SPECIAL MEETING

BASEHOR CITY COUNCIL
January 29, 1996
7:00 PM
Basehor City Hall

PRESENT: MAYOR BETTIN, COUNCILMEN JOSEPH ODLE, JERRY BARLOW, JOHN PFANNENSTIEL ROBERT VERVAECKE. (Charles Wilderson-absent)

Others: Mary Mogle, City Clerk
John Matthews, Plan. Comm.
Burl Gratny, Plan Comm.
Joe Scherer, Plan. Comm.
Victor Ziegler, Plan. Comm.
Jim Hewitt, Leavenworth County Planning & Zoning
Cecil Kingsley and Pat Cox, BG Consultants
Joe Daniels, Leavenworth County Health Dept.
Tammy Veltman, Basehor Sentinel Newspaper

Mayor Bettin announced the purpose of the work session is to discuss pending sewer issues. The City has a February 1, 1996 deadline to file a commitment with Kansas Department of Health & Environment as to which plan the City will adopt for a future wastewater treatment. Bettin requested Council approve him to contact KDHE for an additional three month extension to look into the Bonner Springs option. Council unanimously approved. Mayor Bettin will contact the city attorney to draw up the necessary paper work and forward to Joe Mester, KDHE.

City engineer, Cecil Kingsley, asked Council to make sure when they receive the final report from Bonner Springs that it meets the present work criteria of Plan A and B presented by BG Consultants. An estimate of $1,550,990.00 was given by Kingsley to bring the sewer from the present lagoon facility to a location east of Basehor to connect Bonner Springs.

Kingsley asked Council to question Bonner Springs as to (l) Schedule of completion date of project (2) what if Basehor needs to grow before Bonner Springs, what would the costs be, terms of a twenty year interlocal agreement, maintenance costs, (3) what will Basehor be responsible for , and (4) what will Bonner Springs charge to meet point "A" and deliver our sewage to their treatment plant. He also urged the board to be comfortable with who will regulate Basehor's growth if they use this alternative route. Odle also questioned if Bonner reaches capacity, will Basehor bare the upgrade costs or will Bonner, Leavenworth County and Basehor share the costs. That will be determined in an interlocal agreement.

Jim Hewitt, Leavenworth County Planning & Zoning, reported Kansas City Kansas has approached them in sending the county sewage to their plant in Edwardsville, Kansas. The costs will be the same as the current users and will guarantee service as long as the system is in operation. There will not be a surcharge unless all users are assessed. An estimation of 1.3 million dollars was reported by Hewitt to bring connect the County's line to Kansas City, Kansas. Bob Rowdy, Kansas City Dept. of Public Works, will approach his city council to loan the city and county money to build the line if necessary. A decision will be made between the two entities within two-three weeks. Mayor Bettin reported that Basehor cannot make any decisions at this time without seeing final cost figures.

Mayor Bettin noted he felt Bonner Springs was receptive about receiving sewage from Wolf Creek area but not the entire Basehor area.

Council briefly discussed ways to finance the project. Kingsley reported options are to issue conventional bonds at 6-7% interest, state revolving loans with a interest rate of 3.5% or increase user fees to include a debt retirement fee. The cost of land and bonds will have to be separated for financing purposes. Currently an average monthly sewer bill is $10.79 per household. Kingsley estimated the bills will probably triple when the project is completed.

Other topics discussed were the creation of benefit districts out side the city limits, repairs to current sewer system and sewer mains (cost of $213,500), bond issues, revenue bonds verses general obligation bonds and design requirements.

Mayor Bettin reiterated he will have the city engineer send a letter to Joe Mester, Kansas Department of Health and Environment for a three month extention and urged Council to compile a list of questions they want answered by Bonner Springs and Kansas City, Kansas.

The city clerk was directed by Mayor Bettin to add to the February agenda repairing of sewer mains and private services lines.

The meeting was adjourned at 8:50 PM.

Submitted for Council approval ~~with~~/without corrections this 19th day of February, 1996.

Bryce D. Bettin, Mayor

Mary A. Mogle, City Clerk

CITIZENS PRESENT AT JANUARY ~~28~~ 29, 1996
SPECIAL SEWER MEETING

Robert Bryan, Planning Commission
John Matthews, Planning Commission
Victor Ziegler, Planning Commission
Gayle Runnels, Planning Commission
Joe Scherer, Planning Commission
Bill Kiesling, Plannng Consultant
Bill Mogle, Wastewater Operator
Mary Mogle, City Clerk
Raphael Breuer
John Eberth
Jim Hewitt, County Planning & Zoning
Pat McCool, Kansas Dept. of Health & Environment
Tammy Veltman, Basehor Sentinel Newspaper
Cecil Kingsley, BG Consultants
Pat Cox, BG Consultants
Ray Harvey
George Sprague, Leavenworth County Commissioner
David Breuer, KC Construction
Ryan Chambers, Basehor-Linwood School Newspaper
Leslie Kennard, Basehor-Linwood School Newspaper

