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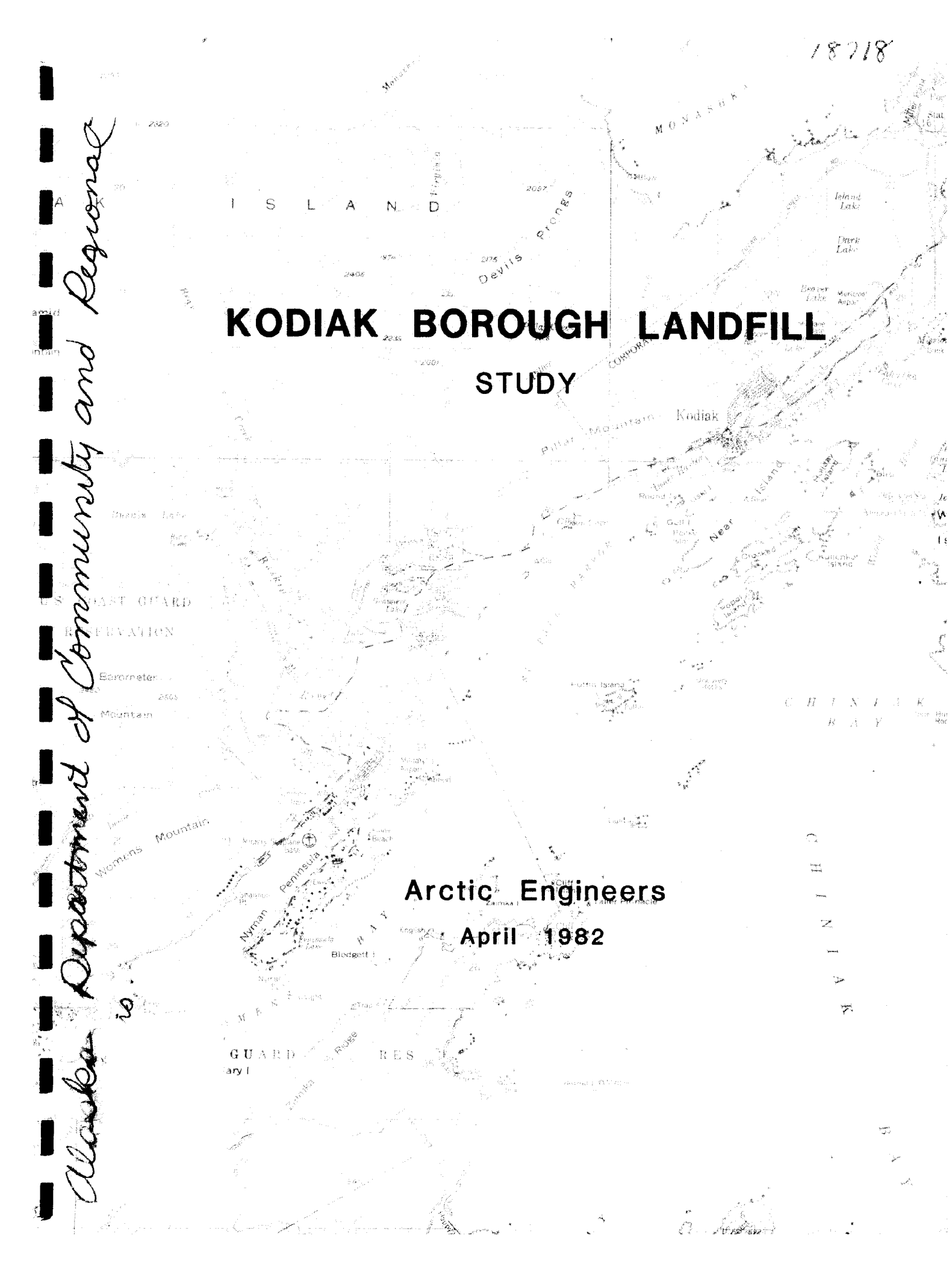
Alaska Department of Community and Regional Affairs



KODIAK BOROUGH LANDFILL

STUDY

Arctic Engineers

April 1982

INDEX

KODIAK ISLAND BOROUGH

SOLID WASTE DISPOSAL STUDY

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CHAPTER 1

CHAPTER 1

RECOMMENDATIONS

I. ORGANIZATION

The Greater Kodiak area should be organized as one solid waste disposal utility to provide service for the entire area served by the road system. The Coast Guard, Borough and City should all be included.

II. SOLID WASTE PROCESSING

The analysis carried out in this study clearly shows that baling solid wastes presents the most cost effective solution to long range solid waste disposal. Weight must be given to the risks caused by more stringent future operation requirements that will create added costs of operation, therefore baling becomes even more attractive. Bales dramatically reduce the potential for leachate production and thus reduce one of the largest cost risks.

A baling facility located in or on the edge of the City of Kodiak should be designed, funded, and installed.

III. SOLID WASTE DISPOSAL

The existing City of Kodiak landfill should be updated and converted to a bale fill. The fill should be operated strictly as a sanitary landfill with very positive surface sealing practiced.

The junk auto and scrap metal disposal program that is currently being strengthened should continue. The Borough should investigate mechanisms for forcing junk auto owners to dispose of their own vehicles through enforceable regulation and/or taxation. If landfilling must be practiced, it should be at a separate site.

The City of Kodiak should make every attempt to gain authority for discharge of digested and treated sludge from their wastewater treatment plant. If the City is prohibited from continuing outfall discharge of sludge, a landfill located in the Solone Creek area following the guidelines set out in this study should be implemented.

IV. SCHEDULE

The City of Kodiak has a two year permit that was initiated in late 1981. It is imperative that any election process that is necessary be implemented so that design and construction can proceed in 1983.

If an election must be held, both the issue of authority to operate and bonds necessary for financing the project should be voted simultaneously.

V. FUNDING

The project should be funded by a combination of local and State grant funds. Funding should break down as follows depending on eligibility determinations: The calculations are based on a bale plant, landfill improvements, and two transfer stations.

1.	Local Funding (1983 Dollars)	$1,770,000
2.	State Grant (1983 Dollars)	$1,770,000

CHAPTER 2

CHAPTER 2

BACKGROUND AND PROJECTIONS

I. SCOPE

The Kodiak Borough has a grant from the Alaska Department of Regional and Community Affairs under the Coastal Energy Impact Program to develop a Solid Waste Disposal Facility design for the urban area in and around the City of Kodiak. Soon after the study was initiated, it became very apparent that the existing feasibility study was inadequate and outdated. The scope of this project was then changed to the development of a facility plan including re-evaluation of all possible sites in the area. The facility plan is to provide clear step-by-step recommendations for implementation and phase two detailed design.

II. CLIMATOLOGY

Kodiak Island is located on the western side of the Gulf of Alaska, 90 miles southwest of the Kenai Peninsula. Oriented northeast-southwest, the island lies 25 miles southeast of the Alaska Peninsula, separated from it by the Shelikof Strait. The terrain is rugged, with the mountains averaging from 2000 to 4000 feet in height. The highest mountains on Kodiak extend to roughly 5000 feet.

Kodiak has primarily a marine climate. During the summer, the mean air temperature closely approximates the mean sea surface temperature, rising slightly above it during August, but falling below it again in September. In winter, the mean maximum air temperature more closely resembles the mean sea surface temperature curve. Because of the proximity of a large land mass to Kodiak, the absolute temperature range is 98 degrees, regardless of the marine influence. Records show a low of - 12 degrees in February 1971, and a high of 86 degrees in June 1953.

Precipitation is normally abundant throughout the year. Maximums normally occur in September and October with March, April and July the driest months. All months, however, have a wide variation in the amount of precipitation. The normal annual precipitation is over 60 inches but ranges from about 40 to 80 inches. A very high percentage of the precipitation falls during northeast to southwest winds. Small amounts of snow may fall as late as May or as early as September with good ground cover anticipated in November. The mean annual snowfall is about 90 inches with extremes of 178.1 inches in 1956 and 15.9 inches in 1945.

Although the prevailing wind direction is northwesterly, every month except May, June, and July, the average speed is about 10 knots. This data may be misleading because of the extreme variability in both direction and speed. Gusts of over 50 knots have occurred during each month of the year, but are most likely to occur in the winter months. An average of eight storms each year brings wind in excess of 55 knots with the average duration of gusts in excess of 55 knots about eight hours per storm.

III. PROJECTIONS

A. Population

Table 2-1 shows population projections available from the Kodiak Borough Planning Department. The Greater Kodiak Area represents all of the Urban-rural and Coast Guard population that can reasonably be expected to utilize a facility.

B. Solid Waste Quantities

Table 2-2 draws upon the data of table 2-1 to develop annual quantities of solid waste generated. The calculations are based on estimates of quantities by the local solid waste contractor and general experience in the field. The 4.5 pounds per capita figure represents all sources of waste and is not limited to just household wastes.

Table 2-3 gives the annual volume of fill required for 1) Bale fill and 2) Conventional fill. The table also gives the running accumulation in cubic yards.

Table 2-4 gives the accumulation in acre feet. Variation in the capabilities of the sites to accept landfill material to given depths will occur. However at a nominal depth of 20 feet, the community will need the following minimum land area:

1) Bale fill 9.44; Say 10 Acres
   Because other material that is non-baleable must be accommodated, this area should be increased to 15 acres minimum.

2) Conventional Landfill 20.23; Say 21 Acres

The period covered represents thirteen years of service. The landfill improvements should be developed for a twenty year design if possible. Taking the growth rate of 1.7% as shown in the coastal zone management population projections for the period from 1995 to 2000 and extrapolating two years beyond 2000, the community can be expected to be producing nearly 30 million pounds of solid waste annually. The extended numbers are shown in Tables 2-2, 2-3 and 2-4. The minimum 20 year acreage requirements based on nominal 20 foot depth of landfill are:

1) Bale Fill Area: 15.8 Acres; Say 16 Acres plus conventional landfill requirements created by non-baleable material.
Use 25 Acres as requirement at 20 foot average depth. Additional acreage is required for obtaining cover material.

