Network becomes greater when compared to Touch Read and Walk-by.

Average Operating Cost per Read Comparison of Meter Reading Alternatives (Monthly Meter Reading)

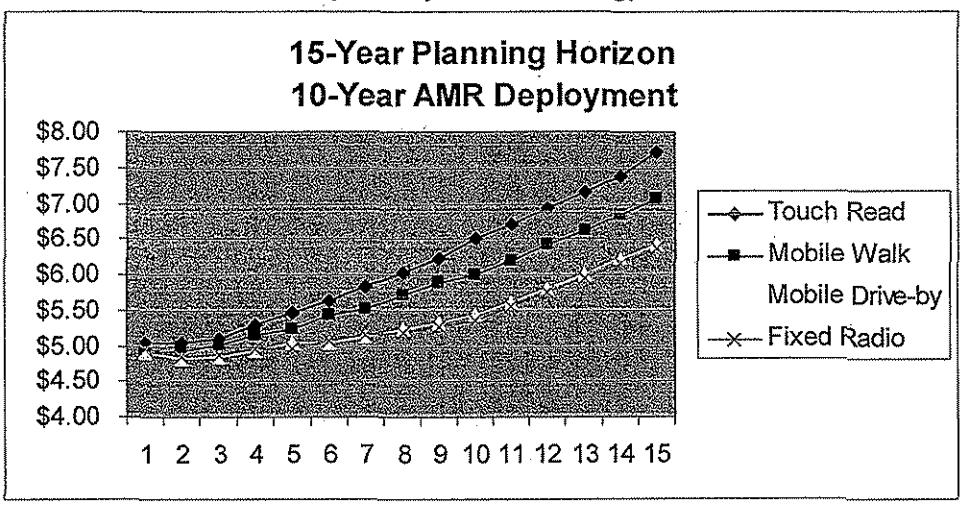


Figure 25

Average Total Cost per Read Comparison of Meter Reading Alternatives (Monthly Meter Reading)

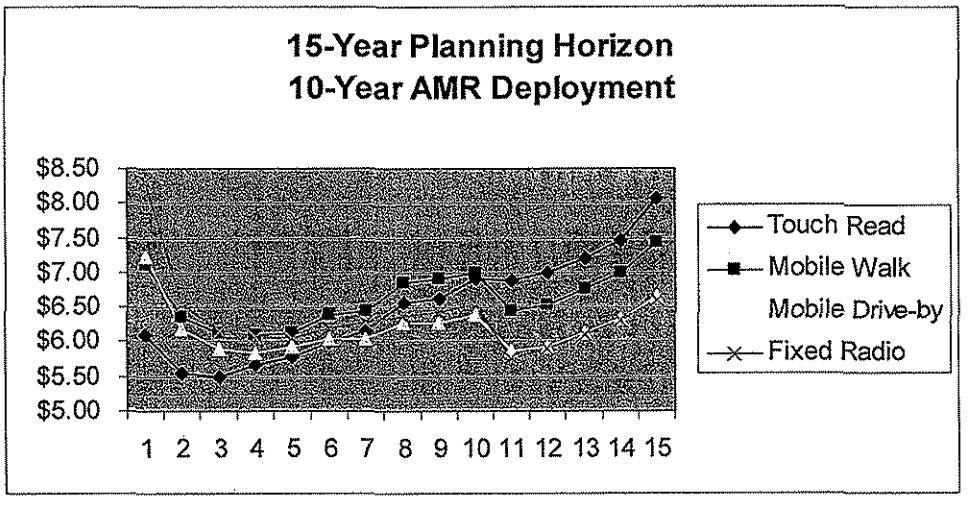


Figure 26

A ranking of the analysis results of the four scenarios is presented in the table below. A rank of 1 indicates the lowest NPV cost alternative. Touch Read is the lowest cost alternative in five of the eight comparisons. Reviewing this table reveals that Drive-by AMR is the lowest cost alternative in three of the eight comparisons, and is the second lowest cost alternative in the remaining five. Fixed Network systems are ranked as the second lowest cost alternative under two of the four monthly meter reading analyzes.

While it appears that Touch Read is the least cost, and subsequently the best meter reading alternative for the District, NKWD should consider the end results of each analysis performed. As previously pointed out, at the end of both the 10 and 15-year planning horizons, total annual cost Drive-by and Fixed Network are less than Touch Read. In fact, under current reading and billing frequency with 10-year AMR deployment, both Drive-by and Fixed Network are less expensive than Touch Read by the end of Year 8.

Rank Comparison of Meter Reading Alternatives

Scenarios	Planning Horizon	Touch Read	Walk-By	Drive-by	Fixed Network
1 – Current reading frequency and deployment	10 years 15 years	1 1	3 3	2 2	4 4
2 – Current reading frequency w/3 year AMR deployment	10 years 15 year	1 1	3 4	2 2	4 3
3 – Monthly reading w/current deployment	10 years 15 years	1 3	4 4	2 1	3 2
4 – Monthly reading w/3 year AMR deployment	10 years 15 years	2 3	4 4	1 1	3 2

Figure 27

G. Key Implementation Issues and Risks

Implementation issues and risks will be dependent upon the AMR technology solution selected, especially in the area of the District's operations. One component of the decision making process will be the additional effort that the District will have to undertake to implement and maximize the AMR technology solution. This section will highlight some of these efforts.

The financial model measured the economic impacts of accelerating the deployment of AMR technology. The model was run for 10-year and 3-year AMR deployment. The results have been presented in the previous section. The model indicates that the sooner the AMR technology solution is implemented, the more cost effective it becomes. This result occurs due to the accelerated reduction in full-time equivalent Meter Readers and Field Service Representatives.

There are several additional benefits to this strategy that is difficult to capture in a financial model. For example, there are costs associated with running two systems in parallel for a long period of time. This can create confusion for the organization and the customer. The District would be delivering two levels of service to its customers; those that have the new system and those that are not. Economies of scale may be lost, both in the system deployment effort and routine work. As an example, routine meter reading costs may increase if 100% saturation is not achieved in a particular area, as readers would have to make special visits to such accounts. As noted earlier in this report, instead of the meter reading costing $1.00 per read, it would be more like the field service reading cost of $20.61 per read presented Section II, Figure 10.

Considerations will need to be weighed regarding the system implementation strategy. How the Bid is structured affects how companies will price the project and how competitive the process may be. The age of the existing meter base is relatively young. Many utilities normally replace meters that are over 5 years old and retrofit the younger meters, depending upon the speed of the replacement program. However, by having an existing, relatively new meter base, some vendors may have a comparative advantage. The District may need to consider if the quest for open architecture and maximizing competition is worth stranding some of its meter assets.

The Bid might be structured as turnkey proposal, or separated into components, such as AMR equipment, meters and deployment services. Another consideration is whether the installation services will be performed in-house or out-sourced. The District will also need to examine the project management requirements. Even with a turnkey project, there are numerous project management and support tasks that must be performed by the District or an agent retained to represent the District. These decisions will affect the overall cost of the project.

The District will need to allocate resources to determine how the selected AMR technology solution will affect its operations and how to best maximize its features. Utilities typically establish a team representing those areas of the operation that are most impacted by the technology solution to sort through these issues. They also rely upon consulting services to lead the team or provide technical support. The following highlights some of the more critical areas requiring attention:

- Re-allocation of meter reading and field service staff members
- AMR system maintenance material and staffing requirements
- New policies and procedures to support the AMR system and changes to level of service
- Customer service staffing and service delivery
- Use of AMR data and information to improve management of the District
- Billing system interface and data management (during system deployment and continued operations)
- Adjustments to cost of service rates and special service fees; creation of new service fees

The rapid deployment of an AMR system will have an impact on future meter reading system maintenance and replacement schedules. Depending upon the life of the meter and life of the RF device, these components can be on two different replacement schedules, especially if PSC requirements do not have sufficient flexibility regarding meter replacement. The District may also need to review staffing requirements for this future work, or outsource it when the next replacement program is initiated.

Currently, the District is shouldering the entire cost of the meter reading system and related maintenance, field service and billing activities. The District provides meter reading information and other services to the Sanitary District at no cost. The Sanitary District uses these meter readings to render its own bills. It is certainly not cost effective for the Sanitary District to maintain a parallel metering operation, nor is it effective to have some other administrative scheme to approximate wastewater service usage. Other utilities use a cost sharing arrangement with their wastewater counterparts to cover meter related capital and operating costs. This certainly should be explored, especially when considering movement to AMR.

Risk mitigation for an AMR technology solution runs the same course as most other projects. There needs to be an assessment done of the various risk factors at each stage of the process and a plan to address them. Most of the vendors in AMR are well established and have sufficient financial resources to stand behind their product. Establishing reasonable and performance driven operation and warranty requirements will help mitigate most risk factors. The only area that may be insufficiently tested is the interoperability of some equipment

between certain meter vendors. The District should consider requesting an open-system meter reading architecture to maximize competition, providing it with more solution choices. However, sufficient consideration to such interoperability risk issues will need to be addressed in the product evaluation and contract negotiation process to avoid problems.

H. Other Reading Alternatives

In addition to owning and operating the meter reading system and process, the District has several alternatives it can explore.

One alternative is to outsource meter reading services to a third party vendor. There are several national firms, including local gas and electric utilities that offer this service. Contract periods are typically 3 to 5 years long and provide a fixed unit cost for most reading activities. Price per read for this service runs from $1.00 to 2.00.

The major benefit of this alternative is it allows the District to more easily budget for meter reading costs. The downside of this alternative is the loss of control over this critical revenue generating operation. It appears that these outsourced service contracts are decreasing with meter reading responsibility reverting back to the water utility.

The District may wish to explore a joint venture with neighboring utilities. Sharing the cost of AMR implementation will reduce the cost of AMR. This option could prove restrictive if an AMR system is already deployed by the neighboring utility. In this case, the District will be limited to the technology on hand. The District will still need to purchase and install the AMR components, but the neighboring utility may be able to provide the fixed network collector system, mobile reading equipment or reading service.

Another alternative is for NKWD to take the lead in providing meter reading service to other utilities. In this case, NKWD would be compensated to perform these services, providing revenue that would reduce District customers' rates. Following this alternative would keep the District in control of its customers' meter reading. The District could select the AMR technology and equipment best suited to its needs.

There are several risk factors associated with each alternative that need to be fully explored prior to implementing any strategy.

V. Recommendations and Conclusion

A. Recommendations

HDR offers the District the following meter reading system recommendations. These recommendations are separated into four main categories: Preferred System, Deployment, Procurement, Implementation, and Operation. By following these recommendations, HDR is confident that the District will install and operate the meter reading system that meets the future needs and requirements of the system.

Preferred System

- Implement a radio frequency Drive-by or Fixed Network AMR system. This technology provides the District with the type of benefits that delivers the level of service envisioned by the District's Mission, Vision and Values statement. Drive-by and Fixed Network AMR provides the flexibility to address future challenges and uncertainties that the current touch read system cannot hope to address, including:
  - Provides the District with an immediate strategy to eliminate and cap certain labor costs, while positioning itself for low cost service territory expansion.
  - Elevates meter reading and billing from a transaction to a relationship with the customer - a utility trend. Customer relationship management is mission critical to the District as it faces the financial challenges associated with water quality, regulatory, infrastructure replacement, security, and water resource availability issues.
  - Provides an unparalleled amount of data that can be crafted into proactive customer service and utility management information. Customer service enhancements include providing customers with consumption history/analysis, identifying leaks before they escalate out of control, reducing response time to customer inquiries. Utility management information includes consumption data that can assist with hydraulic modeling, real-time evidence of meters that are starting to under-record volume, and increased data for water audits and leak detection analysis.

Deployment

- Deploy the selected AMR technology solution within 3 years or less. The sooner the system is installed, the sooner the District receives solution benefits. This avoids running the current touch read system in parallel with the new AMR system for too long reducing operating confusion, differences in service level delivery, and overall meter reading operating costs.
- Examine whether the District can deploy the AMR system itself. There are several well qualified installation service contractors available on the market. However, the District may be able to save resources and build capacity by performing the deployment themselves. Should the deployment or entire project be contracted out to a single vendor, the District will still have an extensive project management responsibility and role. How this responsibility and role will be performed must be reviewed and estimated.
- Unless extenuating circumstances can be demonstrated, the initial meter replacement and AMR deployment target area should be the City of Newport service area. This service area is slated for meter replacement within the next two years and has one of the higher meter reading operating costs in the NKWD system.

Procurement

- Once AMR technology and deployment solution strategies are determined, issue a Bid document. The Bid should allow proposals on both Drive-by and Fixed Network radio frequency solutions. The benefit of a joint bid is that the price to the District may be driven lower as result of vendors offering competing solutions.
- The Bid should be structured to maximize competition. This may require abandonment of existing metering product before the end of its useful life.
- The Bid and vendor selection process should stress the value of open architecture. Reading system should be able to read multiple makes of meters, while minimizing RF device inventory requirements.
- Re-validate all major assumptions contained in the financial model to ensure the new operational structure will support the level of activity projected by the selected AMR technology decision. Prior to selecting a vendor rerun the financial model using the results of the proposals, and other information gathered in the course of the Bid process.
- Select the AMR technology that provides the lowest whole life cost of ownership. Factors such as useful life, battery life, warranty coverage and terms, failure rates, ease of maintenance, ease of operation may be more important factors than initial purchase price. Soft cost and non-economic factors may play a key role in the decision making process.

Implementation

- During the procurement and implementation period, the District should continue with its current meter replacement program using AMR compatible meters while minimizing current meter inventory.
- Once an AMR technology solution decision is made, establish a team to identify and implement strategies that will maximize this AMR investment. Many opportunities will present themselves and the District needs to have a mechanism in place to take advantage of them.
- As soon as an AMR technology solution decision is made, suspend replacement of manual read and pin style read meters, and any further investment in the existing meter reading system. Any meter replacements should be completed with product that is compatible with the selected AMR technology solution.

Operation

- Examine the meter accuracy of the small meter population and determine if extending the current 10-year meter replacement cycle is warranted. The most cost effective operation of an AMR system occurs when meter and AMR replacement/service activities are performed at the same time, and when both systems are at the end of their useful lives. Normally, a longer installed life of a meter and RF system, the lower the total cost of ownership.
- Shift a negotiated proportion of the capital, operating and maintenance costs for meter reading activities to the Sanitation District. The Sanitation District is currently not charged for its proportionate share of meter reading and billing activities. The fact that the Sanitation District is not charged for these services becomes even more important if NKWD makes the investment required for AMR deployment to support monthly meter reading and billing.

B. Next Steps

The next step for the District is to develop a Bid document to solicit proposals from meter reading vendors. The District should request two bid prices relating to 10 and 3-year system-wide AMR deployment. Vendor proposals should also include pricing for a "turn-key" AMR installation. HDR is confident that through this procurement process, the District will be in the best position to make the appropriate choice regarding its future meter reading system.

If the District elects to move ahead with system-wide deployment, we recommend that in lieu of a pilot program, the District's senior staff should conduct structured visits at one or two utilities that have implemented AMR to better understand how these systems function, what is involved in successful deployment, and how the utilities are coping with integrating the new technology into day-to-day operations.

We would like to thank the District for the asking HDR to conduct this meter reading feasibility study, and look forward to the opportunity to assist the District with any of the required next steps. In the meantime, we are prepared to respond to any questions and concerns that may have resulted from the analysis and recommendations presented in this report.

VI. Appendices

Appendix A

Meeting Minutes

NORTHERN KENTUCKY WATER DISTRICT

Northern Kentucky Water District & HDR Inc. Meeting

March 23, 2005

Attendees: Northern Kentucky Water District

Mark Lofland	Ron Weyman
Don Gibson	Mary Alexander
Rusty Collinsworth	Barb Northcutt
Chris Wetherell	Melissa Bielo

Attendees: HDR Inc.

Tom Jakubowski
David Foltz

A meeting between the Northern Kentucky Water District and HDR Inc. was called to order at 9:00 a.m. at 3049 Dixie Highway, Covington, Ky.

- **Overview**
  - Tom Jakubowski gave an overview of the purpose of this meeting. The Main Point: Is AMR feasible for the District?
- **Interview Notes - Handout:** The following issues were presented to Mr. Jakubowski and Mr. Foltz in interviews held on March 22, 2005 with district employees. The different issues/comments/expectations of this study were compiled, discussed, and voted on in this meeting.
  - **Meter Management Issues:**
    - The need to replace Newport Meters:
      - Newport is the District's least efficient area. There is a high degree of go-backs for readings in the Newport area. Newport meets the criteria for a business case for AMR feasibility: Accuracy, Difficulty to read, and Age limit.
    - Current meter replacement is not strategically based:
      - The District does not have a systematic focus plan for changing-out meters. The productivity of AMR will be lost if the same change-out

system is kept. A systematic approach is key to implementing the new metering system.

- **Meter Reading Issues:**
  - Cost per meter read:
    - Items included in this cost: equipment, cost to maintain the equipment, and labor. In order to compare the District's cost per meter read to another system our size, we would need to know how they developed their cost. HDR has not seen standardization for this, but will compare the District's cost per read to another utility of the same size.
  - Standard/consistent meter reading technology:
    - Different types of meters (neptune, gallon, cubic feet, manual, touch read, etc)
    - A more effective and efficient reading system will come with standardization of the meter reading technology.
  - Limitation of radio reads:
    - Will a Radio Read System limit the District due to some equipment, hills, etc?
    - Will the District be limited in certain areas if AMR is chosen? It is important to test in the field to learn the limitations that AMR will impose on the District.
  - Route Optimization:
    - The way the routes are laid out the Meter Readers are not able to read them in one day.
    - AMR would eliminate this issue.
  - Lowest cost meter reading alternative or best alternative:
    - The District wants to be good stewards of their money.
    - Best Alternative: What is *best* for the district at this time?
    - Tie this into Benchmarking- where does the District stand in comparison to other water utilities of the same size?
  - Durability of existing meter reading equipment:
    - Maintenance Issues

- Manufacturer Issues: Different equipment so when there is a problem with the equipment there is usually a longer process than necessary- for example; a call is made to the 1st company who tells us the problem is with the 2nd company, etc.
    - This issue goes back to the *Standard / consistent meter reading technology*- getting on 1 system

- Skeptical about radio at first, but now believes:
    - AMR is the most reliable
- Existing meter reading system is "old and tired":
    - It is still reliable, but it is not the most efficient system
- Inconsistency in meter reading capture accuracy:
    - Results that are being captured may not be accurate.
    - The number of ECR's we read compared to the number of ECR's we are getting a reading on.
        - Chris Wetherell has the number of Billing Inspections that the Servicemen are doing
- Is Campbell County representative of radio read capability: (Related to Limitation of Radio Read Issue)
    - 160 in Campbell County, 100 in Kenton County
    - Fixed and Drive By are 2 different things
    - When Ron Weyman drives this it's 120-160 miles in that day
- Concerned about on the job safety – particularly traffic and reading access:
    - Current system is not as safe as AMR:
        - In/Out of vehicles
        - Parking vehicles and walking
        - Pets
        - Etc
    - The District does not have a system of problems that have occurred.
    - Look at other utilities comparable to the District and see where we stand.
- Recurring ECR problems:

- Same problems on same accounts
- Is this delaying the Billing process?
- NKWD is tracking this now → the number of accounts that are affected by this are not hundreds but dozens.

- Meter reading routes unbalanced – too large:
  - Relates to *"Lopsided Cycles Issue"*
  - Try to schedule 1 route a day
  - Quicker turn-around → reads come in, download information, get bills out → instead of waiting until the end of the month.
  - The closer the District can bill to the meter reading date → the easier it will be on Customer Service as a whole.
  - If the District goes to AMR, will this be an issue?
- Current radio hand-held system reliability:
  - Relates to *Durability of Equipment*: ties into reading Neptune meters with Sensus guns, etc
- Radio system reliability in Newport:
  - Relates to *Limitation of Radio Read*
  - Will it work in Newport?
- There is no incentive for good/high productivity:
  - The Meter Readers are the ones driving the revenue.
  - The number of meters they read a day is tied into their appraisal
  - If the District goes to Radio Read the customer will no long see the employee from the District reading → this could be a good or bad thing.
  - The liability issue → a majority of the work orders are brought in by the meter readers → this will be lost with AMR.
- Meter reading and weather issues:
  - The past couple of winters have not been as bad, however, the weather could force estimated bills → the bigger issue is job safety for the meter readers.

➢ **Customer Service and Billing:**

- Cycles are "lopsided." It would help to even these out:

- An AMR System would help normalize the flow of bills through the system
- *Biggest Road Block*: the District sends the information to Sanitation. Sanitation would need to change some of their information.

- Move towards monthly billing:
  - Trend is going towards monthly billing and AMR would make this feasible.
- Reduction in work orders: (Relates back to *Reliability Issues)*
  - The District wants to drive the number of work orders down as much as possible, the less frequently we need to send the Servicemen back out, the better.
- CIS and meter reading technology compatibility:
  - In the District's RFP state how the two need to be compatible
  - What provides the easiest transition but is cost efficient? (Relates to GIS)

➢ **General Issues**:

- Strives to be the best-in-class (benchmarking): The District wants to see what other utilities of the same size are doing in order to have the most efficient and cost effective system. Productivity, cost-efficient, safety → these all go into being the best-in-class. It is important to look around and see what has worked and what hasn't worked → the District wants to be good stewards of their revenue.
- Consumption data requirements for analysis:
  - Relates and was discussed with *How much meter reading information is enough?*
  - A fixed system will help with the up & down consumption customers.
  - This depends on what the District wants out of it
- Turn-key versus in-house implementation: (Relates to *Opportunistic AMR implementation & Implementation schedule – 3,5, or 10 years)*
  - Does the District have the staff to do this? Or should the District hire a firm to implement, install, etc?

- Hire someone to do the initial implementation and installation, then the District would continue with any new meters/services to install.
- Change Newport in a year as a pilot program?

- Opportunistic AMR implementation: (Relates to *Turn-key versus In-house & Implementation Schedule)*
- Additional work due to AMR:
  - Maintenance will need to be done on these meters
  - Additional work in regard to IS department → the focus shifts from one department to another.
  - What will be the cost of additional work?
- Staffing/employment level impact:
  - HDR has not seen a reduction in staff when switching to AMR. However, there may be changes in staffing.
  - Where does the change affect the most? Meter Readers, Customer Service Calls
  - This will not be a detrimental issue.
- Fixed radio system option:
  - Reduces the labor that goes into Meter Reading.
  - Will it work in the District's system with the terrain, etc?
- Implementation schedule – 3,5,or 10 years:
  - A 2-3 year implementation process if the District goes with the turn-key approach.
  - Have to look at the District's money/revenue?
  - If the District does the implementation on a 10 year plan they will run into software and technology changes.
- How much meter reading information is enough:
  - This relates to the data information on *Consumption data requirements for analysis.*
  - Fixed system will provide constant data
    - This would be beneficial for hydraulic analysis.

- Geo-coding of meter locations:
  - The District would like to link GIS to CIS → GPS is needed
- Need to be more cost conscious – do more with less:
  - This refers back to *Lowest Cost Meter Reading Alternative*
- Decision regarding meter reading technology:
  - The District wants to move forward, we want to get the ball rolling.
- Collaboration opportunities:
  - If the District goes to fix read → there can be collaboration between Cinergy and other utilities.
    - Where's the risk gauge on this?
- Departmental cooperation and coordination of workload:
  - Working between departments is KEY in this process.
  - Is the staffing balanced?
  - Is the staff cross-trained?
  - How much cross-training is being done now?
  - How will AMR affect this?
  - How will being in a Central Facility help?
- Comparison of existing meter reading technologies:
  - Relates to Benchmarking
  - Where is the industry today? And where does the District fit in?

❖ **Voting on Issues:** The committee voted on the above issues. Each District employee was allowed 8 votes. The following chart shows the number of votes for each of the issues discussed:

Need to replace Newport Meters	11
Current meter replacement is not strategically based	0
Cost per meter read	7
Standard/Consistent meter reading technology	8
Limitation of radio reads	0
Route optimization	1
Lowest cost meter reading alternative	0
Durability of existing meter reading equipment	2

Skeptical about radio at first, but now believes	0
Existing meter reading system is "old and tired"	0
Inconsistency in meter reading capture accuracy	0
Is Campbell County representative of radio read capability?	0
Concerned about on the job safety- particularly traffic and reading access	4
Recurring ECR problems	1
Meter reading routes unbalanced – too large	0
Current radio hand-held system reliability	0
Radio system reliability in Newport	0
There is no incentive for good/high productivity	1
Meter reading and weather issues	0
Cycles are "lopsided." It would help to even these out	3
Move towards monthly billing	1
Reduction in work orders	3
CIS and meter reading technology compatibility	2
Strives to be best-in-class (benchmarking)	1
Consumption data requirements for analysis	0
Turn-key versus in-house implementation	0
Opportunistic AMR implementation	0
Additional work due to AMR	1
Staffing/employment level impact	0
Fixed radio system option	1
Implementation schedule – 3,5, or 10 years	4
How much meter reading information is enough?	0
Geo-coding of meter locations	5
Need to be more cost conscious- do more with less	1
Decision regarding meter reading technology	2
Collaboration opportunities	1
Departmental cooperation and coordination of workload	0
Comparison of existing meter reading technologies	3

- **Outstanding Items:** An Initial Data Request Status and Questions handout was reviewed to complete outstanding items. The following chart contains the information given by the Northern Kentucky Water District to HDR Inc:

1. Map of Service territory	Mary Alexander to get this info	P
2. Table of organization	Item emailed to HDR	C
3. List or table by job classification of the personnel in the section mentioned in Item No. 2.	Item given to HDR	C
4. Composition of overhead ratio requested in above item.	Item included with information from #3	C
5. Number of vehicles assigned to each of the areas mentioned in Item 3, including mileage and costs- capital, operating, and maintenance	Chris Wetherell gave to Steve Bergman at meeting - 2/1/05 Mark Lofland gave O&M and Capital Costs to HDR - 3/23/05	C
6. Detailed annual budget or costs for meter reading, meter maintenance, billing and customer service operations, etc.	Chris Wetherell gave to Steve Bergman at meeting - 2/1/05 Mark Lofland gave annual budget to HDR - 3/23/05	C
7. Annual reports or sample copies of any monthly reports covering metering, billing, customer service and meter shop operations	Rusty will get: #1. Annual summary of all meter readers. #2. Summary of meter related customer service items	P
8. A list of any labor or employment policy documents covering meter reading and customer service personnel	No information on this item yet: Rusty Collinsworth is working on this.	C
9. A current rate schedule, including fixed and per unit charges, for water, wastewater, storm water, etc.	Rusty Collinsworth and Barb Northcutt gave this information to HDR at the meeting.	C
10. For each rate classification or type of customer, and/or for each service size, the amount of water and sewer revenues collected that are based on consumption, and the amount based on fixed charges.	Barb Northcutt gave this information at the meeting.	C
11. Annual average day, maximum day, minimum month, and maximum month production figures for the last 5 years.	HDR has this information: if more info is needed, it can be found in our PSC Report	C
12. For all the meters in service, a table listing the number of meters in every combination of relevant fields or variables: meter size, type, manufacturer, meter model, meter register type, and setting or location.	Completed per HDR Handout at 3/23/05 meeting	C
13. The number of secondary meters (that is, deduct or irrigation meters; this does not	Chris Wetherell gave to Steve Bergman at meeting	C

mean meters that serve water only) by size, make and model, type and year set.		
14. The approximate number of meters of each size in inventory (that is, not installed). Please provide a list of recent meter purchase prices by make, size, type, etc.	Chris Wetherell gave to Steve Bergman at meeting	C
15. Standard schedules or criteria for meter inspections, testing ands change-out by size and type	Chris Wetherell gave to Steve Bergman at meeting and discussed with Tom Jakubowski at meeting.	C
16. Meter turnover.	Chris Wetherell gave to Steve Bergman at meeting	C
17. Any recent analyses or reports meter accuracy	Chris Wetherell gave to Steve Bergman at meeting	C
18. Any recent reports on the utility's large meter testing or right-sizing programs.	Chris Wetherell gave information to HDR Inc on 3/23/05	C
19. Description, including capital costs, of current meter reading equipment or systems.	Mark Lofland gave to HDR Inc 3/23/05	C
20. Table showing the routes in each meter reading cycle, and the total number of accounts in each route.	Rusty e-mailed the # of routes in each cycle, but will get with Ron Weyman to figure out the more difficult ones to read.	C
21. Any recent statistics available on meter reader injuries, lost time due to on-the-job injuries, and costs to the utility	Rusty gave to HDR Inc	C
22. Any summary reports and/or sample productivity statistics for meter readers and routes	Will leave this open until HDR sees what Rusty gets together for Item 7	P
23. Number of re-reads performed each year, and the causes	Rusty Collinsworth gave this to Steve Bergman at the meeting 2/1/05 Barb Northcutt gave HDR a summary at meeting on 3/23/05	C
24. Any meter reading performance standards, goals, and incentives.	Rusty Collinsworth sent copies of appraisals.	C
25. Annual number of customer calls to the customer service call centers for water/wastewater customer service by type	Items have been given- completed by Barb	C
26. If you have an automatic call distribution system, please provide a sample of daily, weekly and monthly call center reports.	Items have been given- completed by Barb	C
27. Any customer service performance standards, goals, and incentives.	Items have been given- completed by Barb	C
28. Data or samples of transaction process durations	Items have been given- completed by Barb	C
29. Number of work orders by type by month for last year.	Items have been given- completed by Barb 2/1/05 Barb Northcutt gave HDR a summary at meeting on 3/23/05	C

30. Sample work orders.	Barb will give samples of these forms	C
31. Any field service personnel performance standards, goals, and incentives.	Chris Wetherell gave to Steve Bergman at meeting	C
32. Table of number of customers of each type billed at different intervals.	Rusty Collinsworth gave to Steve Bergman at meeting	C
33. Description of customer information/billing system software and hardware platform, supporting network, terminals, etc.	Rusty Collinsworth gave to Steve Bergman at meeting	C
34. Sample customer bills.	Items have been given- completed by Barb	C
35. Monthly volume report for items processed.	Rusty Collinsworth gave to Steve Bergman at meeting	C
36. What is the lag time (days) between reading and billing? What is variation? Does billing system bill entire cycle at once or as meter readings are received?	HDR given the Reading schedule 2/1/05 Barb Northcutt gave information to HDR in interview on 3/22/05 and meeting 3/23/05	C
37. Number and percentage of total bills by month that are based on valid reading, flagged by the pre-bill edit process, corrected by clerical or billing system estimates, etc.	Items have been given – completed by Barb	C
38. Under what circumstances does the Department allow for leak and other inadvertent consumption adjustments? Description of procedures for processing billing adjustments	Included in Rates, Rules, and Regulations- given by Barb in Item No. 9	C
39. Average annual amounts for 30, 60, and 90 day arrears, or samples of Accounts Receivable aging reports.	Items have been given – completed by Barb	C
40. (Added by David Foltz) Unaccounted for Water information	Rusty will get this information to HDR	C
41. Recent article about radio read implementation. Presented by Ron Lovan	Mark Lofland will get a copy and either forward or supply the proper reference to HDR	P
42. Copy of the 2004 Advance Report	Mark Lofland	P
43. Copy of 2005 update to the Advance Report	Mark Lofland	P

There being no further business, the meeting was closed at 12:45 p.m.

_____ Date

_____ Mark Lofland

Appendix B

Ascent Group White Paper

How Does Your Meter Reading Performance Compare?

What Does it Take to Be A "Best Performer"?

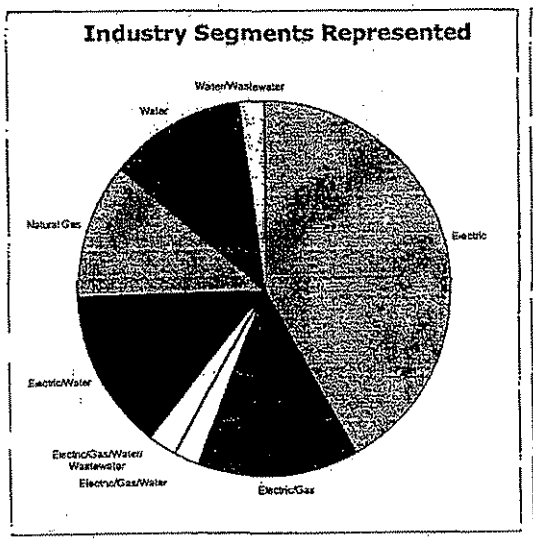
To better understand the state of utility meter reading, the Ascent Group conducted a benchmarking project to evaluate Meter Reading performance and practices. The main objective of the study was to evaluate the tactics and strategies used today to read customer meters and to identify best practices or opportunities for improvement. Secondary objectives included understanding:

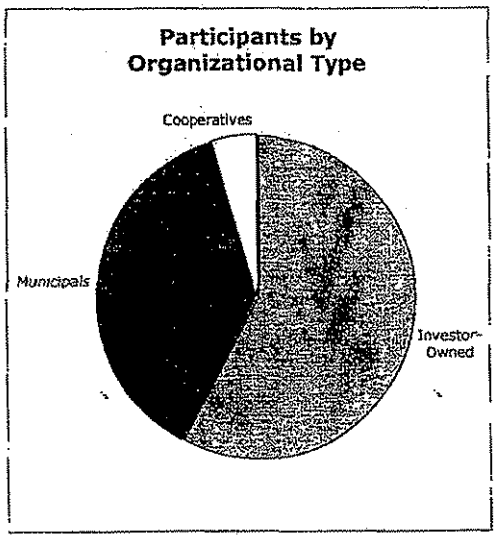
- The range of performance by utility and by industry segment;
- How utilities are using technology to reduce costs and improve performance;
- How utilities measure individual, team, and center-level performance and encourage high productivity and performance;
- The role of meter reading training and its impact on performance.
- Other effective process improvement or cost-reduction techniques;

Participants were asked to share any system or process improvements leading to a gain in performance. We also asked utilities to include considerations, successes, and plans moving forward.

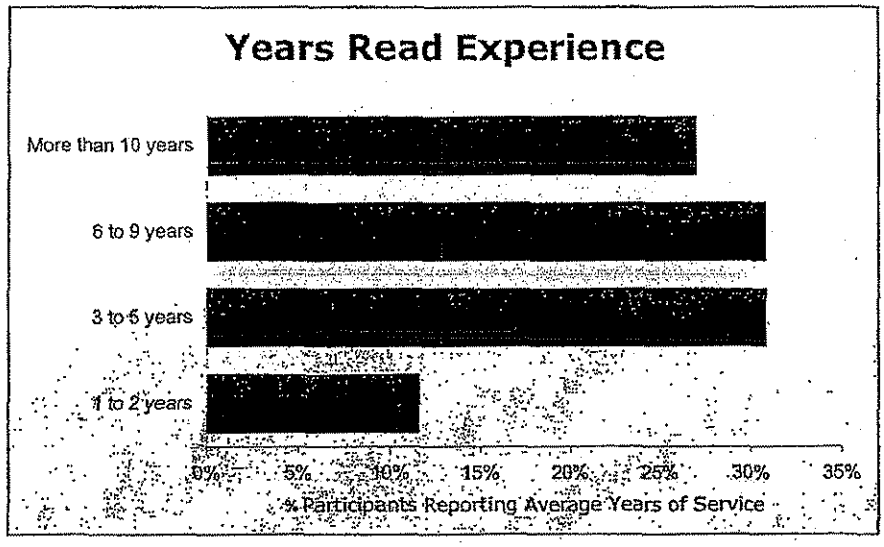
Panel Participants

Forty-seven utilities participated in the research. Study participants range in size from 3,750 meters to be read to as many as 4.5 million. Three-fourths of participants read less than the participant average of 722,000 meters per month. The majority of study participants were from the United States, however we did have two utilities from Canada. Nearly sixty percent of participants' meter readers are bargaining-unit represented.

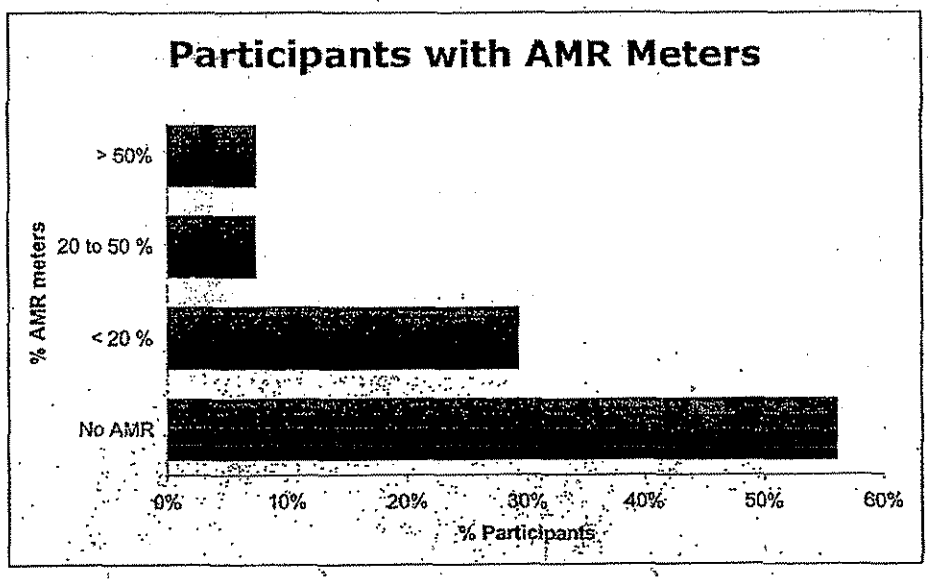




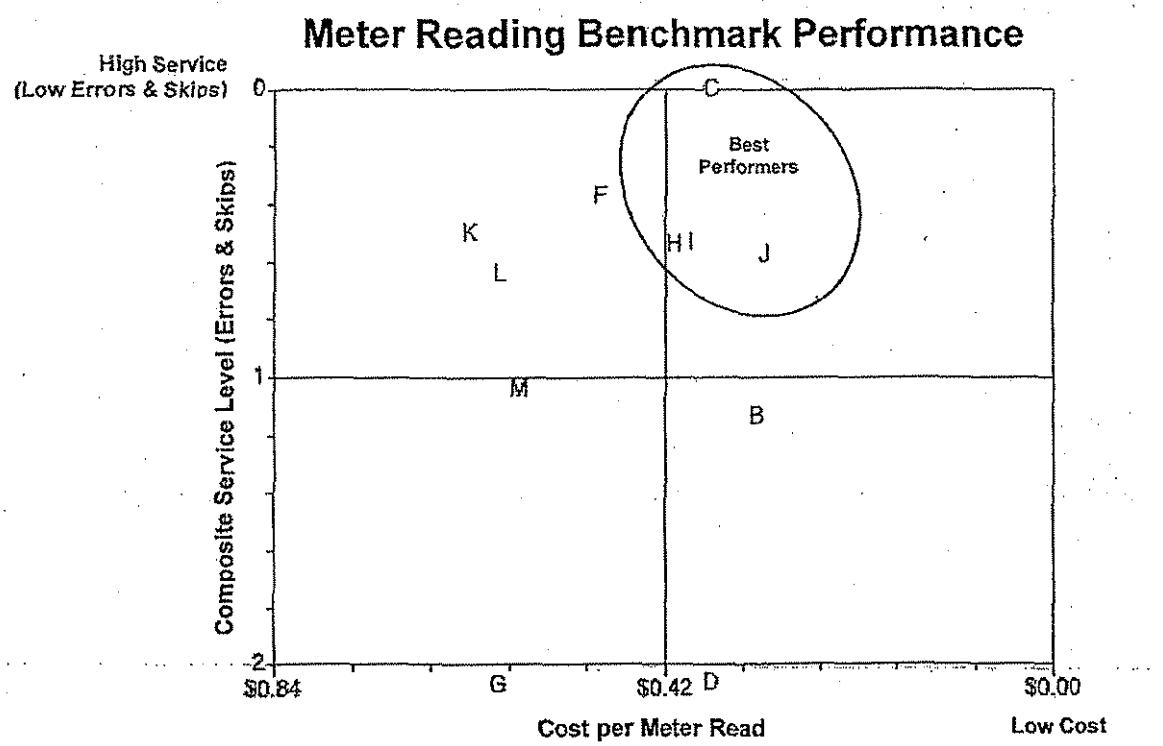
Average years of meter reading experience ranged from 1 to 20 years, with an average for the group of 7.5 years.



Natural Gas Utilities reported the highest percentage of AMR meters in our panel, followed by Electric Utilities. None of our Water/Wastewater utilities reported any meter reading automation. Fifteen utilities reported AMR installations, ranging from 1 percent of total meters to be read to 95 percent. As a group, panel participants reported an 8.3 percent AMR installation (total AMR meters divided by total meters).



Among our participant group, AMR maturity (years installed) ranges from 2 to 17 years. As a group, Natural Gas and Combination Utilities have the most mature AMR systems, averaging about 7 years. The Electric Utilities average an AMR installation of 4 years.



We applied the Ascent Group's proprietary benchmark performance framework to identify high performing Meter Reading organizations. Company performance was evaluated on three levels—Productivity, Cost, and Service. Companies delivering high productivity, low cost, and high service were identified as "best performers" in this study.

Once we identified the "best performers" for each industry-segment (electric, natural gas, combination utility, and water/wastewater)—above average companies that deliver low cost meter reading, high productivity, and high service (low errors, low skips), we calculated a "best performer" average for these high performing companies, by industry segment.

We also calculated an industry-segment average for each of the benchmark metrics, to demonstrate the performance of the "rest" of the panel, those companies who were not "best performers", for comparison.

We then interviewed companies and analyzed meter reading practices to identify the characteristics contributing to "best practice" performance.

Study Findings

1. *Best Performing Companies Use Automated Meter Reading (AMR) Strategically to Address Access-Problem Meters.* The majority of AMR implementations represented by utilities in this survey indicated an AMR implementation rate of less than 20 percent. In terms of total meters, our group reported an AMR implementation of 8.3 percent. Clearly, the majority of AMR implementations have been to address high-cost-read meters. Only 3 utilities reported AMR implementations of more than 50 percent of total meters. While a few were in the process of implementing a company-wide AMR program, most indicated taking a strategic approach at cost reduction through AMR.

2. *Best Performing Companies Reroute Continuously.* The "best performers" identified in this study (above average performance — low cost, high productivity, high service) reported continuous or frequent rerouting and route optimization to maximize productivity and reduce costs. Companies with AMR implementations also stressed the importance of route consolidation and optimization throughout the transition to automation.

3. *Best Performing Companies Implement Clear and Concise Measures of Meter Reader Performance* – The "best performers" identified in this study were deliberate in their measurement of employee, group, and departmental performance—cost, service, and productivity. Best performers reported providing employees with a clear idea of job expectations and performance. Nearly half of our participants did not have a measurement program in place for individual meter reader performance.