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CHAPTER 5

WASTE TREATMENT

5.1 GENERAL

The City of Basehor, Kansas currently treats its wastewater by means of two separate 3-cell discharging lagoon systems. The facilities were originally constructed in 1969-70 as 2-cell discharging lagoons and later modified in 1982 to include a third cell and primary surface aeration. The North facility is located in the northwestern part of the City just West of the intersection of Poplar Street & 157th Terrace. The North treatment facility was originally designed to treat approximately 35% of the total city wastewater flows including the Basehor grade school and the northern 1/3 of the city. The South facility is located in the western part of the City just south of Wilow Drive & 156th Terrace. The South treatment facility was originally designed to treat approximately 65% of the total city wastewater flows including the Basehor high school and the southern 2/3's of the city. Both facilities, via tributary, discharge into Hog Creek a tributary to Stranger Creek and the Stranger Creek drainage basin. The topography of the area actually splits the city into two separate drainage basins with most of the existing city in the Stranger Creek drainage basin to the west and part of the undeveloped area of the city to the southeast in the Wolf Creek drainage basin. See Section 5.9 for more details.

5.2 CURRENT FACILITY CHARACTERISTICS AND OPERATION

As indicated previously, both the North and South facilities currently have 3 cells each with the primary cell in each facility surface aerated (5 hp. Air-o-lator aerators). Both facilities are currently operated in series with wastewater entering cell No. 1,where primary surface aeration occurs, then passing through each facility and discharging from cell No. 3 to the discharge tributary. This type of treatment is known as a discharging facultative aerated lagoon system. The following conditions currently exist in each facility:

NORTH FACILITY

Surface Area--------Cell No. 1-----4' water level-----1.13 acres (aerated)**

Cell No. 2-----4' water level-----1.04 acres

(Storage) Cell No. 3-----10' water level----0.23 acres

Total Surface Area----------**2.40 acres**

Cell Volume---------Cell No. 1-----176,436 c.f.-----1,319,741 gallons (aerated)**

Cell No. 2-----161,696 c.f.-----1,209,486 gallons

(Storage) Cell No. 3------43,800 c.f.--------327,624 gallons

Total Volume----------**381,932 c.f.-----2,856,851 gallons**

** Cell No. 1 currently contains 3- 5 hp. surface aerators totaling 15 hp.

SOUTH FACILITY

Surface Area--------Cell No. 1-----4' water level-----2.00 acres (aerated)**

Cell No. 2-----4' water level-----2.00 acres

(Storage) Cell No. 3-----10' water level----0.40 acres

Total Surface Area----------**4.40 acres**

Cell Volume---------Cell No. 1-----319,704 c.f.-----2,391,386 gallons (aerated)**

Cell No. 2-----319,704 c.f.-----2,391,386 gallons

(Storage) Cell No. 3-------92,450 c.f.-------691,526 gallons

Total Volume----------**731,858 c.f.-----5,474,298 gallons**

** Cell No. 1 currently contains 5- 5 hp. surface aerators totaling 25 hp.

5.3 PROPOSED EFFLUENT QUALITY STANDARDS

Currently the city of Basehor is operating both wastewater treatment facilities under the following State and Federal discharge permits:

NORTH FACILITY

Kansas Water Pollution Control Permit No. M-KS04-0001

Federal NPDES Permit No. KS-0044946

SOUTH FACILITY

Kansas Water Pollution Control Permit No. M-KS04-0002

Federal NPDES Permit No. KS-0044938

The current permits are scheduled for renewal in December, 1997. The following effluent quality compliance parameters are currently associated with the above referenced permits.

NORTH FACILITY

BOD5-Biochemical Oxygen Demand (5-day)	Sept.-June	July-Aug.
Weekly Average- mg/l	45	30
Monthly Average- mg/l	30	20

SOUTH FACILITY

BOD5-Biochemical Oxygen Demand (5-day)	Sept.-June	July-Aug.
Weekly Average- mg/l	45	40
Monthly Average- mg/l	30	25

BOTH FACILITIES

PH.....6 to 9

TSS-Total Suspended Solids- mg/l.....80 (all year)

Fecal Coliform- colonies per 100ml.....2000

Ammonia- mg/l.....varies from 3.0 in July to 4.0 in Dec., Jan., Feb.

NEW OR RENOVATED FACILITIES

The following additional permit requirements may be imposed to provide compliance with more stringent KDHE Surface Water Quality Standards in the future. These requirements could possibly change dependent upon the type of wastewater treatment utilized, and the location of the proposed facilities in reference to the discharge tributary.

CBOD5-Carbonaceous Biochemical Oxygen Demand (day)- mg/l.....15

TSS-Total Suspended Solids- mg/l.....30

Ammonia- mg/l.....1.5

Denitrification.....Recommended

DO-Dissolved Oxygen- mg/l.....6-7

Fecal Coliform- colonies per 100 ml.....200 *

* Would probably require Disinfection of the facility effluent to meet permit requirements.

5.4 CURRENT RAW WASTEWATER DATA & EFFLUENT QUALITY

The following historic data was compiled from information given by Mr. Terry Kostner, Q.W.A.L. Testing Lab, Pittsburg, Ks., 316-232-1970. This testing laboratory currently provides analytical results of samples taken by the city of Basehor and tested to provide compliance assurance with KDHE discharge permit requirements, mentioned in section 5.3.