2) Conventional Landfill: 33.9 Acres; Say 34 Acres
Use 40 Acres as requirement at 20 foot average depth. Additional acreage is necessary to obtain cover material.

C. Cover Material

The general Kodiak urban area has a very shallow soil mantel over slightly fractured rock. Cover availability and means for limiting its required volume are very important considerations both in the selection of landfill operation technique and the landfill site for Kodiak. The cover requirements of a bale fill will be approximately 10% of the final fill volume, while the cover requirements of a conventional landfill will be approximately 25% of the final fill volume. The differences are easier to see when the actual projected cover quantities are compared:

Year	Conventional Fill Requirements for Cover (Cubic Yards)	Bale Fill Requirements for Cover* (Cubic Yards)	Conventional Versus Bale Fill Ratio
1983	9,790	1,830	5.4
1987	11,880	2,230	5.4
1992	13,670	2,550	5.4

The depth of the bale fill has considerable bearing on the percent cover required. The deeper the fill the lower the percent.

* Adjusted to account for cover needed for conventional landfilling of non-baleable material.

TABLE 2-1

GREATER KODIAK POPULATION
PROJECTIONS

Information from Coastal Zone Management Program
and Kodiak Island Community Profiles

YEAR	BOROUGH TOTAL	OTHER AREAS	GREATER KODIAK TOTAL
1980	9,917	1,295	8,622
1985	13,851	1,430	12,421
1990	15,558	1,579	13,979
1995	17,967	1,743	16,224
2000	19,556	1,924	17,632

TABLE 2-2

GREATER KODIAK AREA
SOLID WASTE PROJECTIONS

(Based on 4.5 #/Person/Day)

RATE OF INCREASE	YEAR	POPULATION	DAILY TOTAL IN POUNDS	ANNUAL TOTAL IN POUNDS
7.546 %	1980	8,622	38,799	14,161,635
	1981	9,275	41,737	15,234,188
	1982	9,976	44,892	16,385,580
	1983	10,733	48,299	17,628,953
	1984	11,546	51,957	18,964,305
	1985	12,421	55,895	20,401,492
2.3915%	1986	12,718	57,231	20,889,315
	1987	13,022	58,599	21,388,635
	1988	13,334	60,003	21,901,095
	1989	13,653	61,438	22,425,053
	1990	13,979	62,905	22,960,508
3.5116%	1991	14,470	65,115	23,766,975
	1992	14,978	67,401	24,601,365
	1993	15,504	69,768	25,465,320
	1994	16,049	72,221	26,360,483
1.6784 %	1995	16,224	73,008	26,647,920
	2000	17,632	-	-
	EXTRAPOLATION TO 2002			29,940,870

TABLE 2-3

VOLUME REQUIREMENTS

	BALE FILL ① IN CUBIC YARDS				CONVENTIONAL LANDFILL ② IN CUBIC YARDS			
YEAR	ANNUAL	COVER	ANNUAL TOTAL	ACCUMULATION	ANNUAL	COVER	TOTAL	ACCUMULATION
1983	16,630	1,660	18,290	18,290	29,380	9,790	39,170	39,170
1984	17,890	1,790	19,680	19,680	31,610	10,540	42,150	81,320
1985	19,250	1,930	21,180	59,150	34,010	11,340	45,350	126,670
1986	19,710	1,970	21,680	80,830	34,820	11,610	46,430	173,100
1987	20,180	2,020	22,200	103,030	35,650	11,880	47,530	220,630
1988	20,660	2,070	22,730	125,760	36,500	12,170	49,210	269,840
1989	21,160	2,120	23,280	149,040	37,380	12,460	49,840	319,680
1990	21,660	2,170	23,830	172,870	38,270	12,760	51,030	370,710
1991	22,420	2,240	24,660	197,530	39,610	13,200	52,810	423,520
1992	23,210	2,320	25,530	223,060	41,010	13,670	54,680	478,200
1993	24,020	2,400	26,420	249,480	42,440	14,150	56,590	534,790
1994	24,870	2,490	27,360	276,840	43,940	14,650	58,590	593,380
1995	25,140	2,510	27,650	304,490	44,410	14,800	59,210	652,590
2002	28,250	2,830	31,080	510,050	49,900	16,630	66,530	1,092,680

① Bale Volumes Based on 1,060 #/Cu. Yd. Cover @ 1:10. The actual rates of cover to fill will decrease as the fill gets deeper.

② Fill at 600 #/Cu. Yd. Cover @ 3:1 Rates

TABLE 2-4

LANDFILL
VOLUME REQUIREMENTS
(1 Acre foot = 1,613.3 cubic yards)
(1 Acre foot = 1,613.3 cubic yards)

YEAR	ACCUMULATION CONVENTIONAL LANDFILL	BALE LANDFILL
1983	24.3	11.3
1984	50.4	23.5
1985	78.5	36.7
1986	107.3	50.1
1987	136.8	63.9
1988	167.2	78.0
1989	198.1	92.4
1990	230.0	107.2
1991	262.5	122.4
1992	296.4	138.3
1993	331.4	154.6
1994	367.8	171.6
1995	404.5	188.7
2002	677.3	316.2

CHAPTER 3

CHAPTER 3

SITE EVALUATIONS

I. INTRODUCTION

During the field analysis and follow-up, seven sites were reviewed. The sites are:

A. Solone Creek on Borough Land
B. Solone Creek Gunnery Range
C. Swampy Acres
D. Site West and Above Swampy Acres
E. City of Kodiak Existing Landfill
F. Bell Flats West of Fairgrounds
G. West Bell Flats

The sites will be discussed on a site-by-site basis. Sites F and G were added to the evaluation ofter the interim report of June 1981 was reviewed. During the review process, the Alaska Department of Environmental Conservation requested that sites F and G be reviewed.

II. SITE EVALUATION CRITERIA

A. Land Ownership
B. Availability of Cover Material at the site or within Reasonable Distance
C. Distance from City of Kodiak
D. Potential for Leachate Production
E. Geography including Vegetation, Wetlands, Streams and Lakes
F. Character of nearby Neighborhoods
G. Fisheries within Downstream area of the Common Drainage Basin
H. Capital Improvement Costs
I. Site Groundwater and Soils Conditions.

A. Solone Creek on Borough Land

The Solone Creek site on Borough Land lies to the East of the Gunnery Range and is approximately one mile from the highway.

The site is located mostly in wetland or near wetland and has a creek running along the south side near the existing access road to the Gunnery Range. The soils in the area consist of silt with some sand covered by a

thin mantel of loam or peat. The silt is tight and it does not appear that ground water migrates horizontally at a significant rate. Groundwater was encountered at a depth of 6 to 8 feet.

In order to use the site as a landfill, the area method must be used. The area method involves building a landfill above the existing ground. Because of the poor soils beneath the fill site, fabric cloth and an initial stabilizing fill will be necessary. The cloth and stabilizing course must be used to allow machinery activity during land filling and to avoid soil failure after fill completion. Initial preparation costs require that the area be used to its maximum potential. A program utilizing a minimum of three eight foot lifts would be required to make economical use of this site.

The Borough owns land along the base of the ridge just south and west of the site. This land has good material for construction of a working pad and can provide the necessary cover material. The existing silt probably can be used as a sealer for the final cover. During wet weather, the silt will be nearly impossible to work.

The existing access road will have to be upgraded. It currently is a little better than a wilderness trail. The immediate site access will require a large culvert creek crossing.

Providing positive surface water control under Kodiak weather conditions will be nearly impossible. Leachate control should be accomplished through positive surface sealing of completed landfill area. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including very positive surface sealing over completed segments. While a peripheral drain and dike with a leachate recirculation system may help, it cannot be expected to dissipate the net precipitation production that comes through the site. The net flow through will become a discharge and the operator will have to apply for a discharge permit. The extent of net flow through can be minimized in two ways.

1) A bale fill, properly managed, will be more compact than a normal fill and will reduce the infiltration potential thus forcing more of the runoff to take a surface routing. Additionally, the bales themselves will not allow water to pass through them. A compact bale fill would make it reasonable to consider a surface seal using plastic sheeting.
2) The landfill can be completed in sections with the completed sections being sealed and having positive drainage away from the facility.

The extent of treatment will be dictated by the Alaska Department of Environmental Conservation (ADEC), Alaska Department of Fish and Game (ADF&G), U.S. Environmental Protection Agency (EPA), U.S. Corps of Engineers (Corps), and U.S. Fish and Wildlife Society (USFWS). The extent of treatment can

range from a simple aerated lagoon and sand filter bed to a very complex physical-chemical treatment plant. The later would be required if the Agencies insist on heavy metal and complex organic removal.

ENVIRONMENTAL ASSESSMENT

The Solone Creek Borough Land site has a creek on the south edge and tidal wetlands to the northeast. The site itself will have some wetland involvement. Solone Creek lies to the north of the site and would receive any drainage from the site. Solone Creek is considered to be an excellent Salmon stream.

If a landfill is to be sited at this location, the operating Agency will definitely need to obtain a wetlands permit from the Corps as well as a landfill permit from ADEC.

Because of the nature of the soils at the site, the streams on both sides can be effectively isolated from direct groundwater input. However, the necessary discharge described previously cannot be isolated.

It will be difficult to obtain a permit for a conventional landfill. The stipulations of any permit will probably be very strict and therefore cause the cost of operation to be very high.