4. *Best Performing Companies Encourage High Performance through Incentives and Rewards* – The "best performers" identified in this study encouraged excellence through incentive programs and/or informal or formal reward programs. Programs varied from bonus pay, special recognition, gift certificates, "bucks" redeemable at the company store, steak dinners, and other non-cash awards.

5. *New Meter Readers Reach Standard on Average in 80 Days.* Utilities reported that new meter readers reach standard levels of performance in about 80 days. Our "best performing" utilities reported reaching standard at about 60 days. Meter reading is an entry-level job for many utilities—a way into the company. Costs rise and service can suffer with higher turnover and lengthier time to standard.

6. *Best performing Companies Tended to Experience Higher than Average Turnover.* The companies identified as best performers in this study reported an average annual turnover ranging from 11 to 50 percent while the rest of the panel averaged from 7 to 15 percent.

7. *Effective Classroom and On-the-Job Training Reduces Time to Standard.* "Best performing" companies in this study reported an average of 1 to 2 days of classroom training and 12 to 13 days of OJT. Best performers' meter readers reach standard 20 days sooner than average. These same companies reported the fewest errors and skipped meters, the highest productivity, in combination with the lowest unit cost. Our analysis shows a

direct correlation between increased training, especially OJT, and reduced errors, up to a point. Companies reporting shorter than average training programs tended to have higher error rates, skip rates, and increased unit cost.

8. *Most Utilities are Not Testing New Meter Readers as Part of the New Hire Training Process.* Only 40 percent of utilities report the use of testing during the new hire training process. Testing is an effective technique to assess training comprehension and to determine readiness. Testing also reinforces training content through application. Testing can be incorporated through manual tests or computer-based testing.

9. *Computer-based Training Plays an Active Role in New Meter Reader Training.* More than one-third of respondents reported the use of computer-based training in the new hire meter reading training process. More than 80% of respondents that offer refresher training incorporate computer-based training. Computer-based training offers a self-paced training program to help meter readers learn at their own pace, thereby facilitating better comprehension and recall.

10. *Few utilities Offer Refresher Training.* Only 15 percent of participants reported delivering refresher training to meter readers. Refresher training is an effective way to keep employees up-to-date on technical and customer service skills as well as address seasonal challenges, difficult customers, bad dogs, and other work challenges.

11. *Pepper Spray is the Most Popular Dog Control Technique.* Pepper spray was the most used dog control technique. Nearly 35 percent of utilities are using pepper spray. Other dog control techniques include focused training, dog sticks, umbrellas, and dog biscuits. The effective use of dog control techniques can help reduce the percentage of re-reads and lower operating costs.

Recommendations

1. *Optimize Routes Continually, Especially Throughout the Transition to AMR.* As long as there are routes to be read, whether manually or not, there will be room for optimization. Utilities can gain 10 to 20 percent efficiency on a company-wide rerouting. Rerouting is critical in areas of high growth, after an acquisition or merger, and during the transition to AMR. Many AMR technologies require route reading, either with a walk-by or drive-by technology. In many instances, achieving the gains of AMR on a mixed route requires rerouting. Software is available to help with the route optimization, however it's not essential.

2. *Utilize AMR for High-Read-Cost, Unsafe Meters, and High Turnover Premises.* Strategic deployment of AMR technology is an effective way to reduce cost, improve safety, and increase customer satisfaction. Best performing companies are utilizing AMR to tackle the problem-meters and high-read-cost meters first. Companies have also automated meter reading for large businesses and commercial customers, in preparation of deregulation. While a company-wide implementation may not be feasible, a strategic deployment to address problem meters can be very effective.

3. *Measure and Communicate Employee Performance Regularly.* Employees want to perform to expectation – make sure they clearly understand what is expected, the measures that will be used, how they are collected and calculated, and how they impact their performance. Performance measures will change in the transition to AMR—route expectations change, employees may be performing other duties in addition to reading meters, emphasis will be shifting to other priorities—make sure your expectations and measures change accordingly.

4. *Use Rewards and Incentives To Encourage High Performance.* Incentives and rewards do increase performance and morale. Make sure you are encouraging the right behavior and encouraging high performance in the right areas. Incentives and rewards can be come stale with time, be sure to rotate emphasis on various measures to keep interest in the program. Also make sure the rewards are fair and worth the extra effort – ask employees for suggestions on types of rewards. Involvement is key to any successful process.

5. *Train and Equip Meter Readers to Effectively and Safely Read Meters.* Invest in your front-line—provide them with the tools, equipment, and training to get the job done right the first time. Make sure they are equipped and trained to handle all situations. Help them understand the customer perspective and how their job fits into the overall picture of customer service and satisfaction.

6. *Incorporate classroom and OJT into your training program to reinforce techniques. Take advantage of testing and computer-based instruction to increase learning comprehension. Refresh training periodically to keep employees in top performance and up-to-date on customer service and technical skills. Training is recognized as a key factor for success in reducing error rates, detecting tampering and lost meters, improving safety, and improving customer service.*

Characteristics of a "Best Performer"

1. *Use AMR Strategically* – to address inaccessible meters, unsafe meter locations, high turnover premises, and other high-read cost meters.

2. *Continually Optimize Routes* – to maximize productivity and reduce costs.

3. *Implement Clear and Concise Measures of Meter Reader Performance* – give employees a clear idea of job expectations and performance.

4. *Encourage High Performance through Incentives and Rewards* – encourage the right behavior through incentive programs and/or informal or formal reward programs.

5. *Train and Equip Meter Readers* – provide employees with the tools, safety equipment, clothing, and training to do the job right the first time.

Role of Meter Reading in Today's Utility

Meter reading is still one of the more labor-intensive utility activities. While the use of automated meter reading technologies (AMR) is increasing, most utilities are reading the majority of their meters manually. Our panel reported an overall AMR implementation rate of 8.3 percent — only 8.3 percent of our panel's meters have been automated. The remaining 91.7 meters are read manually, usually on a monthly basis.

With all the changes in the utility industry and the economy, most utilities have been forced to reduce operating costs. At the same time, companies are being asked by regulators, customers, members, and shareholders to increase customer service and satisfaction. Essentially to "do more with less"—a daunting challenge for any organization.

The Meter Reading organization is effectively the cash register of the utility. Utilities must measure and bill energy or water use monthly (in most cases). Meter reading is the usage collection process that makes billing possible. Errors in meter reading result in billing errors or unbilled accounts that ultimately result in lowering customer satisfaction. In addition, skipped meter readings result in estimated bills or no-bills, which also usually impact customer satisfaction negatively.

For many companies, the meter reader is an entry-level job, a planned stepping-stone into the company. And as such, meter reading departments can incur high turnover, thereby increasing the costs incurred to hire and train effective and efficient meter readers, and ultimately, increasing the cost to read a meter.

Not only is it critical to effectively and efficiently read meters every month, the meter reader also plays an important community relations role — the "gatekeeper" who looks for leaks, problems, hazards, safety issues, and effectively becomes a neighborhood watch. For many customers, the meter reader is the only company employee ever seen.

Clearly the meter reading organization is evolving with the introduction of automation. The diversity of metering and AMR equipment, complexity of accounts and billing, the challenges of service territory, and needs of different customer classes dictate different solutions for different companies.

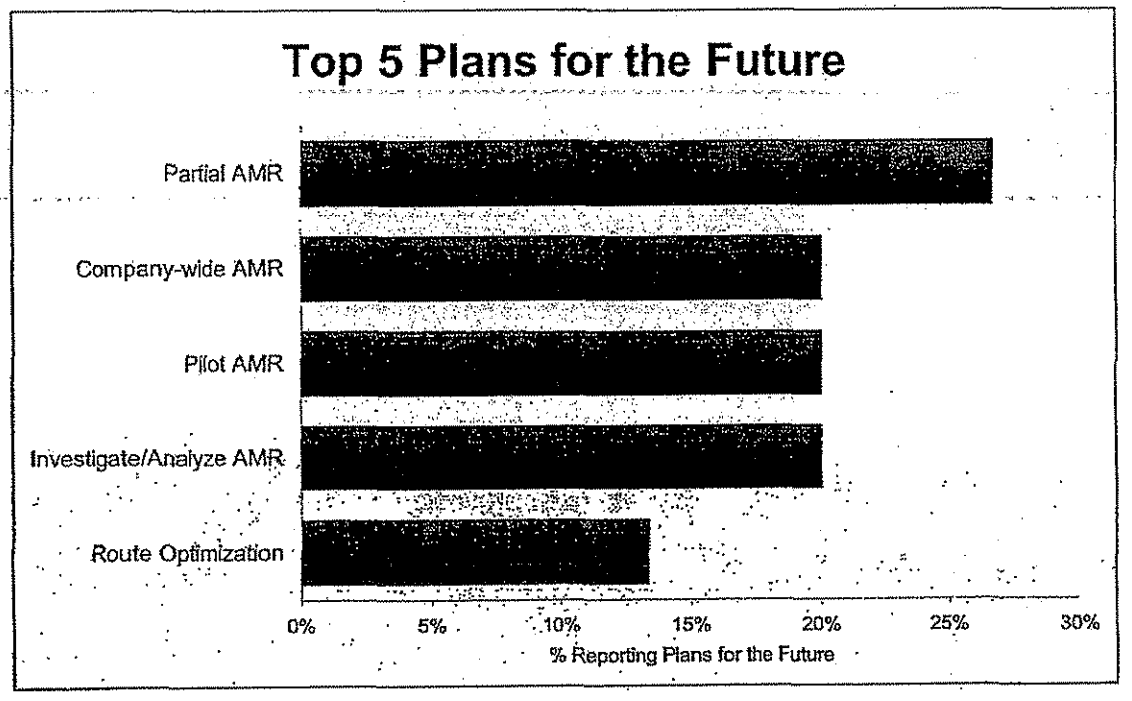
Regardless of the AMR implementation rate, the transition from manual to automation is challenging from a technology and people perspective. Routes must be consolidated and optimized, employee roles and responsibilities change with changing priorities, performance measurement metrics must shift to accommodate the mix of automation and manual effort, processes and systems change... it's a challenging time for any organization. Even after automation, metering devices must be visited periodically to ensure the device is working properly and to protect assets.

In this transition to automation and the quest for reduced operating expenses, most utilities are focusing on three approaches to meter reading improvement:

- Reducing costs of manual reads through contract negotiations, rerouting, more sophisticated hand-held equipment and meters, productivity improvement, and lowering overhead; many have maxed out these options; Some have reduced costs to a point that makes it difficult to justify AMR, for residential accounts.
- Contract meter reading to reduce overhead, tackle seasonal peaks, and as a strategy to transition to automated meter reading.
- Automated meter reading – some large-scale implementation as well as several strategies to pinpoint "high read cost" meters, unsafe meter locations, and high-turnover premises. Some companies have automated "key accounts" and commercial accounts to accommodate real-time pricing and/or prepare for the competitive market.

The promise of automation

For our study participants, AMR implementation remains *the* top plan for the future, whether it's a partial or complete implementation, or just investigating the technology's potential.



Take-Aways

What can you take away from all of this? Utilities are still reading meters manually and are likely to be reading them manually for some time. In the mean time, companies are challenged to read meters efficiently and effectively. As a cost reduction and service improvement initiative, many utilities are strategically deploying AMR, especially in high-read-cost situations. This trend will likely continue until the cost of AMR becomes more attractive for the residential meter.

Best performing companies are strategically implementing AMR, continually optimizing routes, and effectively training and encouraging high performance. Employees are trained, encourage, and equipped with the tools, safety equipment, and clothing to do the job right the first time. Employee performance in best performing companies is measured and reported clearly and concisely—employees have a clear idea of job expectations and performance.

In order to improve, meter reading performance must be measured and tracked. This includes individual measures of performance as well as group or departmental measures. Employees must understand the importance of their role in customer satisfaction—through accurate readings and bills, good company relations, and efficiently read routes. This importance should be communicated clearly and reinforced through performance metrics and rewards and incentives.

Make sure your meter reading processes, both the people and technology-driven processes are effective and efficient. Review work tasks, route standards, and systems periodically to identify opportunities for improvement.

Benchmarking performance is an effective technique to understand your meter reading department's level of performance and opportunities. Be sure to compare cost and service for a balanced view of performance (like the metrics in this study).

*You can purchase the results from this benchmarking study, **Meter Reading Profiles and Best Practices**, at our web site www.ascentgroup.com. Results are available in a printed and bound format, on CD-Rom, and online (downloadable pdfs). Contact Christine Kozlosky at the Ascent Group for more information 478-469-3950.*

Vol. 7, No. 1 October 2002

CUSTOMER SERVICE QUARTERLY

PPL Electric Utilities: Satisfying Customers is the Name of the Game

In July 2002, J.D. Power and Associates named PPL Electric Utilities first among electric companies in the East, according to its 2002 Electric Utility Residential Customer Satisfaction Study. PPL Electric Utilities (PPL EU) garnered the top score among 15 eastern companies in all five component measures of satisfaction—image, power quality and reliability, price and value, billing and payment, and customer service.

Recognition for superb customer service is nothing unusual for this utility, which is a subsidiary of Allentown-based PPL Corporation. This is the fifth J.D. Power and Associates award and for the second year in a row, PPL placed first in the American Customer Satisfaction Index, a nationwide study of customer satisfaction (for electric – gas combination utilities) produced by the University of Michigan Business School in partnership with the American Society for Quality and CFI Group, an international management consulting firm.

It is this dedication to customer service that drives the company's commitment to quality in its contact center that fields over 2 million calls each year. With approximately 1.3 million customers in 29 eastern and central Pennsylvania counties, PPL Electric Utilities' agents handle 1.75 million of these calls, while approximately 250,000 calls are served within the Interactive Voice Response (IVR) system.

State-of-the-art technology, well-trained and customer oriented employees, and innovative practices are the tools employed to consistently deliver award-winning customer service. CCEJ interviewed Dave Ling, director of customer operations, and Scott Fisher, manager of business perfor

In This Issue...

FOR THE UTILITY EXECUTIVE
Published by The Ascent Group, Inc.

FOR THE UTILITY EXECUTIVE
Published by The Ascent Group, Inc.

Vol. 3, No. 1 OCTOBER 2002

CALL CENTER E-JOURNAL

EarthLink's Customer Focus is Key to Award-Winning Support

EarthLink is one of America's largest Internet Service Providers (ISPs). Headquartered in Atlanta, EarthLink provides a full range of Internet access, hosting, and e-commerce solutions to 4.9 million subscribers over a nationwide network of dial-up points of presence, high-speed access, and wireless technologies.

Through its dedication to its core values and beliefs, its actions, and products and services, EarthLink continually strives to make the Internet a relevant, entertaining, and personal tool for its subscribers. EarthLink regularly wins industry awards for *member satisfaction, reliability* and outstanding service.

EarthLink's core values and beliefs (CVBs) are the driving force behind EarthLink's culture and delineate EarthLink's commitment to continually providing the best service in the ISP industry. EarthLink devotes approximately 60 percent of its staff to providing award-winning toll-free support, 24-hours-a-day, seven-days-a-week.

CCE-J interviewed Kyle Scofield, director of Technical Support for EarthLink. Scofield runs the technical support side of EarthLink's customer service. Basically, any time a customer has an issue using any EarthLink product, he or she can contact the technical support team for assistance. Another group, Customer Service, handles account maintenance and billing inquiries.

EarthLink began operations in 1995 with one call center. Since its merger with MindSpring in 2000, EarthLink has built a network of call centers across the U.S. Now more than 2,800 technical support employees, located in eight centers, handle about 1.3 million calls each month.

In This Issue...

FOR THE CALL CENTER EXECUTIVE
Published by The Ascent Group, Inc.

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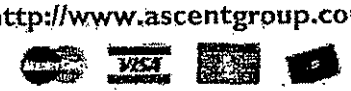

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Appendix C

10-Year Planning Horizon Model Results

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Operating Budget										
Touch Read	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,235	$ 2,221,514	$ 2,322,219	$ 2,427,578	$ 2,537,775	$ 2,653,062
Mobile Walk	$ 1,718,382	$ 1,796,546	$ 1,878,325	$ 1,963,875	$ 2,053,389	$ 2,147,038	$ 2,245,017	$ 2,264,444	$ 2,368,702	$ 2,477,831
Mobile Drive-by	$ 1,719,032	$ 1,797,212	$ 1,809,420	$ 1,892,475	$ 1,979,401	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069
Fixed Radio	$ 1,737,742	$ 1,816,390	$ 1,828,962	$ 1,912,505	$ 1,915,206	$ 1,926,422	$ 2,016,191	$ 2,027,303	$ 2,122,732	$ 2,222,703
Capital Budget										
Touch Read	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 338,448	$ 324,902	$ 533,725	$ 345,897	$ 356,928
Mobile Walk	$ 903,752	$ 831,397	$ 854,907	$ 878,994	$ 903,869	$ 989,990	$ 955,784	$ 1,094,883	$ 1,010,838	$ 1,039,617
Mobile Drive-by	$ 954,252	$ 831,397	$ 850,890	$ 878,994	$ 903,869	$ 1,018,096	$ 955,784	$ 1,067,963	$ 1,010,838	$ 1,039,617
Fixed Radio	$ 1,394,108	$ 1,015,852	$ 1,039,662	$ 1,073,368	$ 1,098,636	$ 1,139,671	$ 1,166,078	$ 1,226,207	$ 1,232,485	$ 1,267,180
Operating + Capital Budget										
Touch Read	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990
Mobile Walk	$ 2,622,134	$ 2,627,943	$ 2,733,231	$ 2,842,869	$ 2,957,258	$ 3,137,028	$ 3,200,802	$ 3,359,327	$ 3,379,540	$ 3,517,448
Mobile Drive-by	$ 2,673,284	$ 2,628,609	$ 2,660,311	$ 2,771,468	$ 2,883,270	$ 2,923,088	$ 2,950,011	$ 3,155,656	$ 3,196,400	$ 3,327,686
Fixed Radio	$ 3,131,850	$ 2,832,242	$ 2,868,625	$ 2,985,873	$ 3,013,841	$ 3,066,093	$ 3,182,269	$ 3,253,510	$ 3,355,216	$ 3,489,882

Results and Inputs	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad. MIU	Startup-Infra.	Read Eq. Life
Touch Read	$ **18,321,548**	1	10	450	25	$ 15.00		5
Mobile Walk	$ **21,981,447**	3	10	600	35	$ 75.00	$ 12,500	5
Mobile Drive-by	$ **21,197,469**	2	10	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	$ **22,754,859**	4	10			$ 95.00	$ 360,000	15

Cost per Read										
Meter Readings	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Meter Readers	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service										
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 5.15	$ 5.31	$ 5.48	$ 5.66	$ 5.84	$ 6.02	$ 6.22	$ 6.42	$ 6.62	$ 6.83
Mobile Walk	$ 4.97	$ 5.13	$ 5.30	$ 5.47	$ 5.64	$ 5.82	$ 6.01	$ 5.98	$ 6.18	$ 6.38
Mobile Drive-by	$ 4.97	$ 5.13	$ 5.10	$ 5.27	$ 5.44	$ 5.17	$ 5.34	$ 5.52	$ 5.70	$ 5.89
Fixed Radio	$ 5.03	$ 5.19	$ 5.16	$ 5.32	$ 5.26	$ 5.22	$ 5.40	$ 5.36	$ 5.54	$ 5.72
Op.+Cap. Cost/Read										
Touch Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75
Mobile Walk	$ 7.59	$ 7.51	$ 7.71	$ 7.91	$ 8.12	$ 8.51	$ 8.57	$ 8.88	$ 8.82	$ 9.06
Mobile Drive-by	$ 7.73	$ 7.51	$ 7.50	$ 7.71	$ 7.92	$ 7.93	$ 7.90	$ 8.34	$ 8.34	$ 8.57
Fixed Radio	$ 9.06	$ 8.09	$ 8.09	$ 8.31	$ 8.28	$ 8.32	$ 8.52	$ 8.60	$ 8.75	$ 8.99

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Current Meter Reading and Billing Frequency with 3-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Operating Budget										
Touch Read	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,235	$ 2,221,514	$ 2,322,219	$ 2,427,578	$ 2,537,775	$ 2,653,062
Mobile Walk	$ 1,718,382	$ 1,796,546	$ 1,808,738	$ 1,891,775	$ 1,978,683	$ 2,069,632	$ 2,164,812	$ 2,264,444	$ 2,368,702	$ 2,477,831
Mobile Drive-by	$ 1,719,032	$ 1,653,674	$ 1,660,712	$ 1,738,409	$ 1,819,781	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069
Fixed Radio	$ 1,737,742	$ 1,605,925	$ 1,611,203	$ 1,686,888	$ 1,766,170	$ 1,849,208	$ 1,936,183	$ 2,027,303	$ 2,122,732	$ 2,222,703
Capital Budget										
Touch Read	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 338,448	$ 324,902	$ 533,725	$ 345,897	$ 356,928
Mobile Walk	$ 2,575,940	$ 2,548,176	$ 2,613,117	$ 103,436	$ 107,599	$ 167,350	$ 116,379	$ 262,593	$ 125,913	$ 130,996
Mobile Drive-by	$ 2,626,440	$ 2,539,951	$ 2,613,474	$ 103,436	$ 107,599	$ 217,245	$ 116,379	$ 206,104	$ 125,913	$ 130,996
Fixed Radio	$ 3,437,893	$ 3,100,833	$ 3,193,244	$ 126,309	$ 131,353	$ 145,740	$ 141,985	$ 204,208	$ 153,522	$ 159,670
Operating + Capital Budget										
Touch Read	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990
Mobile Walk	$ 4,294,322	$ 4,344,722	$ 4,421,854	$ 1,995,211	$ 2,086,282	$ 2,236,982	$ 2,281,192	$ 2,527,037	$ 2,494,615	$ 2,608,828
Mobile Drive-by	$ 4,345,472	$ 4,193,625	$ 4,274,186	$ 1,841,845	$ 1,927,380	$ 2,122,238	$ 2,110,605	$ 2,293,797	$ 2,311,476	$ 2,419,065
Fixed Radio	$ 5,175,636	$ 4,706,758	$ 4,804,447	$ 1,813,197	$ 1,897,523	$ 1,994,949	$ 2,078,168	$ 2,231,510	$ 2,276,254	$ 2,382,373

Results and Inputs	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Eq. Life
Touch Read	**$ 18,321,548**	1	10	450	25	$ 15.00		5
Mobile Walk	**$ 22,383,010**	3	3	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	**$ 21,377,544**	2	3	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	**$ 22,825,894**	4	3			$ 95.00	$ 360,000	15

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cost per Read										
Meter Readings										
Meter Readers	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Field Service	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 5.15	$ 5.31	$ 5.48	$ 5.66	$ 5.84	$ 6.02	$ 6.22	$ 6.42	$ 6.62	$ 6.83
Mobile Walk	$ 4.97	$ 5.13	$ 5.10	$ 5.26	$ 5.44	$ 5.61	$ 5.80	$ 5.98	$ 6.18	$ 6.38
Mobile Drive-by	$ 4.97	$ 4.72	$ 4.68	$ 4.84	$ 5.00	$ 5.17	$ 5.34	$ 5.52	$ 5.70	$ 5.89
Fixed Radio	$ 5.03	$ 4.59	$ 4.54	$ 4.69	$ 4.85	$ 5.02	$ 5.18	$ 5.36	$ 5.54	$ 5.72
Op.+Cap. Cost/Read										
Touch Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75
Mobile Walk	$ 12.42	$ 12.41	$ 12.47	$ 5.55	$ 5.73	$ 6.07	$ 6.11	$ 6.68	$ 6.51	$ 6.72
Mobile Drive-by	$ 12.57	$ 11.98	$ 12.05	$ 5.13	$ 5.30	$ 5.76	$ 5.65	$ 6.06	$ 6.03	$ 6.23
Fixed Radio	$ 14.97	$ 13.44	$ 13.54	$ 5.05	$ 5.21	$ 5.41	$ 5.56	$ 5.90	$ 5.94	$ 6.14

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Monthly Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Walk	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Drive-by	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fixed Radio	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Budget										
Touch Read	$ 2,139,737	$ 3,129,952	$ 4,208,203	$ 5,313,082	$ 5,556,964	$ 5,812,190	$ 6,079,284	$ 6,358,850	$ 6,651,406	$ 7,046,631
Mobile Walk	$ 2,077,673	$ 3,066,429	$ 4,142,408	$ 5,173,501	$ 5,337,086	$ 5,584,317	$ 5,762,917	$ 6,030,988	$ 6,311,626	$ 6,516,244
Mobile Drive-by	$ 2,078,773	$ 2,999,932	$ 4,003,917	$ 4,957,415	$ 5,113,687	$ 5,187,460	$ 5,351,194	$ 5,521,276	$ 5,697,366	$ 5,879,757
Fixed Radio	$ 2,096,863	$ 3,018,300	$ 4,022,566	$ 4,976,648	$ 5,048,553	$ 5,207,927	$ 5,372,891	$ 5,460,481	$ 5,634,328	$ 5,814,390
Capital Budget										
Touch Read	$ 440,884	$ 330,140	$ 343,641	$ 382,437	$ 305,241	$ 341,616	$ 331,396	$ 572,209	$ 418,536	$ 452,012
Mobile Walk	$ 930,652	$ 891,602	$ 912,353	$ 943,202	$ 898,210	$ 995,081	$ 962,288	$ 1,192,148	$ 1,086,279	$ 1,069,022
Mobile Drive-by	$ 982,252	$ 857,451	$ 881,844	$ 906,844	$ 899,579	$ 1,033,935	$ 951,201	$ 1,096,462	$ 1,010,838	$ 1,038,917
Fixed Radio	$ 1,419,308	$ 1,041,906	$ 1,071,204	$ 1,104,234	$ 1,093,727	$ 1,155,511	$ 1,162,145	$ 1,254,040	$ 1,235,896	$ 1,266,480
Operating + Capital Budget										
Touch Read	$ 2,580,621	$ 3,460,092	$ 4,551,844	$ 5,695,519	$ 5,862,204	$ 6,153,806	$ 6,410,680	$ 6,931,059	$ 7,069,942	$ 7,498,643
Mobile Walk	$ 3,008,325	$ 3,958,031	$ 5,054,761	$ 6,116,703	$ 6,235,296	$ 6,579,398	$ 6,725,205	$ 7,223,136	$ 7,397,906	$ 7,585,266
Mobile Drive-by	$ 3,061,025	$ 3,857,383	$ 4,885,761	$ 5,864,259	$ 6,013,266	$ 6,221,395	$ 6,302,395	$ 6,617,738	$ 6,708,204	$ 6,918,675
Fixed Radio	$ 3,516,171	$ 4,060,206	$ 5,093,770	$ 6,080,882	$ 6,142,280	$ 6,363,438	$ 6,535,036	$ 6,714,522	$ 6,870,225	$ 7,080,871

	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Eq. Life
Results and Inputs								
Touch Read	$ **39,549,979**	1	10	450	25	$ 15.00		5
Mobile Walk	$ **42,366,256**	4	10	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	$ **40,124,769**	2	10	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	$ **41,679,352**	3	10			$ 95.00	$ 360,000	15

Cost per Read										
Meter Readings	414,065	613,039	817,120	993,288	1,006,200	1,019,280	1,032,528	1,045,956	1,059,552	1,073,328
Meter Readers	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service										
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 5.05	$ 5.03	$ 5.09	$ 5.30	$ 5.47	$ 5.65	$ 5.83	$ 6.02	$ 6.22	$ 6.50
Mobile Walk	$ 4.91	$ 4.93	$ 5.01	$ 5.16	$ 5.25	$ 5.43	$ 5.53	$ 5.71	$ 5.90	$ 6.01
Mobile Drive-by	$ 4.91	$ 4.82	$ 4.84	$ 4.94	$ 5.03	$ 5.04	$ 5.13	$ 5.23	$ 5.33	$ 5.43
Fixed Radio	$ 4.95	$ 4.85	$ 4.87	$ 4.96	$ 4.97	$ 5.06	$ 5.15	$ 5.17	$ 5.27	$ 5.36
Op.+Cap. Cost/Read										
Touch Read	$ 6.10	$ 5.56	$ 5.51	$ 5.68	$ 5.77	$ 5.98	$ 6.15	$ 6.56	$ 6.61	$ 6.92
Mobile Walk	$ 7.11	$ 6.36	$ 6.11	$ 6.10	$ 6.14	$ 6.39	$ 6.45	$ 6.84	$ 6.91	$ 7.00
Mobile Drive-by	$ 7.23	$ 6.20	$ 5.91	$ 5.85	$ 5.92	$ 6.04	$ 6.04	$ 6.27	$ 6.27	$ 6.38
Fixed Radio	$ 8.30	$ 6.52	$ 6.16	$ 6.06	$ 6.05	$ 6.16	$ 6.27	$ 6.36	$ 6.42	$ 6.53

HDR Engineering, Inc.

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Monthly Meter Reading and Billing Frequency with 3-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Walk	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Drive-by	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fixed Radio	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Budget										
Touch Read	$ 2,139,737	$ 3,129,952	$ 4,208,203	$ 5,313,082	$ 5,556,964	$ 5,812,190	$ 6,079,284	$ 6,358,850	$6,651,406	$7,046,631
Mobile Walk	$ 2,077,673	$ 2,998,805	$ 3,933,174	$ 4,884,615	$ 5,112,969	$ 5,352,099	$ 5,682,712	$ 5,947,881	$6,225,512	$6,516,244
Mobile Drive-by	$ 2,013,500	$ 2,721,608	$ 3,576,387	$ 4,442,362	$ 4,654,749	$ 4,877,327	$ 5,110,579	$ 5,355,063	$5,611,252	$5,879,757
Fixed Radio	$ 2,032,210	$ 2,673,859	$ 3,526,878	$ 4,390,841	$ 4,601,137	$ 4,821,543	$ 5,052,535	$ 5,294,672	$5,548,421	$5,814,390
Capital Budget										
Touch Read	$ 440,884	$ 330,140	$ 343,641	$ 382,437	$ 305,241	$ 341,616	$ 331,396	$ 572,209	$ 418,536	$ 452,012
Mobile Walk	$ 2,602,840	$ 2,575,973	$ 2,617,490	$ 137,964	$ 107,599	$ 177,533	$ 154,352	$ 319,591	$ 166,375	$ 130,996
Mobile Drive-by	$ 2,626,440	$ 2,539,951	$ 2,613,474	$ 103,436	$ 107,599	$ 217,245	$ 116,379	$ 206,104	$ 125,913	$ 130,996
Fixed Radio	$ 3,437,893	$ 3,100,833	$ 3,193,244	$ 126,309	$ 131,353	$ 145,740	$ 141,985	$ 204,208	$ 153,522	$ 159,670
Operating + Capital Budget										
Touch Read	$ 2,580,621	$ 3,460,092	$ 4,551,844	$ 5,695,519	$ 5,862,204	$ 6,153,806	$ 6,410,680	$ 6,931,059	$7,069,942	$7,498,643
Mobile Walk	$ 4,680,513	$ 5,574,778	$ 6,550,664	$ 5,022,578	$ 5,220,568	$ 5,529,632	$ 5,837,063	$ 6,267,473	$6,391,887	$6,647,240
Mobile Drive-by	$ 4,639,940	$ 5,261,559	$ 6,189,862	$ 4,545,798	$ 4,762,347	$ 5,094,573	$ 5,226,958	$ 5,561,167	$5,737,165	$6,010,753
Fixed Radio	$ 5,470,104	$ 5,774,692	$ 6,720,122	$ 4,517,151	$ 4,732,490	$ 4,967,283	$ 5,194,520	$ 5,498,880	$5,701,943	$5,974,061

Results and Inputs	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Eq. Life
Touch Read	**$ 39,549,979**	2	10	450	25	$ 15.00		5
Mobile Walk	**$ 41,964,215**	4	3	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	**$ 38,725,634**	1	3	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	**$ 40,173,984**	3	3			$ 95.00	$ 360,000	15

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cost per Read										
Meter Readings										
Meter Readers	414,065	613,039	817,120	993,288	1,006,200	1,019,280	1,032,528	1,045,956	1,059,552	1,073,328
Field Service	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 5.05	$ 5.03	$ 5.09	$ 5.30	$ 5.47	$ 5.65	$ 5.83	$ 6.02	$ 6.22	$ 6.50
Mobile Walk	$ 4.91	$ 4.82	$ 4.76	$ 4.87	$ 5.03	$ 5.20	$ 5.45	$ 5.63	$ 5.82	$ 6.01
Mobile Drive-by	$ 4.76	$ 4.37	$ 4.33	$ 4.43	$ 4.58	$ 4.74	$ 4.90	$ 5.07	$ 5.24	$ 5.43
Fixed Radio	$ 4.80	$ 4.30	$ 4.27	$ 4.38	$ 4.53	$ 4.68	$ 4.85	$ 5.01	$ 5.19	$ 5.36
Op.+Cap. Cost/Read										
Touch Read	$ 6.10	$ 5.56	$ 5.51	$ 5.68	$ 5.77	$ 5.98	$ 6.15	$ 6.56	$ 6.61	$ 6.92
Mobile Walk	$ 11.06	$ 8.96	$ 7.92	$ 5.01	$ 5.14	$ 5.37	$ 5.60	$ 5.93	$ 5.97	$ 6.13
Mobile Drive-by	$ 10.96	$ 8.45	$ 7.49	$ 4.53	$ 4.69	$ 4.95	$ 5.01	$ 5.27	$ 5.36	$ 5.55
Fixed Radio	$ 12.92	$ 9.28	$ 8.13	$ 4.50	$ 4.66	$ 4.83	$ 4.98	$ 5.21	$ 5.33	$ 5.51

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meter Reading										
Meters										
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444
Read Frequency										
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads										
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758
Bi-monthly	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Reading Days/Year										
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450
Field Service (Meter Reading Related)										
Field Service Reads per Year										
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Days/Year										
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233
Visits/Man Day	25	25	25	25	25	25	25	25	25	25
Personnel Required										
Calculated Meter Readers	4.1	4.2	4.2	4.3	4.3	4.4	4.5	4.5	4.6	4.6
Meter Readers FTE	5	5	5	5	5	5	5	5	5	5
Meter Reader Super.	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Calculated Field Service Techs	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8
Field Service Techs FTE	2	2	2	2	2	2	2	2	2	2
Field Service Super.	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating Expenses										
Meter Related										
Salary										
Meter Readers	$ 229,466	$ 237,497	$ 245,809	$ 254,413	$ 263,317	$ 272,533	$ 282,072	$ 291,944	$ 302,162	$ 312,738
Field Service Tech	111,879	115,795	119,848	124,042	128,384	132,877	137,528	142,341	147,323	152,480
Meter Reader Supervisor	46,200	47,817	49,491	51,223	53,016	54,871	56,792	58,779	60,837	62,966
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	18,290	18,931	19,593	20,279	20,989
Total Salary	$ 402,945	$ 417,048	$ 431,644	$ 446,752	$ 462,388	$ 478,572	$ 495,322	$ 512,658	$ 530,601	$ 549,172
Education										
Meter Readers	$ 2,000	$ 2,080	$ 2,163	$ 2,250	$ 2,340	$ 2,433	$ 2,531	$ 2,632	$ 2,737	$ 2,847
Field Service Tech	1,250	1,300	1,352	1,406	1,462	1,521	1,582	1,645	1,711	1,779
Total Education	$ 3,250	$ 3,380	$ 3,515	$ 3,656	$ 3,802	$ 3,954	$ 4,112	$ 4,277	$ 4,448	$ 4,626
M & S										
Meter Readers	$ 8,000	$ 8,280	$ 8,570	$ 8,870	$ 9,180	$ 9,501	$ 9,834	$ 10,178	$ 10,534	$ 10,903
Field Service Tech	3,625	3,752	3,883	4,019	4,160	4,305	4,456	4,612	4,773	4,941
Total M&S	$ 11,625	$ 12,032	$ 12,453	$ 12,889	$ 13,340	$ 13,807	$ 14,290	$ 14,790	$ 15,308	$ 15,844
Contract Services										
Meter Readers	$ 7,000	$ 7,245	$ 7,499	$ 7,761	$ 8,033	$ 8,314	$ 8,605	$ 8,906	$ 9,218	$ 9,540
Field Service Tech	1,250	1,294	1,339	1,386	1,434	1,485	1,537	1,590	1,646	1,704
Total Contract Services	$ 8,250	$ 8,539	$ 8,838	$ 9,147	$ 9,467	$ 9,798	$ 10,141	$ 10,496	$ 10,864	$ 11,244
Fuel										
Meter Readers	$ 9,500	$ 9,928	$ 10,374	$ 10,841	$ 11,329	$ 11,839	$ 12,371	$ 12,928	$ 13,510	$ 14,118
Field Service Tech	6,750	7,054	7,371	7,703	8,050	8,412	8,790	9,186	9,599	10,031
Total Fuel	$ 16,250	$ 16,981	$ 17,745	$ 18,544	$ 19,378	$ 20,250	$ 21,162	$ 22,114	$ 23,109	$ 24,149
Insurance										
Meter Readers	$ 18,000	$ 18,900	$ 19,845	$ 20,837	$ 21,879	$ 22,973	$ 24,122	$ 25,328	$ 26,594	$ 27,924
Field Service Tech	5,150	5,408	5,678	5,962	6,260	6,573	6,901	7,247	7,609	7,989
Total Insurance	$ 23,150	$ 24,308	$ 25,523	$ 26,799	$ 28,139	$ 29,546	$ 31,023	$ 32,574	$ 34,203	$ 35,913
Misc.										
Meter Readers	$ 1,700	$ 1,760	$ 1,821	$ 1,885	$ 1,951	$ 2,019	$ 2,090	$ 2,163	$ 2,239	$ 2,317
Field Service Tech	750	776	803	832	861	891	922	954	988	1,022
Total Miscellaneous	$ 2,450	$ 2,536	$ 2,625	$ 2,716	$ 2,811	$ 2,910	$ 3,012	$ 3,117	$ 3,226	$ 3,339
Meter Reading Equipment Maintenance										
Hand-held	$ 1,960	$ 2,009	$ 2,059	$ 2,111	$ 2,163	$ 2,218	$ 2,273	$ 2,330	$ 2,388	$ 2,448
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249
Total Annual Meter Reading Budget										
Meter Readers	$ 324,826	$ 336,540	$ 348,682	$ 361,267	$ 374,311	$ 387,833	$ 401,848	$ 416,377	$ 431,437	$ 447,049
Field Service Tech	146,054	151,317	156,771	162,424	168,282	174,354	180,646	187,168	193,928	200,934
Meter Reading Operating Budget	$ 470,880	$ 487,857	$ 505,453	$ 523,690	$ 542,593	$ 562,186	$ 582,495	$ 603,545	$ 625,365	$ 647,984
Customer Service Related										
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078
Total Meter Reading Related	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,235	$ 2,221,514	$ 2,322,219	$ 2,427,578	$ 2,537,775	$ 2,653,062

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating Cost per Read										
Regular Meter Read	$0.97	$0.99	$1.01	$1.03	$1.06	$1.08	$1.11	$1.13	$1.16	$1.18
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$17.54	$17.94	$18.35	$18.77	$19.20
Regular + Field Service	$1.36	$1.39	$1.42	$1.46	$1.49	$1.52	$1.56	$1.60	$1.63	$1.67
Reg + Field Serv. + Cust. Serv.	$5.15	$5.31	$5.48	$5.66	$5.84	$6.02	$6.22	$6.42	$6.62	$6.83
Capital Items										
Vehicles										
Meter Reader Vehicles Req'd	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Vehicle Purchases (Retirements)	7.80	-	-	-	-	-	-	-	-	-
Calculated Vehicle Replacements					-	-	-	7.80	-	-
Required Vehicle Replacements					-	-	-	7.80	-	-
Reading Equipment										
# of Interrogators (1/Meter Read)	5	5	5	5	5	5	5	5	5	5
# of Spare Interrogators	2	2	2	2	2	2	2	2	2	2
Purchases (Retirements)	7	-	-	-	-	-	-	-	-	-
Calculated Replacements					-	7	-	-	-	-
Required Replacements					-	7	-	-	-	-
# of Pocket Pro (1/Field Service)	2	2	2	2	2	2	2	2	2	2
# of Spare Pocket Pro	1	1	1	1	1	1	1	1	1	1
Purchases (Retirements)	3	-	-	-	-	-	-	-	-	-
Calculated Replacements					-	3	-	-	-	-
Required Replacements					-	3	-	-	-	-
Touch Pad										
Years to Replace Existing Pads	10									
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444
Touch Pad Cost	$ 15.00	$ 15.38	$ 15.76	$ 16.15	$ 16.56	$ 16.97	$ 17.40	$ 17.83	$ 18.28	$ 18.73
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Budget										
Vehicle Purchases (Retirements)	$ 156,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 198,476	$ -	$ -
Reading Equipment Purchases (Ret.)										
Interrogators	$ 19,600	$ -	$ -	$ -	$ -	$ 22,176	$ -	$ -	$ -	$ -
Pocket Pro	$ 1,200	$ -	$ -	$ -	$ -	$ 1,358	$ -	$ -	$ -	$ -
Touch Pad	238,884	278,032	286,825	295,870	305,241	314,914	324,902	335,250	345,897	356,928
Total Capital Budget	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 338,448	$ 324,902	$ 533,725	$ 345,897	$ 356,928
Total Budget (Operating + Capital)	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990
Net Present Value										
Discount Rate (Cost of Capital)	6.0%									
NPV of Total Expenditures	$18,321,548									
Total Cost per Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Walk-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meter Reading										
Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444
Total Meters	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889
Meters with MIU										
Read Frequency	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Quarterly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bi-monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Monthly %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total										
Annual Reads	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758
Quarterly	-	-	-	-	-	-	-	-	-	-
Bi-monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Monthly	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Total										
Reads by Read Type	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Mobile Reads Monthly, Annual Tot.	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504
Mobile Meters Read Monthly	-	-	-	-	-	-	-	-	-	-
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	7,007	40,812	76,714	112,669	148,675	184,736	220,852	257,024	293,252	329,537
Mobile Reads Quarterly, Annual Tot.	1,752	10,203	19,179	28,167	37,169	46,184	55,213	64,256	73,313	82,384
Mobile Meters Read Quarterly	33,762	67,915	104,169	140,481	176,849	213,276	249,763	286,311	322,919	359,590
Total Annual Mobile Reads	-	-	-	-	-	-	-	-	-	-
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	302,587	272,806	240,982	209,156	177,334	145,511	113,687	81,866	50,043	18,221
Touch Read Quarterly, Annual Tot.	302,587	272,806	240,982	209,156	177,334	145,511	113,687	81,866	50,043	18,221
Total Annual Touch Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Total Annual Reads										
Reading Days/Year Touch Pad	4	4	4	4	4	4	4	4	4	4
Reading Days/Man Week	12	12	12	12	12	12	12	12	12	12
Holidays/Year	10	10	10	10	10	10	10	10	10	10
Vacation Days/Year	5	5	5	5	5	5	5	5	5	5
Sick Days/Year	181	181	181	181	181	181	181	181	181	181
Total Reading Days/Year	450	450	450	450	450	450	450	450	450	450
Reads/Man Day										
Reading Days/Year Mobile Radio	4	4	4	4	4	4	4	4	4	4
Reading Days/Man Week	12	12	12	12	12	12	12	12	12	12
Holidays/Year	10	10	10	10	10	10	10	10	10	10
Vacation Days/Year	5	5	5	5	5	5	5	5	5	5
Sick Days/Year	181	181	181	181	181	181	181	181	181	181
Total Reading Days/Year	800	800	800	800	800	800	800	800	800	800
Reads/Man Day										