Biochemical Oxygen Demand & Total Suspended Solids

NORTH FACILITY

DATE	INFLUENT QUALITY		EFFLUENT QUALITY	
	BOD5	TSS	BOD5	TSS
1-11-95	121	180	29.5	16
2-08-95	217	88	33 **	84 **
3-08-95	143	60	36 **	42
4-12-95	147	104	32 **	22
5-10-95	100	49	29.9	66
6-14-95	142	74	26.9	20
7-11-95	196	92	27 **(20)	7
8-15-95	67	12	27 **(20)	28
9-13-95	130	64	13.1	32

DATE	INFLUENT QUALITY		EFFLUENT QUALITY	
	BOD5	TSS	BOD5	TSS
10-10-95	212	100	13.6	6
11-09-95	206	112	26.9	22
11 month Average	**153**	**85**	**26.8**	**31.4**

All numbers represented in milligrams per liter or parts per million.

(20)- indicates monthly compliance limit.

**** out of compliance**

Biochemical Oxygen Demand & Total Suspended Solids

SOUTH FACILITY

DATE	INFLUENT QUALITY		EFFLUENT QUALITY	
	BOD	TSS	BOD	TSS
1-11-95	183	168	19.8	28
2-08-95	264	60	28	40
3-08-95	195	112	37 **	48
4-12-95	171	98	27	36
5-10-95	117	86	30 **	37
6-14-95	131	62	13	10
7-11-95	180	72	17.8 (20)	29
8-15-95	147	84	13.5 (20)	32
9-13-95	201	156	16.4	32
10-10-95	232	68	31.9 **	26
11-09-95	216	180	34 **	48
11 month Average	**185**	**104**	**24.4**	**33**

All numbers represented in milligrams per liter or parts per million.

(20)- indicates monthly compliance limit.

**** out of compliance**

Fecal Coliform & Ammonia

NORTH FACILITY

DATE	EFFLUENT FECAL COLIFORM	EFFLUENT AMMONIA
1-11-95	2,440 **	20.9 **
2-08-95	260	18.8 **
3-08-95	1,200	15.3 **
4-12-95	3,560 **	10.0 **
5-10-95	2,000 **	2.8
6-14-95	>10,000 **	6.9 **
7-11-95	>4,000 **	15.6 **
8-15-95	>4,000 **	10.8 **
9-13-95	1,300	7.7 **
10-10-95	780	11.3 **
11-09-95	1,900	16.5 **
11 Month Average	**1,680**	**12.4 ** **

Fecal Coliform represented in colonies per 100 ml.

Ammonia represented in milligrams per liter or parts per million.

**** out of compliance**

Fecal Coliform & Ammonia

SOUTH FACILITY

DATE	EFFLUENT FECAL COLIFORM	EFFLUENT AMMONIA
1-11-95	450	12.4 **
2-08-95	2,640 **	13.8 **

DATE	EFFLUENT FECAL COLIFORM	EFFLUENT AMMONIA
3-08-95	240	13.2 **
4-12-95	610	9.95 **
5-10-95	3,000 **	8.9 **
6-14-95	>10,000 **	3.4
7-11-95	5,200 **	1.8
8-15-95	>4,000 **	2.0
9-13-95	100	3.8 **
10-10-95	120	1.87
11-09-95	60,000 **	4.5 **
11 Month Average	**8,040 ** **	**6.87 ** **

Fecal Coliform represented in colonies per 100 ml.

Ammonia represented in milligrams per liter or parts per million.

** **out of compliance**

The previous historic data indicates numerous monthly permit violations and periods of extended non-compliance for both facilities. The facilities as they exist currently do not operate within the parameters of their existing permits in the following areas:

NORTH FACILITY

1. Winter BOD5 removal.
2. Extreme hot weather BOD5 removal.
3. Total Suspended Solids removal early spring.
4. Fecal Coliform counts during hot weather.
5. Ammonia reduction year round.

SOUTH FACILITY

1. Winter BOD5 removal.
2. Fecal Coliform counts during hot weather.
3. Ammonia reduction year round.

Section 5.7 will discuss the evaluation of these deficiencies as related to each treatment facility.

5.5 PROJECTED WASTEWATER FLOWS

Since no records have been kept pertaining to actual wastewater flows collected and treated by each of Basehor's treatment facilities, an estimate of wastewater flow, based on per capita contribution, percentage split to each facility, and assumed infiltration or inflow of extraneous water shall be utilized. This estimate will consist of using 100 gallons per day (GPD) for each population equivalent (P.E.). Currently Basehor's winter time water use is approximately 72 gallons per capita per day. Use of the 100 gpcd number is conservative, and will allow for current unknown extraneous water entering the system. Each resident of Basehor shall be considered as a population equivalent of 1, while each student attending school in Basehor shall count as 1/4 P.E. Using population estimations given in Chapter 1, projected wastewater flows are given in Table 4.