The potential for demonstrating the potential damage is minimized and/or eliminated through the use of a bale fill is excellent.

It will be nearly impossible to screen the site from visability at the main highway.

Winds coming out of the upper valley can create difficulties in conrolling wind blown material.

B. Solone Creek Gunnery Range

The most suitable site in the Solone Creek area is located at the upper end of the valley in the Gunnery Range. The Borough does not own the land and it is a popular "unofficial" rifle range.

The soil varies from sandy gravel to sandy silt and the water table varies from 4 to 7 feet deep. Because of the silt subsoil, filter fabric and a gravel overlay may be necessary to assure that the integrity of the landfill can be maintained.

Surface drainage will create the same problems as discussed previously, but to a somewhat less severe potential. The discussion of the previous site also applies to this site.

The site also has some area that will probably be classified as wetlands. The wetlands area will require a Corps permit and all the other agencies will have a say in the stipulations.

While the Solone Creek Gunnery Range site appears to be a reasonable site, it is the most distant of the sites and does require extensive access road construction.

Like the other Solone Creek Site, the area method of landfill must be used. The area method should be very effective, particularily if a bale fill approach is used.

Leachate control should be accomplished through the positive sealing of completed landfill surface areas. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including very positive surface sealing over completed segments.

ENVIRONMENTAL ASSESSMENT

The Solone Creek Gunnery Range site has Solone Creek reasonably close on the north side and a small stream that courses along the south edge.

Approximately one-half of the site will probably be classified as wetlands.

The wetlands portion will require extensive justification for its use as a landfill. Of the four sites that involve wetlands, this site probably has the best arguments going for it. The wetlands portion can be easily isolated and its character changed to assure its continued isolation from the natural wetlands around it to the east and north.

As discussed previously, any drainage from the site will discharge to Solone Creek directly or through the wetlands and minor stream routing.

The factors brought out previously regarding potential leachate control requirements are equally valid for this site.

High winds from the upper valley can be expected to provide serious litter control problems. Site visibility from the road or other settled areas can be effectively controlled.

C. Swampy Acres

The Swampy Acres site involves wetlands including a small shallow lake. The site is located northeast of Coast Guard housing and adjacent to the main highway between Kodiak and the Airport.

The site varies from shallow bedrock to deposits of silt with muskeg overlaying them.

Cover will be a problem and may have to be imported from Bell Flats or Solone Creek.

While the Swampy Acres site was recommended in a previous report by another engineer, times have changed and factors such as more stringent ADEC requirements and wetlands permits by the Corps were not a necessity at that time. They are now of major concern.

Drainage from the Swampy Acres site probably goes into other lakes in the area and into Salmon streams feeding out of the lakes. A hydrologic study would be necessary to ascertain this. The only acceptable method of landfill operation would be the area method as described earlier.

Leachate control should be accomplished through positive surface sealing of completed landfill areas. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including the use of bale landfill techniques and very positive surface sealing over completed segments

An access road can be built with direct connection to the main highway.

ENVIRONMENTAL ASSESSMENT

The Swampy Acres site is located in wetlands including a small shallow lake. The outlet for the lake is not clearly defined but undoubtedly courses through a lake to the south and a stream to the ocean.

The wetlands are clearly covered under the wetland permit requirements while the Solone Creek sites have a clearer potential for damage to Salmon streams, the small lake involved in this system will probably make it equally tough to get a wetlands permit. The operation requirements can be expected to be as strict and more difficult to achieve.

Site problems will evolve from two factors, nusiance potential and leachate. The nusiance factor consists of blown litter and visibility to the general public from the highway. The litter problem can be controlled reasonably, but not totally, by fencing. The problems created by leachate are similar to those described in the Borough Solone Creek site analysis. They will be more severe at Swampy Acres, because it is located at the bottom of a drainage bowl.

D. Site West and above Swampy Acres

A site could be developed in the low hills just above the Swampy Acres site. The site will be the second most difficult of the new sites to develop. However, a bottom seal does not appear to be necessary. Surface drainage will be easier to control and a surface seal should provide adequate protection from leachate. The site is more appropriate for a bale fill. A conventional loose garbage landfill will present two very significant problems.

1) Traffic management for access will be difficult and probably will impact the nearby areas. Site control including normal traffic operations will be difficult.
2) Blown litter will be very difficult to control.

Once the general area drainage has been corrected to isolate the active site, surface drainage from completed portions should be more effective than the other sites, except the existing City site and possibly the West Bell Flats site.

Leachate control should be accomplished through positive surface sealing of completed landfill areas. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including the use of bale landfill techniques and very positive surface sealing over completed segments.

The access road to this area will be the second most difficult to develop of all the alternates.

ENVIRONMENTAL ASSESSMENT

The general area is at the top of two drainage systems and there is a small perched lake in the immediate area. Leachate control will have to be very positive, otherwise it will contaminate one or both of the drainage systems involved. In the one direction, a river that flows southeast courses through the Coast Guard Housing Area. If leachate is developed the odds are pretty good that very extensive treatment will be required.

With the exception of the small lake, the area does not appear to involve wetlands.

A new access road would have to be provided in order to avoid nusiance impact on the Coast Guard Housing Area.

The area is well screened with natural hills and trees. However, litter could be picked up by updrafts and carried a long distance if conventional landfill practices were used.

E. City Of Kodiak Existing Landfill

The existing City Landfill site is located just off Monaska Bay Road at approximately four mile.

The existing City of Kodiak "landfill" is not being operated as a true sanitary landfill. The costs of conversion to a true sanitary landfill are going to be very high and difficult, particularily if leachate collection is required. Leachate collection would be nearly impossible. The site is located on a hillside. The site is not located close to creeks or lakes with the exception of a small drainage channel that drains through the site during rainy periods now. The small drainage channel can be intercepted above the landfill and drained elsewhere. It is intermittent and has no flow or ponds during dry weather.

The site is well protected from wind and currently does not show significant amounts of wind blown material either direction from the site, or in the trees.

The site has potential for being used as a very deep fill, which would extend its life considerably as a bale fill. The area method of landfill would be best suited to this site using a tier development.

Leachate control should be accomplished through positive surface sealing of completed landfill areas. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including very positive surface sealing over completed segments. One set of samples have been taken at and around the site. The samples shown no significant leachate. Appendix 9-1 shows the results.

Surface drainage can be controlled with an impervious cover and cut-off drains that shunt the local subsurface drainage off the site before it can find a way into the fill.

Use of this site has several distinct advantages.

1) The site is already in use as a landfill.
2) Surrounding water uses for consumption or Fish & Wildlife are at a minimum.
3) A dump can be closed, sealed, and future problems that it may cause minimized.
4) Surface drainage can be easily controlled.

One major disadvantage does exist. Cover material is not readily available. Shot rock is currently utilized, which is very expensive. For this study, we have used the costs of bringing material from the Solone Creek area, a costly and inconvenient process. It is hoped that a barrow site near the landfill could be acquired and utilized.

ENVIRONMENTAL ASSESSMENT

The existing site has good visual and litter control characteristics. Access is excellent and the best of any of the sites reviewed.

The current operation cannot be classified as a true landfill. Yet the existing site is not creating a significant nusiance or environmental hazard. This is in spite of ADEC demands that the site be closed within two years.

The site does not have wetlands involvement.

As a result of preliminary review comments by the ADEC, it became evident that the Agencies involved believed that the existing site is causing a serious leachate pollution problem and should be closed as soon as possible. In order to further define the actual extent of potential problems created by leachate, a series of water samples were taken.

The result of the sample program is included as Appendix 9-1. The results do not support the contention that serious pollution is occurring. In fact the chemical analysis show that insignificant changes are occurring. Therefore, even though the potential for leachate production is indicated, it does not in fact show up in the test results.

F. Bell Flats West of Fairgrounds

The Bell Flats site west of the fairgrounds is located immediately adjacent to the fairgrounds and behind it. The site is one of two that the Alaska Department of Environmental Conservation requested be evaluated.

The site has some wetlands and has a couple of minor streams coursing through it. A major stream borders the site on the south.

Visual screening between the fairground and the site will require a substantial buffer of natural vegetation and trees.

In order to use the site as a landfill, two minor streams will have to be rerouted elsewhere and the area method of landfilling must be used.

Leachate control should be accomplished through positive surface sealing of completed landfill ares. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including very positive surface sealing over completed segments.

Soils work has not been done at the site. However, Bell Flats does have gravel deposits and the area is a major source of the gravel needs of Kodiak. A small inactive pit in the area indicates that the site may

be underlain by gravel. The Borough has found that muskeg and high silt zones are intermingled with the good gravel areas, and soils work must be done at specific sites before development can proceed.

The site is not owned by the Borough and it is anticipated that public sentiment may be extremely strong against its use. There are residential areas near to both the south and the west.

ENVIRONMENTAL ASSESSMENT

The Bell Flats west of the Fairgrounds site has a major stream just south of it that is a Salmon stream. The general site shows evidence of high water debris on portions of it. There are two minor streams that course through the site. The minor streams appear to be drainage outlets and do not appear to be fish habitat. However, this has not been confirmed by ADF&G.

Some of the area involves wetlands and could create potential problems from localized flooding. With proper design these deficiencies can be minimized.

Strongest among the native factors of the site relates to its close proximity to residential neighborhoods and the fairground. Public acceptance would be difficult. A bale fill would have a much better chance of public acceptance. Wind blown debris should not be a problem at this site. Leachate control will have the same implication as discussed with Solone Creek at the Gunnery Range.

G. West Bell Flats

The West Bell Flats site is located generally in the Jack Lake area in the upper highlands of the mid valley. The site is approximately two to two and one-half miles from the main highway.

ADEC requested that this site be investigated.

The site is composed of rolling hills with a small lake located in the middle of it.