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Walk-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Field Service (Meter Reading Related)										
Field Service Reads per Year										
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Reads by Read Type										
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,803	8,867	9,932
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Days/Year										
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Mobile	35	35	35	35	35	35	35	35	35	35
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25
Personnel Required										
Calculated Meter Readers	3.9	3.8	3.7	3.5	3.4	3.3	3.1	3.0	2.8	2.7
Meter Readers FTE	4	4	4	4	4	4	4	3	3	3
Meter Reader Super.	48%	48%	48%	48%	48%	48%	48%	36%	36%	36%
Calculated Field Service Techs	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3
Field Service Techs FTE	2	2	2	2	2	2	2	2	2	2
Field Service Super.	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Operating Expenses										
Meter Related										
Salary										
Meter Readers	$ 183,572	$ 189,998	$ 196,647	$ 203,530	$ 210,654	$ 218,027	$ 225,657	$ 175,167	$ 181,297	$ 187,643
Field Service Tech	111,879	115,795	119,848	124,042	128,384	132,877	137,528	142,341	147,323	152,480
Meter Reader Supervisor	36,960	38,254	39,592	40,978	42,412	43,897	45,433	35,268	36,502	37,780
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	18,290	18,931	19,593	20,279	20,989
Total Salary	$ 347,812	$ 359,985	$ 372,584	$ 385,625	$ 399,122	$ 413,091	$ 427,549	$ 372,369	$ 385,402	$ 398,891
Education										
Meter Readers	$ 1,600	$ 1,664	$ 1,731	$ 1,800	$ 1,872	$ 1,947	$ 2,025	$ 1,579	$ 1,642	$ 1,708
Field Service Tech	1,250	1,300	1,352	1,406	1,462	1,521	1,582	1,645	1,711	1,779
Total Education	$ 2,850	$ 2,964	$ 3,083	$ 3,206	$ 3,334	$ 3,467	$ 3,606	$ 3,224	$ 3,353	$ 3,487
M & S										
Meter Readers	$ 6,400	$ 6,624	$ 6,856	$ 7,096	$ 7,344	$ 7,601	$ 7,867	$ 6,107	$ 6,321	$ 6,542
Field Service Tech	3,625	3,752	3,883	4,019	4,160	4,305	4,456	4,612	4,773	4,941
Total M&S	$ 10,025	$ 10,376	$ 10,739	$ 11,115	$ 11,504	$ 11,907	$ 12,323	$ 10,719	$ 11,094	$ 11,482

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Walk-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Contract Services										
Meter Readers	$ 5,600	$ 5,796	$ 5,999	$ 6,209	$ 6,426	$ 6,651	$ 6,884	$ 5,344	$ 5,531	$ 5,724
Field Service Tech	1,250	1,294	1,339	1,386	1,434	1,485	1,537	1,590	1,646	1,704
Total Contract Services	$ 6,850	$ 7,090	$ 7,338	$ 7,595	$ 7,861	$ 8,136	$ 8,420	$ 6,934	$ 7,177	$ 7,428
Fuel										
Meter Readers	$ 7,600	$ 7,942	$ 8,299	$ 8,673	$ 9,063	$ 9,471	$ 9,897	$ 7,757	$ 8,106	$ 8,471
Field Service Tech	6,750	7,054	7,371	7,703	8,050	8,412	8,790	9,186	9,599	10,031
Total Fuel	$ 14,350	$ 14,996	$ 15,671	$ 16,376	$ 17,113	$ 17,883	$ 18,687	$ 16,943	$ 17,705	$ 18,502
Insurance										
Meter Readers	$ 14,400	$ 15,120	$ 15,876	$ 16,670	$ 17,503	$ 18,378	$ 19,297	$ 15,197	$ 15,957	$ 16,754
Field Service Tech	5,150	5,408	5,678	5,962	6,260	6,573	6,901	7,247	7,609	7,989
Total Insurance	$ 19,550	$ 20,528	$ 21,554	$ 22,632	$ 23,763	$ 24,951	$ 26,199	$ 22,443	$ 23,565	$ 24,744
Misc.										
Meter Readers	$ 1,360	$ 1,408	$ 1,457	$ 1,508	$ 1,561	$ 1,615	$ 1,672	$ 1,298	$ 1,343	$ 1,390
Field Service Tech	750	776	803	832	861	891	922	954	988	1,022
Total Miscellaneous	$ 2,110	$ 2,184	$ 2,260	$ 2,339	$ 2,421	$ 2,506	$ 2,594	$ 2,252	$ 2,331	$ 2,412
Meter Reading Equipment Maintenance										
Hand-held	$ 3,600	$ 3,690	$ 3,782	$ 3,877	$ 3,974	$ 4,073	$ 4,175	$ 3,744	$ 3,838	$ 3,934
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 552	$ 566	$ 580	$ 594	$ 609	$ 624
Total Annual Meter Reading Budget										
Meter Readers	$ 262,592	$ 272,032	$ 281,816	$ 291,955	$ 302,465	$ 313,357	$ 324,647	$ 253,243	$ 262,364	$ 271,819
Field Service Tech	146,054	151,317	156,771	162,424	168,282	174,354	180,646	187,168	193,928	200,934
Meter Reading Operating Budget	$ 408,647	$ 423,349	$ 438,587	$ 454,379	$ 470,747	$ 487,711	$ 505,293	$ 440,411	$ 456,292	$ 472,753
Customer Service Related										
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078
Total Meter Reading Related	$ 1,718,382	$ 1,796,546	$ 1,878,325	$ 1,963,875	$ 2,053,389	$ 2,147,038	$ 2,245,017	$ 2,264,444	$ 2,368,702	$ 2,477,831
Operating Cost per Read										
Regular Meter Read	$0.78	$0.80	$0.82	$0.84	$0.85	$0.87	$0.89	$0.69	$0.70	$0.72
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$17.54	$17.94	$18.35	$18.77	$19.20
Regular + Field Service	$1.18	$1.21	$1.24	$1.26	$1.29	$1.32	$1.35	$1.16	$1.19	$1.22
Reg + Field Serv. + Cust. Serv.	$4.97	$5.13	$5.30	$5.47	$5.64	$5.82	$6.01	$5.98	$6.18	$6.38

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	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Items										
Vehicles										
Meter Reader Vehicles Req'd	4.48	4.48	4.48	4.48	4.48	4.48	4.48	3.36	3.36	3.36
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Vehicle Purchases (Retirements)	6.68	-	-	-	-	-	-	(1.12)	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	-
Required Vehicle Replacements					-	-	-	5.56	-	-
Reading Equipment										
# of Interrogators (1/FTE)	6	6	6	6	6	6	6	5	5	5
# of Spare Interrogators	2	2	2	2	2	2	2	2	2	2
Purchases (Retirements)	8	-	-	-	-	-	-	(1)	-	-
Calculated Replacements					-	8	-	-	-	-
Required Replacements					-	8	-	-	-	-
Installation Programmers Req'd	2	2	2	2	2	2	2	2	2	2
Programmers Purchased (Retired)	2	-	-	-	-	-	-	-	-	-
Calculated Prog. Replacements					-	2	-	-	-	-
Required Programmer Replacements					-	2	-	-	-	-
Software and Training Units	1	1	1	1	1	1	1	1	1	1
Software and Training Units Purch.	1	-	-	-	-	-	-	-	-	-
Software and Training Replacements					-	1	-	-	-	-
Mobile Interface Unit										
Years to Replace Existing Pads	10									
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444
MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Capital Budget										
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ -	$ -	$ -	$ -	$ -	$ 112,978	$ -	$ -
Reading Equipment Purchases (Ret.)	$ 36,000	$ -	$ -	$ -	$ -	$ 40,731	$ -	$ (1,070)	$ -	$ -
Installation Programmers	5,000	-	-	-	-	5,657	-	-	-	-
Software and Training	12,500	-	-	-	-	14,143	-	-	-	-
Mobile Interface Unit	716,652	831,397	854,907	878,994	903,869	929,459	955,784	982,974	1,010,838	1,039,617
Total Capital Budget	$ 903,752	$ 831,397	$ 854,907	$ 878,994	$ 903,869	$ 989,990	$ 955,784	$ 1,094,883	$ 1,010,838	$ 1,039,617
Total Budget (Operating + Capital)	$ 2,622,134	$ 2,627,943	$ 2,733,231	$ 2,842,869	$ 2,957,258	$ 3,137,028	$ 3,200,802	$ 3,359,327	$ 3,379,540	$ 3,517,448
Net Present Value	6.0%									
Discount Rate (Cost of Capital)										
NPV of Total Expenditures	$21,981,447									
Total Cost per Read	$ 7.59	$ 7.51	$ 7.71	$ 7.91	$ 8.12	$ 8.51	$ 8.57	$ 8.88	$ 8.82	$ 9.06

HDR Engineering, Inc.

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meter Reading										
Meters										
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444
Meters with MIU	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889
Read Frequency										
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads										
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758
Bi-monthly	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Reads by Read Type										
Mobile Reads Monthly, Annual Tot.	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Mobile Meters Read Monthly	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	-	-	-	-	-	-	-	-	-	-
Mobile Reads Quarterly, Annual Tot.	7,006	40,814	76,716	112,669	148,677	184,735	220,851	257,026	293,251	329,538
Mobile Meters Read Quarterly	1,752	10,204	19,179	28,167	37,169	46,184	55,213	64,257	73,313	82,385
Total Annual Mobile Reads	33,761	67,917	104,171	140,481	176,851	213,275	249,762	286,313	322,918	359,591
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Touch Read Quarterly, Annual Tot.	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220
Total Annual Touch Reads	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220
Total Annual Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Reading Days/Year Touch Pad										
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450
Reading Days/Year Mobile Radio										
Reading Days/Man Week	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233
Reads/Man Day (Drive-by)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Field Service (Meter Reading Related)										
Field Service Reads per Year										
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Reads by Read Type										
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,804	8,867	9,932
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Days/Year										
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Mobile	90	90	90	90	90	90	90	90	90	90
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25
Personnel Required										
Calculated Meter Readers	3.7	3.4	3.0	2.6	2.3	2.0	2.0	2.0	2.0	2.0
Meter Readers FTE	4	4	3	3	3	2	2	2	2	2
Meter Reader Super.	48%	48%	36%	36%	36%	24%	24%	24%	24%	24%
Calculated Field Service Techs	1.5	1.4	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0
Field Service Techs FTE	2	2	2	2	2	1	1	1	1	1
Field Service Super.	20%	20%	20%	20%	20%	10%	10%	10%	10%	10%
Operating Expenses										
Meter Related										
Salary										
Meter Readers	$ 183,572	$ 189,998	$ 147,486	$ 152,648	$ 157,990	$ 109,013	$ 112,829	$ 116,778	$ 120,865	$ 125,095
Field Service Tech	111,879	115,795	119,848	124,042	128,384	66,439	68,764	71,171	73,662	76,240
Meter Reader Supervisor	36,960	38,254	29,694	30,734	31,809	21,948	22,717	23,512	24,335	25,186
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	9,145	9,465	9,797	10,139	10,494
Total Salary	$ 347,812	$ 359,985	$ 313,524	$ 324,498	$ 335,855	$ 206,545	$ 213,775	$ 221,257	$ 229,001	$ 237,016
Education										
Meter Readers	$ 1,600	$ 1,664	$ 1,298	$ 1,350	$ 1,404	$ 973	$ 1,012	$ 1,053	$ 1,095	$ 1,139
Field Service Tech	1,250	1,300	1,352	1,406	1,462	760	791	822	855	890
Total Education	$ 2,850	$ 2,964	$ 2,650	$ 2,756	$ 2,866	$ 1,734	$ 1,803	$ 1,875	$ 1,950	$ 2,028
M & S										
Meter Readers	$ 6,400	$ 6,624	$ 5,142	$ 5,322	$ 5,508	$ 3,801	$ 3,934	$ 4,071	$ 4,214	$ 4,361
Field Service Tech	3,625	3,752	3,883	4,019	4,160	2,153	2,228	2,306	2,387	2,470
Total M&S	$ 10,025	$ 10,376	$ 9,025	$ 9,341	$ 9,668	$ 5,953	$ 6,162	$ 6,377	$ 6,601	$ 6,832
Contract Services										
Meter Readers	$ 5,600	$ 5,796	$ 4,499	$ 4,657	$ 4,820	$ 3,326	$ 3,442	$ 3,562	$ 3,687	$ 3,816
Field Service Tech	1,250	1,294	1,339	1,386	1,434	742	768	795	823	852
Total Contract Services	$ 6,850	$ 7,090	$ 5,838	$ 6,043	$ 6,254	$ 4,068	$ 4,210	$ 4,358	$ 4,510	$ 4,668

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fuel										
Meter Readers	$ 7,600	$ 7,942	$ 6,225	$ 6,505	$ 6,797	$ 4,735	$ 4,949	$ 5,171	$ 5,404	$ 5,647
Field Service Tech	6,750	7,054	7,371	7,703	8,050	4,206	4,395	4,593	4,800	5,016
Total Fuel	$ 14,350	$ 14,996	$ 13,596	$ 14,208	$ 14,847	$ 8,941	$ 9,344	$ 9,764	$ 10,204	$ 10,663
Insurance										
Meter Readers	$ 14,400	$ 15,120	$ 11,907	$ 12,502	$ 13,127	$ 9,189	$ 9,649	$ 10,131	$ 10,638	$ 11,170
Field Service Tech	5,150	5,408	5,678	5,962	6,260	3,286	3,451	3,623	3,804	3,995
Total Insurance	$ 19,550	$ 20,528	$ 17,585	$ 18,464	$ 19,387	$ 12,476	$ 13,099	$ 13,754	$ 14,442	$ 15,164
Misc.										
Meter Readers	$ 1,360	$ 1,406	$ 1,093	$ 1,131	$ 1,170	$ 808	$ 836	$ 865	$ 895	$ 927
Field Service Tech	750	776	803	832	861	445	461	477	494	511
Total Miscellaneous	$ 2,110	$ 2,184	$ 1,896	$ 1,962	$ 2,031	$ 1,253	$ 1,297	$ 1,342	$ 1,389	$ 1,438
Meter Reading Equipment Maintenance										
Hand-held	$ 2,250	$ 2,306	$ 1,891	$ 1,938	$ 1,987	$ 1,018	$ 1,044	$ 1,070	$ 1,097	$ 1,124
Drive-by	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 552	$ 283	$ 290	$ 297	$ 305	$ 312
Total Annual Meter Reading Budget										
Meter Readers	$ 263,242	$ 272,698	$ 212,911	$ 220,555	$ 228,477	$ 158,489	$ 164,179	$ 170,076	$ 176,189	$ 182,524
Field Service Tech	146,054	151,317	156,771	162,424	168,282	87,177	90,323	93,584	96,964	100,467
Meter Reading Operating Budget	$ 409,297	$ 424,015	$ 369,683	$ 382,979	$ 396,759	$ 245,666	$ 254,502	$ 263,661	$ 273,153	$ 282,991
Customer Service Related										
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078
Total Meter Reading Related	$ 1,719,032	$ 1,797,212	$ 1,809,420	$ 1,892,475	$ 1,979,401	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069
Operating Cost per Read										
Regular Meter Read	$0.78	$0.80	$0.62	$0.63	$0.65	$0.44	$0.45	$0.46	$0.47	$0.48
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$8.77	$8.97	$9.18	$9.39	$9.60
Regular + Field Service	$1.18	$1.21	$1.04	$1.07	$1.09	$0.67	$0.68	$0.70	$0.71	$0.73
Reg + Field Serv. + Cust. Serv.	$4.97	$5.13	$5.10	$5.27	$5.44	$5.17	$5.34	$5.52	$5.70	$5.89

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Items										
Vehicles										
Meter Reader Vehicles Req'd	4.48	4.48	3.36	3.36	3.36	2.24	2.24	2.24	2.24	2.24
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	1.10	1.10	1.10	1.10	1.10
Vehicle Purchases (Retirements)	6.68	-	(1.12)	-	-	(2.22)	-	-	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	(1.12)
Required Vehicle Replacements					-	-	-	3.34	-	-
Reading Equipment										
# of Interrogators (1/FTE)	4	4	3	3	3	1	1	1	1	1
# of Spare Interrogators	1	1	1	1	1	1	1	1	1	1
Interrogator Purchases (Retirements)	5	-	(1)	-	-	(2)	-	-	-	-
Calculated Interr. Replacements					-	5	-	(1)	-	-
Required Interrogator Replacements					-	2	-	-	-	-
Installation Programmers Req'd	2	2	2	2	2	1	1	1	1	1
Programmers Purchased (Retired)	2	-	-	-	-	(1)	-	-	-	-
Calculated Prog. Replacements					-	2	-	-	-	-
Required Programmer Replacements					-	1	-	-	-	-
Drive-by Units Req'd	2	2	2	2	2	2	2	2	2	2
Drive-by Units Purchased	2	-	-	-	-	-	-	-	-	-
Drive-by Units Replaced					-	2	-	-	-	-
Mobile Interface Unit										
Years to Replace Existing Pads	10									
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444
MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Capital Budget										
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ (3,428)	$ -	$ -	$ (7,533)	$ -	$ 84,988	$ -	$ -
Reading Equipment Purchases (Ret.)										
Hand-Held	14,000	-	(588)	-	-	-	-	-	-	-
Installation Programmers	5,000	-	-	-	-	-	-	-	-	-
Drive-by	85,000	-	-	-	-	96,170	-	-	-	-
Mobile Interface Unit	716,652	831,397	854,907	878,994	903,869	929,459	955,784	982,974	1,010,838	1,039,617
Total Capital Budget	$ 954,252	$ 831,397	$ 850,890	$ 878,994	$ 903,869	$ 1,018,096	$ 955,784	$ 1,067,963	$ 1,010,838	$ 1,039,617
Total Budget (Operating + Capital)	$ 2,673,284	$ 2,628,609	$ 2,660,311	$ 2,771,468	$ 2,883,270	$ 2,923,088	$ 2,950,011	$ 3,155,656	$ 3,196,400	$ 3,327,686
Net Present Value										
Discount Rate (Cost of Capital)	6.0%									
NPV of Total Expenditures	$21,197,469									
Total Cost per Read	$ 7.73	$ 7.51	$ 7.50	$ 7.71	$ 7.92	$ 7.93	$ 7.90	$ 8.34	$ 8.34	$ 8.57

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meter Reading										
Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444
Total Meters	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889
Meters with MIU										
Read Frequency	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Quarterly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bi-monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Monthly %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total										
Annual Reads	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758
Quarterly	-	-	-	-	-	-	-	-	-	-
Bi-monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Monthly	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Total										
Reads by Read Type	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053
Mobile Reads Monthly, Annual Tot.	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504
Mobile Meters Read Monthly	-	-	-	-	-	-	-	-	-	-
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	7,006	40,814	76,716	112,669	148,677	184,735	220,851	257,026	293,251	329,538
Mobile Reads Quarterly, Annual Tot.	1,752	10,204	19,179	28,167	37,169	46,184	55,213	64,257	73,313	82,385
Mobile Meters Read Quarterly	33,761	67,917	104,171	140,481	176,851	213,275	249,762	286,313	322,918	359,591
Total Annual Mobile Reads	-	-	-	-	-	-	-	-	-	-
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220
Touch Read Quarterly, Annual Tot.	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220
Total Annual Touch Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811
Total Annual Reads										
Reading Days/Year Touch Pad	4	4	4	4	4	4	4	4	4	4
Reading Days/Man Week	12	12	12	12	12	12	12	12	12	12
Holidays/Year	10	10	10	10	10	10	10	10	10	10
Vacation Days/Year	5	5	5	5	5	5	5	5	5	5
Sick Days/Year	181	181	181	181	181	181	181	181	181	181
Total Reading Days/Year	450	450	450	450	450	450	450	450	450	450
Reads/Man Day										
Reading Days/Year Mobile Radio	5	5	5	5	5	5	5	5	5	5
Reading Days/Man Week	12	12	12	12	12	12	12	12	12	12
Holidays/Year	10	10	10	10	10	10	10	10	10	10
Vacation Days/Year	5	5	5	5	5	5	5	5	5	5
Sick Days/Year	233	233	233	233	233	233	233	233	233	233
Total Reading Days/Year										

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	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Field Service (Meter Reading Related)										
Field Service Reads per Year										
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Reads by Read Type										
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,804	8,867	9,932
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465
Field Service Days/Year										
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25
Personnel Required										
Calculated Meter Readers	3.7	3.3	3.0	2.6	2.2	1.8	1.4	1.0	1.0	1.0
Meter Readers FTE	4	4	3	3	3	2	2	1	1	1
Meter Reader Super.	48%	48%	36%	36%	36%	24%	24%	12%	12%	12%
Calculated Field Service Techs	1.5	1.4	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0
Field Service Techs FTE	2	2	2	2	1	1	1	1	1	1
Field Service Super.	20%	20%	20%	20%	10%	10%	10%	10%	10%	10%
Operating Expenses										
Meter Related										
Salary										
Meter Readers	$ 183,572	$ 189,998	$ 147,486	$ 152,648	$ 157,990	$ 109,013	$ 112,829	$ 58,389	$ 60,432	$ 62,548
Field Service Tech	111,879	115,795	119,848	124,042	64,192	66,439	68,764	71,171	73,662	76,240
Meter Reader Supervisor	36,960	38,254	29,694	30,734	31,809	21,948	22,717	11,756	12,167	12,593
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	8,836	9,145	9,465	9,797	10,139	10,494
Total Salary	$ 347,812	$ 359,985	$ 313,524	$ 324,498	$ 262,827	$ 206,545	$ 213,775	$ 151,112	$ 156,401	$ 161,875
Education										
Meter Readers	$ 1,600	$ 1,664	$ 1,298	$ 1,350	$ 1,404	$ 973	$ 1,012	$ 526	$ 547	$ 569
Field Service Tech	1,250	1,300	1,352	1,406	731	760	791	822	855	890
Total Education	$ 2,850	$ 2,964	$ 2,650	$ 2,756	$ 2,135	$ 1,734	$ 1,803	$ 1,349	$ 1,403	$ 1,459
M & S										
Meter Readers	$ 6,400	$ 6,624	$ 5,142	$ 5,322	$ 5,508	$ 3,801	$ 3,934	$ 2,036	$ 2,107	$ 2,181
Field Service Tech	3,625	3,752	3,883	4,019	2,080	2,153	2,228	2,306	2,387	2,470
Total M&S	$ 10,025	$ 10,376	$ 9,025	$ 9,341	$ 7,588	$ 5,953	$ 6,162	$ 4,342	$ 4,494	$ 4,651

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Contract Services										
Meter Readers	$ 5,600	$ 5,796	$ 4,499	$ 4,657	$ 4,820	$ 3,326	$ 3,442	$ 1,781	$ 1,844	$ 1,908
Field Service Tech	1,250	1,294	1,339	1,386	717	742	768	795	823	852
Total Contract Services	$ 6,850	$ 7,090	$ 5,838	$ 6,043	$ 5,537	$ 4,068	$ 4,210	$ 2,576	$ 2,667	$ 2,760
Fuel										
Meter Readers	$ 7,600	$ 7,942	$ 6,225	$ 6,505	$ 6,797	$ 4,735	$ 4,949	$ 2,586	$ 2,702	$ 2,824
Field Service Tech	6,750	7,054	7,371	7,703	4,025	4,206	4,395	4,593	4,800	5,016
Total Fuel	$ 14,350	$ 14,996	$ 13,596	$ 14,208	$ 10,822	$ 8,941	$ 9,344	$ 7,179	$ 7,502	$ 7,839
Insurance										
Meter Readers	$ 14,400	$ 15,120	$ 11,907	$ 12,502	$ 13,127	$ 9,189	$ 9,649	$ 5,066	$ 5,319	$ 5,585
Field Service Tech	5,150	5,408	5,678	5,962	3,130	3,286	3,451	3,623	3,804	3,995
Total Insurance	$ 19,550	$ 20,528	$ 17,585	$ 18,464	$ 16,257	$ 12,476	$ 13,099	$ 8,689	$ 9,123	$ 9,579
Misc.										
Meter Readers	$ 1,360	$ 1,408	$ 1,093	$ 1,131	$ 1,170	$ 808	$ 836	$ 433	$ 448	$ 463
Field Service Tech	750	776	803	832	430	445	461	477	494	511
Total Miscellaneous	$ 2,110	$ 2,184	$ 1,896	$ 1,962	$ 1,601	$ 1,253	$ 1,297	$ 910	$ 942	$ 974
Meter Reading Equipment Maintenance										
Hand-held	$ 1,960	$ 2,009	$ 1,471	$ 1,508	$ 1,236	$ 950	$ 974	$ 666	$ 682	$ 699
Collectors	$ 20,000	$ 20,500	$ 21,013	$ 21,538	$ 22,076	$ 22,628	$ 23,194	$ 23,774	$ 24,368	$ 24,977
Software	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 276	$ 283	$ 290	$ 297	$ 305	$ 312
Total Annual Meter Reading Budget										
Meter Readers	$ 281,952	$ 291,876	$ 232,453	$ 240,585	$ 248,423	$ 179,918	$ 186,144	$ 109,686	$ 113,358	$ 117,157
Field Service Tech	146,054	151,317	156,771	162,424	84,141	87,177	90,323	93,584	96,964	100,467
Meter Reading Operating Budget	$ 428,007	$ 443,193	$ 389,224	$ 403,009	$ 332,564	$ 267,095	$ 276,467	$ 203,270	$ 210,322	$ 217,624
Customer Service Related										
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078
Total Meter Reading Related	$ 1,737,742	$ 1,816,390	$ 1,828,962	$ 1,912,505	$ 1,915,206	$ 1,926,422	$ 2,016,191	$ 2,027,303	$ 2,122,732	$ 2,222,703
Operating Cost per Read										
Regular Meter Read	$0.84	$0.86	$0.67	$0.69	$0.70	$0.50	$0.51	$0.30	$0.30	$0.31
Field Service Read	$15.68	$16.03	$16.40	$16.77	$8.58	$8.77	$8.97	$9.18	$9.39	$9.60
Regular + Field Service	$1.24	$1.27	$1.10	$1.12	$0.91	$0.72	$0.74	$0.54	$0.55	$0.56
Reg + Field Serv. + Cust. Serv.	$5.03	$5.19	$5.16	$5.32	$5.26	$5.22	$5.40	$5.36	$5.54	$5.72

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Items										
Vehicles										
Meter Reader Vehicles Req'd	4.48	4.48	3.36	3.36	3.36	2.24	2.24	1.12	1.12	1.12
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	1.10	1.10	1.10	1.10	1.10	1.10
Vehicle Purchases (Retirements)	6.68	-	(1.12)	-	(1.10)	(1.12)	-	(1.12)	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	(1.12)
Required Vehicle Replacements					-	-	-	2.22	-	-
Reading Equipment										
# of Interrogators (1/FTE)	5	5	4	4	3	2	2	1	1	1
# of Spare Interrogators	2	2	1	1	1	1	1	1	1	1
Interrogator Purchases (Retirements)	7	-	(2)	-	(1)	(1)	-	(1)	-	-
Calculated Interr. Replacements					-	7	-	(2)	-	(1)
Required Interrogator Replacements					-	-	-	-	-	-
Installation Programmers Req'd	2	2	2	2	1	3	1	1	1	1
Programmers Purchased (Retired)	2	-	-	-	(1)	1	-	-	-	-
Calculated Prog. Replacements					-	-	-	-	-	(1)
Required Programmer Replacements					-	2	-	-	-	-
Fixed Units Req'd	1	1	1	1	1	1	1	1	1	1
Fixed Units Purchased	1	-	-	-	-	-	-	-	-	-
Fixed Units Replaced					-	-	-	-	-	-
Mobile Interface Unit										
Years to Replace Existing Pads	10									
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444
MIU Cost	$ 95.00	$ 97.36	$ 99.81	$ 102.30	$ 104.86	$ 107.48	$ 110.17	$ 112.93	$ 115.75	$ 118.64
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Capital Budget										
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ (3,428)	$ -	$ (3,607)	$ (3,801)	$ -	$ 27,990	$ -	$ -
Reading Equipment Purchases (Ret.)										
Hand-Held	19,600	-	(1,177)	-	(618)	6,336	-	(666)	-	-
Installation Programmers	5,000	-	-	-	(552)	2,829	-	-	-	-
Fixed Infrastructure	360,000	-	-	-	-	-	-	-	-	-
Mobile Interface Unit	875,908	1,015,852	1,044,267	1,073,368	1,103,412	1,134,307	1,166,078	1,198,882	1,232,485	1,267,180
Total Capital Budget	$ 1,394,108	$ 1,015,852	$ 1,039,662	$ 1,073,368	$ 1,098,636	$ 1,139,671	$ 1,166,078	$ 1,226,207	$ 1,232,485	$ 1,267,180
Total Budget (Operating + Capital)	$ 3,131,850	$ 2,832,242	$ 2,868,625	$ 2,985,873	$ 3,013,841	$ 3,066,093	$ 3,182,269	$ 3,253,510	$ 3,355,216	$ 3,489,882
Net Present Value										
Discount Rate (Cost of Capital)	6.0%									
NPV of Total Expenditures	$22,754,859									
Total Cost per Read	$ 9.06	$ 8.09	$ 8.09	$ 8.31	$ 8.28	$ 8.32	$ 8.52	$ 8.60	$ 8.75	$ 8.99

HDR Engineering, Inc.

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meters										
Growth Factor		1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Meter Count	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444
Read Frequency (Monthly % of Meters)										
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Read Frequency (Bi-monthly % of Meters)										
Touch Read	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mobile Walk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mobile Drive-by	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fixed Radio	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Field Service Visits (% of Meters)										
Customer Service/Billing	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Reading and Field Visit Productivity										
Meter Reading										
Touch Read Days per Week	4	4	4	4	4	4	4	4	4	4
Mobile Walk Days per Week	4	4	4	4	4	4	4	4	4	4
Mobile Drive-by Days per Week	5	5	5	5	5	5	5	5	5	5
Fixed Radio Days per Week	5	5	5	5	5	5	5	5	5	5
Touch Reads per Day	450	450	450	450	450	450	450	450	450	450
Mobile Walk Reads per Day	800	800	800	800	800	800	800	800	800	800
Mobile Drive-by Reads per Day	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Field Visits										
Touch Read Days per Week	5	5	5	5	5	5	5	5	5	5
Mobile Walk Days per Week	5	5	5	5	5	5	5	5	5	5
Mobile Drive-by Days per Week	5	5	5	5	5	5	5	5	5	5
Fixed Radio Days per Week	5	5	5	5	5	5	5	5	5	5
Touch Read Visits per Day	25	25	25	25	25	25	25	25	25	25
Mobile Walk Visits per Day	35	35	35	35	35	35	35	35	35	35
Mobile Drive-by Visits per Day	90	90	90	90	90	90	90	90	90	90
Reading and Field Visit Paid Time Off										
Meter Reading										
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5
Field Visits										
Holidays/Year	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating Expenses										
Meter Related										
Salary										
Growth Factor (Inflation)		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Paid Hours per Year	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080
Meter Readers Hourly Rate	$ 15.76	$ 16.31	$ 16.88	$ 17.47	$ 18.08	$ 18.72	$ 19.37	$ 20.05	$ 20.75	$ 21.48
Field Service Tech Hourly Rate	$ 19.21	$ 19.88	$ 20.58	$ 21.30	$ 22.04	$ 22.82	$ 23.61	$ 24.44	$ 25.30	$ 26.18
Read & FS Benefits Multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Loaded Meter Reading Rate	$ 22.06	$ 22.84	$ 23.64	$ 24.46	$ 25.32	$ 26.21	$ 27.12	$ 28.07	$ 29.05	$ 30.07
Loaded Field Service Tech Rate	$ 26.89	$ 27.84	$ 28.81	$ 29.82	$ 30.86	$ 31.94	$ 33.06	$ 34.22	$ 35.41	$ 36.65
Meter Reader Super. Annual	$ 55,000	$ 56,925	$ 58,917	$ 60,979	$ 63,114	$ 65,323	$ 67,609	$ 69,975	$ 72,424	$ 74,959
Field Service Tech Super. Annual	$ 55,000	$ 56,925	$ 58,917	$ 60,979	$ 63,114	$ 65,323	$ 67,609	$ 69,975	$ 72,424	$ 74,959
Super Benefits Multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Mtr Reader Super. Loaded Annual	$ 77,000	$ 79,695	$ 82,484	$ 85,371	$ 88,359	$ 91,452	$ 94,653	$ 97,966	$ 101,394	$ 104,943
Field Srv. Super. Loaded Annual	$ 77,000	$ 79,695	$ 82,484	$ 85,371	$ 88,359	$ 91,452	$ 94,653	$ 97,966	$ 101,394	$ 104,943
Read Supervisor/FTE	12%									
Field Srv Super/FTE	10%									
Education		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 400.00	$ 416.00	$ 432.64	$ 449.95	$ 467.94	$ 486.66	$ 506.13	$ 526.37	$ 547.43	$ 569.32
Field Service $/FTE	$ 625.00	$ 650.00	$ 676.00	$ 703.04	$ 731.16	$ 760.41	$ 790.82	$ 822.46	$ 855.36	$ 889.57
Material & Supplies		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 1,600.00	$ 1,656.00	$ 1,713.96	$ 1,773.95	$ 1,836.04	$ 1,900.30	$ 1,966.81	$ 2,035.65	$ 2,106.89	$ 2,180.64
Field Service $/FTE	$ 1,812.50	$ 1,875.94	$ 1,941.60	$ 2,009.55	$ 2,079.89	$ 2,152.68	$ 2,228.03	$ 2,306.01	$ 2,386.72	$ 2,470.25
Contract Services		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 1,400.00	$ 1,449.00	$ 1,499.72	$ 1,552.21	$ 1,606.53	$ 1,662.76	$ 1,720.96	$ 1,781.19	$ 1,843.53	$ 1,908.06
Field Service $/FTE	$ 625.00	$ 646.88	$ 669.52	$ 692.95	$ 717.20	$ 742.30	$ 768.28	$ 795.17	$ 823.01	$ 851.81
Fuel		4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 1,900.00	$ 1,985.50	$ 2,074.85	$ 2,168.22	$ 2,265.79	$ 2,367.75	$ 2,474.29	$ 2,585.64	$ 2,701.99	$ 2,823.58
Field Service $/FTE	$ 3,375.00	$ 3,526.88	$ 3,685.58	$ 3,851.44	$ 4,024.75	$ 4,205.86	$ 4,395.13	$ 4,592.91	$ 4,799.59	$ 5,015.57
Insurance		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 3,600.00	$ 3,780.00	$ 3,969.00	$ 4,167.45	$ 4,375.82	$ 4,594.61	$ 4,824.34	$ 5,065.56	$ 5,318.84	$ 5,584.78
Field Service $/FTE	$ 2,575.00	$ 2,703.75	$ 2,838.94	$ 2,980.88	$ 3,129.93	$ 3,286.43	$ 3,450.75	$ 3,623.28	$ 3,804.45	$ 3,994.67
Misc.		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Growth Factor (Inflation)										
Meter Readers $/FTE	$ 340.00	$ 351.90	$ 364.22	$ 376.96	$ 390.16	$ 403.81	$ 417.95	$ 432.57	$ 447.72	$ 463.39
Field Service $/FTE	$ 375.00	$ 388.13	$ 401.71	$ 415.77	$ 430.32	$ 445.38	$ 460.97	$ 477.10	$ 493.80	$ 511.09

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Model Inputs
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(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Meter Reading Equipment Maintenance										
Growth Factor (Inflation)		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Touch Read Hand-held	$ 280	$ 287	$ 294	$ 302	$ 309	$ 317	$ 325	$ 333	$ 341	$ 350
Mobile Hand-held	$ 450	$ 461	$ 473	$ 485	$ 497	$ 509	$ 522	$ 535	$ 548	$ 562
Drive-by	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249
Collectors	$ 200	$ 205	$ 210	$ 215	$ 221	$ 226	$ 232	$ 238	$ 244	$ 250
Touch and Mobile Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249
Fixed Software	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498
Installation Programmers	$ 250	$ 256	$ 263	$ 269	$ 276	$ 283	$ 290	$ 297	$ 305	$ 312
Customer Service Related										
Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Account Service Total	$ 1,309,950									
Cost per Read	$ 3.79	$ 3.92	$ 4.06	$ 4.20	$ 4.35	$ 4.50	$ 4.66	$ 4.82	$ 4.99	$ 5.16
Capital Related										
Vehicles										
Cost Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Vehicle Cost	$ 20,000	$ 20,700	$ 21,425	$ 22,174	$ 22,950	$ 23,754	$ 24,585	$ 25,446	$ 26,336	$ 27,258
Vehicle Life in Years	7	**Inputs restricted to values of 4 to 10 years**								
Reading Equipment										
Cost Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Touch Pad Interrogator Cost	$ 2,800	$ 2,870	$ 2,942	$ 3,015	$ 3,091	$ 3,168	$ 3,247	$ 3,328	$ 3,412	$ 3,497
Touch Pad Interrogator Life	5	**Inputs restricted to values of 4 to 10 years**								
Touch Pad Pocket Pro Cost	$ 400	$ 410	$ 420	$ 431	$ 442	$ 453	$ 464	$ 475	$ 487	$ 500
Touch Pad Pocket Pro Life	5	**Inputs restricted to values of 4 to 10 years**								
Mobile Interrogator Cost	$ 4,500	$ 4,613	$ 4,728	$ 4,846	$ 4,967	$ 5,091	$ 5,219	$ 5,349	$ 5,483	$ 5,620
Mobile Interrogator Life	5	**Inputs restricted to values of 4 to 10 years**								
Interrogator Spares % of FTE	25%									
Installation Programmer Cost	$ 2,500	$ 2,563	$ 2,627	$ 2,692	$ 2,760	$ 2,829	$ 2,899	$ 2,972	$ 3,046	$ 3,122
Installation Programmer Life	5	**Inputs restricted to values of 4 to 10 years**								
Mobile Walk										
System Computer	$ 2,500									
Software and Training	$ 10,000									
Total Mobile Walk Startup Cost	$ 12,500	$ 12,813	$ 13,133	$ 13,461	$ 13,798	$ 14,143	$ 14,496	$ 14,859	$ 15,230	$ 15,611
	5	**Inputs restricted to values of 4 to 10 years**								
Drive-by										
Mobile Collector	$ 30,000									
System Computer	$ 2,500									
Software and Training	$ 10,000									
Total Drive-by Mobile Unit Cost	$ 42,500	$ 43,563	$ 44,652	$ 45,768	$ 46,912	$ 48,085	$ 49,287	$ 50,519	$ 51,782	$ 53,077
Drive-by Unit Life in Years	5	**Inputs restricted to values of 4 to 10 years**								

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fixed Radio										
Collector Units	100									
Cost per Collector	$ 3,000									
Network Control Computer	$ 40,000									
Sotware and Training	$ 20,000									
Fixed Unit Infrastructure Cost	$ 360,000	$ 369,000	$ 378,225	$ 387,681	$ 397,373	$ 407,307	$ 417,490	$ 427,927	$ 438,625	$ 449,591
Fixed Unit Infrastructure Life	15	**Inputs restricted to values of 4 to 15 years**								
Touch Pad and MIU										
Initial Replacement Time in Years										
Touch Read	10									
Mobile Walk	10									
Mobile Drive-by	10									
Fixed Radio	10									
Pad and MIU Cost										
Touch Read Cost Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Touch Pad Cost	$ 15.00	$ 15.38	$ 15.76	$ 16.15	$ 16.56	$ 16.97	$ 17.40	$ 17.83	$ 18.28	$ 18.73
Mobile Walk Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Mobile Walk MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66
Mobile Drive-by Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Mobile Drive-by MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66
Fixed Radio Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Fixed MIU Cost	$ 95.00	$ 97.38	$ 99.81	$ 102.30	$ 104.86	$ 107.48	$ 110.17	$ 112.93	$ 115.75	$ 118.64
Pad and MIU Installation Cost										
Touch Read Cost Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Touch Pad Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Mobile Walk Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Mobile Walk MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Mobile Drive-by Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Mobile Drive-by MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Fixed Radio Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Fixed MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44
Discount Rate	6.0%									

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
2005 Budget
(Updated July 18, 2005)

Actual Budget

			FTE	$/FTE
Meter Reading				
Salary	$	197,200	5	
Benefits*		94,300		
Education		2,000		$ 400
M & S		8,000		$ 1,600
Contract Services		7,000		$ 1,400
Fuel		9,500		$ 1,900
Insurance		18,000		$ 3,600
Misc.		1,700		$ 340
	$	337,700		
Field Service				
Salary	$	512,600	8	
Benefits*		179,000		
Education		5,000		$ 625
M & S		14,500		$ 1,813
Contract Services		5,000		$ 625
Fuel		27,000		$ 3,375
Insurance		20,600		$ 2,575
Misc.		3,000		$ 375
	$	766,700		
Flushing & Leak Detection				
Salary	$	176,900		
Benefits*		71,800		
Education		1,000		
M & S		10,500		
Contract Services		5,000		
Fuel		13,500		
Insurance		10,200		
Misc.		1,050		
	$	289,950		
Meter Shop				
Salary	$	164,100		
Benefits*		56,600		
Education		2,000		
M & S		48,000		
Contract Services		24,500		
Fuel		11,000		
Insurance		10,200		
Misc.		1,500		
	$	317,900		

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
2005 Budget
(Updated July 18, 2005)

Customer Service		
Account Service	$ 1,309,950	
General	500,650	
Courier & Maint.	57,050	
	1,867,650	

Total Customer Service, Readers, Field Service, Flushing&Detection, Meter Shop

Total	$ 3,579,900	

Cost Model Budget Estimate

Meter Reading Total (Total Readers, Field Service @ 25%)

Salary	$ 325,350	
Benefits*	139,050	
Education	3,250	
M & S	11,625	
Contract Services	8,250	
Fuel	16,250	
Insurance	23,150	
Misc.	2,450	
	$ 529,375	

* Includes Taxes

Customer Service		
Account Service	$ 1,309,950	
General	-	(Cost not impacted by changes in meter reading)
Courier & Maint.	-	(Cost not impacted by changes in meter reading)
	$ 1,309,950	
Total Estimated Reading Budget	$ 1,839,325	

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Meter Type and Meter Reading
(Updated July 18, 2005)

Read Type Breakdown

Manual	8,000	(Zero by 2006)
Pin	6,500	
Touch Pad	64,768	
MXU (Radio)	360	
Total	79,628	

Installed Meters

Manufacturer	Size	Quantity	Read Type	
Badger	1.500	3	Manual	
Badger	2.000	1	Manual	
Badger	3.000	2	Manual	
Badger	4.000	1	Manual	
Badger	0.625	1,170	Manual	
Hersey	6.000	9	Manual	
Hersey	8.000	6	Manual	
Neptune	1.500	308	Touch Read	Some manual, some Sensus TR
Neptune	10.000	2	Touch Read	
Neptune	1.000	636	Touch Read	
Neptune	2.000	333	Touch Read	
Neptune	0.750	33	Touch Read	Most are Sensus TR
Neptune	0.750	1	Manual	
Neptune	.625x.750	4,493	Touch Read	Some manual
Neptune	3.000	57	Touch Read	Some manual
Neptune	4.000	40	Touch Read	About half are manual
Neptune	0.625	23,177	Touch Read	Some manual
Neptune	6.000	31	Manual	Some touch read
Neptune	8.000	7	Manual	Some touch read
Sensus	1.500	367	Touch Read	
Sensus	1.500	1	Manual	
Sensus	1.000	972	Touch Read	
Sensus	1.000	32	Manual	
Sensus	2.000	490	Touch Read	
Sensus	2.000	9	Manual	
Sensus	.625x.750	1,764	Touch Read	Some manual
Sensus	3.000	58	Touch Read	Some manual
Sensus	4.000	43	Touch Read	
Sensus	0.625	40,684	Touch Read	
Sensus	0.625	4,854	Touch Read	Many manual
Sensus	6.000	32	Touch Read	
Sensus	8.000	12	Touch Read	
		79,628		

Northern Kentucky Water District
Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Meter Type and Meter Reading
(Updated July 18, 2005)

		Reads
Quarterly	97.2%	309,565
Bi-monthly	-	-
Monthly	2.8%	26,840
		336,405
Rereads *	4.3%	3,447
Final Reads *	7.4%	5,870
		9,317
Total Meter Visits		345,722

* Rereads and Final Reads estimated from actual activity in 2004.