5.6 INFLOW AND INFILTRATION

Any sewage treatment system modification or alternative proposed in this report shall be based in part on projected amounts of inflow and infiltration (I/I) into the collection system. Minimal amounts of I/I into the collection system are normal and allowed for by the KDHE Minimum Design Standards. As referenced in an earlier chapter, the collection system in Basehor consists of approximately 59,799 L.F. of 8" gravity sewer and 224 manholes of various types. Based on these numbers it is estimated that the allowable amount of I/I into the Basehor's collection system to be used for design purposes in 1995 shall be 24,694 gpd. Although many existing sections of gravity sewer are available for the construction of new housing, some expansion of the existing collection system should be anticipated within the next 20 years. Therefore, the allowable

amount of I/I for the year 2015 should be increased by approximately 10% to 27,163 gpd. It should be noted that this allowable amount of I/I used in the design of collection systems and treatment facilities mentioned above, is not the same as the actual amount of I/I or extraneous water currently entering the Basehor collection system, due to current system deficiencies. The actual amount of I/I or extraneous water entering the collection system is unknown at this time.

TABLE 4 - Projected Wastewater Flows for the City of Basehor*

Item	Current Estimate	2015 Estimate
Population	2,043	4,476
School District Population Equivalent (1/4 Person per P.E.)	429	939
P.E.	2,472	5,415
Wastewater Flow Per P.E.	100 gpd	100 gpd
Allowable Inflow/Infiltration	24,694 gpd	27,163 gpd
Estimated Total Daily Flow	271,894 gpd	568,663 gpd

* Based upon Allowable Inflow/Infiltration

For evaluation of the existing treatment facilities, based upon previously generated analytical data, we will assume that 35% of the estimated total current wastewater flows enter the North treatment facility or 95,163 gpd and 65% of the total estimated current wastewater flows enter the South treatment or 176,731 gpd. For alternatives associated with a single treatment facility location a design loading of 568,663 gpd (2015 design year) shall be used.

5.7 WASTEWATER TREATMENT FACILITY EVALUATION

Currently the operation of both wastewater treatment facilities in the city of Basehor has been difficult related to continuous monthly compliance of the current effluent discharge permit parameters mentioned in section 5.3. The following narrative shall deal with specific deficiencies as determined by the evaluator.

RAW WASTEWATER STRENGTH

Based upon the historic data as indicated in section 5.4, raw wastewater concentrations within the city seem to be higher than normal for domestic waste. PH fluctuations shown at the effluent to both facilities seem larger than normal. Raw wastewater BOD5 typically has concentrations within the 150-240 mg/l range. The city should investigate the potential for dumping of high strength chemicals into the system that affect the facilities operation,(solvents, oil, cleaning solutions, etc.). Public education within local businesses and schools will help.

PRIMARY SURFACE AERATION EQUIPMENT RELIABILITY

Based upon previous information provided by the KDHE district office in Lawrence, Ks., equipment failure and electrical power outage has been a problem in the past. The city should have on hand both a repair parts inventory and the ability to repair the broken equipment by city personnel within a reasonable time frame. The electrical power outage problem should be handled by either owning or having access to portable standby generators of the size necessary to operate the facilities for short periods of time. With the aerators either broken or out of service the efficiency of the facility is drastically reduced causing severe odor problems almost immediately. The electrical supplier should be made aware that the operation of the aerators at the wastewater treatment facilities is high priority as is hospitals and emergency services.

SLUDGE ACCUMULATION IN TREATMENT FACILITIES

Experience with similar facilities and operator data indicate that some sludge accumulation has occurred within the existing treatment cells over the last 25 years. Allowing sludge to accumulate on the cell bottom reduces the amount of volume available for wastewater storage thereby reducing the detention time within the overall treatment facility. This condition affects the ability of the facility to operate efficiently. The following data indicates the estimated amount of sludge accumulation at each facility:

NORTH FACILITY

Cell No. 1 (12").....40,320 c.f.....301,594 gallons

Cell No. 2 (6").....18,403 c.f.....137,654 gallons

Estimated Sludge Accumulation.....58,723 c.f.....439,248 gallons

SOUTH FACILITY

Cell No. 1 (12").....74,814 c.f.....559,609 gallons

Cell No. 2 (6").....37,407 c.f.....279,804 gallons

Estimated Sludge Accumulation...112,221 c.f.....839,413 gallons

Sludge removal in the existing facilities would have some affect on the detention time within each facility, but does not increase the numbers enough to be very cost effective. In place sludge removal is very expensive approximately $20,000.00 per surface acre. Sludge removal costs for both facilities would be estimated as follows:

NORTH FACILITY.....(2.17 ACRES).....$ 43,400.00

SOUTH FACILITY.....(4.0 ACRES).....$ 80,000.00

Estimated Cost of Removal.....$ 123,400.00

WASTEWATER FLOW DETENTION

The ability of an aerated discharging facultative lagoon system to work properly and maintain continuous effluent quality within the discharge permit parameters is largely dependent upon the wastewater flow detention time within the facility. The detention time is dependent upon the average daily flows coming in to the system and the available volume of the entire facility. Based upon the current estimated average daily flows as indicated in section 5.6 and the facility volumes as discussed in section 5.2 the following conditions currently exist:

NORTH FACILITY

Detention (original construction).....30.02 days

Detention (with sludge accumulation).....25.4 days

SOUTH FACILITY

Detention (original construction).....30.98 days

Detention (with sludge accumulation).....26.2 days

According to KDHE regulations and minimum standards of design discharging lagoons require 120 days of detention. When discharging lagoons are retrofitted with mechanical aeration, such as the city of Basehor's, no detention requirements are set. The regulation for permit compliance is met by requiring the aerated discharging lagoon system to monitor and meet effluent parameters related to Fecal Coliform counts and Ammonia concentrations. Aeration of lagoon systems is done by either natural wind and wave action or mechanical aeration or a combination of both. Mechanical aeration addition is normally done when physical constraints will not allow the expansion of an existing facility. Oxygen transfer in a normal discharging lagoon requires a certain amount of surface area based upon the original design parameters.

All of the effluent parameters are affected by certain items of treatment. BOD5 reduction is affected by both increased natural and/or mechanical aeration as well as increased system detention. Unfortunately Fecal Coliform counts and Ammonia concentrations are influenced the least by aeration but respond best to reductions by substantially increasing detention times within the total facilities.

Since the 1982 retrofit of the Basehor wastewater treatment facilities to include a third cell (10' deep) and primary mechanical surface aeration at each location, increased population has caused increased loading on each facility which in turn has reduced the detention time. To make matters worse and compliance harder, KDHE regulations and permit compliance parameters have gotten more strict. The bottom line for both facilities as they exist today is to either increase size for additional detention or look to alternative treatment. It is the option of the evaluator that anything less than expansion to meet the

120 day detention requirements is not and will not be consistent with current and future Regulatory compliance.

The following data shows the requirements for 120 day detention at each facility both currently and in the year 2015. This expansion data is based upon constructing the appropriate additional surface area to meet KDHE regulations for primary treatment cells (5' deep) and secondary detention cells for total detention (10' deep). The primary treatment cells must be of sufficient size to handle a BOD5 surface loading of 34 pounds BOD5 per surface acre. With a total detention of 120 days there will be no requirement for the primary treatment cells to have mechanical surface aeration.

NORTH FACILITY

Current additional Surface Area Required.....3.27 acres

Additional Surface Area Required for 2015.....9.50 acres

SOUTH FACILITY

Current additional Surface Area Required.....5.05 acres

Additional Surface Area Required for 2015.....17.60 acres

The following costs are general estimates of an opinion of probable project cost based upon similar sized and types of improvements. Estimates are based upon a unit cost of $ 86,675.00 per surface acre expansion for conventional lagoons without surface aeration. The unit estimate includes construction cost and other related project costs, such as engineering design, construction observation, legal, state revolving loan administration, etc., but does not include any cost of land purchase, easement acquisition, or conventional bond costs.

NORTH FACILITY

Cost of expansion to meet current 120 day detention.....$ 283,427*

Cost of expansion to meet 20 year growth (2015).....$ 823,413*

SOUTH FACILITY

Cost of expansion to meet current 120 day detention.....$ 437,709*

Cost of expansion to meet 20 year growth (2015).....$1,525,480*

ESTIMATED COST OF EXISTING FACILITY IMPROVEMENTS

Cost of expansion to meet current deficiencies.....$ 721,136*

Cost of expansion to meet 20 year growth (2015).....$ 2,348,893*

* COSTS DO NOT INCLUDE LAND PURCHASE, EASEMENT ACQUITION, OR CONVENTIONAL BOND COSTS.

Expansion of the existing facilities to just meet current deficiencies is not good planning and does not meet KDHE minimum requirements and needs for future development. Therefore we will not consider this option any further in this report.

Expansion of the existing facilities to meet a 20 year design life is also probably not feasible either. The current facilities are close to existing inhabitants and due to the existing topography don't have the available additional land necessary for expansion. Therefore we will not consider this option any further in this report.

5.8 ALTERNATIVES TO EXPANSION OF EXISTING FACILITIES

Several alternatives exist for achieving regulatory compliance related to wastewater treatment for the city of Basehor, Ks. other than expansion of the existing facilities in their current locations. Both existing facilities are within the Stranger Creek drainage basin, and via Hog Creek discharge southwest to a common point down stream approximately 6000 feet +- as indicated on the map M-1 in the appendix. Utilization of this general area for construction of a combined new wastewater treatment facility is very possible. The alternative to locating the treatment facilities in the Stranger Creek drainage basin is to locate the facilities in the Wolf Creek drainage basin southeast of Basehor, Kansas. Section 5.9 of this report will deal with the feasibility and present worth comparison of these alternative locations.