ADEC has indicated that they have no objection to the small lake being drained and the minor drainage pattern that it supports being diverted. Alaska Fish and Game has not commented on the lake drainage.

Soils conditions in the area are not known. However, a correlation with similar areas would indicate that they will vary from cobble rocks through sand and gravel with pockets of silt and muskeg.

Major transportation improvements would be necessary at this site. The current access through existing development would be totally inadequate. The existing roads are not even satisfactory for local subdivision requirements with the west end being barely better than a wilderness trail. Roads meeting secondary road standards would be necessary. Channeling major traffic through local neighborhoods is never good and would be particularily bad for this site because of the hills and curves necessary. The increased traffic, particularily trucks, would meet with major resistance from the local residents near this site.

The site can be used for either area or trench method of operation. Site drainage should not be a significant problem.

Leachate control should be accomplished through positive surface sealing of completed landfill areas. It is impossible to say that no leachate can or will be produced. Therefore, this site would require that substantial steps be taken to provide positive control including very positive surface sealing over completed segments. Wind blown material may be a major problem.

ENVIRONMENTAL ASSESSMENT

The West Bell Flats site is situated in rolling hills with the potential for a variety of soils conditions. The site is approximately two to two and one-half miles from the main highway and access will have to go through existing residential neighborhoods most of the distance.

A small lake exists on the site. While ADEC indicates that the lake can be drained, the Alaska Fish and Game and several Federal Agencies may see it quite differently. The area has wetlands and the lake. Any changes in their status will require a Corps permit. There also is a creek in the area that will complicate the issues.

The site can be utilized for both trench and an area method of operation. A conventional landfill operation will have windblown material problems.

While the potential leachate generation problems are not as severe as several of the other sites, they do pose the potential for getting into existing groundwater and the Salmon stream located to the north of the site.

If a loose garbage landfill is utilized, the potential for windblown litter certainly exists and is more severe for this site than the others except the Swampy Acres site.

Of all the potential adverse environmental considerations, the traffic problem is most apparent. It is not good practice to place a site so that local neighborhoods must absorb significant through traffic. There will be substantial costs to the community to upgrade the access road and provide the necessary safety and noise abatement conditions.

III. SITE COMPARISONS

A. Introduction

The sites vary considerably in their characteristics. There are two (2) basic modes of operation being considered in this study. They are conventional landfilling and bale landfilling. The sites are evaluated in tabular form and presented in:

1) Table 3-1 Site Suitability Comparison for Conventional landfill Development. This table looks at each site on aqualitative basis for its suitability for conventional landfilling. Costs are not injected, except that they are reflected in the degree of difficulty to develop the site, and indirectly by the distance from the community center. Costs will be covered in Chapter Six, Cost Comparisons.

2) Table 3-2 Site Suitability Comparison for Bale Landfill Development. This table looks at each site on a aqualitative basis for its suitability for a bale landfill operation. As in #1, costs are not directly injected, but will be covered in Chapter Six.

B. Qualitative Site Ranking

Not all of the sites will remain in the ranking.

1)	Conventional Landfill	
	Solone Creek Gunnery Range	1
	Solone Creek on Borough Land	2
	Swampy Acres	3
2)	Bale Landfill	
	City of Kodiak Existing Landfill	1
	Solone Creek Gunnery Range	2
	Solone Creek on Borough Land	3

TABLE 3-1

SITE SUITABILITY COMPARISON FOR CONVENTIONAL LANDFILL DEVELOPMENT

(COSTS NOT INCLUDED)

SITE	1 DISTANCE FROM POPULATION CENTER	2 ACCESS ROAD	3 RELATIONSHIP TO NEARBY NEIGHBORHOODS	4 SITE AREA, TERRAIN AND EASE OF DEVELOPMENT	5 COVER MATERIAL AVAILABILITY	6 NATURAL LEACHATE CONTROL	7 DANGER OF FISHERY DAMAGE WITH SUBSTANTIAL LEACHATE POLLUTION	8 NATURAL LITTER CONTROL (WIND & EXPOSURE)	GENERAL SUITABILITY FOR CONVENTIONAL LANDFILL
1. SOLONE CREEK ON BOROUGH LAND	3 POOR	3 POOR	10 SUPERIOR	7 EXCELLENT	10 SUPERIOR	7 EXCELLENT	5 GOOD	3 POOR	6.00 GOOD
2. SOLONE CREEK GUNNERY RANGE	3 POOR	3 POOR	10 SUPERIOR	10 SUPERIOR	10 SUPERIOR	7 EXCELLENT	5 GOOD	5 GOOD	6.63 EXCELLENT
3. SWAMPY ACRES	10 SUPERIOR	5 GOOD	5 GOOD	5 GOOD	5 GOOD	3 POOR	3 POOR	3 POOR	6.00 GOOD
4. SITE WEST AND ABOVE SWAMPY ACRES	7 EXCELLENT	3 POOR	5 GOOD	3 POOR	5 GOOD	5 GOOD	3 POOR	1 BAD	4.00 POOR
5. CITY OF KODIAK EXISTING LANDFILL	7 EXCELLENT	10 SUPERIOR	10 SUPERIOR	5 GOOD	1 BAD	10 SUPERIOR	10 SUPERIOR	10 SUPERIOR	7.88 BAD
6. BELL FLATS WEST OF FAIRGROUNDS	5 GOOD	7 EXCELLENT	3 POOR	7 EXCELLENT	7 EXCELLENT	5 GOOD	5 GOOD	7 EXCELLENT	5.75 GOOD
7. WEST BELL FLATS	3 POOR	1 BAD	1 BAD	5 GOOD	10 SUPERIOR	7 EXCELLENT	5 GOOD	1 BAD	4.13 BAD

* Even though site has an overall rating that is highest among sites, the bad rating for cover removes it from conventional landfill consideration.

TABLE 3-2

SITE SUITABILITY COMPARISON FOR BALE LANDFILL DEVELOPMENT

(COSTS NOT INCLUDED)

SITE	1 DISASTER FROM BALER FACILITY	2 ACCESS ROAD	3 RELATIONSHIP TO NEARBY NEIGHBORS	4 SITE AREA, TERRAIN AND EASE OF DEVELOPMENT	5 COVER MATERIAL AVAILABILITY	6 NATURAL LEACHATE CONTROL	7 DANGER OF FISHERY DAMAGE WITH SUBSTANTIAL LEACHATE POLLUTION	GENERAL SUITABILITY FOR BALE LANDFILL
1. SOLONE CREEK AND BOROUGH LAND	3 POOR	3 POOR	10 SUPERIOR	7 EXCELLENT	10 SUPERIOR	7 EXCELLENT	5 GOOD	6.43 EXCELLENT
2. SOLONE CREEK GUNNERY RANGE	3 POOR	3 POOR	10 SUPERIOR	10 SUPERIOR	10 SUPERIOR	7 EXCELLENT	7 EXCELLENT	7.14 EXCELLENT
3. SWAMPY ACRES	10 SUPERIOR	5 GOOD	7 EXCELLENT	7 EXCELLENT	5 GOOD	3 POOR	3 POOR	5.71 GOOD
4. SITE WEST AND ABOVE SWAMPY ACRES	7 EXCELLENT	3 POOR	7 EXCELLENT	5 GOOD	5 GOOD	5 GOOD	5 GOOD	5.29 GOOD
5. CITY OF KODIAK EXISTING LANDFILL	7 EXCELLENT	10 SUPERIOR	10 SUPERIOR	7 EXCELLENT	3 POOR	10 SUPERIOR	10 SUPERIOR	8.14 SUPERIOR
6. BELL FLATS WEST OF FAIRGROUNDS	5 GOOD	7 EXCELLENT	5 GOOD	7 EXCELLENT	7 EXCELLENT	5 GOOD	5 GOOD	5.86 GOOD
7. WEST BELL FLATS	3 POOR	1	1	5	10	7	5	4.57 BAD

CHAPTER 4

CHAPTER 4

CONVENTIONAL LANDFILL REQUIREMENTS

I. INTRODUCTION

Sanitary landfilling is an engineered method of disposing of solid waste on land by spreading the waste in thin layers, compacting the waste to the smallest practical volume and covering the waste with soil each day of operation in a manner which safeguards against environmental pollution.

A sanitary landfill calls for developing a detailed description and plans that outline the steps to be taken to provide for the safe, efficient disposal of quantities and types of solid wastes that are expected to be received. The final plans must outline volume requirements, site improvements (clearing of the land, construction of roadways and buildings, fences, utilities), and all the equipment necessary for day-to-day operations of the specific land-filling method involved.

A plan of construction and operation must include means for controlling water pollution and the movement of decomposition gas.

A final site and ultimate land use plan must be incorporated.

Achieving the broad objectives set forth under the rainy climate conditions of Kodiak will be difficult and costly.

II. STATE REQUIREMENTS

The State of Alaska regulates solid waste management under the authority of regulations published in Register 67, October 1978, 18 ACC Chapter 60, Solid Waste Management. A copy of the current regulations and the permit application are included in Appendix 9-2.

Certain very small self contained users are exempt but otherwise all private and governmental groups must comply with the regulations.

A summary of the key points of the regulation requirements follows:

A. Provide 2 sets of completed application forms.

B. Provide 2 sets of details plans and specifications.

C. Certification of compliance with local ordinances and zoning.

D. Report detailing proposed method of operation, population and service area, material source, characteristics and quantity, emergency operating procedures, type and amount of equipment to be provided, and ultimate land use plan.