2004 Read Comparison. Supplied by Rusty Collinsworth

Name	# Read	Avg. Read	% Coded	Avg. Lost	Avg. Start	Avg. End
Reader 1	59,921	440	0.003	87	28	21
Reader 2	62,013	467	0.001	100	33	20
Reader 3	69,569	513	0.002	93	29	17
Reader 4	62,553	416	0.003	105	32	25
Reader 5	22,032	437	0.004	152	37	30
Reader 6	33,575	396	0.005	98	27	22
Total/Average	309,663	445				

* Reader 5 and 6 only read part of the time for the year. Reader 5 transferred to Flushing.

Meter Readings per Day

Reading Days per Year	181
Meter Readers	4
Meter Readings	336,405
Meter Readings/Day	465

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
2005 Meter Reading Frequency
(Updated June 8, 2005)

Area	Cycle #	# of Routes	Total Meters	Days to Read	Read Frequency	Annual Reads
Newport	91	1	66	1.0	Monthly	792
Sub Districts	73-90	26	2,146	1.0	Monthly	25,752
Bell	36	19	2,553	1.5	Quarterly	10,212
CC City	52	20	4,662	3.0	Quarterly	18,648
CC City	54	19	3,995	3.0	Quarterly	15,980
Cov A	60	13	3,904	3.0	Quarterly	15,616
Cov B	24	14	4,867	3.0	Quarterly	19,468
Cov C	40	11	4,182	3.0	Quarterly	16,728
Dayton	32	15	1,929	1.5	Quarterly	7,716
Ft Thomas	12	22	3,415	2.0	Quarterly	13,660
Ft Thomas	14	24	3,353	2.0	Quarterly	13,412
HH/SG	38/42	11	1,892	1.0	Quarterly	7,568
Independence	18	12	3,060	2.0	Quarterly	12,240
Ken 01	22	11	2,245	2.0	Quarterly	8,980
Ken 12	34	18	4,785	3.0	Quarterly	19,140
Ken 21	44/48	11	4,213	2.0	Quarterly	16,852
Ken 32	46	5	3,296	2.0	Quarterly	13,184
Ken 32B	56	7	2,551	1.0	Quarterly	10,204
Ken 33	62	6	1,596	1.0	Quarterly	6,384
Ken 37	16	7	1,937	2.0	Quarterly	7,748
Ken 44	20	18	4,781	2.0	Quarterly	19,124
Ludlow	50	23	1,975	1.0	Quarterly	7,900
Newport	19	21	2,023	2.0	Quarterly	8,092
Newport	39	15	1,644	2.0	Quarterly	6,576
Newport	55	17	2,635	2.0	Quarterly	10,540
Taylor Mill	63	6	1,697	2.0	Quarterly	6,788
Taylor Mill	65	9	1,975	2.0	Quarterly	7,900
Taylor Mill	67	8	1,372	2.0	Quarterly	5,488
		389	78,749			332,692

Monthly Percentage 2.81%

Presented by Barb Northcutt

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Customer Requested Readings
(Updated July 18, 2005)

	Total FSR	FSR Reads	Total Readers	Reader Reads
2004 On/Off	4,257	4,257	1,613	1,613
2004 On	2,148	-	-	-
2004 Billing Inspections	7,564	2,500	2,867	947
	13,969	6,757	4,480	2,561

		% of Meters
Estimate of Annual Rereads	3,447	4.3%
Estimate of Annual Final Reads	5,870	7.4%
	9,318	

Notes:
Number of work orders 7/1 - 12/31/04: On/Off 6610; On 2148
Number of rereads 7/1 -12/31/04: 5275

Appendix D

15-Year Planning Horizon Model Results

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Summary of Results
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Monthly Read Frequency															
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Operating Budget															
Touch Read	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,235	$ 2,221,514	$ 2,322,219	$ 2,427,576	$ 2,537,775	$ 2,653,062	$ 2,773,709	$ 2,899,919	$ 3,031,949	$ 3,170,094	$ 3,314,605
Mobile Walk	$ 1,718,382	$ 1,796,546	$ 1,878,325	$ 1,963,875	$ 2,053,389	$ 2,147,038	$ 2,245,017	$ 2,264,444	$ 2,368,702	$ 2,477,831	$ 2,586,105	$ 2,705,509	$ 2,830,481	$ 2,961,310	$ 3,098,236
Mobile Drive-by	$ 1,719,032	$ 1,797,212	$ 1,809,420	$ 1,892,475	$ 1,979,401	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069	$ 2,395,482	$ 2,507,974	$ 2,625,781	$ 2,749,181	$ 2,878,406
Fixed Radio	$ 1,737,742	$ 1,816,390	$ 1,828,962	$ 1,912,505	$ 1,915,206	$ 1,926,422	$ 2,016,191	$ 2,027,303	$ 2,122,732	$ 2,222,703	$ 2,327,713	$ 2,437,712	$ 2,552,934	$ 2,673,652	$ 2,800,094
Capital Budget															
Touch Read	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 338,448	$ 324,902	$ 533,725	$ 345,897	$ 356,928	$ 73,498	$ 48,309	$ 50,066	$ 51,930	$ 306,334
Mobile Walk	$ 903,752	$ 831,397	$ 854,907	$ 878,994	$ 903,869	$ 989,990	$ 955,784	$ 1,094,883	$ 1,010,838	$ 1,039,617	$ 197,965	$ 138,352	$ 142,168	$ 146,201	$ 330,212
Mobile Drive-by	$ 954,252	$ 831,397	$ 850,890	$ 878,994	$ 903,869	$ 1,018,096	$ 955,784	$ 1,067,963	$ 1,010,838	$ 1,039,617	$ 254,968	$ 138,352	$ 142,168	$ 146,201	$ 258,342
Fixed Radio	$ 1,394,108	$ 1,015,852	$ 1,039,662	$ 1,073,368	$ 1,098,636	$ 1,139,671	$ 1,166,078	$ 1,226,207	$ 1,232,485	$ 1,267,180	$ 174,438	$ 168,367	$ 172,869	$ 177,625	$ 254,215
Operating + Capital Budget															
Touch Read	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990	$ 2,847,206	$ 2,948,228	$ 3,082,015	$ 3,222,024	$ 3,620,939
Mobile Walk	$ 2,622,134	$ 2,627,943	$ 2,733,231	$ 2,842,869	$ 2,957,258	$ 3,137,028	$ 3,200,802	$ 3,359,327	$ 3,379,540	$ 3,517,448	$ 2,784,070	$ 2,843,861	$ 2,972,650	$ 3,107,511	$ 3,428,448
Mobile Drive-by	$ 2,673,284	$ 2,628,609	$ 2,660,311	$ 2,771,468	$ 2,883,270	$ 2,923,088	$ 2,950,011	$ 3,155,658	$ 3,196,400	$ 3,327,686	$ 2,650,450	$ 2,646,326	$ 2,767,949	$ 2,895,382	$ 3,136,747
Fixed Radio	$ 3,131,850	$ 2,832,242	$ 2,868,625	$ 2,985,873	$ 3,013,841	$ 3,066,093	$ 3,182,269	$ 3,253,510	$ 3,355,216	$ 3,489,882	$ 2,502,151	$ 2,606,079	$ 2,725,803	$ 2,851,277	$ 3,054,309

	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Life
Touch Read	$ 25,667,564	1	10	450	25	$ 15.00		5
Mobile Walk	$ 28,060,094	3	10	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	$ 27,796,044	2	10	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	$ 29,181,644	4	10			$ 95.00	$ 350,000	15

Cost per Read															
Meter Readings															
Meter Readers	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Field Service	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Operating Cost/Read (Meter Readers + Field Service + Customer Service)															
Touch Read	$ 5.15	$ 5.31	$ 5.48	$ 5.66	$ 5.84	$ 6.02	$ 6.22	$ 6.42	$ 6.62	$ 6.83	$ 7.05	$ 7.28	$ 7.51	$ 7.75	$ 8.00
Mobile Walk	$ 4.97	$ 5.13	$ 5.30	$ 5.47	$ 5.64	$ 5.82	$ 6.01	$ 5.98	$ 6.18	$ 6.38	$ 6.57	$ 6.79	$ 7.01	$ 7.24	$ 7.48
Mobile Drive-by	$ 4.97	$ 5.13	$ 5.10	$ 5.27	$ 5.44	$ 5.17	$ 5.34	$ 5.52	$ 5.70	$ 5.89	$ 6.09	$ 6.29	$ 6.51	$ 6.72	$ 6.95
Fixed Radio	$ 5.03	$ 5.19	$ 5.16	$ 5.32	$ 5.26	$ 5.22	$ 5.40	$ 5.36	$ 5.54	$ 5.72	$ 5.92	$ 6.12	$ 6.33	$ 6.54	$ 6.76
Op.+Cap. Cost/Read															
Touch Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75	$ 7.24	$ 7.40	$ 7.64	$ 7.88	$ 8.74
Mobile Walk	$ 7.59	$ 7.51	$ 7.71	$ 7.91	$ 8.12	$ 8.51	$ 8.57	$ 8.88	$ 8.82	$ 9.06	$ 7.08	$ 7.14	$ 7.37	$ 7.60	$ 8.28
Mobile Drive-by	$ 7.73	$ 7.51	$ 7.50	$ 7.71	$ 7.92	$ 7.93	$ 7.90	$ 8.34	$ 8.34	$ 8.57	$ 6.74	$ 6.64	$ 6.86	$ 7.08	$ 7.57
Fixed Radio	$ 9.06	$ 8.09	$ 8.09	$ 8.31	$ 8.28	$ 8.32	$ 8.52	$ 8.60	$ 8.75	$ 8.99	$ 6.36	$ 6.54	$ 6.75	$ 6.97	$ 7.37

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Summary of Results
Current Meter Reading and Billing Frequency with 3-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Monthly Read Frequency															
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Operating Budget															
Touch Read	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,236	$ 2,221,514	$ 2,322,219	$ 2,427,578	$ 2,537,775	$ 2,653,062	$ 2,773,709	$ 2,899,919	$ 3,031,949	$ 3,170,094	$ 3,314,605
Mobile Walk	$ 1,716,382	$ 1,796,546	$ 1,808,738	$ 1,891,775	$ 1,978,683	$ 2,069,632	$ 2,164,812	$ 2,264,444	$ 2,368,702	$ 2,477,831	$ 2,586,105	$ 2,705,509	$ 2,830,481	$ 2,961,310	$ 3,098,236
Mobile Drive-by	$ 1,719,032	$ 1,653,674	$ 1,660,712	$ 1,738,409	$ 1,819,781	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069	$ 2,395,482	$ 2,507,974	$ 2,625,781	$ 2,749,181	$ 2,878,406
Fixed Radio	$ 1,737,742	$ 1,605,925	$ 1,611,203	$ 1,686,888	$ 1,765,170	$ 1,849,208	$ 1,936,163	$ 2,027,303	$ 2,122,732	$ 2,222,703	$ 2,327,713	$ 2,437,712	$ 2,552,934	$ 2,673,652	$ 2,800,094
Capital Budget															
Touch Read	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 336,448	$ 324,902	$ 533,725	$ 345,897	$ 356,926	$ 73,498	$ 48,309	$ 50,066	$ 51,930	$ 306,334
Mobile Walk	$ 2,575,940	$ 2,548,176	$ 2,613,117	$ 103,436	$ 107,599	$ 167,350	$ 116,379	$ 262,593	$ 125,913	$ 130,996	$ 197,965	$ 138,352	$ 142,168	$ 146,201	$ 330,212
Mobile Drive-by	$ 2,626,440	$ 2,539,951	$ 2,613,474	$ 103,436	$ 107,599	$ 217,245	$ 116,379	$ 206,104	$ 125,913	$ 130,996	$ 254,968	$ 138,352	$ 142,168	$ 146,201	$ 259,342
Fixed Radio	$ 3,437,893	$ 3,100,833	$ 3,193,244	$ 126,309	$ 131,353	$ 145,740	$ 141,985	$ 204,208	$ 153,522	$ 159,670	$ 174,438	$ 168,367	$ 172,869	$ 177,625	$ 264,215
Operating + Capital Budget															
Touch Read	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990	$ 2,847,206	$ 2,948,228	$ 3,082,015	$ 3,222,024	$ 3,620,939
Mobile Walk	$ 4,294,322	$ 4,344,722	$ 4,421,854	$ 1,995,211	$ 2,086,282	$ 2,236,982	$ 2,281,192	$ 2,527,037	$ 2,494,615	$ 2,608,828	$ 2,784,070	$ 2,843,861	$ 2,972,650	$ 3,107,511	$ 3,428,448
Mobile Drive-by	$ 4,345,472	$ 4,193,625	$ 4,274,186	$ 1,841,845	$ 1,927,380	$ 2,122,238	$ 2,110,605	$ 2,293,797	$ 2,311,476	$ 2,419,065	$ 2,650,450	$ 2,646,326	$ 2,767,949	$ 2,895,382	$ 3,136,747
Fixed Radio	$ 5,175,636	$ 4,708,758	$ 4,804,447	$ 1,813,197	$ 1,897,523	$ 1,994,949	$ 2,078,168	$ 2,231,510	$ 2,276,254	$ 2,382,373	$ 2,502,151	$ 2,606,079	$ 2,725,803	$ 2,851,277	$ 3,054,309

	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Life
Touch Read	$ 25,667,564	1	10	450	25	$ 15.00		5
Mobile Walk	$ 29,461,657	4	3	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	$ 27,976,119	2	3	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	$ 29,252,679	3	3			$ 95.00	$ 360,000	15

Cost per Read															
Meter Readings	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Meter Readers	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service															
Operating Cost/Read (Meter Readers + Field Service + Customer Service)															
Touch Read	$ 5.15	$ 5.31	$ 5.48	$ 5.66	$ 5.84	$ 6.02	$ 6.22	$ 6.42	$ 6.62	$ 6.83	$ 7.05	$ 7.28	$ 7.51	$ 7.75	$ 8.00
Mobile Walk	$ 4.97	$ 5.13	$ 5.10	$ 5.26	$ 5.44	$ 5.61	$ 5.80	$ 5.98	$ 6.18	$ 6.36	$ 6.57	$ 6.78	$ 7.01	$ 7.24	$ 7.48
Mobile Drive-by	$ 4.97	$ 4.72	$ 4.68	$ 4.84	$ 5.00	$ 5.17	$ 5.34	$ 5.52	$ 5.70	$ 5.89	$ 6.09	$ 6.29	$ 6.51	$ 6.72	$ 6.95
Fixed Radio	$ 5.03	$ 4.59	$ 4.54	$ 4.69	$ 4.85	$ 5.02	$ 5.18	$ 5.36	$ 5.54	$ 5.72	$ 5.92	$ 6.12	$ 6.33	$ 6.54	$ 6.76
Op.+Cap. Cost/Read															
Touch Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75	$ 7.24	$ 7.40	$ 7.64	$ 7.88	$ 8.74
Mobile Walk	$ 12.42	$ 12.41	$ 12.47	$ 5.55	$ 5.73	$ 5.07	$ 6.11	$ 6.68	$ 6.51	$ 6.72	$ 7.08	$ 7.14	$ 7.37	$ 7.60	$ 8.28
Mobile Drive-by	$ 12.57	$ 11.98	$ 12.05	$ 5.13	$ 5.30	$ 5.76	$ 5.65	$ 6.06	$ 6.03	$ 6.23	$ 6.74	$ 6.64	$ 6.86	$ 7.08	$ 7.57
Fixed Radio	$ 14.97	$ 13.44	$ 13.54	$ 5.05	$ 5.21	$ 5.41	$ 5.56	$ 5.90	$ 5.94	$ 6.14	$ 6.36	$ 6.54	$ 6.75	$ 6.97	$ 7.37

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Summary of Results
Monthly Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Monthly Read Frequency															
Touch Read	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Walk	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Drive-by	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fixed Radio	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Budget															
Touch Read	$ 2,139,737	$ 3,129,952	$ 4,208,203	$ 5,313,082	$ 5,556,964	$ 5,812,190	$ 6,079,284	$ 6,358,850	$ 6,651,406	$ 7,046,631	$ 7,370,420	$ 7,709,271	$ 8,063,680	$ 8,435,043	$ 8,823,857
Mobile Walk	$ 2,077,673	$ 3,066,429	$ 4,142,406	$ 5,173,501	$ 5,337,086	$ 5,584,317	$ 5,762,917	$ 6,030,988	$ 6,311,626	$ 6,516,244	$ 6,811,279	$ 7,129,838	$ 7,463,409	$ 7,812,762	$ 8,178,559
Mobile Drive-by	$ 2,078,773	$ 2,999,932	$ 4,003,917	$ 4,957,415	$ 5,113,687	$ 5,187,460	$ 5,351,194	$ 5,521,276	$ 5,697,366	$ 5,879,757	$ 6,161,212	$ 6,456,178	$ 6,765,286	$ 7,089,278	$ 7,428,782
Fixed Radio	$ 2,096,863	$ 3,018,300	$ 4,022,566	$ 4,976,648	$ 5,048,553	$ 5,207,927	$ 5,372,891	$ 5,460,481	$ 5,634,328	$ 5,814,390	$ 6,093,443	$ 6,385,915	$ 6,692,439	$ 7,013,749	$ 7,350,471
Capital Budget															
Touch Read	$ 440,884	$ 330,140	$ 343,641	$ 362,437	$ 305,241	$ 341,616	$ 331,396	$ 572,209	$ 418,536	$ 452,012	$ 171,909	$ 55,800	$ 61,697	$ 67,981	$ 387,158
Mobile Walk	$ 930,652	$ 891,602	$ 912,353	$ 943,202	$ 898,210	$ 995,081	$ 962,288	$ 1,192,148	$ 1,086,279	$ 1,069,022	$ 272,793	$ 150,393	$ 154,630	$ 165,548	$ 402,729
Mobile Drive-by	$ 982,252	$ 857,451	$ 881,844	$ 906,844	$ 899,579	$ 1,033,935	$ 951,201	$ 1,036,462	$ 1,010,838	$ 1,038,917	$ 285,565	$ 138,352	$ 142,168	$ 146,201	$ 258,342
Fixed Radio	$ 1,419,308	$ 1,041,906	$ 1,071,204	$ 1,104,234	$ 1,093,727	$ 1,155,511	$ 1,162,145	$ 1,254,040	$ 1,235,896	$ 1,266,480	$ 206,036	$ 168,367	$ 172,869	$ 181,637	$ 254,215
Operating + Capital Budget															
Touch Read	$ 2,580,621	$ 3,460,092	$ 4,551,844	$ 5,695,519	$ 5,862,204	$ 6,153,806	$ 6,410,680	$ 6,931,059	$ 7,069,942	$ 7,498,643	$ 7,542,329	$ 7,765,071	$ 8,125,577	$ 8,503,024	$ 9,317,015
Mobile Walk	$ 3,008,325	$ 3,958,031	$ 5,054,761	$ 6,116,703	$ 6,235,296	$ 6,579,398	$ 6,725,205	$ 7,223,136	$ 7,397,906	$ 7,585,266	$ 7,084,073	$ 7,280,231	$ 7,618,039	$ 7,978,310	$ 8,581,288
Mobile Drive-by	$ 3,061,025	$ 3,857,383	$ 4,885,761	$ 5,864,259	$ 6,013,266	$ 6,221,395	$ 6,302,395	$ 6,617,738	$ 6,708,204	$ 6,918,675	$ 6,447,778	$ 6,594,529	$ 6,907,454	$ 7,235,479	$ 7,687,124
Fixed Radio	$ 3,516,171	$ 4,060,206	$ 5,093,770	$ 6,080,882	$ 6,142,280	$ 6,363,438	$ 6,535,036	$ 6,714,522	$ 6,870,225	$ 7,080,871	$ 6,299,476	$ 6,554,282	$ 6,865,308	$ 7,195,366	$ 7,604,685

	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.	Read Life
Touch Read	$ 58,840,335	3	10	450	25	$ 15.00		5
Mobile Walk	$ 60,397,229	4	10	800	35	$ 75.00	$ 12,500	5
Mobile Drive-by	$ 55,444,969	1	10	10,000	90	$ 75.00	$ 42,500	5
Fixed Radio	$ 57,829,536	2	10			$ 95.00	$ 360,000	15

Cost per Read															
Meter Readings															
Meter Readers	414,065	613,039	817,120	993,288	1,006,200	1,019,280	1,032,528	1,045,956	1,059,552	1,073,328	1,087,284	1,101,420	1,115,736	1,130,244	1,144,932
Field Service	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Operating Cost/Read (Meter Readers + Field Service + Customer Service)															
Touch Read	$ 5.05	$ 5.03	$ 5.09	$ 5.30	$ 5.47	$ 5.65	$ 5.83	$ 6.02	$ 6.22	$ 6.50	$ 6.71	$ 6.93	$ 7.16	$ 7.39	$ 7.72
Mobile Walk	$ 4.91	$ 4.93	$ 5.01	$ 5.16	$ 5.25	$ 5.43	$ 5.53	$ 5.71	$ 5.90	$ 6.01	$ 6.20	$ 6.41	$ 6.62	$ 6.85	$ 7.07
Mobile Drive-by	$ 4.91	$ 4.82	$ 4.84	$ 4.94	$ 5.03	$ 5.04	$ 5.13	$ 5.23	$ 5.33	$ 5.43	$ 5.61	$ 5.81	$ 6.00	$ 6.21	$ 6.43
Fixed Radio	$ 4.95	$ 4.85	$ 4.87	$ 4.96	$ 4.97	$ 5.06	$ 5.15	$ 5.17	$ 5.27	$ 5.36	$ 5.55	$ 5.74	$ 5.94	$ 6.15	$ 6.36
Op.+Cap. Cost/Read															
Touch Read	$ 6.10	$ 5.56	$ 5.51	$ 5.68	$ 5.77	$ 5.98	$ 6.15	$ 6.56	$ 6.61	$ 6.92	$ 6.87	$ 6.98	$ 7.21	$ 7.45	$ 8.06
Mobile Walk	$ 7.11	$ 6.36	$ 6.11	$ 6.10	$ 6.14	$ 6.39	$ 6.45	$ 6.84	$ 6.91	$ 7.00	$ 6.45	$ 6.55	$ 6.76	$ 6.99	$ 7.42
Mobile Drive-by	$ 7.23	$ 6.20	$ 5.91	$ 5.85	$ 5.92	$ 6.04	$ 6.04	$ 6.27	$ 6.27	$ 6.38	$ 5.87	$ 5.93	$ 6.13	$ 6.34	$ 6.65
Fixed Radio	$ 8.30	$ 6.52	$ 6.16	$ 6.06	$ 6.05	$ 6.18	$ 6.27	$ 6.36	$ 6.42	$ 6.53	$ 5.74	$ 5.89	$ 6.09	$ 6.30	$ 6.58

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Summary of Results
Monthly Meter Reading and Billing Frequency with 3-Year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Monthly Read Frequency															
Touch Read	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Walk	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Drive-by	15.0%	45.0%	75.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fixed Radio	15.0%	45.0%													
Operating Budget															
Touch Read	$ 2,139,737	$ 3,129,952	$ 4,208,203	$ 5,313,082	$ 5,556,964	$ 5,812,190	$ 6,079,284	$ 6,358,850	$ 6,651,406	$ 7,046,631	$ 7,370,420	$ 7,709,271	$ 8,063,880	$ 8,435,043	$ 8,929,857
Mobile Walk	$ 2,077,673	$ 2,998,805	$ 3,933,174	$ 4,884,615	$ 5,112,969	$ 5,352,099	$ 5,682,712	$ 5,947,881	$ 6,225,512	$ 6,516,244	$ 6,811,279	$ 7,129,838	$ 7,463,409	$ 7,812,762	$ 8,178,559
Mobile Drive-by	$ 2,013,500	$ 2,721,608	$ 3,576,387	$ 4,442,362	$ 4,654,749	$ 4,877,327	$ 5,110,579	$ 5,355,063	$ 5,611,252	$ 5,879,757	$ 6,161,212	$ 6,456,176	$ 6,765,286	$ 7,089,278	$ 7,428,782
Fixed Radio	$ 2,032,210	$ 2,673,859	$ 3,526,878	$ 4,390,841	$ 4,601,137	$ 4,821,543	$ 5,052,535	$ 5,294,672	$ 5,548,421	$ 5,814,390	$ 6,093,443	$ 6,385,915	$ 6,692,439	$ 7,013,749	$ 7,350,471
Capital Budget															
Touch Read	$ 440,884	$ 330,140	$ 343,641	$ 382,437	$ 305,241	$ 341,616	$ 331,396	$ 572,209	$ 418,536	$ 452,012	$ 171,909	$ 65,800	$ 61,697	$ 67,981	$ 387,158
Mobile Walk	$ 2,602,840	$ 2,575,973	$ 2,617,490	$ 137,964	$ 107,599	$ 177,533	$ 154,352	$ 319,591	$ 188,375	$ 130,996	$ 241,196	$ 160,393	$ 142,168	$ 194,132	$ 402,729
Mobile Drive-by	$ 2,626,440	$ 2,589,951	$ 2,613,474	$ 103,436	$ 107,599	$ 217,245	$ 116,379	$ 206,104	$ 125,913	$ 130,996	$ 254,968	$ 138,352	$ 142,168	$ 146,201	$ 258,342
Fixed Radio	$ 3,437,893	$ 3,100,833	$ 3,193,244	$ 128,309	$ 131,353	$ 145,740	$ 141,985	$ 204,208	$ 153,522	$ 159,670	$ 174,438	$ 168,367	$ 172,869	$ 177,625	$ 254,215
Operating + Capital Budget															
Touch Read	$ 2,580,621	$ 3,460,092	$ 4,551,844	$ 5,695,519	$ 5,862,204	$ 6,153,806	$ 6,410,680	$ 6,931,059	$ 7,069,942	$ 7,498,643	$ 7,542,329	$ 7,765,071	$ 8,125,577	$ 8,503,024	$ 9,317,015
Mobile Walk	$ 4,680,513	$ 5,574,778	$ 6,550,664	$ 5,022,578	$ 5,220,568	$ 5,529,632	$ 5,837,063	$ 6,267,473	$ 6,391,887	$ 6,647,240	$ 7,052,475	$ 7,289,231	$ 7,605,578	$ 8,006,893	$ 8,581,288
Mobile Drive-by	$ 4,639,940	$ 5,261,559	$ 6,189,862	$ 4,545,798	$ 4,762,347	$ 5,094,573	$ 5,226,958	$ 5,561,167	$ 5,737,165	$ 6,010,753	$ 6,416,180	$ 6,594,529	$ 6,907,454	$ 7,235,479	$ 7,687,124
Fixed Radio	$ 5,470,104	$ 5,774,692	$ 6,720,122	$ 4,517,151	$ 4,732,490	$ 4,967,283	$ 5,194,520	$ 5,498,880	$ 5,701,943	$ 5,974,061	$ 6,267,881	$ 6,554,282	$ 6,865,306	$ 7,191,373	$ 7,604,685

	NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad. Mtl	Startup-Infra.	Read Life
			10	460	25	$ 15.00	$ 12,500	5
			3	800	35	$ 75.00	$ 42,500	5
Touch Read	$ 58,840,335	3	3	10,000	90	$ 75.00	$ 42,500	5
Mobile Walk	$ 59,985,342	4	3			$ 95.00	$ 360,000	15
Mobile Drive-by	$ 55,029,189	1	3					
Fixed Radio	$ 56,305,748	2						

Cost per Read															
Meter Readings	414,065	813,039	817,120	993,288	1,006,200	1,019,280	1,032,528	1,045,956	1,059,552	1,073,328	1,087,284	1,101,420	1,115,736	1,130,244	1,144,932
Meter Readers	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service															
Operating Cost/Read (Meter Readers + Field Service + Customer Service)															
Touch Read	$ 5.05	$ 5.03	$ 5.09	$ 5.30	$ 5.47	$ 5.65	$ 5.83	$ 6.02	$ 6.22	$ 6.50	$ 6.71	$ 6.93	$ 7.16	$ 7.39	$ 7.72
Mobile Walk	$ 4.91	$ 4.82	$ 4.76	$ 4.87	$ 5.03	$ 5.20	$ 5.45	$ 5.63	$ 5.82	$ 6.01	$ 6.20	$ 6.41	$ 6.62	$ 6.85	$ 7.07
Mobile Drive-by	$ 4.78	$ 4.37	$ 4.33	$ 4.43	$ 4.58	$ 4.74	$ 4.90	$ 5.07	$ 5.24	$ 5.43	$ 5.61	$ 5.81	$ 6.00	$ 6.21	$ 6.43
Fixed Radio	$ 4.80	$ 4.30	$ 4.27	$ 4.38	$ 4.53	$ 4.68	$ 4.85	$ 5.01	$ 5.19	$ 5.36	$ 5.55	$ 5.74	$ 5.94	$ 6.15	$ 6.36
Op.+Cap. Cost/Read															
Touch Read	$ 6.10	$ 5.56	$ 5.51	$ 5.68	$ 5.77	$ 5.98	$ 6.15	$ 6.56	$ 6.61	$ 6.92	$ 6.87	$ 6.98	$ 7.21	$ 7.45	$ 8.06
Mobile Walk	$ 11.06	$ 8.96	$ 7.92	$ 5.01	$ 5.14	$ 5.37	$ 5.60	$ 5.93	$ 5.97	$ 6.13	$ 6.42	$ 6.55	$ 6.75	$ 7.02	$ 7.42
Mobile Drive-by	$ 10.96	$ 8.45	$ 7.49	$ 4.53	$ 4.69	$ 4.85	$ 5.01	$ 5.27	$ 5.36	$ 5.55	$ 5.84	$ 5.93	$ 6.13	$ 6.34	$ 6.65
Fixed Radio	$ 12.92	$ 9.28	$ 8.13	$ 4.50	$ 4.66	$ 4.83	$ 4.98	$ 5.21	$ 5.33	$ 5.51	$ 5.71	$ 5.89	$ 6.09	$ 6.30	$ 6.58

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 16, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Meter Reading															
Meters															
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444	90,607	91,785	92,978	94,187	95,411
Read Frequency															
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads															
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758	352,280	356,860	361,498	366,199	370,958
Bi-monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reading Days/Year															
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Field Service (Meter Reading Related)															
Field Service Reads per Year															
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846	3,896	3,947	3,998	4,050	4,103
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619	6,705	6,792	6,880	6,970	7,060
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service Days/Year															
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Visits/Man Day	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Personnel Required															
Calculated Meter Readers	4.1	4.2	4.2	4.3	4.3	4.4	4.5	4.6	4.6	4.6	4.7	4.8	4.8	4.9	4.9
Meter Readers FTE	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Meter Reader Super.	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Calculated Field Service Techs	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
Field Service Techs FTE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Field Service Super.	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Operating Expenses															
Meter Related															
Salary															
Meter Readers	$ 229,466	$ 237,497	$ 245,809	$ 254,413	$ 263,317	$ 272,533	$ 282,072	$ 291,944	$ 302,162	$ 312,738	$ 323,684	$ 335,013	$ 346,738	$ 358,874	$ 371,435
Field Service Tech	111,879	115,795	119,848	124,042	128,384	132,877	137,528	142,341	147,323	152,480	157,816	163,340	169,057	174,974	181,098
Meter Reader Supervisor	46,200	47,817	49,491	51,223	53,016	54,871	56,792	58,779	60,837	62,966	65,170	67,451	69,811	72,255	74,784
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	18,290	18,931	19,593	20,279	20,989	21,723	22,484	23,270	24,085	24,928
Total Salary	$ 402,945	$ 417,048	$ 431,644	$ 446,752	$ 462,388	$ 478,572	$ 495,322	$ 512,658	$ 530,601	$ 549,172	$ 568,393	$ 588,287	$ 608,877	$ 630,188	$ 652,244
Education															
Meter Readers	$ 2,000	$ 2,080	$ 2,163	$ 2,250	$ 2,340	$ 2,433	$ 2,531	$ 2,632	$ 2,737	$ 2,847	$ 2,960	$ 3,079	$ 3,202	$ 3,330	$ 3,463
Field Service Tech	1,250	1,300	1,352	1,406	1,462	1,521	1,582	1,645	1,711	1,779	1,850	1,924	2,001	2,081	2,165
Total Education	$ 3,250	$ 3,380	$ 3,515	$ 3,656	$ 3,802	$ 3,954	$ 4,112	$ 4,277	$ 4,448	$ 4,626	$ 4,811	$ 5,003	$ 5,203	$ 5,411	$ 5,628

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
M & S															
Meter Readers	$ 8,000	$ 8,280	$ 8,570	$ 8,870	$ 9,180	$ 9,501	$ 9,834	$ 10,178	$ 10,534	$ 10,903	$ 11,285	$ 11,680	$ 12,089	$ 12,512	$ 12,950
Field Service Tech	3,625	3,752	3,883	4,019	4,160	4,305	4,456	4,612	4,773	4,941	5,113	5,292	5,478	5,669	5,868
Total M&S	$ 11,625	$ 12,032	$ 12,453	$ 12,889	$ 13,340	$ 13,807	$ 14,290	$ 14,790	$ 15,308	$ 15,844	$ 16,398	$ 16,972	$ 17,566	$ 18,181	$ 18,817
Contract Services															
Meter Readers	$ 7,000	$ 7,245	$ 7,499	$ 7,761	$ 8,033	$ 8,314	$ 8,605	$ 8,906	$ 9,218	$ 9,540	$ 9,874	$ 10,220	$ 10,577	$ 10,948	$ 11,331
Field Service Tech	1,250	1,294	1,339	1,386	1,434	1,485	1,537	1,590	1,646	1,704	1,763	1,825	1,889	1,955	2,023
Total Contract Services	$ 8,250	$ 8,539	$ 8,838	$ 9,147	$ 9,467	$ 9,798	$ 10,141	$ 10,496	$ 10,864	$ 11,244	$ 11,637	$ 12,045	$ 12,466	$ 12,903	$ 13,354
Fuel															
Meter Readers	$ 9,500	$ 9,928	$ 10,374	$ 10,841	$ 11,329	$ 11,839	$ 12,371	$ 12,928	$ 13,510	$ 14,118	$ 14,753	$ 15,417	$ 16,111	$ 16,836	$ 17,593
Field Service Tech	6,750	7,054	7,371	7,703	8,050	8,412	8,790	9,186	9,599	10,031	10,483	10,954	11,447	11,962	12,501
Total Fuel	$ 16,250	$ 16,981	$ 17,745	$ 18,544	$ 19,378	$ 20,250	$ 21,162	$ 22,114	$ 23,109	$ 24,149	$ 25,236	$ 26,371	$ 27,558	$ 28,798	$ 30,094
Insurance															
Meter Readers	$ 18,000	$ 18,900	$ 19,845	$ 20,837	$ 21,879	$ 22,973	$ 24,122	$ 25,328	$ 26,594	$ 27,924	$ 29,320	$ 30,786	$ 32,325	$ 33,942	$ 35,639
Field Service Tech	5,150	5,408	5,678	5,962	6,260	6,573	6,901	7,247	7,609	7,989	8,389	8,808	9,249	9,711	10,197
Total Insurance	$ 23,150	$ 24,308	$ 25,523	$ 26,799	$ 28,139	$ 29,546	$ 31,023	$ 32,574	$ 34,203	$ 35,913	$ 37,709	$ 39,594	$ 41,574	$ 43,653	$ 45,835
Misc.															
Meter Readers	$ 1,700	$ 1,760	$ 1,821	$ 1,885	$ 1,951	$ 2,019	$ 2,090	$ 2,163	$ 2,239	$ 2,317	$ 2,398	$ 2,482	$ 2,569	$ 2,659	$ 2,752
Field Service Tech	750	776	803	832	861	891	922	954	988	1,022	1,058	1,095	1,133	1,173	1,214
Total Miscellaneous	$ 2,450	$ 2,536	$ 2,625	$ 2,716	$ 2,811	$ 2,910	$ 3,012	$ 3,117	$ 3,226	$ 3,339	$ 3,456	$ 3,577	$ 3,702	$ 3,832	$ 3,966
Meter Reading Equipment Maintenance															
Hand-held	$ 1,960	$ 2,009	$ 2,059	$ 2,111	$ 2,163	$ 2,218	$ 2,273	$ 2,330	$ 2,388	$ 2,448	$ 2,533	$ 2,622	$ 2,714	$ 2,809	$ 2,907
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249	$ 1,293	$ 1,338	$ 1,385	$ 1,433	$ 1,483
Total Annual Meter Reading Budget															
Meter Readers	$ 324,826	$ 336,540	$ 348,682	$ 361,267	$ 374,311	$ 387,833	$ 401,848	$ 416,377	$ 431,437	$ 447,049	$ 463,270	$ 480,087	$ 497,521	$ 515,597	$ 534,337
Field Service Tech	146,054	151,317	156,771	162,424	168,282	174,354	180,646	187,168	193,928	200,934	208,196	215,723	223,524	231,611	239,993
Meter Reading Operating Budget	$ 470,880	$ 487,857	$ 505,453	$ 523,690	$ 542,593	$ 562,186	$ 582,495	$ 603,545	$ 625,365	$ 647,984	$ 671,466	$ 695,810	$ 721,046	$ 747,207	$ 774,330
Customer Service Related															
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078	$ 2,102,242	$ 2,204,110	$ 2,310,903	$ 2,422,867	$ 2,540,275
Total Meter Reading Related	$ 1,780,615	$ 1,861,054	$ 1,945,191	$ 2,033,187	$ 2,125,235	$ 2,221,514	$ 2,322,219	$ 2,427,578	$ 2,537,775	$ 2,653,062	$ 2,773,709	$ 2,899,919	$ 3,031,949	$ 3,170,094	$ 3,314,605
Operating Cost per Read															
Regular Meter Read	$0.97	$0.99	$1.01	$1.03	$1.06	$1.08	$1.11	$1.13	$1.16	$1.18	$1.21	$1.24	$1.27	$1.30	$1.33
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$17.54	$17.94	$18.35	$18.77	$19.20	$19.64	$20.09	$20.55	$21.02	$21.50
Regular + Field Service	$1.36	$1.39	$1.42	$1.46	$1.49	$1.52	$1.56	$1.60	$1.63	$1.67	$1.71	$1.75	$1.79	$1.83	$1.87
Reg + Field Serv. + Cust. Serv.	$5.15	$5.31	$5.48	$5.65	$5.84	$6.02	$6.22	$6.42	$6.62	$6.83	$7.05	$7.28	$7.51	$7.75	$8.00

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Touch Read
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Capital Items															
Vehicles															
Meter Reader Vehicles Req'd	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Vehicle Purchases (Retirements)	7.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calculated Vehicle Replacements					-	-	-	7.80	-	-	-	-	-	-	7.80
Required Vehicle Replacements					-	-	-	7.80	-	-	-	-	-	-	7.80
Reading Equipment															
# of Interrogators (1/Meter Read)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
# of Spare Interrogators	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Purchases (Retirements)	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calculated Replacements					-	7	-	-	-	-	7	-	-	-	-
Required Replacements					-	7	-	-	-	-	7	-	-	-	-
# of Pocket Pro (1/Field Service)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
# of Spare Pocket Pro	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Purchases (Retirements)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calculated Replacements					-	3	-	-	-	-	3	-	-	-	-
Required Replacements					-	3	-	-	-	-	3	-	-	-	-
Touch Pad															
Years to Replace Existing Pads	10														
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	-	-	-	-	-
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628	79,628	79,628	79,628	79,628	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148	1,163	1,178	1,193	1,209	1,224
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111	1,163	1,178	1,193	1,209	1,224
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444	90,607	91,785	92,978	94,187	95,411
Touch Pad Cost	$ 15.00	$ 15.38	$ 15.76	$ 16.15	$ 16.56	$ 16.97	$ 17.40	$ 17.83	$ 18.28	$ 18.73	$ 18.92	$ 19.11	$ 19.30	$ 19.49	$ 19.69
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Capital Budget															
Vehicle Purchases (Retirements)	$ 156,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 198,476	$ -	$ -	$ -	$ -	$ -	$ -	$ 252,516
Reading Equipment Purchases (Ret.)															
Interrogators	$ 19,600	$ -	$ -	$ -	$ -	$ 22,176	$ -	$ -	$ -	$ -	$ 25,334	$ -	$ -	$ -	$ -
Pocket Pro	$ 1,200	$ -	$ -	$ -	$ -	$ 1,358	$ -	$ -	$ -	$ -	$ 1,551	$ -	$ -	$ -	$ -
Touch Pad	238,884	278,032	286,825	295,870	305,241	314,914	324,902	335,250	345,897	356,928	46,612	48,309	50,066	51,930	53,816
Total Capital Budget	$ 415,684	$ 278,032	$ 286,825	$ 295,870	$ 305,241	$ 338,448	$ 324,902	$ 533,725	$ 345,897	$ 356,928	$ 73,498	$ 48,309	$ 50,066	$ 51,930	$ 306,334
Total Budget (Operating + Capital)	$ 2,196,299	$ 2,139,086	$ 2,232,016	$ 2,329,057	$ 2,430,476	$ 2,559,961	$ 2,647,121	$ 2,961,304	$ 2,883,672	$ 3,009,990	$ 2,847,206	$ 2,946,228	$ 3,082,015	$ 3,222,024	$ 3,620,939
Net Present Value															
Discount Rate (Cost of Capital)	6.0%														
NPV of Total Expenditures	$25,667,564														
Total Cost per Read	$ 6.35	$ 6.11	$ 6.29	$ 6.48	$ 6.68	$ 6.94	$ 7.09	$ 7.83	$ 7.52	$ 7.75	$ 7.24	$ 7.40	$ 7.64	$ 7.88	$ 8.74