Discharging Lagoon Facility:

A centralized discharging lagoon facility will require extremely large amounts of relatively flat land with no subsurface rock or water conditions for construction (Approximately 33.9 surface acres built on 42 total acres of land). The facility must also be constructed above the 100 year flood elevation of any major stream or creek and at least 500 feet from any existing currently inhabited dwelling. With these requirements and the existing topography of the majority of the area it is not very likely that a viable site can be

found. The site must also be reasonably close to a discharge tributary. For the above mentioned reasons the centralized discharging lagoon alternate will not be completely ruled out, but is probably not feasible in this area. Assuming a site could be found in the general area the following estimates of probable costs would apply for a good site with no terrain or subsurface problems:

Conventional Discharging Lagoon System	$ 2,938,283.00
Gravity sewers from existing facilities	$ 368,000.00
Pump Station	$ 175,000.00
Force Main to Facility Location	$ 60,000.00 *
Additional Land Costs (42 acres)	$ 210,000.00
Contingency (30%)	$ 243,900.00 **
Estimated Total Project Probable Cost	$ 3,995,183.00

(Stranger Creek General Location)

* Assumes that a feasible site can be found within 3,000 feet of the proposed lift station location.

** Contingency added for all items but the conventional discharging lagoon system which has the appropriate contingency already added.

Mechanical Treatment Facility:

A centralized mechanical treatment facility is very feasible and can be constructed on approximately 7 acres of land. This type of facility must also be located reasonably close to a discharge tributary and above any 100 year flood elevation. The setback requirements for a mechanical treatment facility are more stringent than lagoons, requiring 1,000 feet from currently inhabited dwellings. The smaller amount of land required makes the siting of this type of treatment facility much easier. The approximate estimate of probable cost shall be as follows:

Gravity Sewers from existing facilities	$ 368,000.00
Pump Station	$ 175,000.00
Force Main to new facility location	$ 60,000.00 *
Land Cost (7 acres)	$ 35,000.00

Mechanical Plant (0.569 MGD).....$ 1,628,962.00

Contingency (30%).....$ 680,089.00

Estimated Total Probable Project Cost.....$ 2,947,051.00

(Stranger Creek General Location)

* Assumes that a feasible site can be found within 3,000 feet of the proposed lift station location.

Alternative Treatment Option:

Although outside the scope of this report, the City of Basehor, Kansas might consider the option of getting out of the sewage treatment business all together. This could be accomplished by eliminating the two existing treatment facilities and pumping long-distance to a facility that can process and treatment the waste.

5.9 PRESENT WORTH ANALYSIS OF ALTERNATIVES

The following two possible alternatives to sewage treatment for the city of Basehor, Kansas shall be evaluated based upon the following assumptions:

Alternate No. 1. - Construct single new Treatment Facility in Stranger Creek Basin.

Alternate No. 2. - Construct single new Treatment Facility in Wolf Creek Basin.

Due to the larger initial cost of construction and the uncertainty of a viable site location, the discharging lagoon option in either basin will not be compared to the mechanical alternates.

Only the mechanical treatment alternate located in either the Stranger Creek drainage basin or the Wolf Creek drainage basin will be compared.

For the purpose of uniform comparison we will assume a sewer service area for Basehor, Kansas including a total area of approximately 4,581 acres. The acreage is broken out as follows: (See attached map)

Stranger Creek Basin:

SUB-BASIN: (In Service Area for comparison)

1s----------2,299 acres (West of Basehor, Ks.) = 50.19% of Service area

Total Area **2,299 acres in Stranger Creek Service Area**

SUB-BASIN: (Future Development Area Outside Service Area)

2s----------2,114 acres (Hog ck. south 24-40) = Future Development **

3s----------3,259 acres (Hog ck. north 24-40) = Future Development **

Total Area 5,373 acres

Wolf Creek Basin:

SUB-BASIN: (In Service Area for comparison)

1w----------585 acres (Part Existing City & Future Development)

2w----------90 acres (Future Development Area East of City)

3w----------209 acres (Future Development Area East of City)

4w----------396 acres (Part Existing City Limits & Undeveloped)

5w----------345 acres (Part Existing City Limits- Undeveloped) *

6w----------375 acres (Part Existing City Limits & Undeveloped)

7w----------219 acres (South 24-40) = Future Development Area

8w----------63 acres (South 24-40) = Future Development Area *

Total Area 2,282 acres (East of Basehor, Ks.) = 49.81% of Service Area

Total Area **2,282 acres in Wolf Creek Service Area**

* Areas 5w and 8w are located on the east bank of Wolf Creek. Both areas will require one if not several lift stations to transport sewage across Wolf Creek either to a large lift station serving areas 6w and 7w (Alternate No. 1) or directly to a possible treatment facility assumed to be south of 24-40 and East of Wolf Creek (Alternative No. 2).

** Areas 2s and 3s can expand the possible service area boundary for Basehor, Ks., especially if a treatment facility is built in the Stranger Creek Basin. (Alternative No. 1). The treatment facility would need to be constructed in the lower (westerly) area of Hog Creek prior to discharge into Stranger Creek. These two areas will not be considered in this present worth analysis.