E. A permit shall be valid for a specified period but in no case exceeding five years.

F. A permit may not be transferred without State consent.

SPECIFIC OPERATING REQUIREMENTS:

A. A permittee shall be required to:

(1) Provide a permanent sign posted at the facility entrance identifying the facility, the hours and days the facility is open for public use, the name and address of the operator and other information pertinent to the operation of the facility;

(2) Provide effective methods, approved by the department, to control insects, birds, rodents, other disease vectors and nuisance conditions;

(3) Obtain specific departmental approval for the processing and disposal of hazardous waste

B. A permittee may be required to:

(1) Compact and cover all solid waste accumulated after each day's operation with earth or other approved material in an approved manner safeguarding the environmental quality of the surrounding area, except that solid waste processed by milling, baling or other operation, specifically approved by the department, may not require daily cover;

(2) Install. maintain and operate monitoring equipment, for the detention of pollution or contamination resulting or tending to result from the operation of the facility, in accordance with methods and procedures prescribed by the department, at specified locations and intervals, and to provide the resulting data to the department;

(3) Provide controlled access to the facility in the form of fences and gates that shall be kept locked when an attendant is not on duty.

(4) Submit quarterly reports itemizing the type and quantity of solid waste processed, the quantity of waste requiring final disposal, hours of facility operation and market value of any reclaimed material.

C. A permittee shall not be required to provide daily cover for solid waste comprised of mine tailings, gravel pit and quarry spoils or overburden, but remains responsible for restoring the area by grading, contouring and seeding in accordance to plans approved by the department. (Eff. 7/19/73, Reg. 47)

The disposal of solid waste on the land shall comply with the following requirements:

(1) The disposal of putrescible waste in areas subject to permafrost or leachate generation is restricted and shall be allowed only in conjunction with special procedures approved by the department;

(2) Open burning on a landfill is prohibited;

(3) Solid waste shall be deposited in a manner to prevent waste materials, leachate or eroded soil particles from entering the waters of the state;

(4) A minimum separation of two feet shall be maintained between putrescible solid waste and the anticipated high ground water table; non-putrescible and non-water-soluble material such as brick, stone, concrete and similar materials may be deposited below the anticipated high ground water table as such deposition will result in a nuisance-free operation and no pollution to the ground waters;

(5) Surface water drainage from areas outside a landfill shall not be allowed to flow over or through a landfill;

(6) The working face of a landfill shall be limited to as small an area as practicable and designed to confine wind-blown waste, which shall be collected and returned to the working face:

(7) Scavenging is prohibited;

(8) Uncontrolled live, domestic animals are prohibited within the landfill area;

(9) The approach road to a landfill shall be maintained to provide access and kept clean of solid waste;

(10) Solid waste shall be spread in shallow layers not exceeding a depth of two feet prior to compaction, completed lifts shall be no greater than eight feet in vertical depth unless otherwise allowed by permit requirements;

(11) Solid waste shall be compacted and covered with earth or other approved material at a frequency specified by permit requirement;

(12) Within one month after termination of a landfill, or a major portion thereof, the area shall be covered with at least two feet of compacted earth material, graded and finished to allow surface water to run off without erosion; areas completed during winter operation may receive final cover the following spring;

(13) Ten days prior to removal of earth moving equipment from a completed landfill, the department shall be notified so that an inspection may be conducted. (Eff. 7/19/73, Reg. 47)

III. KODIAK REQUIREMENTS

A. Background

The topography, climate and soil conditions of the Kodiak area make any form of sanitary landfill operation difficult.

There are two basic approaches to conventional landfill operation. They are area and trench.

The area method involves spreading solid wastes on the existing ground surface and covering with material from elsewhere. The area method works best where hills are available nearby to provide a source of cover material.

The trench method requires that a trench be dug first so that solid wastes may then be placed. The removed material is utilized for intermediate and final cover.

The two methods definitely have advantages and disadvantages. For Kodiak, the area method advantages far outstrip the trench method.

The most serious problem the trench method has comes from water standing around the solid waste. In a rainy climate, it is nearly impossible to overcome the disadvantages of the trench method.

B. Specific

The sites vary in conditions but the basic requirements of landfill operation will not change.

(1) Site Preparation

The site must be prepared to minimize leachate production, guarantee access, provide suitable cover, and allow long term workability.

The most important factor of site preparation is leachate control. Particularly in a wet climate like Kodiak, it is extremely important to cut off any potential groundwater intrusion, divert surface water away from the site, and to seal any bottom soil surface that has a high permeability. While it is no fun to deal with leachate, it is much easier to handle leachate in a landfill with a sealed bottom than one that allows a major ground water flow to get involved. It is particularily important to take positive steps to exclude water from the fill.

Groundwater can be lowered around the site by cutting trenches, backfilling them with coarse gravel, and running the trench to daylight or to a sump where the water can be pumped away if necessary. Surface trenches and/or grading should be accomplished to keep surface water away from the site.

(2) Site Access

The site must be maintained in a manner that assures safe access by the users. This means roadway and/or loading areas that can be safely driven on. In the Kodiak area this stipulation means that all surfaces where vehicles must travel will require gravel or other suitable material that drains well and stays firm during rainy weather. A lockable entrance gate should be installed.

(3) Leachate Control

Leachate control takes four forms.

First, groundwater must be kept out of the fill. This can be accomplished with sealants under and around the fill and curtain drains. The curtain drains lower the groundwater locally thus keeping it out of the fill.

Second, surface water must be kept out of the fill. This can be accomplished by sealing the top of the fill, sloping the surface to encourage runoff away from the fill, and provision of diversion drainage around the fill.

Third, leachate produced can be recirculated through the fill to treat and manage its quantity.

Fourth, leachate treatment and discharge depends on the permit requirements set forth by the Alaska Department of Environmental Conservation.

(4) Site Access Control

The site must be sufficiently fenced to prevent use and access at times other than the normal operating hours. The fence does not need to be around the entire site if natural terrain limits access.

(5) Landfill Cover

The landfill operation must be managed to minimize the amount of fill area open during the daily operation. A facility operated in strict accordance with ADEC regulations will utilize daily and final cover amounting to a quantity approximately one-third the volume of solid wastes disposed of. Ideally, two types of cover should be available. A silt or clay material should be used to seal the surface just above the solid wastes and a sandy gravel cover over the silt or clay is needed to make the site workable for further disposal.

The cover has two extremely important functions. It must seal the surface above the solid wastes to prevent the formation of leachate and it must prevent vermon from using the fill for habitat.

It may be more expedient and feasible to use a plastic sealer for both the intermediate and final sealer. If plastic is used the design has to take long range plastic protection into account to assure a reasonable seal. The daily consistency of construction of landfill cells and cell compaction is very important. Solid waste is not a homogenous material, therefore, differential settlement will occur even under the best of construction practices.

Settlement also occurs because of waste decomposition, filtering of fines, breaking down of bridging over voids and general settlement because of increased weight loading. Any sealant or liner that performs as a sealer must be flexible and be able to take differential settlement. Low places and holes in the liner will occur. It is important that the basic landfill design, sequence of cell construction and day-to-day operation strive to reduce the impact that leaks can have when they occur. All potential water flow must move down slope on the cell and out to the landfill edge. The landfill itself has a great deal of "bed" capacity for absorbing water and holding it.

(6) Landfill Equipment

The degree of landfill compaction is dependent on the type of wastes that enter the fill, the depth that each layer is spread out, the weight of equipment utilized, and the number of times the equipment track or wheel passes over the material.

A steel wheeled tractor provides the best compaction. However, it is a specialized piece of equipment that does not double for other purposes. A track loader with a four in-one bucket in the Cat D-6 or larger category is more versatile and will provide good results. Other earth moving equipment is necessary, but it may be cheaper to lease the equipment or contract for the service as necessary.

Cover material must be delivered to the site or moved from one location on site to another. It is more efficient to use earth moving trucks and scrapers for this purpose.

(7) Scheduling

The landfill should only be open when an attendant is at the site. The attendant can double as an equipment operator, as is often done with smaller facilities.

If the Kodiak community decides to utilize a drop box system, the landfill does not need to be open for public use as frequently or for as long a period of time. A drop box is nothing more than a giant garbage can placed at a convenient location.

(8.) Landfill Closure

Eventually every landfill faces closure when completed.

If operated properly over the life of the fill, the closure operation should not be exceedingly expensive.

(a) The landfill should be sealed and a minimum of 2 feet of final cover placed over the sealing layer. The earth material should form a tight soil mantel.

(b) The total landfill should be landscaped to encourage drainage off from, and away from the site. The drainage design should route water off the site by the shortest possible distance.

(c) Vegetation that will develop a tight dense root mat should be planted.

(d) The closure should be publicized with the new landfill location given heavy media coverage.

(e) An alternate final site plan and site use should be adopted and implemented.

(f) For the first year after the site is closed, it should be secured with a fence and locked gate so that potential users cannot gain unauthorized access. A prominent sign should give clear directions to the new disposal facility.

(g) A fill that has not been operated in strict accordance with sanitary landfill practices may have several difficult problems that must be dealt with.

First, rats and other vermin may be present in large populations. Rats in particular are very tenaceous and will seek other habitat for survival. They must be exterminated prior to closure and the process must be handled by a professional.

Second, the site has probably not been properly compacted and graded. Leachate may continue to occur for long periods after the closure. The leachate may require treatment, even extensive treatment and therefore be an on-going cost for a long period of time.

In the case of the existing Kodiak fill, it appears completely feasible to close out the existing fill without requiring extensive long range leachate processing.

CHAPTER 5

CHAPTER 5

BALER FACILITY AND LANDFILL

I. INTRODUCTION

There are some very significant advantages to a baler and baled landfill for a wet climate such as Kodiak's. Wastes are collected at a central location and processed under controlled conditions in a building. Transfer stations and/or drop boxes can be utilized for the convenience of the Coast Guard and rural residents in the Kodiak area.