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Walk-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Meter Reading															
Meters															
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444	90,607	91,785	92,978	94,187	95,411
Meters with MIU	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889	90,607	91,785	92,978	94,187	95,411
Read Frequency															
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads															
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758	352,280	356,860	361,498	366,199	370,958
Bi-monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reads by Read Type															
Mobile Reads Monthly, Annual Tot.	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Mobile Meters Read Monthly	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504	2,537	2,570	2,603	2,637	2,672
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Reads Quarterly, Annual Tot.	7,007	40,812	76,714	112,669	148,675	184,736	220,852	257,024	293,252	329,537	352,280	356,860	361,498	366,199	370,958
Mobile Meters Read Quarterly	1,752	10,203	19,179	28,167	37,169	46,184	55,213	64,256	73,313	82,384	88,070	89,215	90,375	91,550	92,740
Total Annual Mobile Reads	33,762	67,915	104,169	140,481	176,849	213,276	249,763	286,311	322,919	359,590	382,724	387,700	392,739	397,846	403,016
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Quarterly, Annual Tot.	302,587	272,806	240,982	209,156	177,334	145,511	113,687	81,866	50,043	18,221	-	-	-	-	-
Total Annual Touch Reads	302,587	272,806	240,982	209,156	177,334	145,511	113,687	81,866	50,043	18,221	-	-	-	-	-
Total Annual Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reading Days/Year Touch Pad															
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Reading Days/Year Mobile Radio															
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Field Service (Meter Reading Related)															
Field Service Reads per Year															
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846	3,898	3,947	3,998	4,050	4,103
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619	6,705	6,792	6,880	6,970	7,060
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service Reads by Read Type															
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,803	8,867	9,932	10,601	10,739	10,878	11,020	11,163
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533	(0)	(0)	(0)	(0)	(0)
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163

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15-Year Planning Horizon Cost Model
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(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Field Service Days/Year															
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Mobile	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Personnel Required															
Calculated Meter Readers	3.9	3.8	3.7	3.5	3.4	3.3	3.1	3.0	2.8	2.7	2.6	2.7	2.7	2.7	2.8
Meter Readers FTE	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3
Meter Reader Super.	48%	48%	48%	48%	48%	48%	48%	36%	36%	36%	36%	36%	36%	36%	36%
Calculated Field Service Techs	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Field Service Techs FTE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Field Service Super.	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Operating Expenses															
Meter Related															
Salary															
Meter Readers	$ 183,572	$ 189,998	$ 196,647	$ 203,530	$ 210,654	$ 218,027	$ 225,657	$ 175,167	$ 181,297	$ 187,643	$ 194,210	$ 201,008	$ 208,043	$ 215,324	$ 222,861
Field Service Tech	111,879	115,795	119,848	124,042	128,384	132,877	137,528	142,341	147,323	152,480	157,816	163,340	169,057	174,974	181,098
Meter Reader Supervisor	36,960	38,254	39,592	40,978	42,412	43,897	45,433	35,268	36,502	37,780	39,102	40,470	41,887	43,353	44,870
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	18,290	18,931	19,593	20,279	20,989	21,723	22,484	23,270	24,085	24,928
Total Salary	$ 347,812	$ 359,985	$ 372,584	$ 385,625	$ 399,122	$ 413,091	$ 427,549	$ 372,369	$ 385,402	$ 398,891	$ 412,852	$ 427,302	$ 442,257	$ 457,736	$ 473,757
Education															
Meter Readers	$ 1,600	$ 1,664	$ 1,731	$ 1,800	$ 1,872	$ 1,947	$ 2,025	$ 1,579	$ 1,642	$ 1,708	$ 1,776	$ 1,847	$ 1,921	$ 1,998	$ 2,078
Field Service Tech	1,250	1,300	1,352	1,406	1,462	1,521	1,582	1,645	1,711	1,779	1,850	1,924	2,001	2,081	2,165
Total Education	$ 2,850	$ 2,964	$ 3,083	$ 3,206	$ 3,334	$ 3,467	$ 3,606	$ 3,224	$ 3,353	$ 3,487	$ 3,627	$ 3,772	$ 3,923	$ 4,079	$ 4,243
M & S															
Meter Readers	$ 6,400	$ 6,624	$ 6,856	$ 7,096	$ 7,344	$ 7,601	$ 7,867	$ 6,107	$ 6,321	$ 6,542	$ 6,771	$ 7,008	$ 7,253	$ 7,507	$ 7,770
Field Service Tech	3,625	3,752	3,883	4,019	4,160	4,305	4,456	4,612	4,773	4,941	5,113	5,292	5,478	5,669	5,868
Total M&S	$ 10,025	$ 10,376	$ 10,739	$ 11,115	$ 11,504	$ 11,907	$ 12,323	$ 10,719	$ 11,094	$ 11,482	$ 11,884	$ 12,300	$ 12,731	$ 13,176	$ 13,638
Contract Services															
Meter Readers	$ 5,600	$ 5,796	$ 5,999	$ 6,209	$ 6,426	$ 6,651	$ 6,884	$ 5,344	$ 5,531	$ 5,724	$ 5,925	$ 6,132	$ 6,346	$ 6,569	$ 6,799
Field Service Tech	1,250	1,294	1,339	1,386	1,434	1,485	1,537	1,590	1,646	1,704	1,763	1,825	1,889	1,955	2,023
Total Contract Services	$ 6,850	$ 7,090	$ 7,338	$ 7,595	$ 7,861	$ 8,136	$ 8,420	$ 6,934	$ 7,177	$ 7,428	$ 7,688	$ 7,957	$ 8,235	$ 8,524	$ 8,822
Fuel															
Meter Readers	$ 7,600	$ 7,942	$ 8,299	$ 8,673	$ 9,063	$ 9,471	$ 9,897	$ 7,757	$ 8,106	$ 8,471	$ 8,852	$ 9,250	$ 9,667	$ 10,102	$ 10,556
Field Service Tech	6,750	7,054	7,371	7,703	8,050	8,412	8,790	9,186	9,599	10,031	10,483	10,954	11,447	11,962	12,501
Total Fuel	$ 14,350	$ 14,996	$ 15,671	$ 16,376	$ 17,113	$ 17,883	$ 18,687	$ 16,943	$ 17,705	$ 18,502	$ 19,334	$ 20,205	$ 21,114	$ 22,064	$ 23,057
Insurance															
Meter Readers	$ 14,400	$ 15,120	$ 15,876	$ 16,670	$ 17,503	$ 18,378	$ 19,297	$ 15,197	$ 15,957	$ 16,754	$ 17,592	$ 18,472	$ 19,395	$ 20,365	$ 21,383
Field Service Tech	5,150	5,408	5,678	5,962	6,260	6,573	6,901	7,247	7,609	7,989	8,389	8,808	9,249	9,711	10,197
Total Insurance	$ 19,550	$ 20,528	$ 21,554	$ 22,632	$ 23,763	$ 24,951	$ 26,199	$ 22,443	$ 23,565	$ 24,744	$ 25,981	$ 27,280	$ 28,644	$ 30,076	$ 31,580
Misc.															
Meter Readers	$ 1,360	$ 1,408	$ 1,457	$ 1,508	$ 1,561	$ 1,615	$ 1,672	$ 1,298	$ 1,343	$ 1,390	$ 1,439	$ 1,489	$ 1,541	$ 1,595	$ 1,651
Field Service Tech	760	776	803	832	861	891	922	954	986	1,022	1,058	1,095	1,133	1,173	1,214
Total Miscellaneous	$ 2,110	$ 2,184	$ 2,260	$ 2,339	$ 2,421	$ 2,506	$ 2,594	$ 2,252	$ 2,331	$ 2,412	$ 2,497	$ 2,584	$ 2,675	$ 2,768	$ 2,865
Meter Reading Equipment Maintenance															
Hand-held	$ 3,600	$ 3,690	$ 3,782	$ 3,877	$ 3,974	$ 4,073	$ 4,175	$ 3,744	$ 3,838	$ 3,934	$ 4,072	$ 4,214	$ 4,362	$ 4,514	$ 4,672
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249	$ 1,293	$ 1,338	$ 1,385	$ 1,433	$ 1,483
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 552	$ 566	$ 580	$ 594	$ 609	$ 624	$ 646	$ 669	$ 692	$ 717	$ 742
Total Annual Meter Reading Budget															
Meter Readers	$ 262,592	$ 272,032	$ 281,816	$ 291,955	$ 302,465	$ 313,357	$ 324,647	$ 253,243	$ 262,364	$ 271,819	$ 275,667	$ 285,676	$ 296,054	$ 306,813	$ 317,958
Field Service Tech	146,054	151,317	156,771	162,424	168,282	174,354	180,646	187,168	193,928	200,934	208,196	215,723	223,524	231,611	239,993
Meter Reading Operating Budget	$ 408,647	$ 423,349	$ 438,587	$ 454,379	$ 470,747	$ 487,711	$ 505,293	$ 440,411	$ 456,292	$ 472,753	$ 483,863	$ 501,399	$ 519,578	$ 538,424	$ 557,951

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	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Customer Service Related															
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078	$ 2,102,242	$ 2,204,110	$ 2,310,903	$ 2,422,887	$ 2,540,275
Total Meter Reading Related	$ 1,718,382	$ 1,796,546	$ 1,878,325	$ 1,963,875	$ 2,053,389	$ 2,147,038	$ 2,245,017	$ 2,264,444	$ 2,368,702	$ 2,477,831	$ 2,586,105	$ 2,705,509	$ 2,830,481	$ 2,961,310	$ 3,098,236
Operating Cost per Read															
Regular Meter Read	$0.78	$0.80	$0.82	$0.84	$0.85	$0.87	$0.89	$0.69	$0.70	$0.72	$0.72	$0.74	$0.75	$0.77	$0.79
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$17.54	$17.94	$18.35	$18.77	$19.20	$19.64	$20.09	$20.55	$21.02	$21.50
Regular + Field Service	$1.18	$1.21	$1.24	$1.26	$1.29	$1.32	$1.35	$1.16	$1.19	$1.22	$1.23	$1.26	$1.29	$1.32	$1.35
Reg + Field Serv. + Cust. Serv.	$4.97	$5.13	$5.30	$5.47	$5.64	$5.82	$6.01	$5.98	$6.18	$6.38	$6.57	$6.79	$7.01	$7.24	$7.48
Capital Items															
Vehicles															
Meter Reader Vehicles Req'd	4.48	4.48	4.48	4.48	4.48	4.48	4.48	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Vehicle Purchases (Retirements)	6.68	-	-	-	-	-	-	(1.12)	-	-	-	-	-	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	-	-	-	-	-	5.56
Required Vehicle Replacements					-	-	-	5.56	-	-	-	-	-	-	5.56
Reading Equipment															
# of Interrogators (1/FTE)	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5
# of Spare Interrogators	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Purchases (Retirements)	6	-	-	-	-	-	-	(1)	-	-	-	-	-	-	-
Calculated Replacements					-	6	-	-	-	-	8	-	(1)	-	-
Required Replacements					-	6	-	-	-	-	7	-	-	-	-
Installation Programmers Req'd	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Programmers Purchased (Retired)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calculated Prog. Replacements					-	2	-	-	-	-	2	-	-	-	-
Required Programmer Replacements					-	2	-	-	-	-	2	-	-	-	-
Software and Training Units	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Software and Training Units Purch.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Software and Training Replacements					-	1	-	-	-	-	1	-	-	-	-
Mobile Interface Unit															
Years to Replace Existing Pads	10														
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	-	-	-	-	-
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628	79,628	79,628	79,628	79,628	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148	1,163	1,178	1,193	1,209	1,224
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111	1,163	1,178	1,193	1,209	1,224
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444	90,607	91,785	92,978	94,187	95,411
MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66	$ 94.60	$ 95.55	$ 96.50	$ 97.47	$ 98.44
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Capital Budget															
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ -	$ -	$ -	$ -	$ -	$ 112,978	$ -	$ -	$ -	$ -	$ -	$ -	$ 179,999
Reading Equipment Purchases (Ret.)	$ 36,000	$ -	$ -	$ -	$ -	$ 40,731	$ -	$ (1,070)	$ -	$ -	$ 40,716	$ -	$ -	$ -	$ -
Installation Programmers	5,000	-	-	-	-	5,657	-	-	-	-	6,463	-	-	-	-
Software and Training	12,500	-	-	-	-	14,143	-	-	-	-	16,157	-	-	-	-
Mobile Interface Unit	716,652	831,397	854,907	878,994	903,869	929,459	955,784	982,974	1,010,838	1,039,617	134,629	138,352	142,168	146,201	150,213
Total Capital Budget	$ 903,752	$ 831,397	$ 854,907	$ 878,994	$ 903,869	$ 989,990	$ 955,784	$1,094,883	$1,010,838	$1,039,617	$ 197,965	$ 138,352	$ 142,168	$ 146,201	$ 330,212
Total Budget (Operating + Capital)	$ 2,622,134	$ 2,627,943	$ 2,733,231	$ 2,842,869	$2,957,258	$3,137,028	$3,200,802	$3,359,327	$3,379,540	$3,517,448	$2,784,070	$2,843,861	$2,972,650	$3,107,511	$3,428,448
Net Present Value															
Discount Rate (Cost of Capital)	6.0%														
NPV of Total Expenditures	$29,060,094														
Total Cost per Read	$ 7.59	$ 7.51	$ 7.71	$ 7.91	$ 8.12	$ 8.51	$ 8.57	$ 8.88	$ 8.82	$ 9.06	$ 7.08	$ 7.14	$ 7.37	$ 7.60	$ 8.28

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	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Meter Reading															
Meters															
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444	90,607	91,785	92,978	94,187	95,411
Meters with MIU	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889	90,607	91,785	92,978	94,187	95,411
Read Frequency															
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads															
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758	352,280	356,860	361,498	366,199	370,958
Bi-monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reads by Read Type															
Mobile Reads Monthly, Annual Tot.	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Mobile Meters Read Monthly	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504	2,537	2,570	2,603	2,637	2,672
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Reads Quarterly, Annual Tot.	7,006	40,814	76,716	112,669	148,677	184,735	220,851	257,026	293,251	329,538	352,280	356,860	361,498	366,199	370,958
Mobile Meters Read Quarterly	1,752	10,204	19,179	28,167	37,169	46,184	55,213	64,257	73,313	82,385	88,070	89,215	90,375	91,550	92,740
Total Annual Mobile Reads	33,761	67,917	104,171	140,481	176,851	213,276	249,762	286,313	322,918	359,591	382,724	387,700	392,739	397,846	403,016
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Quarterly, Annual Tot.	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220	-	-	-	-	-
Total Annual Touch Reads	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220	-	-	-	-	-
Total Annual Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reading Days/Year Touch Pad															
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Reading Days/Year Mobile Radio															
Reading Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Reads/Man Day (Drive-by)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Field Service (Meter Reading Related)															
Field Service Reads per Year															
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,469	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846	3,896	3,947	3,998	4,050	4,103
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619	6,705	6,792	6,880	6,970	7,060
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service Reads by Read Type															
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,804	8,867	9,932	10,601	10,739	10,878	11,020	11,163
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533	-	-	-	-	-
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Field Service Days/Year															
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Mobile	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Personnel Required															
Calculated Meter Readers	3.7	3.4	3.0	2.8	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Meter Readers FTE	4	4	3	3	3	2	2	2	2	2	2	2	2	2	2
Meter Reader Super.	48%	48%	36%	36%	36%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
Calculated Field Service Techs	1.5	1.4	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Field Service Techs FTE	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Field Service Super.	20%	20%	20%	20%	20%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Operating Expenses															
Meter Related															
Salary															
Meter Readers	$ 183,572	$ 189,998	$ 147,486	$ 152,648	$ 157,990	$ 109,013	$ 112,829	$ 116,778	$ 120,865	$ 125,095	$ 129,474	$ 134,005	$ 138,695	$ 143,550	$ 148,574
Field Service Tech	111,879	115,795	119,848	124,042	128,384	66,439	68,764	71,171	73,662	76,240	78,908	81,670	84,528	87,487	90,549
Meter Reader Supervisor	36,960	38,254	29,694	30,734	31,809	21,948	22,717	23,512	24,335	25,186	26,068	26,980	27,925	28,902	29,913
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	17,672	9,145	9,465	9,797	10,139	10,494	10,862	11,242	11,635	12,042	12,464
Total Salary	$ 347,812	$ 359,985	$ 313,524	$ 324,498	$ 335,855	$ 206,545	$ 213,775	$ 221,257	$ 229,001	$ 237,016	$ 245,311	$ 253,897	$ 262,784	$ 271,981	$ 281,500
Education															
Meter Readers	$ 1,600	$ 1,664	$ 1,298	$ 1,350	$ 1,404	$ 973	$ 1,012	$ 1,053	$ 1,095	$ 1,139	$ 1,184	$ 1,232	$ 1,281	$ 1,332	$ 1,385
Field Service Tech	1,250	1,300	1,352	1,406	1,462	760	791	822	855	890	925	962	1,001	1,041	1,082
Total Education	$ 2,850	$ 2,964	$ 2,650	$ 2,756	$ 2,866	$ 1,734	$ 1,803	$ 1,875	$ 1,950	$ 2,029	$ 2,109	$ 2,194	$ 2,281	$ 2,373	$ 2,468
M & S															
Meter Readers	$ 6,400	$ 6,624	$ 5,142	$ 5,322	$ 5,508	$ 3,801	$ 3,934	$ 4,071	$ 4,214	$ 4,361	$ 4,514	$ 4,672	$ 4,835	$ 5,005	$ 5,180
Field Service Tech	3,625	3,752	3,883	4,019	4,160	2,153	2,228	2,306	2,387	2,470	2,557	2,646	2,739	2,835	2,934
Total M&S	$ 10,025	$ 10,376	$ 9,025	$ 9,341	$ 9,668	$ 5,953	$ 6,162	$ 6,377	$ 6,601	$ 6,832	$ 7,071	$ 7,318	$ 7,574	$ 7,839	$ 8,114
Contract Services															
Meter Readers	$ 5,600	$ 5,796	$ 4,499	$ 4,657	$ 4,820	$ 3,326	$ 3,442	$ 3,562	$ 3,687	$ 3,816	$ 3,950	$ 4,088	$ 4,231	$ 4,379	$ 4,532
Field Service Tech	1,250	1,294	1,339	1,386	1,434	742	768	795	823	852	882	912	944	977	1,012
Total Contract Services	$ 6,850	$ 7,090	$ 5,838	$ 6,043	$ 6,254	$ 4,068	$ 4,210	$ 4,358	$ 4,510	$ 4,668	$ 4,831	$ 5,000	$ 5,175	$ 5,357	$ 5,544
Fuel															
Meter Readers	$ 7,600	$ 7,942	$ 6,225	$ 6,505	$ 6,797	$ 4,735	$ 4,949	$ 5,171	$ 5,404	$ 5,647	$ 5,901	$ 6,167	$ 6,444	$ 6,734	$ 7,037
Field Service Tech	6,750	7,054	7,371	7,703	8,050	4,206	4,395	4,593	4,800	5,016	5,241	5,477	5,724	5,981	6,250
Total Fuel	$ 14,350	$ 14,996	$ 13,596	$ 14,208	$ 14,847	$ 8,941	$ 9,344	$ 9,764	$ 10,204	$ 10,663	$ 11,143	$ 11,644	$ 12,168	$ 12,716	$ 13,288
Insurance															
Meter Readers	$ 14,400	$ 15,120	$ 11,907	$ 12,502	$ 13,127	$ 9,189	$ 9,649	$ 10,131	$ 10,638	$ 11,170	$ 11,728	$ 12,314	$ 12,930	$ 13,577	$ 14,256
Field Service Tech	5,150	5,408	5,678	5,962	6,260	3,286	3,451	3,623	3,804	3,995	4,194	4,404	4,624	4,856	5,098
Total Insurance	$ 19,550	$ 20,528	$ 17,585	$ 18,464	$ 19,387	$ 12,476	$ 13,099	$ 13,754	$ 14,442	$ 15,164	$ 15,922	$ 16,719	$ 17,554	$ 18,432	$ 19,354
Misc.															
Meter Readers	$ 1,360	$ 1,408	$ 1,093	$ 1,131	$ 1,170	$ 808	$ 836	$ 865	$ 895	$ 927	$ 959	$ 993	$ 1,028	$ 1,063	$ 1,101
Field Service Tech	750	776	803	832	861	445	461	477	494	511	529	547	567	586	607
Total Miscellaneous	$ 2,110	$ 2,184	$ 1,896	$ 1,962	$ 2,031	$ 1,253	$ 1,297	$ 1,342	$ 1,389	$ 1,438	$ 1,488	$ 1,540	$ 1,594	$ 1,650	$ 1,708
Meter Reading Equipment Maintenance															
Hand-held	$ 2,250	$ 2,306	$ 1,891	$ 1,938	$ 1,987	$ 1,018	$ 1,044	$ 1,070	$ 1,097	$ 1,124	$ 1,163	$ 1,204	$ 1,246	$ 1,290	$ 1,335
Drive-by	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498	$ 2,585	$ 2,676	$ 2,769	$ 2,866	$ 2,967
Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249	$ 1,293	$ 1,338	$ 1,385	$ 1,433	$ 1,483
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 552	$ 283	$ 290	$ 297	$ 305	$ 312	$ 323	$ 334	$ 346	$ 358	$ 371
Total Annual Meter Reading Budget															
Meter Readers	$ 263,242	$ 272,698	$ 212,911	$ 220,555	$ 228,477	$ 158,469	$ 164,179	$ 170,076	$ 176,169	$ 182,524	$ 189,142	$ 196,003	$ 203,115	$ 210,489	$ 218,134
Field Service Tech	146,054	151,317	156,771	162,424	168,282	87,177	90,323	93,584	96,964	100,467	104,098	107,861	111,762	115,805	119,996
Meter Reading Operating Budget	$ 409,297	$ 424,015	$ 369,683	$ 382,979	$ 396,759	$ 245,646	$ 254,502	$ 263,661	$ 273,153	$ 282,991	$ 293,240	$ 303,864	$ 314,878	$ 326,295	$ 338,130

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Drive-By Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Customer Service Related															
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,736	$ 1,509,496	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078	$ 2,102,242	$ 2,204,110	$ 2,310,903	$ 2,422,887	$ 2,540,275
Total Meter Reading Related	$ 1,719,032	$ 1,797,212	$ 1,809,420	$ 1,892,475	$ 1,979,401	$ 1,904,993	$ 1,994,226	$ 2,087,694	$ 2,185,563	$ 2,288,069	$ 2,395,482	$ 2,507,974	$ 2,625,781	$ 2,749,181	$ 2,878,406
Operating Cost per Read															
Regular Meter Read	$0.79	$0.80	$0.62	$0.63	$0.65	$0.44	$0.45	$0.46	$0.47	$0.48	$0.49	$0.51	$0.52	$0.53	$0.54
Field Service Read	$15.68	$16.03	$16.40	$16.77	$17.15	$8.77	$8.97	$9.18	$9.39	$9.60	$9.82	$10.04	$10.27	$10.51	$10.75
Regular + Field Service	$1.18	$1.21	$1.04	$1.07	$1.09	$0.67	$0.68	$0.70	$0.71	$0.73	$0.75	$0.76	$0.78	$0.80	$0.82
Reg + Field Serv. + Cust. Serv.	$4.97	$5.13	$5.10	$5.27	$5.44	$5.17	$5.34	$5.52	$5.70	$5.89	$6.09	$6.29	$6.51	$6.72	$6.95
Capital Items															
Vehicles															
Meter Reader Vehicles Req'd	4.48	4.48	3.36	3.36	3.36	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	2.20	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Vehicle Purchases (Retirements)	6.68	-	(1.12)	-	-	(2.22)	-	-	-	-	-	-	-	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	(1.12)	-	-	(2.22)	-	6.68
Required Vehicle Replacements					-	-	-	3.34	-	-	-	-	-	-	3.34
Reading Equipment															
# of Interrogators (1/FTE)	4	4	3	3	3	1	1	1	1	1	1	1	1	1	1
# of Spare Interrogators	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interrogator Purchases (Retirements)	5	-	(1)	-	-	(2)	-	-	-	-	-	-	-	-	-
Calculated Interr. Replacements					-	5	-	(1)	-	-	3	-	(1)	-	-
Required Interrogator Replacements					-	2	-	-	-	-	2	-	-	-	-
Installation Programmers Req'd	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Programmers Purchased (Retired)	2	-	-	-	-	(1)	-	-	-	-	-	-	-	-	-
Calculated Prog. Replacements					-	2	-	-	-	-	1	-	-	-	-
Required Programmer Replacements					-	1	-	-	-	-	1	-	-	-	-
Drive-by Units Req'd	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Drive-by Units Purchased	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Drive-by Units Replaced					-	2	-	-	-	-	2	-	-	-	-
Mobile Interface Unit															
Years to Replace Existing Pads	10														
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	-	-	-	-	-
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628	79,628	79,628	79,628	79,628	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148	1,163	1,178	1,193	1,209	1,224
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111	1,163	1,178	1,193	1,209	1,224
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444	90,607	91,785	92,978	94,187	95,411
MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66	$ 94.60	$ 95.55	$ 96.50	$ 97.47	$ 98.44
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Capital Budget															
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ (3,428)	$ -	$ -	$ (7,533)	$ -	$ 84,988	$ -	$ -	$ -	$ -	$ -	$ -	$ 108,129
Reading Equipment Purchases (Ret.)															
Hand-Held	14,000	-	(588)	-	-	-	-	-	-	-	7,238	-	-	-	-
Installation Programmers	5,000	-	-	-	-	-	-	-	-	-	3,231	-	-	-	-
Drive-by	85,000	-	-	-	-	96,170	-	-	-	-	109,869	-	-	-	-
Mobile Interface Unit	716,552	831,397	854,907	878,994	903,669	929,459	955,784	982,974	1,010,838	1,039,617	134,629	138,352	142,168	146,201	150,213
Total Capital Budget	$ 954,252	$ 831,397	$ 850,890	$ 878,994	$ 903,669	$ 1,018,096	$ 955,784	$ 1,067,963	$ 1,010,838	$ 1,039,617	$ 254,968	$ 138,352	$ 142,168	$ 146,201	$ 258,342
Total Budget (Operating + Capital)	$ 2,673,284	$ 2,628,609	$ 2,660,311	$ 2,771,468	$ 2,883,270	$ 2,923,088	$ 2,950,011	$ 3,155,656	$ 3,196,400	$ 3,327,686	$ 2,650,450	$ 2,646,326	$ 2,767,949	$ 2,895,382	$ 3,136,747
Net Present Value															
Discount Rate (Cost of Capital)	6.0%														
NPV of Total Expenditures	$27,796,044														
Total Cost per Read	$ 7.73	$ 7.51	$ 7.50	$ 7.71	$ 7.92	$ 7.93	$ 7.90	$ 8.34	$ 8.34	$ 8.57	$ 6.74	$ 6.64	$ 6.86	$ 7.08	$ 7.57

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Meter Reading															
Meters															
Total Meters	79,628	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444	90,607	91,785	92,978	94,187	95,411
Meters with MIU	3,981	12,462	21,467	30,485	39,517	48,562	57,622	66,697	75,785	84,889	90,607	91,785	92,978	94,187	95,411
Read Frequency															
Quarterly %	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
Bi-monthly %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Monthly %	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual Reads															
Quarterly	309,594	313,618	317,696	321,825	326,009	330,247	334,539	338,890	343,295	347,758	352,280	356,860	361,498	366,199	370,958
Bi-monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Total	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reads by Read Type															
Mobile Reads Monthly, Annual Tot.	26,755	27,103	27,455	27,812	28,174	28,540	28,911	29,287	29,667	30,053	30,444	30,840	31,241	31,647	32,058
Mobile Meters Read Monthly	2,230	2,259	2,288	2,318	2,348	2,378	2,409	2,441	2,472	2,504	2,537	2,570	2,603	2,637	2,672
Mobile Reads Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Meters Read Bi-Monthly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Reads Quarterly, Annual Tot.	7,006	40,814	76,716	112,669	148,677	184,735	220,851	257,026	293,251	329,538	352,280	356,860	361,498	366,199	370,958
Mobile Meters Read Quarterly	1,752	10,204	19,179	28,167	37,169	46,184	55,213	64,257	73,313	82,385	88,070	89,215	90,375	91,550	92,740
Total Annual Mobile Reads	33,761	67,917	104,171	140,481	176,851	213,275	249,762	286,313	322,918	359,591	382,724	387,700	392,739	397,846	403,016
Touch Read Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Bi-Monthly, Annual Tot.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Touch Read Quarterly, Annual Tot.	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220	-	-	-	-	-
Total Annual Touch Reads	302,588	272,804	240,980	209,156	177,332	145,512	113,688	81,864	50,044	18,220	-	-	-	-	-
Total Annual Reads	336,349	340,721	345,151	349,637	354,183	358,787	363,450	368,177	372,962	377,811	382,724	387,700	392,739	397,846	403,016
Reading Days/Year Touch Pad															
Reading Days/Man Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	181	181	181	181	181	181	181	181	181	181	181	181	181	181	181
Reads/Man Day	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Reading Days/Year Mobile Radio															
Reading Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Field Service (Meter Reading Related)															
Field Service Reads per Year															
Cust. Serv. Request % of Meters	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads % of Meters	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Annual Customer Service Req.	3,424	3,459	3,514	3,559	3,606	3,652	3,700	3,748	3,797	3,846	3,896	3,947	3,998	4,050	4,103
Annual Final Reads	5,892	5,969	6,047	6,125	6,205	6,286	6,367	6,450	6,534	6,619	6,705	6,792	6,880	6,970	7,060
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163
Field Service Reads by Read Type															
Mobile Reads	466	1,458	2,512	3,567	4,623	5,682	6,742	7,804	8,867	9,932	10,601	10,739	10,878	11,020	11,163
Touch Reads	8,851	7,980	7,049	6,118	5,187	4,256	3,325	2,395	1,464	533	-	-	-	-	-
Total Annual Field Service Reads	9,316	9,438	9,560	9,685	9,810	9,938	10,067	10,198	10,331	10,465	10,601	10,739	10,878	11,020	11,163

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Field Service Days/Year															
Service Days/Man Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total Reading Days/Year	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Visits/Man Day Touch Pad	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Personnel Required															
Calculated Meter Readers	3.7	3.3	3.0	2.6	2.2	1.8	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Meter Readers FTE	4	4	3	3	3	2	2	1	1	1	1	1	1	1	1
Meter Reader Super.	48%	48%	36%	36%	36%	24%	24%	12%	12%	12%	12%	12%	12%	12%	12%
Calculated Field Service Techs	1.5	1.4	1.2	1.1	1.0	1.0	1.0	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
Field Service Techs FTE	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Field Service Super.	20%	20%	20%	20%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Operating Expenses															
Meter Related															
Salary															
Meter Readers	$ 183,572	$ 189,998	$ 147,486	$ 152,648	$ 157,990	$ 109,013	$ 112,829	$ 58,389	$ 60,432	$ 62,548	$ 64,737	$ 67,003	$ 69,348	$ 71,775	$ 74,287
Field Service Tech	111,879	115,795	119,846	124,042	64,192	66,439	68,764	71,171	73,662	76,240	78,908	81,670	84,528	87,487	90,549
Meter Reader Supervisor	36,960	38,254	29,694	30,734	31,809	21,948	22,717	11,756	12,167	12,593	13,034	13,490	13,962	14,451	14,957
Field Service Tech Supervisor	15,400	15,939	16,497	17,074	8,836	9,145	9,465	9,797	10,139	10,494	10,862	11,242	11,635	12,042	12,464
Total Salary	$ 347,812	$ 359,985	$ 313,524	$ 324,498	$ 262,827	$ 206,545	$ 213,775	$ 151,112	$ 156,401	$ 161,875	$ 167,541	$ 173,404	$ 179,474	$ 185,755	$ 192,257
Education															
Meter Readers	$ 1,600	$ 1,664	$ 1,298	$ 1,350	$ 1,404	$ 973	$ 1,012	$ 526	$ 547	$ 569	$ 592	$ 616	$ 640	$ 666	$ 693
Field Service Tech	1,250	1,300	1,352	1,406	731	760	791	822	855	890	925	962	1,001	1,041	1,082
Total Education	$ 2,850	$ 2,964	$ 2,650	$ 2,756	$ 2,135	$ 1,734	$ 1,803	$ 1,349	$ 1,403	$ 1,459	$ 1,517	$ 1,578	$ 1,641	$ 1,707	$ 1,776
M&S															
Meter Readers	$ 6,400	$ 6,624	$ 5,142	$ 5,322	$ 5,508	$ 3,801	$ 3,934	$ 2,036	$ 2,107	$ 2,181	$ 2,257	$ 2,336	$ 2,418	$ 2,502	$ 2,590
Field Service Tech	3,625	3,752	3,883	4,019	2,080	2,153	2,228	2,306	2,387	2,470	2,557	2,646	2,739	2,835	2,934
Total M&S	$ 10,025	$ 10,376	$ 9,025	$ 9,341	$ 7,588	$ 5,953	$ 6,162	$ 4,342	$ 4,494	$ 4,651	$ 4,814	$ 4,982	$ 5,157	$ 5,337	$ 5,524
Contract Services															
Meter Readers	$ 5,600	$ 5,796	$ 4,499	$ 4,657	$ 4,820	$ 3,326	$ 3,442	$ 1,781	$ 1,844	$ 1,908	$ 1,975	$ 2,044	$ 2,115	$ 2,190	$ 2,266
Field Service Tech	1,250	1,294	1,339	1,386	717	742	768	795	823	852	882	912	944	977	1,012
Total Contract Services	$ 6,850	$ 7,090	$ 5,838	$ 6,043	$ 5,537	$ 4,068	$ 4,210	$ 2,576	$ 2,667	$ 2,760	$ 2,856	$ 2,956	$ 3,060	$ 3,167	$ 3,278
Fuel															
Meter Readers	$ 7,600	$ 7,942	$ 6,225	$ 6,505	$ 6,797	$ 4,735	$ 4,949	$ 2,586	$ 2,702	$ 2,824	$ 2,951	$ 3,083	$ 3,222	$ 3,367	$ 3,519
Field Service Tech	6,750	7,054	7,371	7,703	4,025	4,206	4,395	4,593	4,800	5,016	5,241	5,477	5,724	5,981	6,250
Total Fuel	*$ 14,350*	*$ 14,995*	*$ 13,596*	*$ 14,208*	*$ 10,822*	$ 8,941	$ 9,344	$ 7,179	$ 7,502	$ 7,839	$ 8,192	$ 8,561	$ 8,946	$ 9,348	$ 9,769
Insurance															
Meter Readers	$ 14,400	$ 15,120	$ 11,907	$ 12,502	$ 13,127	$ 9,189	$ 9,649	$ 5,066	$ 5,319	$ 5,585	$ 5,864	$ 6,157	$ 6,465	$ 6,788	$ 7,128
Field Service Tech	5,150	5,408	5,678	5,962	3,130	3,286	3,451	3,623	3,804	3,995	4,194	4,404	4,624	4,856	5,098
Total Insurance	$ 19,550	$ 20,528	$ 17,585	$ 18,464	$ 16,257	$ 12,476	$ 13,099	$ 8,689	$ 9,123	$ 9,579	$ 10,058	$ 10,561	$ 11,089	$ 11,644	$ 12,226
Misc.															
Meter Readers	$ 1,360	$ 1,408	$ 1,093	$ 1,131	$ 1,170	$ 808	$ 835	$ 433	$ 448	$ 463	$ 480	$ 496	$ 514	$ 532	$ 550
Field Service Tech	750	776	803	832	430	445	461	477	494	511	529	547	567	586	607
Total Miscellaneous	$ 2,110	$ 2,184	$ 1,896	$ 1,962	$ 1,601	$ 1,253	$ 1,297	$ 910	$ 942	$ 974	$ 1,009	$ 1,044	$ 1,080	$ 1,118	$ 1,157
Meter Reading Equipment Maintenance															
Hand-held	$ 1,960	$ 2,009	$ 1,471	$ 1,508	$ 1,236	$ 950	$ 974	$ 666	$ 682	$ 699	$ 724	$ 749	$ 775	$ 803	$ 831
Collectors	$ 20,000	$ 20,500	$ 21,013	$ 21,538	$ 22,076	$ 22,628	$ 23,194	$ 23,774	$ 24,368	$ 24,977	$ 25,851	$ 26,786	$ 27,693	$ 28,662	$ 29,665
Software	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498	$ 2,585	$ 2,676	$ 2,769	$ 2,866	$ 2,967
Installation Programmer	$ 500	$ 513	$ 525	$ 538	$ 276	$ 283	$ 290	$ 297	$ 305	$ 312	$ 323	$ 334	$ 346	$ 358	$ 371
Total Annual Meter Reading Budget															
Meter Readers	$ 281,952	$ 291,876	$ 232,453	$ 240,585	$ 248,423	$ 179,918	$ 186,144	$ 109,686	$ 113,358	$ 117,157	$ 121,372	$ 125,741	$ 130,268	$ 134,960	$ 139,822
Field Service Tech	146,054	151,317	156,771	162,424	84,141	87,177	90,323	93,584	96,964	100,467	104,098	107,861	111,762	115,805	119,996
Meter Reading Operating Budget	$ 428,007	$ 443,193	$ 389,224	$ 403,009	$ 332,564	$ 267,095	$ 276,467	$ 203,270	$ 210,322	$ 217,624	$ 225,470	$ 233,602	$ 242,030	$ 250,765	$ 259,819

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Fixed Network Radio Frequency
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Customer Service Related															
Total Customer Service	$ 1,309,736	$ 1,373,197	$ 1,439,738	$ 1,509,498	$ 1,582,642	$ 1,659,327	$ 1,739,724	$ 1,824,033	$ 1,912,410	$ 2,005,078	$ 2,102,242	$ 2,204,110	$ 2,310,903	$ 2,422,887	$ 2,540,275
Total Meter Reading Related	$ 1,737,742	$ 1,816,390	$ 1,828,962	$ 1,912,505	$ 1,915,206	$ 1,926,422	$ 2,016,191	$ 2,027,303	$ 2,122,732	$ 2,222,703	$ 2,327,713	$ 2,437,712	$ 2,552,934	$ 2,673,652	$ 2,800,094
Operating Cost per Read															
Regular Meter Read	$0.64	$0.66	$0.67	$0.69	$0.70	$0.50	$0.51	$0.30	$0.30	$0.31	$0.32	$0.32	$0.33	$0.34	$0.35
Field Service Read	$15.68	$16.03	$16.40	$16.77	$8.58	$8.77	$8.97	$9.18	$9.39	$9.60	$9.82	$10.04	$10.27	$10.51	$10.75
Regular + Field Service	$1.24	$1.27	$1.10	$1.12	$0.91	$0.72	$0.74	$0.54	$0.55	$0.56	$0.57	$0.59	$0.60	$0.61	$0.63
Reg + Field Serv. + Cust. Serv.	$5.03	$5.19	$5.16	$5.32	$5.26	$5.22	$5.40	$5.36	$5.54	$5.72	$5.92	$6.12	$6.33	$6.54	$6.76
Capital Items															
Vehicles															
Meter Reader Vehicles Req'd	4.48	4.48	3.36	3.36	3.36	2.24	2.24	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
Field Service Tech Vehicles Req'd	2.20	2.20	2.20	2.20	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Vehicle Purchases (Retirements)	6.68	-	(1.12)	-	(1.10)	(1.12)	-	(1.12)	-	-	-	-	-	-	-
Calculated Vehicle Replacements					-	-	-	6.68	-	(1.12)	-	(1.10)	(1.12)	-	5.56
Required Vehicle Replacements					-	-	-	2.22	-	-	-	-	-	-	2.22
Reading Equipment															
# of Interrogators (1/FTE)	5	5	4	4	3	2	2	1	1	1	1	1	1	1	1
# of Spare Interrogators	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Interrogator Purchases (Retirements)	7	-	(2)	-	(1)	(1)	-	(1)	-	-	-	-	-	-	-
Calculated Interr. Replacements					-	7	-	(2)	-	(1)	6	-	(3)	-	(1)
Required Interrogator Replacements					-	3	-	-	-	-	2	-	-	-	-
Installation Programmers Req'd	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Programmers Purchased (Retired)	2	-	-	-	(1)	-	-	-	-	-	-	-	-	-	-
Calculated Prog. Replacements					-	2	-	-	-	(1)	2	-	-	-	(1)
Required Programmer Replacements					-	1	-	-	-	-	1	-	-	-	-
Fixed Units Req'd	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fixed Units Purchased	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fixed Units Replaced										-	-	-	-	-	-
Mobile Interface Unit															
Years to Replace Existing Pads	10										-	-	-	-	-
Pads Replaced/Year	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963	7,963					
Cummulative Replaced	7,963	15,926	23,888	31,851	39,814	47,777	55,740	63,702	71,665	79,628	79,628	79,628	79,628	79,628	79,628
New Services Installed	-	1,035	1,049	1,062	1,076	1,090	1,104	1,119	1,133	1,148	1,163	1,178	1,193	1,209	1,224
Total Pads Installed & Replaced	7,963	8,998	9,012	9,025	9,039	9,053	9,067	9,082	9,096	9,111	1,163	1,178	1,193	1,209	1,224
Cummulative Replaced & Installed	7,963	16,961	25,972	34,997	44,036	53,089	62,156	71,237	80,333	89,444	90,607	91,785	92,978	94,187	95,411
MIU Cost	$ 95.00	$ 97.38	$ 99.81	$ 102.30	$ 104.86	$ 107.48	$ 110.17	$ 112.93	$ 115.75	$ 118.64	$ 119.83	$ 121.03	$ 122.24	$ 123.46	$ 124.69
Installation Cost	$ 15.00	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Capital Budget															
Vehicle Purchases (Retirements)	$ 133,600	$ -	$ (3,428)	$ -	$ (3,607)	$ (3,801)	$ -	$ 27,990	$ -	$ -	$ -	$ -	$ -	$ -	$ 71,870
Reading Equipment Purchases (Ret.)															
Hand-Held	19,600	-	(1,177)	-	(618)	6,336	-	(666)	-	-	7,238	-	-	-	-
Installation Programmers	5,000	-	-	-	(552)	2,829	-	-	-	-	3,231	-	-	-	-
Fixed Infrastructure	360,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mobile Interface Unit	875,908	1,015,852	1,044,267	1,073,368	1,103,412	1,134,307	1,166,078	1,198,882	1,232,485	1,267,180	163,968	168,367	172,869	177,625	182,345
Total Capital Budget	$ 1,394,108	$ 1,015,852	$ 1,039,662	$ 1,073,368	$ 1,098,636	$ 1,139,671	$ 1,166,078	$ 1,226,207	$ 1,232,485	$ 1,267,180	$ 174,438	$ 168,367	$ 172,869	$ 177,625	$ 254,215
Total Budget (Operating + Capital)	$ 3,131,850	$ 2,832,242	$ 2,868,625	$ 2,985,873	$ 3,013,841	$ 3,066,093	$ 3,182,269	$ 3,253,510	$ 3,355,216	$ 3,489,882	$ 2,502,151	$ 2,606,079	$ 2,725,803	$ 2,851,277	$ 3,054,309
Net Present Value															
Discount Rate (Cost of Capital)	6.0%														
NPV of Total Expenditures	$29,181,644														
Total Cost per Read	$ 9.06	$ 8.09	$ 8.09	$ 8.31	$ 8.28	$ 8.32	$ 8.52	$ 8.60	$ 8.75	$ 8.99	$ 6.36	$ 6.54	$ 6.75	$ 6.97	$ 7.37