The actual service area of Basehor, Kansas as it exists today includes the following approximate acreage's:

Total sewered service area - 777 acres (population equivalent 2,471.5)

700 acres in Stranger Creek Basin

77 acres in Wolf Creek Basin

Total unsewered service area - 848 acres (undeveloped area in city limits)

848 acres in Wolf Creek Basin

For the purpose of equivalent comparisons in this Present Worth Analysis we will assume that the 4,581 acre service area as previously defined will have a future population of 5,415 p.e. The sub-basins within the future expansion areas of the service area shall be analyzed for future population & sewer flow by determining a per acre future population equivalent. We will assume uniform density over the future undeveloped areas. This p.e./ acre shall be the future population equivalent minus the current population divided by the service area minus the current sewer service area:

5,415 - 2,471.5 / 4,581 - 777 = 0.7738 p.e./acre (undeveloped areas)

This assumption is for present worth comparison only. Actual future development will not occur uniformly over the projected future service area. This evaluation will not attempt to second guess the location and density of future development.

ALTERNATE NO. 1 SUMMARY:(Stranger Creek Treatment Facility)

Alternate No. 1, to be compared equivalently to the other alternate must include pumping costs associated with service to all the sub-basins in the Wolf Creek service area. Additional Land for the new treatment facility will cost approximately $ 5,000.00 per acre for 7 acres. Construction of the new treatment facility would be in the general location of lift station A. Outfall gravity sewers would have to be built down stream from each existing treatment facility to a common point at lift station A.

Estimated Cost of new facility-------$ 1,628,962.00

Gravity sewers from exist. facilities-$ 368,000.00

Pump Station----------$ 175,000.00

Force Main to new facility location--$ 60,000.00

Land Cost (7 acres)----------$ 35,000.00

Contingency (30%)----------$ 680,089.00

Estimated Total Cost **$ 2,947,051.00 (For 20 yr. PW)**

Future pumping costs associated with Alternate No. 1 shall be as follows:

Lift Station A: ground elev.----------870 msl (Total service area)

Treatment facility elev.----------910 msl

Force main length----------1,500 lin. ft. (8" pvc)

Land area (total service area)---------4,581 acres

Future population equivalent----------5,415 p.e.

Future Flow----------568,663 gpd = 395 gpm

Electrical cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------74

Pumping Cost----------$ 787.57 per month = $ 9,450.84 per year

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Lift Station B: ground elev.----------830 msl (Wolf Creek undeveloped area)

Crest of hill elev.----------990 msl *

Force main length----------6,500 lin. ft.

Land area (sub-basins 2w thru 8w)------1,697 acres (undeveloped currently)

Future population equivalent----------1,313 p.e.

Future Flow (100 gpcd)----------131,300 gpd = 91 gpm

Electrical Cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------225

Pumping Cost----------$ 551.68 per month = $ 6,620.16 per year

* Lift station B would pump flows from sub-basins 2w thru 8w west along 24-40 highway to the crest of the hill @ the intersection of 24-40 highway & state 72.

Lift Station C: ground elev.----------900 msl *

Crest of hill elev.----------990 msl

Force main length----------5,900 lin. ft. (3" pvc)

Land area (sub-basin 1w)----------527 acres (undeveloped currently)

Future population equivalent----------408 p.e.

Future Flow (100 gpcd)----------40,800 gpd = 29 gpm

Electrical Cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------140

Pumping Cost----------$ 109.39 per month = $ 1,312.68 per year

* Lift station C would pump flows west along Leavenworth Road into the existing collection system.

Lift Station D: ground elev.----------840 msl (serve sub-basins 2w,3w,4w)

Pump to Lift Station B

Force main length----------3,400 lin. ft.

Land area (sub-basin 2w, 3w, 4w)---------695 acres (undeveloped currently)

Future population equivalent----------538 p.e.

Future Flow (100 gpcd)----------53,800 gpd = 37 gpm

Electrical Cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------34

Pumping Cost----------$ 33.90 per month = $ 406.80 per year

Lift Station E: ground elev.----------850 msl

Pump to Lift Station B

Force main length----------1,500 lin. ft.

Land area (sub-basin 5w & 8w)----------408 acres (undeveloped currently)

Future population equivalent----------316 p.e.

Future Flow (100 gpcd)----------31,600 gpd = 22 gpm

Electrical Cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------33

Pumping Cost----------$ 19.56 per month = $234.72 per year

Sub-basins 7w & 8w may require additional small lift stations to pump flows to lift stations B and E. For purposes of this evaluation we will assume that sub-basin 7w will gravity flow to lift station B and sub-basin 8w will gravity flow to lift station E.

Summary of Future Pumping Costs - Alternate No. 1

Lift Station	Cost	
A	$ 787.57 per month	$ 9,450.84 per year
B	$ 551.68 per month	$ 6,620.16 per year
C	$ 109.39 per month	$ 1,312.68 per year
D	$ 33.90 per month	$ 406.80 per year
E	$ 19.56 per month	$ 234.72 per year

TOTAL----------$1,502.10 per month$18,025.20 per year (Alt. No. 1)

ALTERNATE NO. 2 SUMMARY: (Wolf Creek Treatment Facility)

Alternate No. 2, to be compared equivalently to the other alternate must include construction costs associated with the original treatment facilities combined effluent gravity sewers and pumping station, as well as the cost of pumping from the Stranger Creek service area to the treatment facility. In addition, the construction cost of the force main from the Stranger Creek service area to the treatment facility must be included. Due to the extreme topographic conditions close to the creek in the Wolf Creek service area sub-basins 2w,3w,4w,5w, and 8w will probably require pumping to the treatment facilities. Future pumping costs in these areas will be included in the PW analysis. For comparison of PW we will assume that the construction cost of the new treatment facilities will be the same in either basin.