A baler compacts solid waste to nearly twice the density that can be achieved in a well operated sanitary landfill. Furthermore the bales are consistent, while the density in a landfill will vary with the weather, the operators attitude, and equipment condition. Like hay bales, the solid waste bales are quite resistant to water penetration.

In the Kodiak area, two factors will almost totally dominate the operation cost comparison for the landfill. The two factors are:

A. Leachate control
B. Suitable and adequate cover material supply

A bale fill does not require nearly as much cover material. The largest savings come in the arena of intermediate cover material requirements. The overall cover requirements are approximately one fifth to one quarter the requirements for a conventional sanitary landfill.

II BALER FACILITY

There are basic considerations that must be addressed in the design of any baler facility, regardless of size. Those factors are:

A. Site access and traffic control.

1) The general location should minimize travel distance for a majority of users.

2) The general location should minimize the adverse impact of truck traffic through residential neighborhoods.

3) The site entrance should be at a safe location with adequate signs and/or traffic signals to assure safe entrance and exit.

4) An area for waiting vehicles to park should be provided and in such a manner as to provide smooth traffic flow into the facility.

5) Depending on the operator's approach to fees, a gate weighing and/or collection facility may be necessary.

6) The building must be designed for drive through traffic and must have room for vehicles to back up to the unloading area and discharge their wastes.

7) The building must provide drive through capabilities for commercial haulers so that they may efficiently unload and leave the building. If 20 to 40 cubic yard drop boxes are utilized at remote sites and the Coast Guard location, the clear ceiling height will have to be set in accordance with the required height for box dumping. This is normally in the range of 24 feet of clear height. The traffic pattern within the building takes on a much greater importance when the facility must handle a large volume of small user traffic while accommodating the commercial haulers at higher capacity.

8) The facility must have space set aside for bale storage. This can best be handled by providing space for a forklift to operate efficiently and/or a trailer to be loaded. Once a trailer is loaded, it can be tarped and parked at the facility or taken to the landfill.

9) A small office is necessary and should be located where fees are collected if a fee system is in use.

In order to demonstrate the concepts discussed as they apply to Kodiak, look at figures 5-1 and 5-2. Figure 5-1 shows a typical site plan for a baling facility located in Kodiak.

A baling facility does not involve significant noise. A facility can be located in any of the commercial/industrial areas without becoming a bad neighbor. Figure 5-2 shows a facility floor plan that will meet the needs of Kodiak.

III. PROCESS CHARACTERISTICS

The baler is a stationary unit having physical characteristics resembling a giant compactor. The wastes are wire tied after being compressed with equipment similar to that used in the field of hay baling.

The bales produced are very compact and quite resistant to breakage with handling. The American Solid Waste Systems model HRB-SWC-2 produces a bale 45" x 30" x 66" and an average bale weight of 2200 pounds. Just about anything that can go into a charging chamber 56" x 111" can be baled. Scottsboro, Alabama reports bale average weights of 2,600 pounds using an HRB-SWC-2. Very little loose garbage gets involved and it is contained within the building at the process area.

The actual baling process does not take long for the wastes generated in a community the size of Kodiak. Scottsboro, Alabama is a community of 13,600. They generate 35 to 40 tons of solid waste per day. It is processed into twenty eight bales weighing 2600 pounds per bale. They use a 1½ ton single axle truck that carries eight bales per load. It makes three to four trips per day.

The town of Torrington, Wyoming with a population of 6000 and Chadron, Nebraska also population 6000 have installed balers. They have found the bale facility to be a one-man operation. Chadron collects 18 loads at 20 cubic yards per load and allows citizen hauled material at their facility which processes 55 bales per week. Considering all costs, including equipment, utility costs, and manpower, they have found the bale fill to be cheaper than a conventional landfill.

The bales will vary in weight, depending on the characteristics of the waste being baled including amount of metal and moisture. The weight can vary from 600 pounds for dry corrigated paper to two tons for metal such as old appliances. This amounts to densities varying from 314 to 2094 pounds per cubic yard.

IV. BALE FILL

The construction and management of a bale landfill is quite different than a conventional landfill. It is much more like stacking baled hay. The bales are delivered to the site on a flat bed or semi trailer truck. A front end loader equipped with a fork lift assembly is used to unload the bales and place them in the landfill stack. The equipment does not need to be extremely heavy duty and it does not receive the routine rough use that conventional landfill equipment does. A very tight and consistant landfill can be laid up. Normally, the bales are stacked one on top of the next to a height of three and up to six bales depending on the type of fork lift in use. Intermediate cover is necessary, therefore, a fill set at five bales per lift will minimize the impact of daily cover. Also, it may be advantageous to use a stacking scheme similar to that shown in figure 5-3. The advantage of the approach shown in 5-3 is that it ties the bales together and reduces the leachate drainage paths through the fill.

An area type of fill is preferred for a bale fill. Six to eight inches of interim cover should be placed over the bale fill, with 24 to 30 inches used on the final course. The specific details of the intermediate and final cover system are discussed under leachate control.

V. LEACHATE CONTROL

Webster's Dictionary defines Leach as "to extract (a soluble substance) from some materials" and "to lose soluble material through a filtering liquid". Stated another way, leachate is the contaminated water which discharges from the refuse disposal area.

With a conventional landfill, leachate cannot be produced until the refuse has reached saturation or field capacity. In the case of the conventional landfill saturation requires substantial quantities of external water.

A general concept which may be applied to leachate production is the law of conservation of matter. More specifically, any water which enters the refuse after it has reached field capacity must displace an equal amount of water which has been in contact with the waste. The displaced water will be contaminated with materials leached from the wastes.

Work done at the University of Minnesota demonstrated that different mechanics occur when water enters a bale fill. It is worthwhile to quote an important finding of their work. "More important for the description of the fluid motion through the bale fill is the form and nature of the flow spaces, which should resemble large planar openings between bales much like flow spaces in fractured limestone, for example. "Interspace width varies between 2 and 4 cm. approximately. This has implications for specific yield, through flow and residence times. In large openings of this kind no effective capillary forces are at work and therefore specific retention will be negligible, flow velocities are high and therefore the reaction to a precipitation and infiltration event will be rapid. On the other hand, retention times will be low allowing for only short contact and chemical reaction times between the percolating water and the wastes. Hence, a leachate of lower strength should be produced as compared to conventional leachates." "Sampling of baled material has shown that very little change from the original water content of the bales occurs with time, and that there is no significant increase in moisture content. This seems to indicate that although field capacity of the bales had not been reached at the time of compression, very little percolating water enters the bales and their permeability is practically zero. Such a conclusion is consistent with the findings of other workers (Eifert and Swartzbaugh, 1977) that indicate low moisture retention for baled solid waste."

The bale itself contributes substantially to leachate control. Adding to the basic safety provided by a bale fill, the following procedures should be utilized:

A. Intercept and divert ground waters prior to their contact with refuse. Figure 5-4 shows a cut-off drain system.

B. Intercept and drain surface water as rapidly and completely as possible to control infiltration.

C. Intermediate and final cover sealants. In a rainy climate, it is far more important to seal the top of a landfill than it is to provide a bottom seal. There are several ways to provide the seal. Figure 5-5 shows several methods.