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Meters															
Growth Factor		1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Meter Count	79,626	80,663	81,712	82,774	83,850	84,940	86,044	87,163	88,296	89,444	90,607	91,785	92,978	94,187	95,411
Read Frequency (Monthly % of Meters)															
Touch Read	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Walk	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Mobile Drive-by	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Fixed Radio	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Read Frequency (Bi-monthly % of Meters)															
Touch Read	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mobile Walk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mobile Drive-by	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fixed Radio	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Field Service Visits (% of Meters)															
Customer Service/Billing	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
Final Reads	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Reading and Field Visit Productivity															
Meter Reading															
Touch Read Days per Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mobile Walk Days per Week	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mobile Drive-by Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Fixed Radio Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Touch Reads per Day	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Mobile Walk Reads per Day	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Mobile Drive-by Reads per Day	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Field Visits															
Touch Read Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mobile Walk Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mobile Drive-by Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Fixed Radio Days per Week	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Touch Read Visits per Day	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Mobile Walk Visits per Day	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Mobile Drive-by Visits per Day	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Reading and Field Visit Paid Time Off															
Meter Reading															
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Field Visits															
Holidays/Year	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Vacation Days/Year	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sick Days/Year	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Operating Expenses															
Meter Related															
Salary															
Growth Factor (Inflation)		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Paid Hours per Year	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080	2,080
Meter Readers Hourly Rate	$ 15.76	$ 16.31	$ 16.88	$ 17.47	$ 18.08	$ 18.72	$ 19.37	$ 20.05	$ 20.75	$ 21.48	$ 22.23	$ 23.01	$ 23.81	$ 24.65	$ 25.51
Field Service Tech Hourly Rate	$ 19.21	$ 19.88	$ 20.58	$ 21.30	$ 22.04	$ 22.82	$ 23.61	$ 24.44	$ 25.30	$ 26.18	$ 27.10	$ 28.05	$ 29.03	$ 30.04	$ 31.10
Read & FS Benefits Multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Loaded Meter Reading Rate	$ 22.06	$ 22.84	$ 23.64	$ 24.46	$ 25.32	$ 26.21	$ 27.12	$ 28.07	$ 29.05	$ 30.07	$ 31.12	$ 32.21	$ 33.34	$ 34.51	$ 35.71
Loaded Field Service Tech Rate	$ 26.89	$ 27.84	$ 28.81	$ 29.82	$ 30.86	$ 31.94	$ 33.06	$ 34.22	$ 35.41	$ 36.65	$ 37.94	$ 39.26	$ 40.64	$ 42.06	$ 43.53
Meter Reader Super. Annual	$ 55,000	$ 56,925	$ 58,917	$ 60,979	$ 63,114	$ 65,323	$ 67,609	$ 69,975	$ 72,424	$ 74,959	$ 77,583	$ 80,298	$ 83,109	$ 86,018	$ 89,028
Field Service Tech Super. Annual	$ 55,000	$ 56,925	$ 58,917	$ 60,979	$ 63,114	$ 65,323	$ 67,609	$ 69,975	$ 72,424	$ 74,959	$ 77,583	$ 80,298	$ 83,109	$ 86,018	$ 89,028
Super Benefits Multiplier	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Mtr Reader Super. Loaded Annual	$ 77,000	$ 79,695	$ 82,484	$ 85,371	$ 88,359	$ 91,452	$ 94,653	$ 97,966	$ 101,394	$ 104,943	$ 108,616	$ 112,418	$ 116,352	$ 120,425	$ 124,639
Field Srv. Super. Loaded Annual	$ 77,000	$ 79,695	$ 82,484	$ 85,371	$ 88,359	$ 91,452	$ 94,653	$ 97,966	$ 101,394	$ 104,943	$ 108,616	$ 112,418	$ 116,352	$ 120,425	$ 124,639
Read Supervisor/FTE	12%														
Field Srv Super/FTE	10%														

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Education															
Growth Factor (Inflation)		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Meter Readers $/FTE	$ 400.00	$ 416.00	$ 432.64	$ 449.95	$ 467.94	$ 486.66	$ 506.13	$ 526.37	$ 547.43	$ 569.32	$ 592.10	$ 615.78	$ 640.41	$ 666.03	$ 692.67
Field Service $/FTE	$ 625.00	$ 650.00	$ 676.00	$ 703.04	$ 731.16	$ 760.41	$ 790.82	$ 822.46	$ 855.36	$ 889.57	$ 925.15	$ 962.16	$ 1,000.65	$ 1,040.67	$ 1,082.30
Material & Supplies															
Growth Factor (Inflation)		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Meter Readers $/FTE	$ 1,600.00	$ 1,656.00	$ 1,713.96	$ 1,773.95	$ 1,836.04	$ 1,900.30	$ 1,966.81	$ 2,035.65	$ 2,106.89	$ 2,180.64	$ 2,256.96	$ 2,335.95	$ 2,417.71	$ 2,502.33	$ 2,589.91
Field Service $/FTE	$ 1,812.50	$ 1,875.94	$ 1,941.60	$ 2,009.55	$ 2,079.89	$ 2,152.68	$ 2,228.03	$ 2,306.01	$ 2,386.72	$ 2,470.25	$ 2,556.71	$ 2,646.20	$ 2,738.81	$ 2,834.67	$ 2,933.88
Contract Services															
Growth Factor (Inflation)		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Meter Readers $/FTE	$ 1,400.00	$ 1,449.00	$ 1,499.72	$ 1,552.21	$ 1,606.53	$ 1,662.76	$ 1,720.96	$ 1,781.19	$ 1,843.53	$ 1,908.06	$ 1,974.84	$ 2,043.96	$ 2,115.50	$ 2,189.54	$ 2,266.17
Field Service $/FTE	$ 625.00	$ 646.88	$ 669.52	$ 692.95	$ 717.20	$ 742.30	$ 768.28	$ 795.17	$ 823.01	$ 851.81	$ 881.62	$ 912.48	$ 944.42	$ 977.47	$ 1,011.68
Fuel															
Growth Factor (Inflation)		4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Meter Readers $/FTE	$ 1,900.00	$ 1,985.50	$ 2,074.85	$ 2,168.22	$ 2,265.79	$ 2,367.75	$ 2,474.29	$ 2,585.64	$ 2,701.99	$ 2,823.58	$ 2,950.64	$ 3,083.42	$ 3,222.17	$ 3,367.17	$ 3,518.70
Field Service $/FTE	$ 3,375.00	$ 3,526.88	$ 3,685.58	$ 3,851.44	$ 4,024.75	$ 4,205.86	$ 4,395.13	$ 4,592.91	$ 4,799.59	$ 5,015.57	$ 5,241.27	$ 5,477.13	$ 5,723.60	$ 5,981.16	$ 6,250.31
Insurance															
Growth Factor (Inflation)		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Meter Readers $/FTE	$ 3,600.00	$ 3,780.00	$ 3,969.00	$ 4,167.45	$ 4,375.82	$ 4,594.61	$ 4,824.34	$ 5,065.56	$ 5,318.84	$ 5,584.78	$ 5,864.02	$ 6,157.22	$ 6,465.08	$ 6,788.34	$ 7,127.75
Field Service $/FTE	$ 2,575.00	$ 2,703.75	$ 2,838.94	$ 2,980.88	$ 3,129.93	$ 3,286.43	$ 3,450.75	$ 3,623.28	$ 3,804.45	$ 3,994.67	$ 4,194.40	$ 4,404.12	$ 4,624.33	$ 4,855.55	$ 5,098.32
Misc.															
Growth Factor (Inflation)		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Meter Readers $/FTE	$ 340.00	$ 351.90	$ 364.22	$ 376.96	$ 390.16	$ 403.81	$ 417.95	$ 432.57	$ 447.72	$ 463.39	$ 479.60	$ 496.39	$ 513.76	$ 531.75	$ 550.36
Field Service $/FTE	$ 375.00	$ 388.13	$ 401.71	$ 415.77	$ 430.32	$ 445.38	$ 460.97	$ 477.10	$ 493.80	$ 511.09	$ 528.97	$ 547.49	$ 566.65	$ 586.48	$ 607.01
Meter Reading Equipment Maintenance															
Growth Factor (Inflation)		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Touch Read Hand-held	$ 280	$ 287	$ 294	$ 302	$ 309	$ 317	$ 325	$ 333	$ 341	$ 350	$ 362	$ 375	$ 388	$ 401	$ 415
Mobile Hand-held	$ 450	$ 461	$ 473	$ 485	$ 497	$ 509	$ 522	$ 535	$ 548	$ 562	$ 582	$ 602	$ 623	$ 645	$ 667
Drive-by	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249	$ 1,293	$ 1,338	$ 1,385	$ 1,433	$ 1,483
Collectors	$ 200	$ 205	$ 210	$ 215	$ 221	$ 226	$ 232	$ 238	$ 244	$ 250	$ 259	$ 268	$ 277	$ 287	$ 297
Touch and Mobile Software	$ 1,000	$ 1,025	$ 1,051	$ 1,077	$ 1,104	$ 1,131	$ 1,160	$ 1,189	$ 1,218	$ 1,249	$ 1,293	$ 1,338	$ 1,385	$ 1,433	$ 1,483
Fixed Software	$ 2,000	$ 2,050	$ 2,101	$ 2,154	$ 2,208	$ 2,263	$ 2,319	$ 2,377	$ 2,437	$ 2,498	$ 2,585	$ 2,676	$ 2,769	$ 2,866	$ 2,967
Installation Programmers	$ 250	$ 256	$ 263	$ 269	$ 276	$ 283	$ 290	$ 297	$ 305	$ 312	$ 323	$ 334	$ 346	$ 358	$ 371
Customer Service Related															
Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Account Service Total	$ 1,309,950														
Cost per Read	$ 3.79	$ 3.92	$ 4.06	$ 4.20	$ 4.35	$ 4.50	$ 4.66	$ 4.82	$ 4.99	$ 5.16	$ 5.34	$ 5.53	$ 5.73	$ 5.93	$ 6.13
Capital Related															
Vehicles															
Cost Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Vehicle Cost	$ 20,000	$ 20,700	$ 21,425	$ 22,174	$ 22,950	$ 23,754	$ 24,585	$ 25,446	$ 26,336	$ 27,258	$ 28,212	$ 29,199	$ 30,221	$ 31,279	$ 32,374
Vehicle Life in Years	7	**Inputs restricted to values of 4 to 10 years**													
Reading Equipment															
Cost Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Touch Pad Interrogator Cost	$ 2,800	$ 2,870	$ 2,942	$ 3,015	$ 3,091	$ 3,168	$ 3,247	$ 3,328	$ 3,412	$ 3,497	$ 3,619	$ 3,746	$ 3,877	$ 4,013	$ 4,153
Touch Pad Interrogator Life	5	**Inputs restricted to values of 4 to 10 years**													
Touch Pad Pocket Pro Cost	$ 400	$ 410	$ 420	$ 431	$ 442	$ 453	$ 464	$ 475	$ 487	$ 500	$ 517	$ 535	$ 554	$ 573	$ 593
Touch Pad Pocket Pro Life	5	**Inputs restricted to values of 4 to 10 years**													
Mobile Interrogator Cost	$ 4,500	$ 4,613	$ 4,728	$ 4,846	$ 4,967	$ 5,091	$ 5,219	$ 5,349	$ 5,483	$ 5,620	$ 5,817	$ 6,020	$ 6,231	$ 6,449	$ 6,675
Mobile Interrogator Life	5	**Inputs restricted to values of 4 to 10 years**													
Interrogator Spares % of FTE	25%														
Installation Programmer Cost	$ 2,500	$ 2,563	$ 2,627	$ 2,692	$ 2,760	$ 2,829	$ 2,899	$ 2,972	$ 3,046	$ 3,122	$ 3,231	$ 3,345	$ 3,462	$ 3,583	$ 3,708
Installation Programmer Life	5	**Inputs restricted to values of 4 to 10 years**													
Mobile Walk															
System Computer	$ 2,500														
Software and Training	$ 10,000														
Total Mobile Walk Startup Cost	$ 12,500	$ 12,813	$ 13,133	$ 13,461	$ 13,798	$ 14,143	$ 14,496	$ 14,859	$ 15,230	$ 15,611	$ 16,157	$ 16,723	$ 17,308	$ 17,914	$ 18,541
	5	***Inputs restricted to values of 4 to 10 years***													

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Model Inputs
Current Meter Reading and Billing Frequency with 10-year AMR Deployment
(Updated: July 18, 2005)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Drive-by															
Mobile Collector	$ 30,000														
System Computer	$ 2,500														
Software and Training	$ 10,000														
Total Drive-by Mobile Unit Cost	$ 42,500	$ 43,563	$ 44,652	$ 45,768	$ 46,912	$ 48,085	$ 49,287	$ 50,519	$ 51,782	$ 53,077	$ 54,404	$ 56,857	$ 58,847	$ 60,907	$ 63,038
Drive-by Unit Life in Years	5	Inputs restricted to values of 4 to 10 years													
Fixed Radio															
Collector Units	100														
Cost per Collector	$ 3,000														
Network Control Computer	$ 40,000														
Sotware and Training	$ 20,000														
Fixed Unit Infrastructure Cost	$ 360,000	$ 369,000	$ 378,225	$ 387,681	$ 397,373	$ 407,307	$ 417,490	$ 427,927	$ 438,625	$ 449,591	$ 460,826	$ 481,613	$ 498,469	$ 515,916	$ 533,973
Fixed Unit Infrastructure Life	15	Inputs restricted to values of 9 to 15 years													
Touch Pad and MIU															
Initial Replacement Time in Years															
Touch Read	10														
Mobile Walk	10														
Mobile Drive-by	10														
Fixed Radio	10														
Pad and MIU Cost															
Touch Read Cost Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Touch Pad Cost	$ 15.00	$ 15.38	$ 15.76	$ 16.15	$ 16.56	$ 16.97	$ 17.40	$ 17.83	$ 18.28	$ 18.73	$ 18.92	$ 19.11	$ 19.30	$ 19.49	$ 19.69
Mobile Walk Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Mobile Walk MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66	$ 94.60	$ 95.55	$ 96.50	$ 97.47	$ 98.44
Mobile Drive-by Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Mobile Drive-by MIU Cost	$ 75.00	$ 76.88	$ 78.80	$ 80.77	$ 82.79	$ 84.86	$ 86.98	$ 89.15	$ 91.38	$ 93.66	$ 94.60	$ 95.55	$ 96.50	$ 97.47	$ 98.44
Fixed Radio Growth Factor		2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	1.0%	1.0%	1.0%	1.0%	1.0%
Fixed MIU Cost	$ 96.00	$ 97.38	$ 99.81	$ 102.30	$ 104.86	$ 107.48	$ 110.17	$ 112.93	$ 115.75	$ 118.64	$ 119.83	$ 121.03	$ 122.24	$ 123.46	$ 124.69
Pad and MIU Installation Cost															
Touch Read Cost Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Touch Pad Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Mobile Walk Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Mobile Walk MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Mobile Drive-by Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Mobile Drive-by MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Fixed Radio Growth Factor		3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Fixed MIU Installation Cost	$ 15	$ 15.53	$ 16.07	$ 16.63	$ 17.21	$ 17.82	$ 18.44	$ 19.08	$ 19.75	$ 20.44	$ 21.16	$ 21.90	$ 22.67	$ 23.46	$ 24.28
Discount Rate	6.0%														

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
2005 Budget
(Updated July 18, 2005)

Actual Budget

		FTE	$/FTE
Meter Reading			
Salary	$ 197,200	5	
Benefits*	94,300		
Education	2,000		$ 400
M & S	8,000		$ 1,600
Contract Services	7,000		$ 1,400
Fuel	9,500		$ 1,900
Insurance	18,000		$ 3,600
Misc.	1,700		$ 340
	$ 337,700		
Field Service			
Salary	$ 512,600	8	
Benefits*	179,000		
Education	5,000		$ 625
M & S	14,500		$ 1,813
Contract Services	5,000		$ 625
Fuel	27,000		$ 3,375
Insurance	20,600		$ 2,575
Misc.	3,000		$ 375
	$ 766,700		
Flushing & Leak Detection			
Salary	$ 176,900		
Benefits*	71,800		
Education	1,000		
M & S	10,500		
Contract Services	5,000		
Fuel	13,500		
Insurance	10,200		
Misc.	1,050		
	$ 289,950		
Meter Shop			
Salary	$ 164,100		
Benefits*	56,600		
Education	2,000		
M & S	48,000		
Contract Services	24,500		
Fuel	11,000		
Insurance	10,200		
Misc.	1,500		
	$ 317,900		

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
2005 Budget
(Updated July 18, 2005)

Customer Service		
Account Service	$	1,309,950
General		500,650
Courier & Maint.		57,050
		1,867,650

Total Customer Service, Readers, Field Service, Flushing&Detection, Meter Shop

Total	$	3,579,900

Cost Model Budget Estimate

Meter Reading Total (Total Readers, Field Service @ 25%)

Salary	$	325,350
Benefits*		139,050
Education		3,250
M & S		11,625
Contract Services		8,250
Fuel		16,250
Insurance		23,150
Misc.		2,450
	$	529,375

* Includes Taxes

Customer Service			
Account Service	$	1,309,950	
General		-	(Cost not impacted by changes in meter reading)
Courier & Maint.		-	(Cost not impacted by changes in meter reading)
	$	1,309,950	
Total Estimated Reading Budget	$	1,839,325	

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Meter Type and Meter Reading
(Updated July 18, 2005)

Read Type Breakdown

Manual	8,000	(Zero by 2006)
Pin	6,500	
Touch Pad	64,768	
MXU (Radio)	360	
Total	79,628	

Installed Meters

Manufacturer	Size	Quantity	Read Type	
Badger	1.500	3	Manual	
Badger	2.000	1	Manual	
Badger	3.000	2	Manual	
Badger	4.000	1	Manual	
Badger	0.625	1,170	Manual	
Hersey	6.000	9	Manual	
Hersey	8.000	6	Manual	
Neptune	1.500	308	Touch Read	Some manual, some Sensus TR
Neptune	10.000	2	Touch Read	
Neptune	1.000	636	Touch Read	
Neptune	2.000	333	Touch Read	
Neptune	0.750	33	Touch Read	Most are Sensus TR
Neptune	0.750	1	Manual	
Neptune	.625x.750	4,493	Touch Read	Some manual
Neptune	3.000	57	Touch Read	Some manual
Neptune	4.000	40	Touch Read	About half are manual
Neptune	0.625	23,177	Touch Read	Some manual
Neptune	6.000	31	Manual	Some touch read
Neptune	8.000	7	Manual	Some touch read
Sensus	1.500	367	Touch Read	
Sensus	1.500	1	Manual	
Sensus	1.000	972	Touch Read	
Sensus	1.000	32	Manual	
Sensus	2.000	490	Touch Read	
Sensus	2.000	9	Manual	
Sensus	.625x.750	1,764	Touch Read	Some manual
Sensus	3.000	58	Touch Read	Some manual
Sensus	4.000	43	Touch Read	
Sensus	0.625	40,684	Touch Read	
Sensus	0.625	4,854	Touch Read	Many manual
Sensus	6.000	32	Touch Read	
Sensus	8.000	12	Touch Read	
		79,628		

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Meter Type and Meter Reading
(Updated July 18, 2005)

		Reads
Quarterly	97.2%	309,565
Bi-monthly	-	-
Monthly	2.8%	26,840
		336,405
Rereads *	4.3%	3,447
Final Reads *	7.4%	5,870
		9,317
Total Meter Visits		345,722

* Rereads and Final Reads estimated from actual activity in 2004.

2004 Read Comparison. Supplied by Rusty Collinsworth

Name	# Read	Avg. Read	% Coded	Avg. Lost	Avg. Start	Avg. End
Reader 1	59,921	440	0.003	87	28	21
Reader 2	62,013	467	0.001	100	33	20
Reader 3	69,569	513	0.002	93	29	17
Reader 4	62,553	416	0.003	105	32	25
Reader 5	22,032	437	0.004	152	37	30
Reader 6	33,575	396	0.005	98	27	22
Total/Average	309,663	445				

* Reader 5 and 6 only read part of the time for the year. Reader 5 transferred to Flushing.

Meter Readings per Day

Reading Days per Year	181
Meter Readers	4
Meter Readings	336,405
Meter Readings/Day	465

Northern Kentucky Water District

Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
2005 Meter Reading Frequency
(Updated June 8, 2005)

Area	Cycle #	# of Routes	Total Meters	Days to Read	Read Frequency	Annual Reads
Newport	91	1	66	1.0	Monthly	792
Sub Districts	73-90	26	2,146	1.0	Monthly	25,752
Bell	36	19	2,553	1.5	Quarterly	10,212
CC City	52	20	4,662	3.0	Quarterly	18,648
CC City	54	19	3,995	3.0	Quarterly	15,980
Cov A	60	13	3,904	3.0	Quarterly	15,616
Cov B	24	14	4,867	3.0	Quarterly	19,468
Cov C	40	11	4,182	3.0	Quarterly	16,728
Dayton	32	15	1,929	1.5	Quarterly	7,716
Ft Thomas	12	22	3,415	2.0	Quarterly	13,660
Ft Thomas	14	24	3,353	2.0	Quarterly	13,412
HH/SG	38/42	11	1,892	1.0	Quarterly	7,568
Independence	18	12	3,060	2.0	Quarterly	12,240
Ken 01	22	11	2,245	2.0	Quarterly	8,980
Ken 12	34	18	4,785	3.0	Quarterly	19,140
Ken 21	44/48	11	4,213	2.0	Quarterly	16,852
Ken 32	46	5	3,296	2.0	Quarterly	13,184
Ken 32B	56	7	2,551	1.0	Quarterly	10,204
Ken 33	62	6	1,596	1.0	Quarterly	6,384
Ken 37	16	7	1,937	2.0	Quarterly	7,748
Ken 44	20	18	4,781	2.0	Quarterly	19,124
Ludlow	50	23	1,975	1.0	Quarterly	7,900
Newport	19	21	2,023	2.0	Quarterly	8,092
Newport	39	15	1,644	2.0	Quarterly	6,576
Newport	55	17	2,635	2.0	Quarterly	10,540
Taylor Mill	63	6	1,697	2.0	Quarterly	6,788
Taylor Mill	65	9	1,975	2.0	Quarterly	7,900
Taylor Mill	67	8	1,372	2.0	Quarterly	5,488
		389	78,749			332,692

Monthly Percentage 2.81%

Presented by Barb Northcutt

Northern Kentucky Water District
Meter Reading Feasibility Study
15-Year Planning Horizon Cost Model
Customer Requested Readings
(Updated July 18, 2005)

	Total FSR	FSR Reads	Total Readers	Reader Reads
2004 On/Off	4,257	4,257	1,613	1,613
2004 On	2,148	-	-	-
2004 Billing Inspections	7,564	2,500	2,867	947
	13,969	6,757	4,480	2,561

		% of Meters
Estimate of Annual Rereads	3,447	4.3%
Estimate of Annual Final Reads	5,870	7.4%
	9,318	

Notes:
Number of work orders 7/1 - 12/31/04: On/Off 6610; On 2148
Number of rereads 7/1 - 12/31/04: 5275

Appendix E

Quarterly Reading One-Year Deployment Cost Model

Monthly Reading One-Year Deployment Cost Model

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Quarterly Meter Readings with One Year Deployment
(Updated: February 21, 2008)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mobile Drive-by	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Operating Budget										
Touch Read	$ 889,393	$ 926,649	$ 965,509	$ 1,006,038	$ 1,048,312	$ 1,092,409	$ 1,138,407	$ 1,186,395	$ 1,236,455	$ 1,288,682
Mobile Drive-by	$ 838,259	$ 652,107	$ 681,031	$ 711,260	$ 742,858	$ 775,888	$ 810,414	$ 846,511	$ 884,242	$ 923,689
Capital Budget										
Touch Read	$ 176,800	$ -	$ -	$ -	$ -	$ 23,533	$ -	$ 198,476	$ -	$ -
Mobile Drive-by	$ 7,283,555	$ 91,063	$ 99,296	$ 103,383	$ 107,725	$ 126,872	$ 174,915	$ 206,865	$ 126,923	$ 132,275
Total Operating + Capital Budget										
Touch Read	$ 1,066,193	$ 926,649	$ 965,509	$ 1,006,038	$ 1,048,312	$ 1,115,942	$ 1,138,407	$ 1,384,871	$ 1,236,455	$ 1,288,682
Mobile Drive-by	$ 8,121,814	$ 743,169	$ 780,327	$ 814,643	$ 850,583	$ 902,761	$ 985,329	$ 1,053,376	$ 1,011,165	$ 1,055,964

Results and Inputs	Total NPV	Capital NPV	Operating NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.
Touch Read	**$ 8,085,587**	**$307,909**	**$7,777,679**	1	1	400	25	$ -	
Mobile Drive-by	**$ 13,400,327**	**$7,682,627**	**$5,717,699**	2	1	10,000	90	$ 58.50	$ 76,695

Cost per Read										
Meter Readings										
Meter Readers	320,000	324,160	328,376	332,644	336,968	341,348	345,784	350,280	354,832	359,444
Field Service	9,360	9,482	9,605	9,730	9,856	9,984	10,114	10,246	10,379	10,514
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 2.70	$ 2.78	$ 2.86	$ 2.94	$ 3.02	$ 3.11	$ 3.20	$ 3.29	$ 3.39	$ 3.48
Mobile Drive-by	$ 2.55	$ 1.95	$ 2.01	$ 2.08	$ 2.14	$ 2.21	$ 2.28	$ 2.35	$ 2.42	$ 2.50
Op.+Cap. Cost/Read										
Touch Read	$ 3.24	$ 2.78	$ 2.86	$ 2.94	$ 3.02	$ 3.18	$ 3.20	$ 3.84	$ 3.39	$ 3.48
Mobile Drive-by	$ 24.66	$ 2.23	$ 2.31	$ 2.38	$ 2.45	$ 2.57	$ 2.77	$ 2.92	$ 2.77	$ 2.85

Northern Kentucky Water District

Meter Reading Feasibility Study
10-Year Planning Horizon Cost Model
Summary of Results
Monthly Meter Readings with One Year Deployment
(Updated: February 21, 2008)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Monthly Read Frequency										
Touch Read	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mobile Drive-by	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Operating Budget										
Touch Read	$ 2,308,857	$ 2,390,807	$ 2,475,683	$ 2,563,588	$ 2,654,632	$ 2,826,142	$ 2,926,601	$ 3,030,653	$ 3,138,426	$ 3,250,056
Mobile Drive-by	$ 1,935,028	$ 1,512,797	$ 1,565,939	$ 1,620,951	$ 1,677,899	$ 1,736,852	$ 1,797,880	$ 1,861,057	$ 1,926,458	$ 1,994,162
Capital Budget										
Touch Read	$ 409,200	$ -	$ -	$ -	$ -	$ 88,153	$ -	$ 454,967	$ -	$ -
Mobile Drive-by	$ 7,399,255	$ 73,356	$ 99,296	$ 103,383	$ 107,725	$ 126,872	$ 174,915	$ 206,865	$ 126,923	$ 132,275
Total Operating + Capital Budget										
Touch Read	$ 2,718,057	$ 2,390,807	$ 2,475,683	$ 2,563,588	$ 2,654,632	$ 2,914,295	$ 2,926,601	$ 3,485,620	$ 3,138,426	$ 3,250,056
Mobile Drive-by	$ 9,334,283	$ 1,586,153	$ 1,665,235	$ 1,724,334	$ 1,785,624	$ 1,863,725	$ 1,972,795	$ 2,067,922	$ 2,053,381	$ 2,126,437

Results and Inputs	Total NPV	Capital NPV	Operating NPV	Rank	Yrs to Impl.	Reads/Day	Visits/Day	$/Pad, MIU	Startup-Infra.
Touch Read	**$ 20,645,127**	**$733,634**	**$19,911,493**	2	1	400	25	$ -	
Mobile Drive-by	**$ 20,642,016**	**$7,776,019**	**$12,865,997**	1	1	10,000	90	$ 58.50	$ 76,695

Cost per Read										
Meter Readings										
Meter Readers	960,000	972,480	985,128	997,932	1,010,904	1,024,044	1,037,352	1,050,840	1,064,496	1,078,332
Field Service	9,360	9,482	9,605	9,730	9,856	9,984	10,114	10,246	10,379	10,514
Operating Cost/Read (Meter Readers + Field Service + Customer Service)										
Touch Read	$ 2.38	$ 2.43	$ 2.49	$ 2.54	$ 2.60	$ 2.73	$ 2.79	$ 2.86	$ 2.92	$ 2.98
Mobile Drive-by	$ 2.00	$ 1.54	$ 1.57	$ 1.61	$ 1.64	$ 1.68	$ 1.72	$ 1.75	$ 1.79	$ 1.83
Op.+Cap. Cost/Read										
Touch Read	$ 2.80	$ 2.43	$ 2.49	$ 2.54	$ 2.60	$ 2.82	$ 2.79	$ 3.28	$ 2.92	$ 2.98
Mobile Drive-by	$ 9.63	$ 1.62	$ 1.67	$ 1.71	$ 1.75	$ 1.80	$ 1.88	$ 1.95	$ 1.91	$ 1.95

Case No. 2008-____
Exhibit ____A____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

Specifications prepared by HDR Engineers titled
"Automated Meter Reading"

SPECIFICATIONS

FOR

NORTHERN KENTUCKY WATER DISTRICT

Automatic Meter Reading System

July 23, 2007

COMPILED BY:
NORTHERN KENTUCKY WATER DISTRICT
P.O. Box 18640
2835 Crescent Springs Road
Erlanger, Kentucky 41018

SPECIFICATIONS

FOR

NORTHERN KENTUCKY WATER DISTRICT

Automatic Meter Reading System

July 23, 2007

COMMISSIONERS:

JOE KOESTER - CHAIRPERSON
ANDREW COLLINS - TREASURER
DOUG WAGNER - SECRETARY
PAT SOMMERKAMP - COMMISSIONER
FRANK JACKSON - COMMISSIONER
FRED MACKE, JR. - COMMISSIONER

RON LOVAN, PRESIDENT/CEO

CHARLES PANGBURN - ATTORNEY

COMPILED BY:
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018

TABLE OF CONTENTS

Section 00020

INVITATION TO BID

First Advertisement: July 23, 2007
Second Advertisement: August 9, 2007
Third Advertisement: August 30, 2007

PROJECT: Automatic Meter Reading System

SEALED BIDS WILL BE RECEIVED AT:

Northern Kentucky Water District (OWNER)
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, Kentucky 41018

UNTIL: Date: September 20, 2007
Time: 2:00 p.m., local time.

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed Work is generally described as follows: The selected Bidder will provide and install all required equipment, licenses, hardware, and software to implement a system-wide Automatic Meter Reading (AMR) system to record and transmit meter readings for all of the Owner's water customers. The system must be a radio frequency based system employing mobile radio, fixed radio, or a combination of mobile and fixed radio technology. Services will include installation, training, and post-installation support. The time to deploy the AMR System will be twelve, twenty-four, or thirty-six months, and will be determined as part of the bidding process. Bidders will submit pricing for one, two, and three year deployment. A bidder may submit multiple bid forms for multiple meter reading systems. For example, a bidder may submit a bid form for a mobile system, a bid form for a fixed system, and a bid form for a hybrid system.

The Bidder's bid must include a deployment plan that demonstrates compliance with the requirements as defined in the specifications section.

All Bids must be in accordance with the Bidding Documents on file, and available for examination at:

Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018

Copies of the Bidding Documents may be obtained from the Owner at the address listed herein upon payment of a non-refundable price of $50.00 by contacting Chris Wetherell at (859) 426-2742. Additional charges for mailing and handling are as follows:

Mailing and Handling (U.S. Mail) (if requested) $5.00

Mailing and Handling (FED EX) (if requested) $25.00

Bidders will receive a hard copy, and Compact Disc copy of the Bidding Documents. *Any addendums to the Bid will be sent to respondents via email.*

Charges for Bidding Documents and mailing and handling, if applicable, will not be refunded.

A non-mandatory pre-bid conference will be held on August 15, 2007 at the Owner's central facility, 2835 Crescent Springs Road, Erlanger, Kentucky, 41018, at 10:00 a.m. local time. Representatives of Owner and Engineer will be present to discuss the project. Bidders are encouraged to attend and participate at the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions raised at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

Bids will be received on a unit basis as described in the Bid Forms, Contract Forms, and Conditions of Contract sections.

Bid security, in the form of a certified check or Bid Bond in the amount of ten percent (10%) of the maximum total bid price, must accompany each Bid.

The Successful Bidder will be required to furnish a Performance Bond and a Payment Bond as security for the faithful performance of the project and the payment of all bills and obligations arising from the performance of the Contract.

The Successful Bidder and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. This project falls under the provisions of KRS 337.505 to 337.550 for prevailing wage rates (See Conditions of Contract section).

Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, non-responsive, incomplete, unbalanced, or conditional Bids, to waive informalities, and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of Owner to make an award to that Bidder. Owner also reserves the right to negotiate with the apparent successful Bidder to such an extent as may be determined by Owner.

Minority Bidders are encouraged to bid.

Bids shall remain subject to acceptance for a period of 180 days after the day of bid opening.

Mark Lofland, V.P. Account Services & Billing
Northern Kentucky Water District

Section 00100

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS. Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

A. *Engineer* – Owner authorized persons acting as Owner's Agent throughout the procurement and implementation of the AMR System.

B. *Bidder* - The individual, entity, or entities who submit a Bid directly to Owner.

C. *Successful Bidder* - The Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. COPIES OF BIDDING DOCUMENTS. Complete sets of Bidding Documents must be used in preparing Bids; Bidder shall have sole responsibility for errors or misrepresentations resulting from the use of incomplete sets of Bidding Documents.

Owner in making copies of Bidding Documents available on the above terms, does so only for the purpose of obtaining Bids for the Work and does not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS. To demonstrate Bidder's qualifications to perform the Work, Bidder shall demonstrate to the NKWD that the firm and/or its application meets or exceeds the following minimum qualifications. Evidence of these stated minimum qualifications shall be submitted as part of the submittal requirements presented in Section 6 below.

- The proposed AMR system and components must have been deployed for a minimum of 1 year at other water utilities.
- Bidder must provide evidence showing it has demonstrated experience in supplying, installing, and supporting the AMR System proposed, and has performed satisfactorily in previous contracts of similar size and scope.
- Bidder shall provide 3 water utility references. References should be of similar size to NKWD, and should corroborate evidence of demonstrated experience mentioned above.
- Bidder must provide evidence showing it possesses financial resources to provide the required equipment, systems and services;
- Bidder must provide evidence showing it has the character, integrity, reputation, judgment, experience, and efficiency required by the contract this Bidding Document seeks to establish.

- Bidder must show that it will provide a complete AMR System that can be easily maintained and supported by NKWD employees or its Agents; and

- Bidder must demonstrate that it can provide complete and effective application training—both initially and ongoing.

In addition Owner may request Bidder to submit written evidence of minimum qualifications such as financial data, previous experience, present commitments, and such other data as may be requested by Owner or Engineer. Bidders who have not, in the Owner's opinion, had sufficient experience in the size and type of work involved may not be considered.

4. EXAMINATION OF BIDDING DOCUMENTS AND SITE. It is the responsibility of each Bidder, before submitting a Bid, to:

a. thoroughly examine and study the Bidding Documents, including any Addenda;

b. become familiar with and satisfy all federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work;

c. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

d. correlate the information known to Bidder, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

e. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Owner is acceptable to Bidder;

f. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work; and

g. accept the terms and conditions set forth in the Contract Documents.

4.01. Additional Information. Before submitting a Bid, each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to the Site or otherwise, which may affect cost, progress, performance, or furnishing of the Work, and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

On request, 72 hours in advance, the Owner will provide each bidder access to the Site to conduct examinations as each Bidder deems necessary for submission of a Bid. Arrangements for Site visits shall be made by calling Mr. Chris Wetherell with the Northern Kentucky Water District at (859) 426-2742.

All questions related to this Project shall be submitted in writing to:

Chris Wetherell
Field Supervisor
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, KY 41018
Phone: 859-426-2742
Fax: 859-578-5456

E-mail: chrisw@nkywater.org

Questions must be received by September 14, 2007 prior to the close of NKWD business hours (4:30 p.m. local time). Bidders shall clearly understand that the only official answer or position of NKWD will be the one stated in writing.

5. OWNER AND BIDDER'S REPRESENTATIONS.

5.01. Owner's Representation. NKWD reserves the right to cancel this procurement at any time and for any reason and to issue such clarifications, modifications, and/or amendments as it may deem appropriate.

Receipt of a bid by the NKWD or a submission of a bid to the NKWD confers no rights upon the Bidder nor obligates NKWD in any manner.

NKWD reserves the right to waive minor irregularities in bids, provided that such action is in the best interest of the NKWD. Any such waiver shall not modify any remaining Bidding Document requirements or excuse the Bidder from full compliance with the Bidding Documents and other contract requirements if the Bidder is awarded a contract.

5.02. Bidder's Representation. The submission of a Bid will constitute an incontrovertible representation and covenant by Bidder that Bidder has complied with every requirement of Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Owner written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

6. SUBMITTAL REQUIREMENTS. In addition to completion of all indicated required forms included in the Bidding Documents, Bidders are required to provide the following information. Owner retains the right to deem any bid that fails to respond to one or more of the following requests for information as unresponsive.

The items listed below shall be submitted with each bid and shall be presented in the order shown. Each section shall be clearly labeled, with pages numbered and separated by tabs. Failure by a respondent to include all listed items may result in the rejection of its bid. Bids should clearly indicate how the AMR System Requirements and Deployment and Operation

Requirements presented in the AMR System General and Technical Requirements are achieved.

A. Cover Letter

This letter shall be a brief formal letter from the Bidder that provides information regarding the firm and its ability to perform the requirements of the Contract Documents. The letter shall be signed by a person who is authorized to commit the Bidder's organization to perform the work included in the bid, and shall identify all materials and enclosures being forwarded in response to the Bidding Documents.

B. AMR System Description

Provide a description of the functions and features of the proposed AMR System specifically demonstrating the ability to meet the mandatory requirements and deployment and operational requirements. Include sufficient detail to: provide the Owner with an understanding of the product being proposed, and that will enable Owner to determine if the required functionality is provided. Also include the following.

1. Number of years proposed AMR system has been deployed

2. Number of sites using recommended product

3. Number of water and wastewater customers served using recommended product

C. Deployment Plan

Describe in detail how the AMR System will be installed, including:

1. The details of your approach to provide the systems and services requested by these Contract Documents, and method of verifying your system's ability to perform as required

2. Provide details on installation procedures and approach, including: planned cost control measures; inventory receipt and control; management of site work; customer notification process of pending work; safety program and precautions; installation quality control program; verification and acceptance program; and method for documenting meter locations.

3. Indicate where Bidder has contracted with a third party to perform services in support of AMR deployment. Provide participation level of third party including time estimates of on-site participation.

4. Minimum system and hardware requirements including software specifications and warranties.

5. Describe your AMR system and supporting application training, including how training will be conducted, time spent by functional area (Customer Service, Billing, Metering, Work Order, Systems Administration, etc.), location, and availability of on-line training and assistance.

6. Describe how on-going AMR system and supporting application support will be handled, including maximum application down time commitments, and anticipated corrective measure response times for varying levels of severity.

7. Owner responsibilities to support your installation and training plans including estimated amount of time required by Owner.

D. Compensation and Cost Data

Provide the total cost to deploy the AMR System in 12 months, 24 months, and 36 months.

E. Corporate Experience and Capacity

Provide information that documents your firm's and/or subcontractors' qualifications to produce the required outcomes, including its ability, capacity, skill, financial strength, and number of years of experience in providing the required services.

1. Number of years Bidder has been in business
2. Technical support availability, expressed as "Eastern Time Zone"
3. References from 3 water utilities of similar size using proposed system
4. Bidder five year revenue
5. Last five years of Bidder net income
6. Number of persons directly employed by Bidder
7. Revenue from sales of recommended product
8. Prior to disclosure of company financial information, provide a Non-Disclosure Agreement to be signed by Owner and Engineer, if required.

F. Key Personnel

Attach resumes of "key" members of the respondent's team that will provide the services related to this contract. These resumes should include Project Managers, Field Supervisors, Lead Technical Support, and Lead Training Personnel.