Estimated Cost of new facility-------$ 1,628,962.00

Gravity sewers from exist. facilities-$ 368,000.00

Pump Station----------$ 175,000.00

Force Main & sewer to new facility-$ 650,000.00

Land Cost (7 acres)----------$ 35,000.00

Contingency (30%)----------$ 857,089.00

Estimated Total Cost **$ 3,714,051.00 (For 20 yr. PW)**

Future pumping costs associated with Alternate No. 2 shall be as follows:

Lift Station A: ground elev.----------870 msl (Sub-basins 1s & 1w)

Crest of hill elev.----------990 msl

Force main length----------10,100 lin. ft.

Land area (sub-basins 1w & 1s)------2,884 acres

Future population equivalent----------4,001.5 p.e.

Future Flow----------424,844 gpd = 295 gpm *

Electrical Cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------167

Pumping Cost----------$ 1,327.40 per month = $15,928.80 per year

* Future flows were estimated based upon current city flows projections as well as future flows in the undeveloped areas of sub-basins 1s & 1w.

Lift Station B: ground elev.----------830 msl (Total service area)

Pump to Treatment Facility----------Alternate No. 3 (Wolf Creek @ 24-40 Hw.)

Force main length----------2,000 lin. ft.

Land area (total service area)----------4,581 acres

Future population equivalent----------5,415 p.e.

Future Flow----------568,663 gpd = 395 gpm

Electrical cost per kw/hr.----------6.412 cents per kw/hr.

TDH----------106

Pumping Cost----------$1,128.15 per month = $13,537.80 per year

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Lift Stations C, D, & E will all have the same future pumping costs as indicated in Alternate No. 1.

Summary of Future Pumping Costs - Alternate No. 3

Lift Station	Cost

A	$ 1,327.40 per month =	$ 15,928.80 per year
B	$ 1,128.15 per month =	$ 13,537.80 per year
C	$ 109.39 per month =	$ 1,312.68 per year
D	$ 33.90 per month =	$ 406.80 per year
E	$ 19.56 per month =	$ 234.72 per year

TOTAL----------$ 2,618.40 per month = $ 31,420.80 per year (Alt. No. 2)

SUMMARY OF PRESENT WORTH ANALYSIS ASSUMPTIONS:

The city of Basehor, Kansas currently operates the Sewer Department including the existing treatment facilities and the collection system with a 1995 budget of $ 100,400.00, (excluding depreciation & debt service). Of this amount approximately 60% or $ 60,240.00 is associated with the treatment facilities and 40% or $ 40,160.00 with the collection system. The operation of a new mechanical treatment facility is more complex, requiring more testing, more electrical cost, and more labor and expense associated with daily sludge disposal. Alternate No. 1 & 2 (mechanical treatment process) will be estimated to have the same budgets for this evaluation. The estimated budget for Alternate No. 1 & 2 shall be $ 210,00.00 per year. The above mentioned budgets are for comparison of alternatives only in this present worth analysis. The evaluator makes no attempt to determine the actual budget for the city of Basehor, Kansas associated with any future improvements.

For comparison the present worth analysis does not include any current or future debt service or depreciation.

20 YEAR PRESENT WORTH ANALYSIS:

Alternate No. 1

First Cost.....$ 2,947,051.00

Present Worth of Annual Expenses

(P/A, 5%, 20 yrs.) ($ 210,000.00)

(12.462).....$ 2,617,020.00

Present Worth of Annual Pumping

Costs (P/A, 5%, 20 yrs.) ($ 18,025.20)

(12.462).....$ 224,630.04

Salvage Value of Land

(P/F, 5%, 20 yrs.) (7 acres @ $5,000)

(0.3769).....$ -13,191.50

Estimated Present Worth.....$ 5,775,509.54 (Alternate No. 1)

Alternate No. 2

First Cost.....$ 3,714,051.00

Present Worth of Annual Expenses

(P/A, 5%, 20 yrs.) ($ 210,000.00)

(12.462).....$ 2,617,020.00

Present Worth of Annual Pumping

Costs (P/A, 5%, 20 yrs.) ($ 31,420.80)

(12.462).....$ 391,566.00

Salvage Value of Land

(P/F, 5%, 20 yrs.) (7 acres @ $5,000)

(0.3769).....$ -13,191.50

Estimated Present Worth.....$ 6,709,445.50 (Alternate No. 2)

RANKING OF PRESENT WORTH:

The following ranking is in order of most cost effective Alternate (least expensive over 20 years).

1. Alternate No. 1 (Stranger Creek Plant Location).....$ 5,775,509.54 *

2. Alternate No. 2 (Wolf Creek Plant Location).....$ 6,709,445.50 *

*** These present worth costs do not include depreciation, or annual costs associated with either current or future debt service.**