VI. NON BALEABLE MATERIAL DISPOSAL

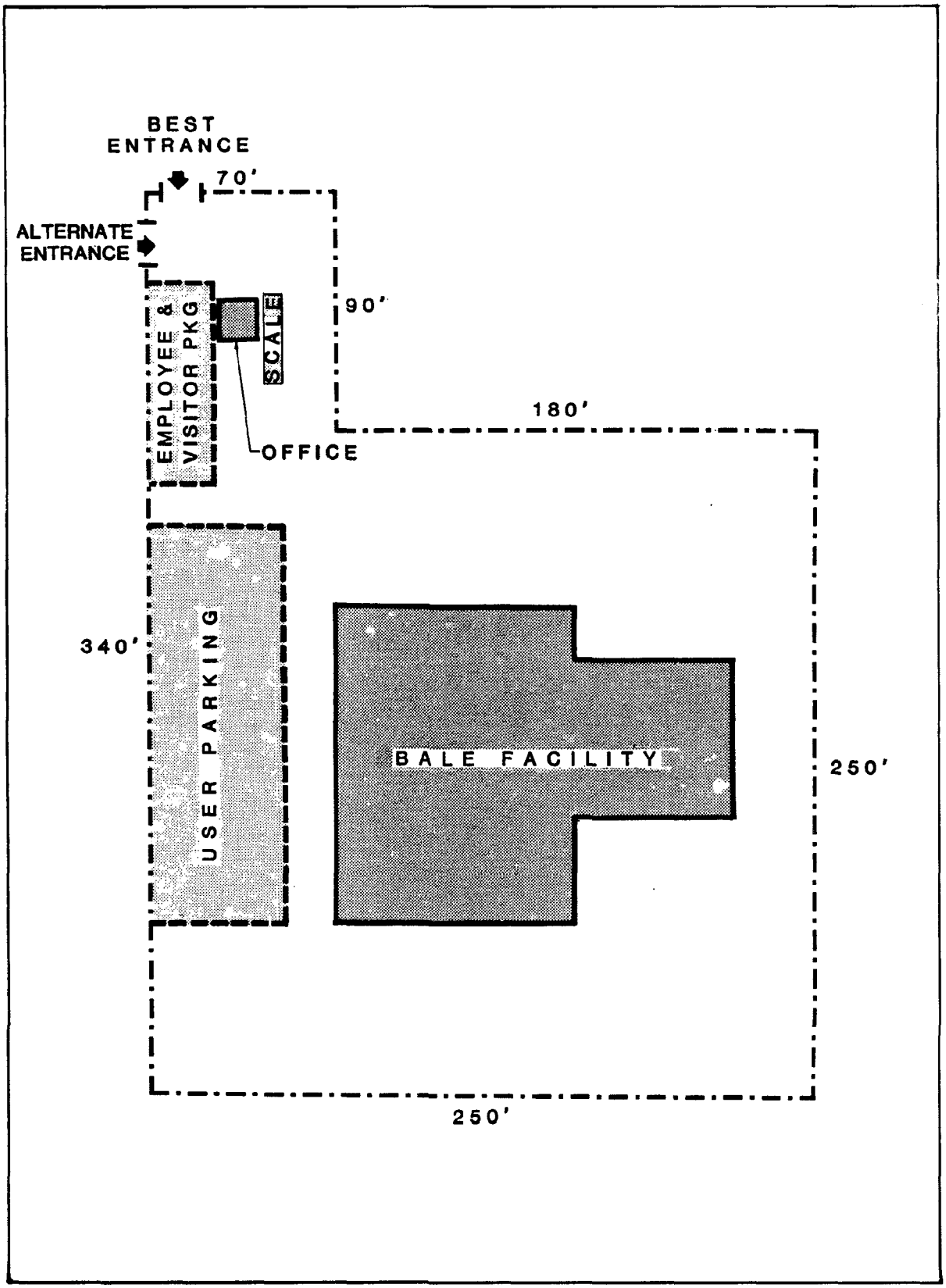
A. Construction Wastes

Bulky and heavy material from construction projects do not need to be baled prior to disposal. However, the material should be segregated and disposed of in a separate area of the landfill or at a different landfill site. Conventional landfill practices should be utilized for the disposal of bulky and heavy construction wastes. The area should be controlled, the materials compacted, and daily cover provided whenever the wastes can be either windblown or provide vermin harborage.

Land clearing wastes should be disposed of at a separate site. They are bulky, hard to compact and do not demand the same care in placement as do other types of wastes.

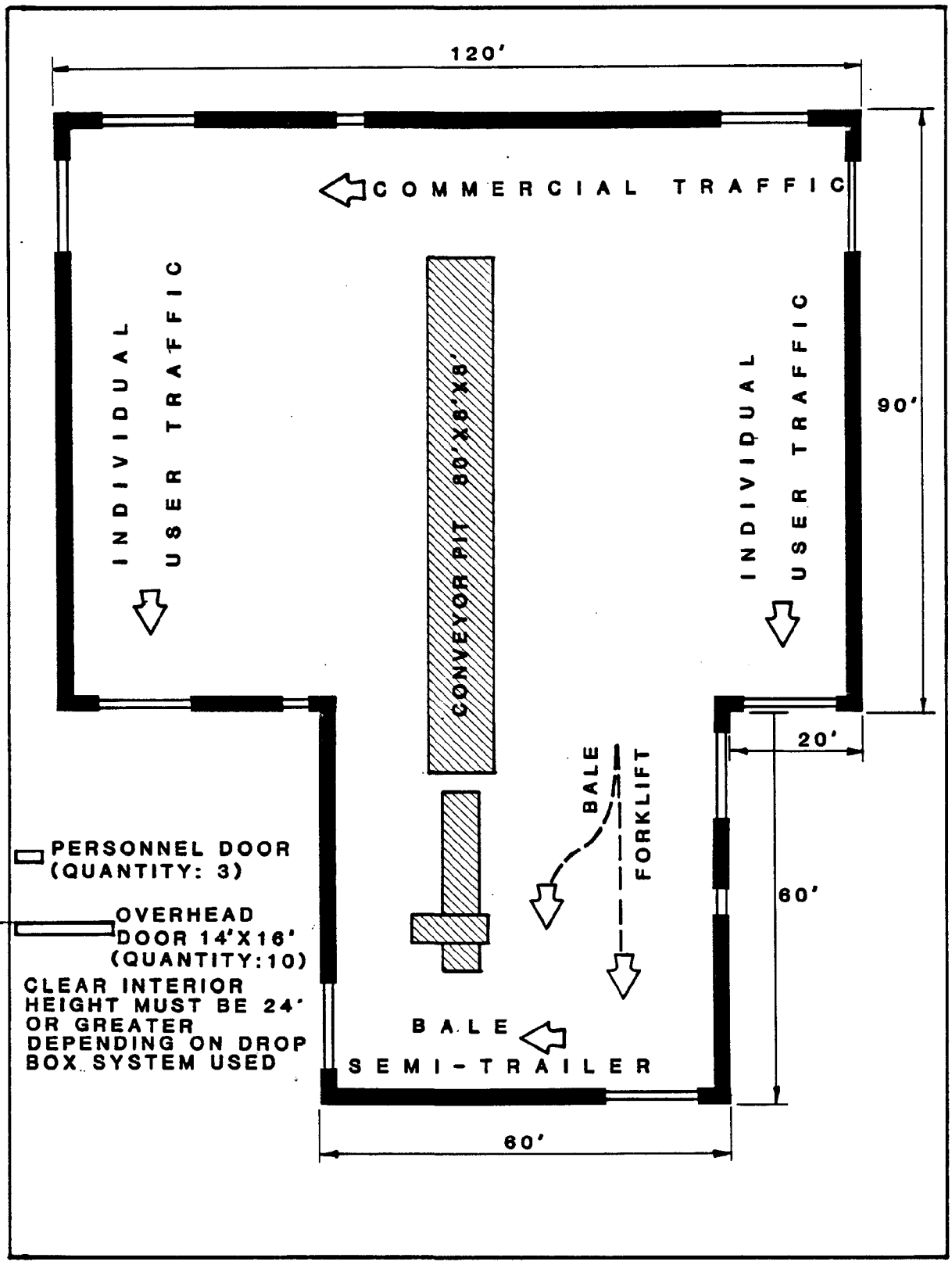
B. Junk Vehicles and Machinery

Any marketable scrap metal should be disposed of in that manner. Non-marketable junk vehicles and machinery should be disposed of in a designated area of the landfill or at a separate facility. They should be compressed as best possible with a dozer or other heavy machinery and then covered with dirt. Junk vehicles and machinery may create significant leachate problems if not handled properly including isolation from ground and surface waters. The sealant over this class of landfill is equally as important as the sealant over the bale fill. This subject is covered much more fully in Chapter 7.