G. Customer Listings

Provide a listing of all AMR customers during the past three (3) years for all work of similar size and scope. Information provided for each client shall include the following:

- Client name and address
- Client's contact reference name and current telephone number
- AMR System and supporting application installed
- Number and type of AMR units installed
- *Time period for deployment*

7. BIDDER DEMONSTRATIONS. – All submitted bids will be evaluated, and the Owner intends to select certain Bidders to perform demonstrations at a location designated by Owner (Anticipated to be either Ft. Thomas, Kentucky or Erlanger, Kentucky). Bidders should be prepared to provide demonstrations during the following period:

October 15, 2007 through October 26, 2007

Notification as to being selected for a product demonstration will be on or about September 1, 2007. Selected Bidder's presentation and demonstration should last no more than one day.

8. INTERPRETATIONS AND ADDENDA. All questions about the meaning or intent of the Bidding Documents shall be submitted to Owner in writing. Submit questions to:

Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018
ATTENTION: Chris Wetherell
FAX 859-578-5456
chrisw@nkywater.org

Any interpretations or clarifications that are considered necessary by Owner in response to such questions will be issued by Addenda and emailed to all Bidders recorded by Owner as having received the Bidding Documents. Questions received after close of business (4:30 p.m. local time) on September 14, 2007 will not be answered unless these questions are deemed essential to the Bidding process as determined by the Owner. The person submitting questions shall be responsible for their prompt delivery. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Engineer.

Engineer will not be responsible for explanations or interpretations of the Bidding Documents or Contract Documents except as issued in accordance herewith.

9. BID SECURITY. Each Bid must be accompanied by Bid security made payable without condition to Owner in an amount of 10 percent of Bidder's maximum Bid and in the form of a certified check or Bid Bond (on the form attached) issued by a surety meeting the requirements as set forth in the General Conditions.

Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and Bid security of that Bidder will be forfeited. Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the later of seven days after the Effective Date of the Agreement or one day after the last day the Bids remain subject to acceptance, whereupon Bid security furnished by such Bidders will be returned.

A sample of an acceptable Bid Bond is presented in the Bid Forms section.

10. CONTRACT TIMES. The Contract Times are numbers of days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in the Agreement. A sample Agreement is provided in the Contract Forms section of this Bidding Document.

11. LIQUIDATED DAMAGES. Provisions for liquidated damages, if any, will be set forth in the Agreement. A sample Agreement is provided in the Contract Forms section of this Bidding Document.

12. RETAINAGE OF PAYMENT. Provisions concerning retainage of payment are set forth in the Agreement. A sample Agreement is provided in the Contract Forms section of this Bidding Document.

13. PREPARATION OF BID. The Owner will not be liable in any way for any costs incurred by any Bidder in the preparation of its bid in response to this Bidding Documents, nor for the presentation of its bid and/or participation in any discussions, demonstrations or negotiations.

The Bid form is included with the Bidding Documents and shall not be removed therefrom unless otherwise specified. All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each lump sum bid item and/or unit price item listed therein, or the words "No Bid", "No Change", or "Not Applicable" entered.

A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

A Bid by an individual shall show the Bidder's name and official address.

A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.

All names shall be typed or printed in ink below the signatures.

The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid form.

The address and telephone number for communications regarding the Bid shall be shown.

14. SUBMITTAL OF BID. A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or Invitation to Bid, or at the modified time and place indicated by Addendum. Bids shall be enclosed in an opaque sealed envelope plainly marked with the notation "Bid Enclosed for Automatic Meter Reading System" and the name and address of Bidder, and shall be accompanied by other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "Bid Enclosed for Automatic Meter Reading System".

Bids shall be addressed to Owner at:

Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, Kentucky 41018
ATTENTION: Chris Wetherell

One complete and executed set of the Bid Form along with "Non-Collusion Affidavit", Bid Bond, and other information outlined in Section 6 to the Instructions to Bidders shall be submitted. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Bids received after the time and date for receipt of Bids may be returned unopened. Oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

A Bidder may submit multiple Bid Forms for one or multiple types of meter reading systems – (mobile, fixed and hybrid, etc.) Copies of the Bid Forms may be used by the bidder as needed. For each type of AMR system bid, a Bidder must submit a Unit Price Bid Schedule for the 12-month Deployment, 24-month Deployment, and 36-month Deployment. A Bidder must indicate the type of AMR system (s) being bid on the line provided on the Unit Price Bid Schedules.

15. MODIFICATION AND WITHDRAWAL OF BIDS. A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid.

16. OPENING OF BIDS. Bids will be opened at the time and place indicated in the advertisement or invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

17. BIDS TO REMAIN SUBJECT TO ACCEPTANCE. All Bids will remain subject to acceptance for the period of 180 days, but Owner may, in its sole discretion, release any Bid prior to the end of this period. The Owner reserves the right to accept or reject in whole or in part any or all bids submitted.

18. BID EVALUATION AND SELECTION OF PREFERRED BIDDER. Bids shall be prepared and submitted in strict compliance with the Bidding Documents. Failure to comply with all

provisions of the Bidding Documents may result in disqualification. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, incomplete, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder which it finds, after reasonable inquiry and evaluation, to be non-responsive. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Owner to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate with the apparent Successful Bidder to such an extent as may be determined by Owner.

Owner is using competitive bidding method of selection, and will select the bidder or bidders that present the best bid as determined by the Owner. Bids will be evaluated based on equipment and system capability, and bidders' qualifications and ability to complete the deployment. An award, if made, shall be made to the responsible Bidder whose bid is most advantageous to the Owner.

The Owner reserves the right to contact any and all references to obtain, without limitation, information regarding the Bidder's performance on previous projects. A uniform sample of references may be checked for each responsive Bidder. After interviews or demonstrations, and checking of references, a final evaluation will then result in the selection of a Bidder.

Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders to perform the Work in accordance with the Contract Documents.

19. CONTRACT SECURITY AND INSURANCE. The General Conditions sets forth Owner's requirements as to performance and payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by such Bonds and insurance certificates. Samples of these forms are presented in the Contract Forms section of these Bidding Documents. Bidders should review these forms.

20. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents identified in the Agreement as attached thereto. Within the number of days set forth in the Bid Form, the Successful Bidder shall sign, leaving the dates blank, and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 15 days thereafter, Owner shall execute all copies of the Agreement and other Contract Documents submitted by Successful Bidder, shall insert the date of the Contract on the Agreement, and shall return one copy to Contractor.

When Owner gives a Notice of Award, it will be accompanied by the required number of unsigned counterparts of the Non-Disclosure Agreement. The Successful Bidder shall sign the Non-Disclosure Agreement and return it with the Agreement.

Section 00300

BID FORM

PROJECT IDENTIFICATION: Automatic Meter Reading System

THIS BID IS SUBMITTED TO:

Northern Kentucky Water District
P.O. Box 18640
Erlanger, Kentucky 41018
ATTENTION: Chris Wetherell

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner to perform all Work as specified or indicated in the Contract Documents for the unit prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Invitation to Bid and the Instructions to Bidders. This Bid will remain subject to acceptance for 180 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:

a. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

No. _____ Dated _____

No. _____ Dated _____

No. _____ Dated _____

b. Bidder is familiar with and is satisfied as to the general and local conditions that may affect cost, progress, and performance of the Work.

c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

d. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Contract Documents.

e. Bidder has correlated the information known to Bidder, reports identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

f. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.

g. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

5. Bidder will complete the Work for the following unit prices, computed in accordance with the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the Contract Documents.

(NOTE: Bidder must include any items required for operation of its system even if not listed in the following tables.)

Type of System (ie. Mobile, Fixed, Hybrid, etc.): _____(1)

UNIT PRICE BID SCHEDULE – 12-month Deployment					
Item Description	**Estimated Quantity**	**Units**	**Cost Component**	**Unit Price**	**Total Cost**
Single meter, inside	11,500	Each	Equipment (2)		
			Labor (3)		
Single meter, outside	63,500	Each	Equipment (2)		
			Labor (3)		
Multiple meter, inside	2,500	Each	Equipment (2)		
			Labor (3)		
Multiple meters, outside	2,500	Each	Equipment (2)		
			Labor (3)		
Handheld data collection units	5	Each	Equipment		
Mobile data collection units (Mobile Only)	2	Each	Equipment		
Fixed data collection units (Enter proposed number)		Each	Lump Sum		
Fixed data collection repeaters (Enter Proposed number)		Each	Lump Sum		
Field programmers required to configure radio frequency meter reading devices	5	Each	Equipment		
Communication system and hardware to transfer data to and from data collection units (4)		1	Lump Sum		
Required AMR System Software (if not included above)		1	Lump Sum		
Training & Support (5)		1	Lump Sum		
Total Amount Bid for 12-month Deployment					

Type of System (ie. Mobile, Fixed, Hybrid, etc.): _____(1)

UNIT PRICE BID SCHEDULE – 24-month Deployment					
Item Description	**Estimated Quantity**	**Units**	**Cost Component**	**Unit Price**	**Total Cost**
Single meter, inside	11,500	Each	Equipment (2)		
			Labor (3)		
Single meter, outside	63,500	Each	Equipment (2)		
			Labor (3)		
Multiple meter, inside	2,500	Each	Equipment (2)		
			Labor (3)		
Multiple meters, outside	2,500	Each	Equipment (2)		
			Labor (3)		
Handheld data collection units	5	Each	Equipment		
Mobile data collection units (Mobile Only)	2	Each	Equipment		
Fixed data collection units (Enter proposed number)		Each	Lump Sum		
Fixed data collection repeaters (Enter Proposed number)		Each	Lump Sum		
Field programmers required to configure radio frequency meter reading devices	5	Each	Equipment		
Communication system and hardware to transfer data to and from data collection units (4)		1	Lump Sum		
Required AMR System Software (if not included above)		1	Lump Sum		
Training & Support (5)		1	Lump Sum		
Total Amount Bid for 24-month Deployment					

Type of System (ie. Mobile, Fixed, Hybrid, etc.): _____(1)

UNIT PRICE BID SCHEDULE – 36-month Deployment					
Item Description	**Estimated Quantity**	**Units**	**Cost Component**	**Unit Price**	**Total Cost**
Single meter, inside	11,500	Each	Equipment (2)		
			Labor (3)		
Single meter, outside	63,500	Each	Equipment (2)		
			Labor (3)		
Multiple meter, inside	2,500	Each	Equipment (2)		
			Labor (3)		
Multiple meters, outside	2,500	Each	Equipment (2)		
			Labor (3)		
Handheld data collection units	5	Each	Equipment		
Mobile data collection units (Mobile Only)	2	Each	Equipment		
Fixed data collection units (Enter proposed number)		Each	Lump Sum		
Fixed data collection repeaters (Enter Proposed number)		Each	Lump Sum		
Field programmers required to configure radio frequency meter reading devices	5	Each	Equipment		
Communication system and hardware to transfer data to and from data collection units (4)		1	Lump Sum		
Required AMR System Software (if not included above)		1	Lump Sum		
Training & Support (5)		1	Lump Sum		
Total Amount Bid for 36-month Deployment					

(1) For a hybrid system please provide pricing for all components, and labor to install these components.

(2) Equipment includes radio frequency meter reading device and other necessary installed components such as antennas installed at or on the meter. It should also include any miscellaneous equipment such as mounting brackets, clips, or wires. In other words any and all items required to have the radio frequency meter reading device working properly.

(3) Labor includes time to install the radio frequency meter reading device, documentation of existing conditions, GPS recording of meter location, verification of operability and any required corrective measures, and restoration of site to preexisting conditions.

(4) Required computer hardware will be provided by the Owner, but Bidders shall provide required operating specifications. If FCC licenses are required for operation of the AMR System, the Bidder shall include the price here.

(5) Indicate the lump sum amount for training and support.

Training:

Owner requires training of all appropriate staff sufficient to enable them to effectively operate and maintain the system. To be effective, Owner requires that training curriculum be provided in advance, that training be accompanied by course workbooks and materials, that training be provided by experienced instructors, and that all training be accompanied by tests or hands-on evaluation to ensure Owner's employees have absorbed the content of the training.

i. Prerequisite to installation. Training must be sufficient to prepare the Owner's staff to fully and completely administer and maintain the system without further reliance on vendor staff beyond normal assistance covered by maintenance agreement. The Owner requires that its staff be trained prior to the commencement of installations.

ii. Training on the Owner's installed equipment. The Successful Bidder shall provide all additional training on the Owner's AMR system equipment (including the control computer and database) after it is installed, tested and accepted by the Owner. Training shall use real data from the Owner's system.

iii. Location. All training shall be done at the Owner's offices and facilities, or in the field.

iv. Training curriculum. Successful Bidder shall provide thorough training in each of the following areas for the designated number of people:

1. All aspects of the AMR system's operation, including obtaining reads and consumption data from the system, transferring reads and other information between the AMR system and the CIS, creating performance reports, diagnosing potential problems with system components, changing or adding customer accounts/MIU/meters to the system; for a minimum of 20 Owner's employees or agents for a minimum of 16 hours.

2. Meter reading database management, for a minimum of 10 Owner's employees or agents for a minimum of 8 hours.

3. Installation management and project control, for a minimum of 10 Owner's employees or agents for a minimum of 12 hours.

4. Field installation, for a minimum of 30 the employees or agents for a minimum of 4 hours.

5. Field diagnostics and maintenance, for a minimum of 30 Owner's employees or agents for a minimum of 8 hours.

6. Application software administration, for a minimum of 10 Owner's employees or agents for a minimum of 12 hours.

Successful Bidder shall specify duration for each of these training sessions.

v. Training aids. User training will include detailed documentation and reference materials for each end-user. Successful Bidder shall provide trainees' workbooks, training aids (including software and videotapes), and system technical manuals prior to or during the training session.

vi. Supplemental Training. Successful Bidder shall provide a schedule of costs for additional training beyond the initial training proposed.

vii. Restore equipment. Successful Bidder shall restore, repair or replace any Owner's equipment damaged in training, and restore any hardware or software modified in training.

viii. Instructors. The Successful Bidder shall provide trained and experienced instructor(s), and ensure that they do not perform other duties during the training period that will interrupt instruction.

b. Support

1. The Successful Bidder must provide telephone and on-site support as needed by Owner for a period of three (3) years from the date of the Notice to Proceed to be issued by Owner. As support will usually be requested when software or equipment malfunctions, such support must be rapid and efficient.

2. Telephone support. Successful Bidder shall provide trained persons to answer technical questions and guide Owner's employees through the use or diagnosis of the system through a toll-free number. Indicate telephone support hours proposed. Response time to a Owner's telephone query shall be within 30 minutes.

3. On-site support. Successful Bidder shall be required to provide on-site assistance at the request of the Owner. On-site support

shall be rendered within twenty-four (24) hours of receiving a request for support.

6. Bidder agrees that the Work will be substantially completed within the time (either 12, 24 or 36 months) required, as determined by the Owner, and ready for final payment as defined in the General Conditions.

7. Communications concerning this Bid shall be sent to the Bidder at the following address.

_____

_____

_____

_____

8. The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders and the General Conditions.

SIGNATURE OF BIDDER

If an Individual

Name (typed or printed): _____

By_____ (SEAL)
(Individual's signature)

doing business as _____

Business address _____

_____

Phone No.: _____ Fax No.: _____

Date _____

If a Partnership

Partnership Name: _____ (SEAL)

By_____
(Signature of general partner - attach evidence of authority to sign)

Name (typed or printed): _____

Business address _____

_____

Phone No. _____ Fax No.: _____

Date _____

If a Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General, Professional, Service, Limited Liability): _____

By_____
(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest _____

Business address _____

_____

Phone No. _____ Fax No.: _____

Date _____

If a Joint Venture

(Each joint venturer must sign. The manner for signing for each individual, partnership, and corporation that is party to the joint venture should be in the manner indicated above.)

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone No.: _____ Fax No.: _____

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone No.: _____ Fax No.:_____

Date _____

BID BOND

BIDDER (Name and Address)

_____
_____
_____

SURETY (Name and Address of Principal Place of Business)

_____
_____
_____

OWNER (Name and Address)

_____
_____
_____

BID

BID DUE DATE _____

PROJECT (Brief Description Including Location)

_____
_____
_____

BOND

BOND NUMBER _____

DATE (Not later than Bid due date) _____

PENAL SUM _____ _____
(Words) (Figures)

IN WITNESS WHEREOF Surety and Bidder intending to be legally bound hereby subject to the terms printed on the reverse side hereof do each cause this Bid Bond to be duly executed on its behalf by its authorized officer agent or representative

BIDDER	SURETY
_____(Seal)	_____(Seal)
Bidder's Name and Corporate Seal	Surety s Name and Corporate Seal
By _____	By _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest _____	Attest _____
Signature and Title	Signature and Title

Note (1) Above addresses are to be used for giving required notice
(2) Any singular reference to Bidder Surety OWNER or other party shall be considered plural where applicable

1 Bidder and Surety jointly and severally bind themselves their heirs executors administrators successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond

2 Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents

3 This obligation shall be null and void if

3 1 OWNER accepts Bidder s Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents or

3 2 All Bids are rejected by OWNER or

3 3 OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and if applicable consented to by Surety when required by paragraph 5 hereof)

4 Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER which notice will be given with reasonable promptness identifying this Bond and the Project and including a statement of the amount due

5 Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety s written consent

6 No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date

7 Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located

8 Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond Such notices may be sent by personal delivery commercial courier or by United States Registered or Certified Mail return receipt requested postage pre paid and shall be deemed to be effective upon receipt by the party concerned

9 Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer agent or representative who executed this Bond on behalf of Surety to execute seal and deliver such Bond and bind the Surety thereby

10 This Bond is intended to conform to all applicable statutory requirements Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length If any provision of this Bond conflicts with any applicable statute then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect

11 The term Bid as used herein includes a Bid offer or proposal as applicable

Section 00460

NON-COLLUSION AFFIDAVIT

STATE OF: _____)

COUNTY OF: _____) SS

_____, being first duly sworn, deposes

and says that he/she is the _____ of
(sole owner, a partner, president, secretary, etc.)

_____, the party making the foregoing bid; that such bid is genuine and not collusive or sham; that said bidder is not financially interested in, or otherwise affiliated in a business way with any other bidder on the same contract; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the price or affidavit of any other bidder, or that of any other bidder, or to secure any advantage against Owner, or any person or persons interested in the proposed Contract; and that all statements contained in said bid are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information of data relative thereto to any association or to any member or agent thereof.

_____
AFFIANT

Sworn to and subscribed before me, a Notary Public in and for the above named

State and County, this _____ day of _____, 20 _____.

_____
NOTARY PUBLIC

End of Section

(Note: The following standard form will be used for)
(preparation of the Agreement, after award of contract.)

Section 00500

AGREEMENT

THIS AGREEMENT is made and entered by and between the Northern Kentucky Water District (herein called Owner) and _____ (herein called Vendor).

Owner and Vendor, in consideration of the mutual covenants herein set forth, agree as follows:

Article 1. WORK.

Vendor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The selected Vendor will provide and install all required equipment, licenses, hardware, and software to implement a system-wide Automatic Meter Reading (AMR) system to record and transmit meter readings for all of the Owner's water customers. The system must be a radio frequency based system employing mobile radio, fixed radio, or a combination of mobile and fixed radio technology. Services will include installation, training, and post-installation support. The time to deploy the AMR System will be _____ months.

Article 2. ENGINEER.

The Project has been designed with the assistance of HDR Engineering, Inc., who is referred to in the Contract Documents as Engineer. Engineer, and its duly authorized agents, are to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIMES, LIQUIDATED DAMAGES, DELAYS, AND DAMAGES.

All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.1. Contract Times. The Work will be substantially completed within _____ months after the date when the Contract Times commence to run as provided in Article 3 of the General Conditions, and completed and ready for final payment in accordance with Article 13 of the General Conditions within six months after the date required for substantial completion.

3.2. Liquidated Damages. Owner and Vendor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed successfully within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 11 of the General Conditions. The parties also recognize the delays,

expenses, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Vendor agree that as liquidated damages for delay (but not as a penalty), Vendor shall pay Owner $750.00 for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Vendor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by Owner, Vendor shall pay Owner as liquidated damages (but not as a penalty) $500.00 for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment until the Work is completed and ready for final payment.

Owner shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Vendor, or to initiate action to recover liquidated damages for nonperformance of this Contract within the time stipulated.

3.3. Delays and Damages. In the event Vendor is delayed in the prosecution and completion of the Work because of any delays caused by Owner or Engineer, Vendor shall have no claim against Owner or Engineer for damages (including but not limited to acceleration costs or damages) or contract adjustment other than an extension of the Contract Times and the waiving of liquidated damages during the period occasioned by the delay.

Vendor shall provide advance written notice to Owner and Engineer of Vendor's intention to accelerate the Work prior to commencing any acceleration. Such written notice shall include a detailed explanation of the nature and scope of the acceleration, the reason for the acceleration, the anticipated duration of the acceleration, and the estimated additional costs to Vendor, if any, related to the acceleration. This requirement shall not in any way affect or alter the agreement of Owner and Vendor with respect to delays and damages as set forth above and in the General Conditions. Owner shall not be responsible or liable for any acceleration costs or damages.

Article 4. CONTRACT PRICE.

Owner shall pay Vendor for completion of the Work in accordance with the Contract Documents. The total amount paid by the Owner shall be based on the total number of each unit price item provided by Vendor on Vendor's bid form for a _____ system to be installed over _____ *month period.*

Article 5. PAYMENT PROCEDURES.

Vendor shall submit Applications for Payment in accordance with Article 13 of the General Conditions. Applications for Payment will be processed by Owner as provided in the General Conditions, as modified by the Supplementary Conditions.

5.1. Progress Payments. Owner shall make progress payments on account of the Contract Price on the basis of Vendor's Applications for Payment on or about the 25th day of each month during performance of the Work. All such payments will be measured by the number of units of unit price items completed.

5.2. Retainage. In addition to any amounts withheld from payment in accordance with Article 13 of the General Conditions, Owner shall retain from progress payments amounts equal to the following percentages:

a. Ten percent (10%) of the amount of the Work completed. This amount may be reduced by the Owner in its sole and absolute discretion, if the project is substantially completed; and

b. Ten percent (10%) of the value of materials and equipment that are not incorporated in the Work but are delivered, suitably stored, and accompanied by documentation satisfactory to Owner as provided in Article 13 of the General Conditions. Retainage for stored materials and equipment will be released when *the materials and equipment are incorporated in the Work.*

All retainage will be paid to Vendor when the Work is completed and ready for final payment in accordance with Article 13 of the General Conditions. Consent of the Surety shall be obtained before retainage is paid by Owner. Consent of the Surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the Surety.

5.3. Final Payment. Upon final completion and acceptance of the Work in accordance with Article 13 of the General Conditions, Owner shall pay the remainder of the Contract Price as provided in paragraph 13.4.

Article 6. VENDOR'S REPRESENTATION

In order to induce Owner to enter into this Agreement Vendor makes the following representations:

a. Vendor has examined and carefully studied the Contract Documents and the other related data identified in the Contract Documents.

b. Vendor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

c. Vendor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

d. Vendor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Vendor, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by Vendor, and safety precautions and programs incident thereto.

e. Vendor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

f. Vendor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

g. Vendor has correlated the information known to Vendor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

h. Vendor has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Vendor has discovered in the Contract Documents, and the written resolution thereof by Owner is acceptable to Vendor.

i. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Article 7. CONTRACT DOCUMENTS.

The Contract Documents, which are incorporated as part of this Agreement, consist of the following:

1. This Agreement;
2. Performance Bond;
3. Payment Bond;
4. General Conditions;
5. Employment Requirements and Wage Rates
6. AMR System General and Technical Requirements;
7. Addenda (numbers ___ to ___, inclusive);
8. Exhibits to this Agreement (enumerated as follows):
    - Notice of Award and Notice to Proceed;
    - Vendor's Bid;
    - Documentation submitted by Vendor prior to Notice of Award;
9. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - Written Amendments;
    - Work Change Directives;
    - Change Orders.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be amended, modified, or supplemented as provided in Article 4 of the General Conditions.

Article 8. COMPLIANCE WITH KENTUCKY LAW

Vendor represents and warrants that it has revealed to Owner any and all final determinations of a violation of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 within the previous five years. Vendor further represents and warrants that it will remain in continuous compliance with the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 for the duration of this Agreement. Vendor understands that its failure to reveal a final determination of a violation or to comply with the above statutory requirements constitutes grounds for cancellation of the Agreement and for disqualification of Vendor from eligibility for any contracts for a period of two years.

Article 9. EQUAL OPPORTUNITY

Unless exempted under KRS 45.590, during the performance of the Agreement, the Vendor agrees as follows:

a. The Vendor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, or national origin;

b. The Vendor will take affirmative action in regard to employment, upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, so as to ensure that applicants are employed and that employees during employment are treated without regard to their race, color, religion, sex, age, or national origin; however, when layoffs occur, employees shall be laid off according to seniority with the youngest employee being laid off first. When employees are recalled, this shall be done in the reverse of the way employees were laid off.

c. The Vendor will state in all solicitations or advertisements for employees placed by or on behalf of the Vendor that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, or national origin.

d. The Vendor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provisions of the nondiscrimination clauses required by this section; and

e. The Vendor will send a notice to each labor union or representative of workers with which he has collective bargaining agreement or other contract or understanding advising the labor union or workers' representative of the Vendor's commitments under the nondiscrimination clauses.

Article 10. MISCELLANEOUS.

a. Terms used in this Agreement will have the meanings indicated in the General Conditions.

b. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

c. Owner and Vendor each binds itself, its partners, successors, assigns, and representatives to the other party hereto, its partners, successors, assigns, and representatives in respect of all covenants, agreements, and obligations contained in the Contract Documents.

d. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Vendor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, Owner and Vendor have signed this Agreement. One counterpart each has been delivered to Owner, Vendor, Surety, and Engineer.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER: Northern Kentucky Water District

By:_____

Address for giving notices

2835 Crescent Springs Road
P.O. Box 18640
Erlanger, Kentucky 41018

VENDOR:_____

By:_____

(Corporate Seal)

Address for giving notices

_____

_____

_____

Joint Venturer

VENDOR:_____

By:_____

(Corporate Seal)

Address for giving notices

_____

_____

_____

Performance Bond

Any singular reference to Contractor Surety Owner or other party shall be considered plural where applicable

CONTRACTOR (Name and Address)

SURETY (Name and Address of Principal Place of Business)

OWNER (Name and Address)

CONTRACT
Date
Amount
Description (Name and Location)

BOND
Date (Not earlier than Contract Date)
Amount
Modifications to this Bond Form

Surety and Contractor intending to be legally bound hereby subject to the terms printed on the reverse side hereof do each cause this Performance Bond to be duly executed on its behalf by its authorized officer agent or representative

CONTRACTOR AS PRINCIPAL
Company (Corp Seal)

Signature _____
Name and Title

SURETY
Company (Corp Seal)

Signature _____
Name and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties if required)

CONTRACTOR AS PRINCIPAL
Company (Corp Seal)

Signature _____
Name and Title

SURETY
Company (Corp Seal)

Signature _____
Name and Title

EJCDC No 1910 28 A (1996 Edition)
Originally prepared through the joint efforts of the Surety Association of America Engineers Joint Contract Documents Committee the Associated General Contractors of America and the American Institute of Architects

1 The CONTRACTOR and the Surety jointly and severally bind themselves their heirs executors administrators successors and assigns to the Owner for the performance of the Contract which is incorporated herein by reference

2 If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond except to participate in conferences as provided in paragraph 3 1

3 If there is no OWNER Default, the Surety s obligation under this Bond shall arise after

3 1 The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract If the OWNER the CONTRACTOR and the Surety agree the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER s right if any subsequently to declare a CONTRACTOR Default and

3 2 The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR s right to complete the Contract Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3 1 and

3 3 The OWNER has agreed to pay the Balance of the Contract Price to

3 3 1 The Surety in accordance with the terms of the Contract,

3 3 2 Another contractor selected pursuant to paragraph 4 3 to perform the Contract

4 When the OWNER has satisfied the conditions of paragraph 3 the Surety shall promptly and at the Surety s expense take one of the following actions

4 1 Arrange for the CONTRACTOR, with consent of the OWNER to perform and complete the Contract, or

4 2 Undertake to perform and complete the Contract itself through its agents or through independent contractors or

4 3 Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER s concurrence to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default or

4 4 Waive its right to perform and complete arrange for completion or obtain a new contractor and with reasonable promptness under the circumstances

4 4 1 After investigation, determine the amount for which it may be liable to the OWNER and as soon as practicable after the amount is determined tender payment therefor to the OWNER, or

4 4 2 Deny liability in whole or in part and notify the OWNER citing reasons therefor

5 If the Surety does not proceed as provided in paragraph 4 with reasonable promptness the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond and the OWNER shall be entitled to enforce any remedy available to the OWNER If the Surety proceeds as provided in paragraph 4 4 and the OWNER refuses the payment tendered or the Surety has denied liability in whole or in part without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER

6 After the OWNER has terminated the CONTRACTOR s right to complete the Contract, and if the Surety elects to act under paragraph 4 1 4 2 or 4 3 above then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract To a limit of the amount of this Bond but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract the Surety is obligated without duplication for

6 1 The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract

6 2 Additional legal design professional and delay costs resulting from the CONTRACTOR s Default and resulting from the actions or failure to act of the Surety under paragraph 4 and

6 3 Liquidated damages or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non performance of the CONTRACTOR

7 The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Contract and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs executors administrators or successors

8 The Surety hereby waives notice of any change including changes of time to the Contract or to related subcontracts purchase orders and other obligations

9 Any proceeding legal or equitable under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond whichever occurs first If the provisions of this paragraph are void or prohibited by law the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable

10 Notice to the Surety the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page

11 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was be performed any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein The intent is that this Bond shall be construed as a statutory bond and not as a common law bond

12 Definitions

12 1 Balance of the Contract Price The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract

12 2 Contract The agreement between the OWNER and the CONTRACTOR identified on the signature page including all Contract Documents and changes thereto

12 3 CONTRACTOR Default. Failure of the CONTRACTOR, which has neither been remedied nor waived to perform or otherwise to comply with the terms of the Contract

12 4 OWNER Default. Failure of the OWNER, which has neither been remedied nor waived to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof

(FOR INFORMATION ONLY Name Address and Telephone)
AGENT or BROKER OWNER S REPRESENTATIVE (Engineer or other party)

Payment Bond

Any singular reference to Contractor Surety Owner or other party shall be considered plural where applicable

CONTRACTOR (Name and Address)

SURETY (Name and Address of Principal Place of Business)

OWNER (Name and Address)

CONTRACT
Date
Amount
Description (Name and Location)

BOND
Date (Not earlier than Contract Date)
Amount
Modifications to this Bond Form

Surety and Contractor intending to be legally bound hereby subject to the terms printed on the reverse side hereof do each cause this Payment Bond to be duly executed on its behalf by its authorized officer agent or representative

CONTRACTOR AS PRINCIPAL		SURETY	
Company	(Corp Seal)	Company	(Corp Seal)
Signature _____		Signature _____	
Name and Title		Name and Title (Attach Power of Attorney)	

(Space is provided below for signatures of additional parties if required)

CONTRACTOR AS PRINCIPAL		SURETY	
Company	(Corp Seal)	Company	(Corp Seal)
Signature _____		Signature _____	
Name and Title		Name and Title	

EJCDC No 1910 28 B (1996 Edition)
Originally prepared through the joint efforts of the Surety Association of America Engineers Joint Contract Documents Committee the Associated General Contractors of America the American Institute of Architects the American Subcontractors Association, and the Associated Specialty Contractors

1 The CONTRACTOR and the Surety jointly and severally bind themselves their heirs executors administrators successors and assigns to the OWNER to pay for labor materials and equipment furnished for use in the performance of the Contract, which is incorporated herein by reference

2 With respect to the OWNER this obligation shall be null and void if the CONTRACTOR

2 1 Promptly makes payment directly or indirectly for all sums due Claimants and

2 2 Defends indemnifies and holds harmless the OWNER from all claims demands liens or suits by any person or entity who furnished labor materials or equipment for use in the performance of the Contract provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims demands liens or suits and tendered defense of such claims demands liens or suits to the CONTRACTOR and the Surety and provided there is no OWNER Default

3 With respect to Claimants this obligation shall be null and void if the CONTRACTOR promptly makes payment directly or indirectly for all sums due

4 The Surety shall have no obligation to Claimants under this Bond until

4 1 Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy or notice thereof to the OWNER stating that a claim is being made under this Bond and with substantial accuracy the amount of the claim

4 2 Claimants who do not have a direct contract with the CONTRACTOR.

1 Have furnished written notice to the CONTRACTOR and sent a copy or notice thereof to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating with substantial accuracy the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed and

2 Have either received a rejection in whole or in part from the CONTRACTOR or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly and

3 Not having been paid within the above 30 days have sent a written notice to the Surety and sent a copy or notice thereof to the OWNER stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR

5 If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety that is sufficient compliance

6 When the Claimant has satisfied the conditions of paragraph 4 the Surety shall promptly and at the Surety s expense take the following actions

6 1 Send an answer to the Claimant with a copy to the OWNER within 45 days after receipt of the claim stating the amounts that are undisputed and the basis for challenging any amounts that are disputed

6 2 Pay or arrange for payment of any undisputed amounts

7 The Surety s total obligation shall not exceed the amount of this Bond and the amount of this Bond shall be credited for any payments made in good faith by the Surety

8 Amounts owed by the OWNER to the CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims if any under any Performance Bond By the CONTRACTOR furnishing and the OWNER accepting this Bond they agree that all funds earned by the CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of the CONTRACTOR and the Surety under this Bond subject to the OWNER s priority to use the funds for the completion of the Work

9 The Surety shall not be liable to the OWNER Claimants or others for obligations of the CONTRACTOR that are unrelated to the Contract The OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond and shall have under this Bond no obligations to make payments to give notices on behalf of or otherwise have obligations to Claimants under this Bond

10 The Surety hereby waives notice of any change including changes of time to the Contract or to related Subcontracts purchase orders and other obligations

11 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4 1 or paragraph 4 2 3 or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs If the provisions of this paragraph are void or prohibited by law the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable

12 Notice to the Surety the OWNER or the CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page Actual receipt of notice by Surety the OWNER or the CONTRACTOR however accomplished shall be sufficient compliance as of the date received at the address shown on the signature page

13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was to be performed any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond

14 Upon request of any person or entity appearing to be a potential beneficiary of this Bond the CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made

15 DEFINITIONS

15 1 Claimant An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor materials or equipment for use in the performance of the Contract The intent of this Bond shall be to include without limitation in the terms labor materials or equipment that part of water gas power light, heat, oil gasoline telephone service or rental equipment used in the Contract architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR s Subcontractors and all other items for which a mechanic s lien may be asserted in the jurisdiction where the labor materials or equipment were furnished

15 2 Contract. The agreement between the OWNER and the CONTRACTOR identified on the signature page including all Contract Documents and changes thereto

15 3 OWNER Default. Failure of the OWNER which has neither been remedied nor waived to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof

(FOR INFORMATION ONLY--Name Address and Telephone)
AGENCY or BROKER OWNER S REPRESENTATIVE (Engineer or other party)

CERTIFICATE OF INSURANCE

Issue Date

PRODUCER

Code Sub-Code

INSURED

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER THIS CERTIFICATE DOES NOT AMEND EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A

COMPANY LETTER B

COMPANY LETTER C

COMPANY LETTER D

COMPANY LETTER E

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS EXCLUSIONS AND CONDITIONS OF SUCH POLICIES

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE	POLICY EXPIRATION DATE	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$1 000
	[X] COMMERCIAL GENERAL LIABILITY				PRODUCTS-COMP/OPS AGGREGATE	$1 000
	[X] OCCURRENCE	(Completed Operations & Products Liability remains				
	[X] BLANKET CONTRACTUAL	in force for 2 years after final payment)			PERSONAL & ADVERTISING INJURY	$1 000
	[ ] _____				EACH OCCURRENCE	$1 000
	AUTOMOBILE LIABILITY					
	[X] ANY AUTO				COMBINED SINGLE LIMIT EACH OCCURRENCE Bodily Injury & Property Damage	$1 000
	[X] HIRED AUTOS					
	[X] NON OWNED AUTOS					
	EXCESS LIABILITY				EACH OCCURRENCE	$4 000
	[X] UMBRELLA FORM	(Follows Form of the Primary)			AGGREGATE	$4 000
	WORKERS COMPENSATION AND EMPLOYERS LIABILITY				STATUTORY	
					EACH ACCIDENT	$1 000
		(Includes US Longshoremen and Harbor Workers Act and Maritime Coverage Where Applicable and All States Endorsement)			DISEASE POLICY LIMIT	$1 000
					DISEASE EACH EMPLOYEE	$1 000
	OTHER				EACH OCCURRENCE	
	[ ] _____				AGGREGATE	

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

1 Certificate Holder(s) & their Officers Directors Partners Employees & Agents Named as Additional Insured (all policies except WC) The coverage afforded the Additional Insured under these policies shall be primary insurance If the Additional Insured has other insurance which is applicable to the loss such other insurance shall be on an excess or contingent basis (Copy of Additional Insured Endorsement attached)

2 Blanket Coverage for XCU Hazards (General Liability & Excess Liability)

3 Waiver of Subrogation Against Certificate Holder(s) Their Officers Directors Partners Employees & Agents (all policies)

4 Contractual Coverage covers liability assumed in the Indemnification Clause of the Contract between Certificate Holder and Insured (General Liability & Excess Liability)

5 General and Products/Completed Operations aggregates apply for each Certificate Holder contract(s) or amendments (General Liability & Excess Liability)

6 Contractual Liability Limitation Endorsement CG2139 or its equivalent is not included in either General or Excess Liability policies

7 Severability of Interest or Cross Liability clause or endorsement included (General Liability & Excess Liability)

CERTIFICATE HOLDERS

1

2

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED TERMINATED OR MATERIALLY CHANGED BEFORE THE EXPIRATION DATE THEREOF THE ISSUING COMPANY WILL MAIL 30 DAYS' WRITTEN NOTICE TO THE CERTIFICATE HOLDERS NAMED TO THE LEFT ANY IMPAIRMENT OR EXHAUSTION OF AGGREGATES WILL BE THE SUBJECT OF IMMEDIATE NOTICE TO THE CERTIFICATE HOLDERS

AUTHORIZED REPRESENTATIVE

CERTIFICATE OF PROPERTY INSURANCE

ISSUE DATE _____ (mm/dd/yy)

THIS IS EVIDENCE THAT INSURANCE AS IDENTIFIED BELOW HAS BEEN ISSUED IS IN FORCE AND CONVEYS ALL THE RIGHTS AND PRIVILEGES AFFORDED UNDER THE POLICY

PRODUCER	COMPANY
Code Sub-Code	
INSURED	POLICY NUMBER
	EFFECTIVE DATE (mm/dd/yy) / EXPIRATION DATE (mm/dd/yy)

PROPERTY INFORMATION

LOCATION/DESCRIPTION

COVERAGE INFORMATION

COVERAGES/PERILS/FORMS	AMOUNT OF INSURANCE	DEDUCTIBLE
BUILDERS RISK/INSTALLATION FLOATER All Risk of Physical Damage or Loss to Equipment and Materials at or Incidental to the Jobsite on *Completed Value Form*	Insurable value of completed work.	

REMARKS (including Special Conditions)

1 Certificate Holder and others identified in the property insurance paragraph of the Contract Documents are Named Insureds
2 Waiver of Subrogation against Named Insureds
3 Any similar insurance carried by Named Insureds is excess of coverage described hereon
4 Losses are payable to Owner as fiduciary for the Named Insureds

CANCELLATION

THIS POLICY IS SUBJECT TO THE PREMIUMS FORMS AND RULES IN EFFECT FOR EACH POLICY PERIOD SHOULD THE POLICY BE TERMINATED OR MATERIALLY CHANGED THE COMPANY WILL GIVE THE CERTIFICATE HOLDERS IDENTIFIED BELOW 30 DAYS' WRITTEN NOTICE, AND WILL SEND NOTIFICATION OF ANY CHANGES TO THE POLICY THAT WOULD AFFECT THAT INTEREST IN ACCORDANCE WITH THE POLICY PROVISIONS OR AS REQUIRED BY LAW

CERTIFICATE HOLDERS

Name and Address	Nature of Interest
1	X Additional Named Insured
2.	SIGNATURE OF AUTHORIZED AGENT OF THE COMPANY

Section 00700

GENERAL CONDITIONS

1. **DEFINITIONS.** Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

Agreement – The written instrument which is evidence of the agreement between Owner and Vendor covering the Work.

Application for Payment – The form acceptable to Engineer which is to be used by Vendor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

Bid - The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bidder - Any person, firm, or corporation submitting a Bid for the Work.

Bidding Documents – The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

Bidding Requirements – The Advertisement or Invitation to Bid, the Instructions to Bidders and the Bid Form with any supplements.

Change Order – A document recommended by Engineer which is signed by Vendor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

Claim – A demand or assertion by Owner or Vendor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

Contract – The entire and integrated written agreement between the Owner and Vendor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Documents – The Contract Documents establish the rights and obligations of the parties and include the documents identified and listed in Article 7 in the Agreement. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by Owner to Vendor are not Contract Documents.

Contract Price – The moneys payable by Owner to Vendor for completion of the Work in accordance with the Contract Documents as stated in the Agreement.

Contract Times – The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

Contractor or Vendor – The individual or entity with whom Owner has entered into the Agreement.

Day - A calendar day of twenty-four (24) hours measured from midnight to the next midnight.

Engineer – The individual or entity named as such in the Agreement.

Field Order – A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

Laws and Regulations – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

NKWD or District – NKWD or District shall mean the Northern Kentucky Water District.

Notice of Award – The written notice by Owner to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

Notice to Proceed – A written notice given by Owner to Vendor fixing the date on which the Contract Times will commence to run and on which Vendor shall start to perform the Work under the Contract Documents.

Owner – The Northern Kentucky Water District.

Partial Utilization – Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

Specifications – That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor - An individual or entity having a direct contract with Vendor or with any other Subcontractor for the performance of a part of the Work at the Site.

Substantial Completion - The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

Vendor – Successful Bidder that has entered into an agreement with NKWD.

Work *- Any and all obligations, duties and responsibilities* assigned to or undertaken by Vendor under the Contract Documents.

Work Change Directive – A written statement to Vendor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive *will not change the Contract Price or the Contract Times but is evidence* that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

Written Amendment – A written statement modifying the Contract Documents, signed by Owner and Vendor on or after the Effective Date of the Agreement and normally dealing with the non-engineering or non-technical rather than strictly construction-related aspects of the Contract Documents.

As ordered, as directed as required, as permitted, as allowed - The order, directions, requirement, permission, or allowance of Owner is intended only to the extent of judging compliance with the Contract Documents. The terms do not imply that Owner has any authority or responsibility for supervision of Vendor's forces or operations, such supervision and the sole responsibility therefore being strictly reserved for Vendor.

Reasonable, suitable, acceptable, proper, satisfactory - The terms reasonable, suitable, acceptable, proper, and satisfactory mean such to District and are intended only to the extent of judging compliance with Contract Documents.

Understood and agreed - Whenever in these Contract Documents the expression "it is understood and agreed" or an expression of like import is used, such expression means the mutual understanding and agreement of the parties executing the Agreement.

2. COPIES OF DOCUMENTS. Owner shall furnish to Vendor up to five copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

3. COMMENCEMENT OF CONTRACT TIMES AND NOTICE TO PROCEED. The Contract Times will commence to run on the thirtieth day after the Effective Data of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within the 30 days after the Effective Date of the Agreement.

4. INTENT, AMENDING, AND REUSE OF CONTRACT DOCUMENTS. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.
The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

Vendor and any Subcontractor or Supplier or other individual or entity performing or furnishing any or the Work under a direct or indirect contract with Owner: (i) shall not have or acquire any title to or ownership rights in any of the Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer, including electronic media editions; and (ii) shall not reuse any of such Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude Vendor from retaining copies of the Contract Documents for record purposes.

5. BONDS AND INSURANCE. Vendor shall furnish performance and payment Bonds each in an amount at least equal to the Contract Price as security for faithful performance and payment of all Vendor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due except as provided otherwise by Laws or Regulations or by the Contract Documents. Vendor shall also furnish such other Bonds as are required by the Contract Documents All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U S Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

If the surety on any Bond furnished by Vendor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements above, Vendor shall within 20 days thereafter substitute another Bond and surety both of which shall comply with the requirements of above.

Vendor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims under worker's compensation laws, disability benefit laws or other similar employee benefit acts; from claims for damages because of bodily injury, occupational sickness or disease, or death of Vendor's employees; claims for damages insured by reasonably available personal injury liability coverage; claims for damages because of bodily injury, sickness or disease, or death of any person other than Vendor's employees; and claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom - any or all of which may arise out of or result from Vendor's operations under the Contract Documents whether such operations be by Vendor or by anyone directly or indirectly employed by Vendor or by anyone for whose acts Vendor may be liable.

This insurance shall include at least the specific coverages and be written for not less than any limits of liability and maximum deductibles specified hereinafter or required by law, whichever is greater, and shall include contractual liability insurance. The Owner shall be included as additional insurers on the General Liability, Automotive Liability and Umbrella Excess Liability Policies. The insurance shall contain a cross liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance. With respect to worker's compensation and employer's liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, Vendor shall require its insurance

carriers to waive all rights of subrogation against Owner, Engineer, and their respective officers, directors, partners, employees, and agents.

The limits of liability for the insurance required shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverage:

a.	State	Statutory
b.	Employer's Liability	$1,000,000 each occurrence

2. Vendor's General Liability, which shall include completed operations and product liability coverage and eliminate the exclusion with respect to property under the acre, custody, and control of Vendor:

a.	General Aggregate	$1,000,000
b.	Products – Completed Operations Aggregate	$1,000,000
c.	Personal and Advertising Injury	$1,000,000
d.	Each Occurrence (Bodily Injury and Property Damage)	$1,000,000
e.	Property Damage liability insurance will provide Explosion, Collapse and Underground coverage's where applicable.	
f.	Excess or Umbrella Liability	
	1) General Aggregate	$4,000,000
	2) Each Occurrence	$4,000,000

3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:

a.	Bodily Injury	
	Each Person	$1,000,000
	Each Accident	$1,000,000
b.	Property Damage	
	Each Accident	$1,000,000
c.	Combined Single Limit	$1,000,000

4. The Contractual Liability shall provide coverage for not less than the following amounts:

a.	Bodily Injury	
	Each Accident	$1,000,000
	Annual Aggregate	$1,000,000

b. Property Damage

Each Accident	$1,000,000
Annual Aggregate	$1,000,000

This insurance shall be obtained by Vendor and issued in the name of Owner, and shall protect and defend Owner against claims arising as a result of the operations of Vendor or Vendor's Subcontractors. The liability limits shall be not less than:

a. Bodily Injury

Each Occurrence	$1,000,000
General Aggregate	$1,000,000

b. Property Damage

Each Occurrence	$1,000,000
General Aggregate	$1,000,000

Vendor shall be responsible for any deductible or self-insured retention.

Before starting the Work, Vendor shall file with Owner certificates of such insurance, acceptable to Owner; these certificates shall contain a provision that the coverage afforded under the policies will not be cancelled or materially changed until at least thirty (30) days prior written notice has been given to Owner. With respect to workers' compensation and employers' liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, Vendor shall require its insurance carriers to waive all rights of subrogation against Owner, and their respective officers, directors, partners, employees, and agents.

6. VENDOR'S RESPONSIBILITIES.

6.1. Labor, Materials, and Equipment. Vendor shall furnish all material, equipment, labor, transportation, and incidentals necessary for completion of the Work. Unless an emergency, no Work shall be done between 6:00 p.m. and 7:00 a.m. without permission of Owner. Work outside these hours may be undertaken with the permission of Owner.

6.2. Taxes. Vendor shall pay all sales, consumer, use, and other similar taxes required to be paid by Vendor in accordance with the law of the place where the Work is to be performed.

6.3. Indemnification. Vendor shall indemnify and hold harmless Owner and Engineer and the officers, commissioners, directors, partners, agents, employees, and other consultants and subcontractors of each and any of them from and against all claims, damages, losses, and expenses, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals arising out of or relating to the performance of the Work, provided that any such claim, damage, loss, or expense (a) is attributable to bodily injury, sickness, or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of Vendor, anyone directly or indirectly employed by Vendor, or anyone for whose acts Vendor may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

In any and all claims against Owner or Engineer or any of their respective officers, commissioners, directors, partners, agents or employees by any employee of Vendor, anyone directly or indirectly employed by Vendor or anyone for whose acts Vendor may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Vendor under worker's compensation acts, disability benefit acts or other employee benefit acts.

6.4. Patents and Royalties. Vendor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work and shall defend all suits or claims for infringement of any patent rights and, to the fullest extent permitted by Laws and Regulations, shall indemnify and hold the Owner and Engineer harmless from and against all claims, losses, costs, and damages arising out of or relating to any infringement.

6.5 Warranty and Guarantee. Vendor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. AMR components with the exception of batteries will be guaranteed for a period of at least two years, with Vendor providing full replacement and installation at no cost to the Owner. Batteries will be guaranteed for a period of at least 10 years.

7. OWNER'S RESPONSIBILITIES. Owner shall furnish the information required of Owner under the Contract Documents promptly and shall make payments to Vendor promptly after they are due.

8. ENGINEER'S STATUS DURING DEPLOYMENT. Engineer will be Owner's representative during completion of the Work. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer. Engineer will make visits to the Site at intervals as Engineer deems necessary in order to observe the progress that has been made and the quality of the various aspects of Vendor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of the Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer's efforts will be directed toward providing Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections to check the quality or quantity of the Work.

Engineer will not supervise, direct, control, or have authority over or be responsible for Vendor's means, methods, techniques, sequences, or procedures of implementation, or the safety precautions and programs incident thereto, or for any failure of Vendor to comply with Laws and Regulations applicable to the performance of the Work.

Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as Engineer may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on Owner and Vendor.

Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and or compatible with the concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Vendor, who shall perform the Work involved promptly.

Engineer will have authority to disapprove or reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the concept of the completed project as a functioning whole as indicated by the Contract Documents.

Engineer will not be responsible for the acts or omissions of Vendor or of any Subcontractor, any supplier, or of any other individual or entity performing any of the Work.

9. CLAIMS. Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to the Engineer and the other party to the Contract promptly but in no case later than thirty (30) days after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the Engineer and the other party to the Contract within sixty (60) days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within thirty (30) days unless Engineer allows additional time. Engineer will render a formal decision in writing within thirty (30) days after receipt of the last submittal of the claimant or the opposing party, if any.

10. CHANGES IN THE WORK. Without invalidating the Agreement and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive.

11. CHANGES OF CONTRACT PRICE OR CONTRACT TIMES. The Contract Price or Contract Times may only be changed by a Change Order or by a Written Amendment. Where Vendor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of the Vendor, the Contract Times will be extended in an amount equal to the time lost due to such delay. This extension shall be Vendor's sole and exclusive remedy for such delay. Delays beyond the control of the Vendor shall include, but not be limited to, acts or neglect by Owner, fires, floods, epidemics, abnormal weather conditions, or acts of God. The Contract Times will not be extended due to delays within the control of the Vendor.

In no event shall Owner or Engineer be liable to Vendor, any Subcontractor, any supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from any delay.

12. CORRECTION PERIOD. If within two years after the date of Substantial Completion or such longer period of time as may be prescribed by the terms of any applicable special guarantee, any Work is found to be defective, Vendor shall promptly, without cost to the Owner, correct such defective Work to the satisfaction of the Owner. If Vendor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All Claims, costs, losses, and damages including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals arising out of or relating to such correction or repair or such removal and replacement will be paid by Vendor.

13. PAYMENTS TO VENDOR AND COMPLETION.

13.1. Unit Price Work. Where Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Vendor will be made by Engineer and Owner. Each unit price will be deemed to include an amount considered to be adequate to cover Vendor's overhead and profit for each separately identified item.

13.2. Applications for Payment. Vendor shall submit to Engineer for review an Application for Payment filled out and signed by Vendor covering the Work completed as of the date of the application and accompanied by such supporting documentation as is required by the Contract Documents. The amount of retainage with respect to progress payments will be as stipulated in the Agreement. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present to the Owner or return the Application to Vendor indicating the reasons for refusing payment. Thirty (30) days after presentation of the Application for Payment to Owner, the amount due and payable will be paid by Owner to Vendor.

Owner may refuse to make payment of the full amount recommended by Engineer because claims have been made against Owner on account of Vendor; liens have been filed in connection with the Work and Vendor has failed have liens discharged in accordance with the Agreement; or there are other items entitling Owner to a set-off against the amount recommended.

13.2. Substantial Completion. When Vendor considers the entire Work ready for its intended use, Vendor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Vendor as incomplete) and request that Engineer issue a certificate of Substantial Completion. Promptly thereafter, Owner, Engineer and Vendor shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Vendor in writing giving the reasons therefore. If Engineer considers the Work substantially complete, Engineer will within 14 days after the inspection of the Work execute and deliver to Vendor a statement of Substantial Completion. At the time of delivery of the certificate of Substantial Completion, Engineer will deliver to Vendor a statement as to division of responsibilities pending final payment between Owner and Vendor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Vendor subsequently agree otherwise in writing, Engineer's aforesaid statement will be binding on Owner and Vendor until final payment.

"Substantial Completion" means that the Automated Meter Reading System and training is completed to the point that 98% or more of all customer meter readings can be recorded and transmitted by the Owner's representatives on a regular basis in a manner that is satisfactory with the Owner. Substantial Completion shall also include the functional integration with existing customer billing system with the ability to transmit meter reading information to Sanitation District #1. All performance testing and training need not have been completed prior to the date of Substantial Completion.

It is understood that in order to achieve substantial completion Vendor must demonstrate that every radio frequency reading device is operable.

13.3. Partial Utilization. Use by Owner at Owner's option of any substantially completed part of the Work which Owner, Engineer, and Vendor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Vendor's performance of the remaining Work, may be accomplished prior to substantial completion of all the Work. Owner may at any time request Vendor in writing to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Vendor agrees that such part of the Work is substantially complete, Vendor will certify to Owner that such part of the Work is substantially complete and request Owner to issue a certificate of Substantial Completion for that part of the Work. Vendor at any time may notify Owner in writing that Vendor considers any such part of the Work ready for its intended use and substantially complete and request Owner to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Engineer, and Vendor shall make an inspection of that part of the Work to determine its status of completion. If the parties are in agreement that the applicable part of the Work is substantially complete, the Engineer will issue a certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

13.4. Final Payment. After Vendor has, in the opinion of the Engineer, satisfactorily completed all corrections and has delivered all maintenance and operating instructions, guarantees, certificates or other documents, Vendor may make application for final payment. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Vendor's other obligations under the Contract Documents have been fulfilled, Engineer will indicate in writing recommendation of payment and present to Owner for payment. Thirty days after presentation to Owner, the amount due and will be paid by Owner to Vendor. Otherwise, Engineer will return the Application for Payment to Vendor, indicating in writing the reasons for refusing to process final payment, in which case Vendor shall make the necessary corrections and resubmit the Application for Payment.

13.5. Final Completion Delayed. If, through no fault of Vendor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Vendor's final Application for Payment, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted.

14. TERMINATION OF WORK. If Vendor is judged as bankrupt or insolvent, or makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for Vendor or for any of his property, or if Vendor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws, or if Vendor fails to supply suitable materials or equipment, or disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction, or if Vendor otherwise violates any provision of the Contract Documents, then Owner may, without prejudice to any other right or remedy and after giving Vendor seven days written notice, terminate the services of Vendor.

Where Vendor's services have been so terminated by Owner, said termination shall not affect any rights of Owner against Vendor then existing or which may thereafter accrue. Any retention or payment of moneys by Owner due Vendor will not release Vendor from liability.

If, through no act or fault of Vendor, Owner fails to pay Vendor any sum within thirty (30) days of its approval and presentation, then Vendor may, upon seven (7) days written notice to Owner, stop the Work until Vendor has been paid all amounts then due.

15. GIVING NOTICE. Whenever any provision of the Contract Documents requires the giving of written notice it shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to him who gave the notice.

16. COMPUTATION OF TIME. When any period of time is referred to in the Contract Documents by days, it shall be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

17. LIMITATIONS. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Vendor and the right and remedies available to Owner hereunder shall be in addition to, and shall not be construed in any way as a limitation of, any rights and remedies available by law, by special guarantee or by other provisions of the Contract Documents.

18. LEGAL ADDRESSES. The business address of Vendor given in the Bid Form is hereby designated as the place to which all notices, letters, and other communication to Vendor will be mailed or delivered. The address of Owner appearing hereinbefore is hereby designated as the place to which all notices, letters, and other communication to District shall be mailed or delivered. Either party may change his address at any time by an instrument in writing delivered to the other party.

19. DISPUTE RESOLUTION. Arbitration will not be acceptable as a means for settling claims, disputes, and other matters.

20. MECHANICS' AND OTHER LIENS. Vendor agrees to pay and satisfy all bills and liens which Vendor may incur in connection with the performance of the Work. In the event liens are filed against any property on which the Work is performed, or in the event that any claim is asserted against the Owner as a result of the acts or omissions of the Vendor, the Vendor shall, at its sole expense and within ten (10) calendar days from the date on which the Owner notifies the Vendor of such filing or assertion, promptly take action to cause the same to be discharged or withdrawn.

End of Section

EMPLOYMENT REQUIREMENTS AND WAGE RATES

R-1. GENERAL. This Contract shall be based upon payment by the Vendor and his Subcontractors of wage rates not less than the prevailing hourly wage rate for each craft or type of workman engaged on the Work as determined by the Department of Labor of the Commonwealth of Kentucky.

The Vendor shall comply with the prevailing wage law of Kentucky, Kentucky Revised Statutes 337.510 to 337.550, including latest amendments thereto.

The Vendor and each Subcontractor shall keep accurate records indicating the hours worked each day by each employee in each classification of work and the amount paid each employee for his work in each classification. Such records shall be open to the inspection and transcript of the Commissioner of Labor or his duly authorized representatives at any reasonable time. These payroll records shall not be destroyed or removed from the state for one year following completion of the improvement.

The Vendor and each Subcontractor shall post and keep posted in a conspicuous place or places at the construction site a copy or copies of prevailing rates of wages and working hours as prescribed in these Contract Documents.

If, during the life of this Contract, the prevailing hourly rate of wages is changed by the Department of Labor, such change shall not be the basis of any claim by the Vendor against the Owner, nor will deductions be made by the Owner against sums due the Vendor by reason of any such change.

The prevailing wage law does not prohibit payment of more than the prevailing rate of wages.

Pursuant to Kentucky Revised Statute 337.540, no laborer, workman, mechanic, helper, assistant, or apprentice shall be permitted to work more than 8 hours in one calendar day, nor more than 40 hours in one week, except in cases of emergency caused by fire, flood, or damage to life or property. Whenever work in excess of 8 hours per day or 40 hours per week is required, payment for overtime shall be at not less than one and one-half times the prevailing rate of wages.

R-2. PREVAILING WAGES. The following attachment for the wage rate schedule is the prevailing wage rate determination made by the Department of Labor of the Commonwealth of Kentucky on the designated date, and shall be a part of the Contract.

ATTACHMENT R-1

The wage rate schedule will be issued by Addendum.

Section 01025

MEASUREMENT AND PAYMENT

1. SCOPE. This section covers methods of measurement and payment for items of Work under this section.

2. GENERAL. The total Bid Price shall cover all Work required by the Contract Documents. All costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction plant, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Vendor and all costs in connection therewith shall be included in the prices bid.

3. ESTIMATED QUANTITIES. All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only as a basis for estimating the probable cost of the Work and for the purpose of comparing the bids submitted for the Work. The actual amounts of work completed and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. Vendor agrees to make no claims for damages, loss of anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts therefore.

4. AMR SYSTEM COMPONENT PAYMENT TERMS. Payment terms for the various AMR System components are presented below.

4.1 SINGLE METERS, INSIDE. Payment will be made based on removing any existing equipment and furnishing and installing each new unit, including all materials, and conducting all testing to confirm fully functional radio frequency meter reading at each location.

4.2 SINGLE METERS, OUTSIDE. Payment will be made based on removing any existing equipment and furnishing and installing each new unit, including all materials, and conducting all testing to confirm fully functional radio frequency meter reading at each location.

4.3 MULTIPLE METERS, INSIDE. Payment will be made based on removing any existing equipment and furnishing and installing each new unit, including all materials, and conducting all testing to confirm fully functional radio frequency meter readings at each location.

4.4 MULTIPLE METERS, OUTSIDE. Payment will be made based on removing any existing equipment and furnishing and installing each new unit, including all materials, and conducting all testing to confirm fully functional radio frequency meter readings at each location.

4.5 HANDHELD AND MOBILE DATA COLLECTION UNITS. Data collection units will be paid for upon delivery and confirmation of operability.

4.6 FIXED DATA COLLECTION UNITS AND REPEATERS. Fixed data collection units and repeaters will be paid for upon installation and confirmation of operability. Installation includes furnishing and installing each required unit.

4.7 FIELD PROGRAMMERS. Field programmers will be paid for upon delivery and verification of operability.

4.8 COMMUNICATION SYSTEM HARDWARE AND SOFTWARE. Communication system hardware and software will be paid for upon implementation and verification of operation. This will occur no earlier than the first meter readings performed for the first regular customers' billing cycle after substantial completion.

4.9 TRAINING. Payment for training will be made on a lump sum basis upon completion of training hours stipulated in vendor's bid.

4.10 FIRST YEAR OPERATIONAL TECHNICAL SUPPORT. Payment for first year technical support will be paid upon request after substantial completion of Project as defined the General Conditions.

5. FINAL PAYMENT. Northern Kentucky Water District will retain 10% of all AMR System component payments through the term of the Project as stated in the Agreement.

Northern Kentucky Water District
AMR Procurement and Deployment Request for Bids
AMR System General and Technical Requirements

1) PURPOSE AND OBJECTIVE

Northern Kentucky Water District (NKWD or District) is soliciting bids from reputable vendors to provide and install an automatic meter reading (AMR) system to read all of the District's retail and wholesale water customers. Throughout this General and Technical Requirements, and the Bidding Document as a whole, AMR or AMR System will refer to all equipment, computer hardware, and software required to support the automatic meter reading of all NKWD's retail and wholesale water customers.

The overall objective of the Bidding Documents is to select the vendor and equipment that represents the best value to NKWD, realizing that the best solution is one that responds to both current and future needs. In general, the project's objective will be achieved by selecting a system that:

- ✓ Will read Neptune and Sensus meters.
- ✓ Will be compatible with other manufacturers' reading systems.
- ✓ Is adaptable to future technology.
- ✓ Is backed by a reputable, experienced firm that will support NKWD during deployment and throughout the life of the system.

2) BACKGROUND

NKWD currently serves over 80,000 customers in Kenton and Campbell Counties. The service territory is diverse ranging from urban areas to less populated rural areas. The terrain varies from flat along the river valleys to rugged and hilly.

NKWD currently captures meter readings through two different reading methods: touch-read, and automatic meter reading (AMR). The vast majority of NKWD meters are read through an encoder register connected to a touch pad using a Sensus hand-held interrogator (interrogator). The interrogator reads both the Sensus and Neptune meters. There are approximately 79,500 touch-read meters in the system.

Approximately 500 accounts concentrated in the monthly billing sub-district section of the District are read using the Sensus' AMR RadioRead System. Meter readings are captured using a hand-held, radio interrogator.

Meter Reading Process

As of September 30, 2006 there are 80,000 meters that must be read regularly to prepare customer invoices. Roughly 50% of these meters are manufactured by Sensus Metering Systems, Inc. with the remainder manufactured by Neptune Technology Group, Inc. Approximately 97% of these accounts are read quarterly with the remainder read monthly.

Approximately 66,000 of the District's meters are located in outside meter pits. The remaining meters are located inside customers' buildings.

NKWD employees collect over 345,700 meter readings per year as shown in table 1 below. Meter readings are taken by two different groups within NKWD: Meter Reading and Field Service.

Total Annual Meter Readings

	Annual Meter Readings
Meter Readers	336,400
Field Service	9,300
Total Annual Reads	345,700

The Meter Reading Group is responsible for the regular quarterly and monthly reads. Meter Readers capture over 336,400 meter readings in support of customer invoicing. There are five full-time Meter Readers capturing regular meter readings. When not gathering routine meter readings, meter readers assist with customer requested meter readings and other activities.

In addition to these regular readings, NKWD responds to customer requested meter readings. These customer requested readings are for account closings (final reads), and billing disputes. It is estimated that the District responds to over 9,300 customer requested readings. The Field Service Group handles customer requested readings in addition to its other duties such as meter installations, service disconnections, collections, and customer leak detection. There are eight Field Service Representatives that are available to respond to customer requested meter readings, but on average, two or three Field Service Representatives are performing this task on a daily basis.

NKWD follows a standard meter reading approach. First, the account information is retrieved from the District's customer information system. Next the account information is transferred in batch form to a PC running Sensus AutoRead Software (Sensus PC). This software takes the AMR account information, and "reconfigures" it so that it can be uploaded to the Interrogators. The meter reader then takes the loaded interrogator and captures the meter reading. Once finished reading, all the captured meter reading information is downloaded from the interrogator back into the Sensus PC. The meter reading information is then configured into a batch file to be transferred back to the AMR where it will be used to prepare regular customer invoices. The process just described is carried out on a daily basis. The number of accounts loaded into the interrogator typically represents one day's work for a meter reader.

Customer requested meter reads are conducted differently. A Service Order is created by Account Service, and forward to the Field Services group. A Field Service Representative takes the Service Order and takes a meter reading using a Sensus PocketPro interrogator. The meter reading is recorded on the Service Order, and the Service Order is returned to Account Service. Account Service uses the reading to prepare a final bill, make a customer billing adjustment, or respond to a customer inquiry.

3) MANDATORY AMR SYSTEM REQUIREMENTS

NKWD has established **four (4)** mandatory requirements related to the AMR System. Respondents must be able to verify through their bid submittal that they meet these four mandatory requirements stated below.

- System must work with existing installed meter base (Neptune and Sensus meters).
- System must be compatible with other manufacturers' meters.
- System must readily interface with NKWD's Advance Utility Billing System.
- System must be Microsoft SQL database compliant.

4) AMR SYSTEM DEPLOYMENT AND OPERATIONAL REQUIREMENTS

The following list presents NKWD's AMR System deployment and operational requirements. Ability to meet these requirements must be presented in the Vendor's bid.

- Deployment of mobile radio, fixed radio, combination of mobile and fixed radio, or other automatic meter reading system (AMR) installed to read NKWD's customers' meters as specified.
- Radio frequency meter reading device (RF Device) compatible with Sensus and Neptune meters, and at least one other manufacturer's meter.
- RF devices that can be installed in NKWD meter pits or in customers' buildings. When installed in outside pits, ideally, the transponder should be flush mounted on top of the pit lid making use of the existing predrilled hole.
- Mobile and handheld data collection units (DCUs) that capture signal from the RF Devices and record necessary meter reading and other related information including but not limited to actual meter reading, tamper detection, and leak detection
- Field programmers or other devices required to configure RF Devices.
- Communication system that transfers data to and from DCUs to the utility billing system.
- Required system software to operate and maintain AMR System. Software shall operate in Microsoft Windows operating system environment, and be Microsoft SQL database compliant. Hardware requirements and specifications required to run system software shall be presented in vendor's bid.
- Training of NKWD personnel to effectively and efficiently operate the AMR system
- Technical and customer support to cover the AMR System for at least 10 years.
- Ability to upgrade to all components and software for at least 10 years.

- Appropriate guarantees (at least 10 years) on equipment, including batteries, and at least an additional 10 warranty on batteries.
- Ample supply of equipment and components stored on NKWD location to support warranty replacements.
- Vendor shall supply any FCC or other communications licenses necessary to operate AMR system.
- Ten copies of documentation for equipment and software should be provided in both paper and electronic format. Electronic shall be pdf files.
- Detailed Deployment Plan showing installation schedule, approach, and procedures. Plan should document installation training, safety requirements, and installer identification badges. The plan shall provide approach for dealing with customer complaints.
- Vendor shall document existing conditions with NKWD prepared forms and digital pictures.
- Vendor shall provide GPS location coordinates of installed meters including the following level of detail: Latitude of Sub-meter accuracy, in Decimal format, with a precision of 1.0E-8, Longitude of Sub-meter accuracy, in Decimal format, with a precision of 1.0E-8, CIS Meter Number, and AMR Device Number.

Case No. 2008-____
Exhibit ____B____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

CERTIFIED STATEMENTS

Affidavit

Franchises

Plan Review and Permit Status

Easements and Right-of-Way Status

Construction Dates and Proposed Date In Service

Plant Retirements

AFFIDAVIT
Automated Meter Reading Project

Affiant, Jack Bragg, Jr., being the first duly sworn, deposes and says that he is the Vice President of Finance of the Northern Kentucky Water District, which he is the Applicant in the proceeding styled above; that he has read the foregoing "Automated Meter Reading Project" Application and knows the contents thereof, and that the same is true of his own knowledge, except as to matters which are therein stated on information or belief, and that is to those matters he believes them to be true.

Jack Bragg, Jr.
Vice President - Finance
Northern Ky. Water District

Subscribed and sworn to before me in said County to be his act and deed by Jack Bragg, Jr., Vice President of Finance of the Northern Kentucky Water District, this 27th day of March 2008.

Frances Robinson
NOTARY PUBLIC
Kenton County, Kentucky
My commission expires 1-3-2010

Northern Kentucky
Water District

Franchises required – None

Plan Review and Permit Status - The District has reviewed and approved the specifications prepared by HDR Engineers titled "Automated Meter Reading System" dated July 2007.

Approval from the Division of Water is not required.

Easements and Right-of-Way Status - Easement and Right-of-Way statements are not required.

Start date of construction – assumed June 2008

Proposed date in service – assumed June 2009 completion

Plant retirements – None

2835 Crescent Springs Rd Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

Case No. 2008-____
Exhibit ____C____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading
Kenton and Campbell Counties
184-0311

BID INFORMATION AND BOARD RESOLUTION

Bid Tabulation

Engineer's Recommendation of Award

Board Resolution

Northern Kentucky
Water District

ITEMS CONCERNING BID INFORMATION AND BOARD RESOLUTION

- The bid opening was September 20, 2007 and the bid tabulation is attached.
- The Engineer's Recommendation of Award is attached.
- The Board Resolution from the March 24, 2008 meeting is attached.

2835 Crescent Springs Rd Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

Case No. 2008-____
Exhibit ____C____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

Bid Tabulation

BID TAB

Northern Kentucky Water District
Automatic Meter Reading
One Year Deployment / Mobil

March 24, 2008

CONTRACTOR	BID AMOUNT	
Itron	$6,760,700.81	Conditional ($7,367,806.70)
Badger / Orion	$7,351,656.79	
Sensus / C.I. Thornburg	$8,146,357.08	
Neptune / VSI	$8,421,850.00	Conditional
Data-Matic	No Bid	

Case No. 2008-____
Exhibit ____C____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

Engineer's Recommendation of Award

HDR | Quest

March 21, 2008

Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018

Re: **Automatic Meter Reading System Selection**

Dear Mr. Wetherell:

This correspondence has been prepared in accordance with the recent recommendation of the Badger Orion AMR System by the Northern Kentucky Water District AMR Selection Committee. The selection committee went through a rigorous evaluation process; including costs evaluations, interviews, demonstrations, site visits, and reference checks to determine their final recommendation.

I concur with the recommendation of the Badger Orion AMR System and feel that this selection will meet the goals and objectives of the Water District.

Sincerely,

Thomas Jakubowski

Thomas Jakubowski
HDR Senior Program Manager

HDR | Quest
HDR Engineering, Inc.

401 West Main Street
Suite 500
Louisville, KY 40202-2936

Phone: (502) 584-4118
Fax: (502) 589-3009
www.hdrinc.com

Case No. 2008-____
Exhibit ____C____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

Board Resolution

Northern Kentucky Water District
Board of Commissioners Meeting
March 24, 2008

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on March 24, 2008 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners were present. Also present were Ron Lovan, Bari Joslyn, Richard Harrison, Jack Bragg, Mark Lofland, Bill Wulfeck, Amy Kramer, Jim Dierig, Bob Buhrlage, Mary Carol Wagner, Amy Matracia, Chris Wetherell, Tim Koenig, Todd Schulkers, Donna Marlin, Randy Kellinghaus, Joe Boyle and Charles Pangburn.

Commissioner Macke called the meeting to order.

Commissioner Koester led those in attendance in the Pledge of Allegiance.

Chief Tim Koenig of the Erlanger Fire Department thanked the Board and the District for the District's contribution to the Erlanger Fire Department's high rating in its recent ISO inspection.

The Board recognized Randy Kellinghaus on the occasion of his completion of 35 years of dedicated and faithful service to the District.

The Board recognized and thanked Joe Boyle on the occasion of his retirement for over 27 years of dedicated and faithful service to the District.

The Board recognized Commissioner Koester for his leadership as Chairman of the Board over the past two years.

Donna Marlin, Manager of the Drinking Water Branch of the Kentucky Division of Water, delivered a presentation to the Board on drinking water regulations and changes.

The Board reviewed correspondence received and articles published since the last regular Board meeting on February 21, 2008.

On motion of Commissioner Koester, seconded by Commissioner Jackson, the Board unanimously approved the minutes for the regular Board meeting held on February 21, 2008.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously approved the expenditures of the District for the month of February, 2008.

On motion of Commissioner Sommerkamp, seconded by Commissioner Koester, and after discussion, the Board unanimously agreed to award the Hazelwood Drive Water Main Replacement Project to Jack Gemmer & Son, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Collins, seconded by Commissioner Jackson, and after discussion, the Board unanimously agreed to award the Waterworks Road 30-inch Water Main Replacement Project to Smith & Brown Contractors, Inc. and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Koester, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to retain Brandstetter Carroll, Inc. to design the 2008 Newport Main Replacement Project and authorized the District staff to execute appropriate engineering contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, and after discussion, the Board unanimously agreed to retain HDR/Quest to design the Portable Generator Project and authorized the District staff to execute appropriate engineering contract documents.

On motion of Commissioner Koester, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Dudley Pump Station Motor # 7 Replacement Project to Matlock Electric and authorized the District staff to execute appropriate contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Koester, and after discussion, the Board unanimously agreed to award the Automated Meter Reading System Project to Badger Meter, Inc. for the purchase of the Badger/Orion Mobile System with a 1-year deployment and authorized the District staff to execute appropriate contract documents.

Commissioner Collins departed the meeting.

On motion of Commissioner Koester, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the purchase of the specified meter items to the highlighted companies listed on the attached three-page Bid Tab and authorized the District staff to execute appropriate contract documents.

The Board reviewed the District's financial reports and Department reports.

Other matters of a general nature were discussed.

On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, the Board unanimously agreed to adjourn the meeting.

CHAIRMAN

SECRETARY

Case No. 2008-____
Exhibit ____D____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading

Kenton and Campbell Counties
184-0311

PROJECT FINANCE INFORMATION

Customers Added and Revenue Effect

Debt Issuance and Source of Debt

Additional Costs for Operating and Maintenance

USoA Plant Account

Depreciation Cost and Debt Service After Construction

Northern Kentucky
Water District

Project Information:

There will be zero new customers added and no revenue effect as a result of the Automated Meter Reading Project.

Project Description: The project includes a retrofit installation of approximately 81,000 transmitters and antenna in the meter setting to support an automated meter reading system. Along with the transmitters, the reading system consists of drive-by radio reading equipment and software.

Financial: The project will be financed by the District's Bond 2006, PSC Reference No. 104 "Radio Read Meters for Newport Area" with a budget of $800,000; plus BAN 2007, PSC Reference No. 106 "Radio Read Meters for Kenton & Campbell Areas 2006" with a budget of $800,000; and $5,900,000 from a Kentucky Infrastructure Authority loan. The cost includes installation and contingencies. A summary of the project costs is provided below:

o Vendor's Bid	$ 7,351,656.79
o Misc. & Contingencies	$ 148,343.21
Total Project Cost	$ 7,500,000.00

The total project cost of $7,500,000 will fall under Uniform System of Accounts Code 334 for "Meter and Meter Installation".

The District will not incur additional operating and maintenance costs for the Automated Meter Reading project. A reduction in costs is anticipated. Based on HDR's Meter Feasibility Study (Exhibit A, Appendix E) under the current quarterly meter reading and billing schedule a payback period of approximately 17 years would be anticipated. However, the District is positioning its meter reading infrastructure to migrate to a monthly meter reading and billing schedule that would accelerate the payback period to approximately 8 years.

Annual depreciation and debt service after installation are as follows:

Depreciation	$490,000/year over 15 years
Debt Service	$765,000/year ($667,000 for 10 years, $98,000 for 25 years)

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Case No. 2008-____
Exhibit ____E____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading
Kenton and Campbell Counties
184-0311

PSC ANNUAL REPORT – 2007

Pending – Will send as soon as complete in April

Case No. 2008-____
Exhibit ____F____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading
Kenton and Campbell Counties
184-0311

SCHEDULE OF MORTGAGES, BONDS, NOTES, AND OTHER INDEBTEDNESS

Northern Kentucky Water District

Bonds Payable and Current Portion

As of February 29, 2008

Account No.	Description	Bond Payable 12-31-2007	Current Portion Payment 2008	Bond Payable 12-31-2008
220-0007-000	Bonds Payable 1997	$4,650,000	$890,000	$3,760,000
220-0008-000	Bonds Payable 1998	$9,285,000	$280,000	$9,005,000
220-0009-000	Rural Development Loan Payable(2000)	$2,143,000	$28,000	$2,115,000
220-0010-000	2001 Bonds Payable	$14,920,000	$170,000	$14,750,000
220-0011-000	2002 A Bonds Payable	$43,680,000	$410,000	$43,270,000
220-0012-000	2002 B Payable-Refunding	$7,985,000	$625,000	$7,360,000
220-0013-000	2003 A Refunding Bonds Payable	$1,475,000	$35,000	$1,440,000
220-0014-000	Series 2003 B Bonds Payable	$26,860,000	$895,000	$25,965,000
220-0015-000	2003 C Refunding Bonds Payable	$18,805,000	$1,235,000	$17,570,000
220-0016-000	Series 2004 A Bonds Payable	$9,625,000	$290,000	$9,335,000
220-0017-000	Series 2006 Bonds Payable	$28,700,000	$720,000	$27,980,000
	Total Long Term Debt	$168,128,000	$5,578,000	$162,550,000
232-0100-000	Note Payable City of Taylor Mill	$1,875,000	$250,000	$1,625,000
	Bond Anticipation Notes	$27,165,000	$27,165,000	$0
	Deferred Note Payable	$100,000		$100,000
	Total BAN's and Notes	$29,140,000	$27,415,000	$1,725,000
	Grand Total	**$ 197,268,000**	**$ 32,993,000**	**$ 164,275,000**

Case No. 2008-____
Exhibit ____G____

NORTHERN KENTUCKY WATER DISTRICT

Project
Automated Meter Reading
Kenton and Campbell Counties
184-0311

CURRENT BALANCE SHEET AND INCOME STATEMENT

Northern Kentucky Water District
Balance Sheet
As of February 29, 2008

	2008	2007
ASSETS		
CURRENT ASSETS		
Cash and Cash Equivalents	$11,445,289	$6,053,874
Accured Interest Receivable		
Accounts Receivable		
Customers	2,985,062	2,940,083
Unbilled Customers	4,200,000	4,200,000
Other	38,892	21,839
Assessments Receivable	77,906	73,008
Inventory Supplies for New Installation and Maintenance, at Cost	1,282,919	1,186,985
Prepaid Items	270,666	503,247
TOTAL CURRENT ASSETS	20,300,734	14,979,036
RESTRICTED ASSETS		
Boone/Florence Settlement Account	2,812,525	3,061,386
Bond Proceeds Fund	17,065,574	12,021,547
Debt Service Reserve Account	13,158,404	12,909,842
Debt Service Account	1,256,349	1,487,639
Improvement, Repair & Replacement	3,461,739	1,462,047
TOTAL RESTRICTED ASSETS	37,754,591	30,942,461
NONCURRENT ASSETS		
Miscellaneous Deferred Charges	9,132,339	10,136,734
Capital assets:		
Land, System, Buildings and Equipment	283,207,363	278,048,862
Construction in Progress	32,638,288	13,411,121
Total capital assets before accumulated depreciation	315,845,651	291,459,983
Less Accumulated Depreciation	(64,439,698)	(59,218,992)
Total capital assets before accumulated depreciation	251,405,953	232,240,991
TOTAL NONCURRENT ASSETS	260,538,292	242,377,725
TOTAL ASSETS	318,593,617	288,299,222

Prepared by WS

Northern Kentucky Water District
Balance Sheet
As of February 29, 2008

	2008	2007
LIABILITIES AND RETAINED EARNINGS		
CURRENT LIABILITIES		
Current Portion of Long Term Debt	$6,023,000	$277,000
Accounts Payable	1,276,966	1,509,565
Accured Payroll & Liabilities	171,316	215,457
Other Accrued Liabilities	74,928	79,128
TOTAL CURRENT LIABILITIES	7,546,210	2,081,150
CURRENT LIABILITIES PAYABLE FROM RESTRICTED ASSETS		
Accounts Payable	1,586,628	858,107
Accured Interest Payable	1,028,103	592,695
TOTAL CURRENT LIABILITIES PAYABLE FROM RESTRICTED ASSETS	2,614,731	1,450,802
LONG-TERM DEBT		
Long-Term Portion of Bonded Indebtedness	156,805,000	168,128,000
Bond Anticipation Notes Payable	27,165,000	
Note Payable - Taylor Mill	1,625,000	1,875,000
Deferred Note Payable	100,000	100,000
TOTAL LONG-TERM DEBT	185,695,000	170,103,000
TOTAL LIABILITIES	195,855,941	173,634,952
Unrestricted Retained Earnings	94,021,049	85,813,277
TOTAL NET ASSETS	122,872,041	114,664,269
TOTAL LIABILITIES AND NET ASSETS	318,727,982	288,299,221

Prepared by WS

03/27/08
09:28 AM

Northern Kentucky Water District
Income Statement Actual to Actual
For the Two Months Ending February 29, 2008

Description	February Actual 07	February 2006	Variance	February YTD 07	February YTD 2006	Variance
Income						
Water Sales	$2,192,121	$2,163,755	(1%)	$4,736,892	$4,557,171	(4%)
Forfited Discounts	34,131	51,481	34%	166,578	138,236	(17%)
Rents from Water Property	31,268	55,633	44%	66,762	104,102	56%
Other Water Revenues	21,835	10,095	(116%)	49,285	43,165	(12%)
Total Operating Revenues	$2,279,355	$2,280,964	0%	$5,019,517	$4,842,674	(4%)
Operating Expenses						
O & M Expenses						
Salaries & Wages	$697,075	$650,697	(7%)	$1,427,336	$1,368,376	(4%)
Employee Pension & Benefits	309,493	263,205	(18%)	562,877	505,445	(10%)
Taxes Other than Income Taxes	49,627	54,717	9%	101,593	105,605	4%
Purchased Power	213,350	195,623	(9%)	453,422	364,738	(20%)
Chemicals	130,816	86,184	(52%)	249,318	178,317	(28%)
Materials & Supplies	88,383	114,699	23%	242,162	226,613	(6%)
Contractual Services	188,027	203,261	7%	338,139	371,672	10%
Transportation	43,393	46,011	6%	92,300	74,240	(20%)
Insurance	53,680	54,105	1%	107,361	111,432	4%
Advertising	3,100	1,153	(169%)	3,149	2,013	(36%)
Bad Debt Expense	52,542	29,106	(81%)	89,468	94,422	6%
Miscellaneous	7,759	4,291	(81%)	10,649	4,723	(56%)
Regulatory Commission Assessment	15,069	9,944	(52%)	30,138	19,888	(34%)
Total O & M Expenses	$1,852,314	$1,712,996	(8%)	$3,707,912	$3,427,484	(8%)
Depreciation	$679,092	$470,000	(44%)	$1,358,184	$940,000	(31%)
Total Operating Expenses	$2,531,406	$2,182,996	(16%)	$5,066,096	$4,367,484	(14%)
Net Operating Income (Loss)	($252,051)	$97,968	357%	($46,579)	$475,190	(1,120%)
Non-Operating Income (Expense)						

Prepared by W Syed

Northern Kentucky Water District
Income Statement Actual to Actual
For the Two Months Ending February 29, 2008

Description	February Actual 07	February 2006	Variance	February YTD 07	February YTD 2006	Variance
Interest Income	$159,846	$179,628	11%	$361,708	$370,595	2%
Miscellaneous	6,208	8,559	27%	15,688	541,285	3,350%
Loss on Disposal of Fixed Assets	0	(228)	100%	0	(228)	0%
Interest on Long Term Debt	(336,098)	(270,109)	(24%)	(1,013,655)	(873,879)	(14%)
Amortization	(64,029)	(66,125)	3%	(128,059)	(132,249)	3%
Net Non-Operating Income (Expense)	($234,073)	($148,275)	(58%)	($764,318)	($94,476)	(88%)
Net Income before Contributions	($486,124)	($50,307)	(866%)	($810,897)	$380,714	(147%)
Capital Contributions	$86,039	$48,823	(76%)	$63,779	$99,848	57%
Net Income (Loss)	($400,085)	($1,484)	(26,860%)	($747,118)	$480,562	(164%)