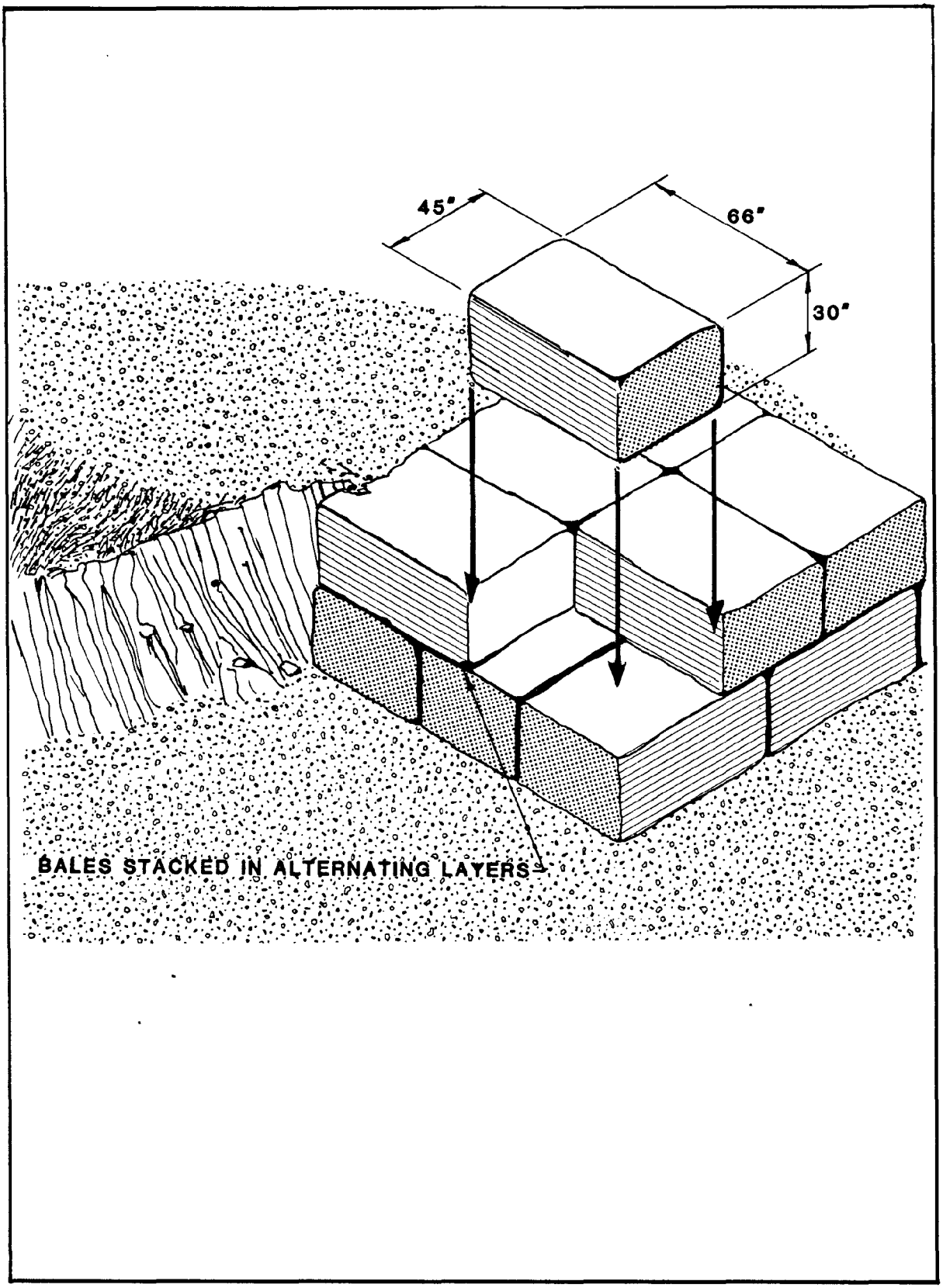
BALER FACILITY SITE PLAN

FIGURE 5-1



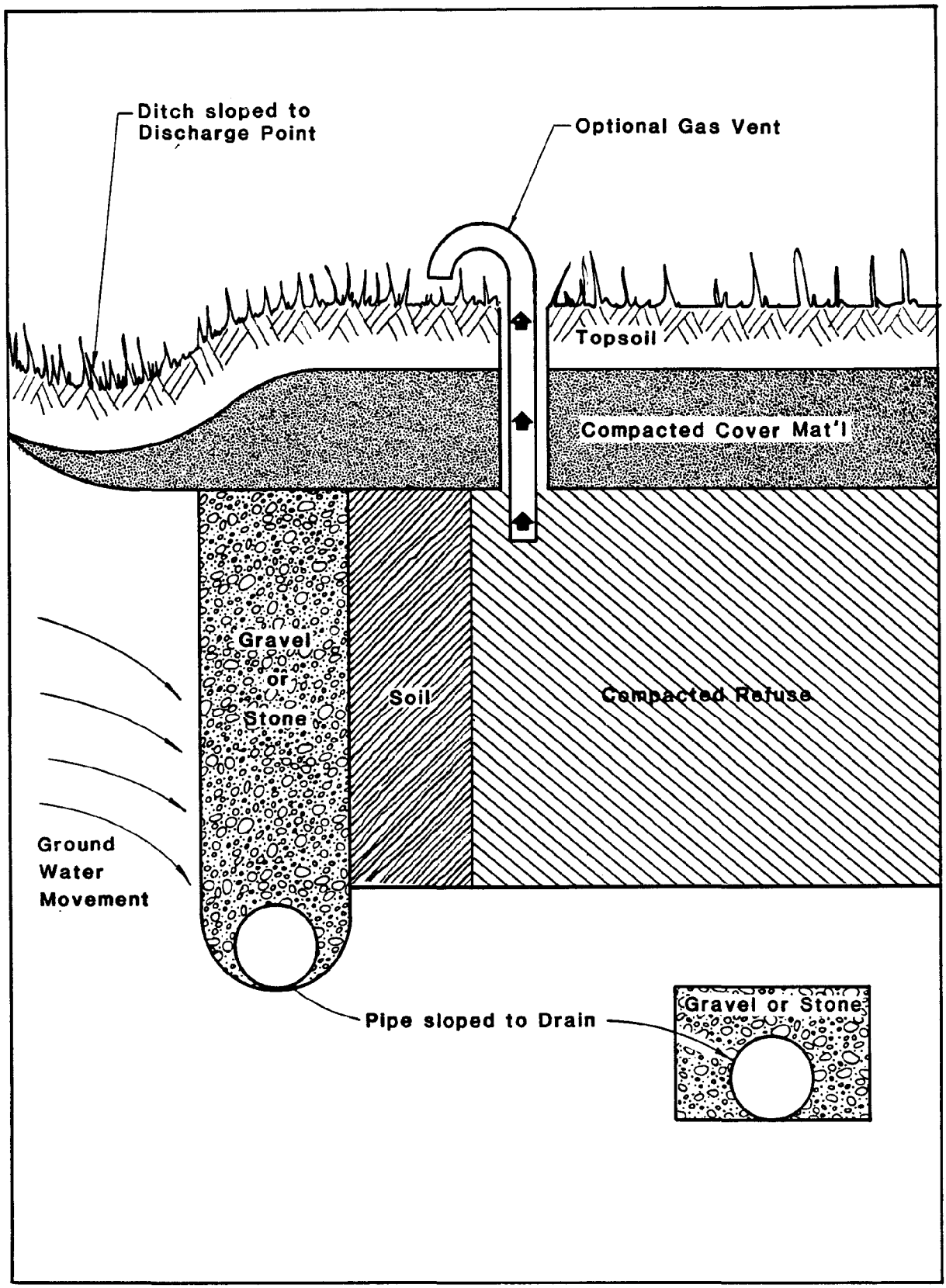
BALING FACILITY FLOOR PLAN

FIGURE 5-2



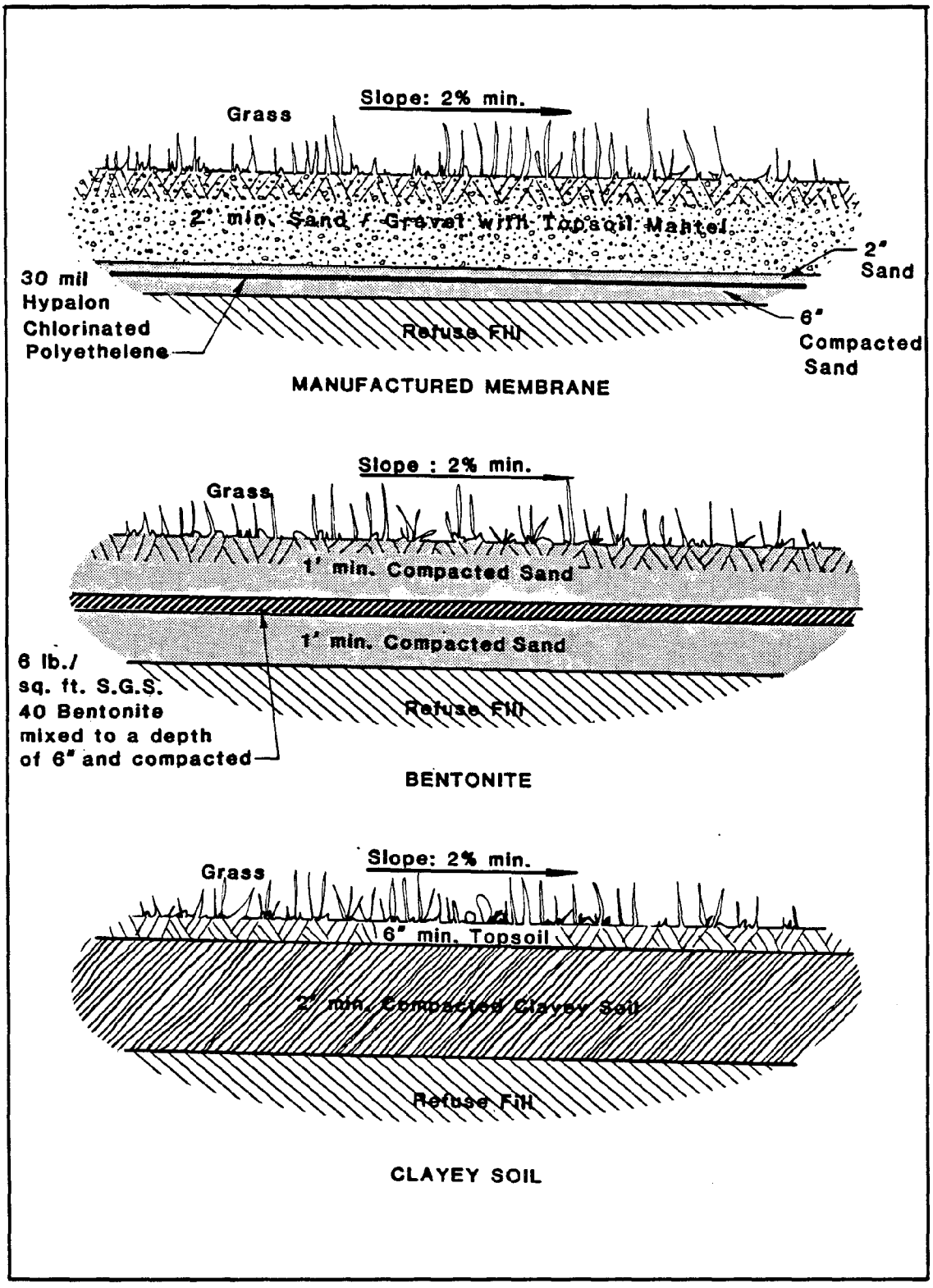
ALTERNATIVE STACKING

FIGURE 5-3



HIGH GROUND & SURFACE WATER CONTROL IN PERMIABLE SOIL

FIGURE 5-4



FINAL COVER ALTERNATIVES
FIGURE 5-5

CHAPTER 6

CHAPTER 6

SEWAGE SLUDGE DISPOSAL

I. INTRODUCTION

The City of Kodiak provides all the sewage treatment for the urban area, both in and outside the City. The sewage treatment plant is a secondary facility utilizing the activated biofilter process. Sludge is drawn from the main system and placed in an aerobic digester. The digested sludge is dewatered with a centrifuge. The City wastewater treatment staff has demonstrated that sludge having a solids concentration of 15 to 18% by weight can be produced by the centrifuge. However, the existing conveyor system cannot handle sludge at that thickness and the sludge must be diluted to convey it. The City is currently evaluating their alternatives at the Wastewater Plant. As related to sludge disposal, the City has four (4) major options for final disposal.

A. Outfall Disposal

The City might lime treat the digested sludge to disinfect it and then inject it into the outfall for disposal. This scheme has not been approved by either the ADEC or EPA. The approach does have considerable merit. It eliminates the cost of centrifuge processing and eliminates the need for sludge disposal at some on-shore facility.

B. Land Disposal

Land disposal could be attractive if the distance to suitable grassland were less. A one way haul distance of 40 miles substantially increases the cost of this alternative. However, the approach has not been eliminated by the City.

C. Landfill Disposal

Kodiak has a rainy climate. It certainly does not rain as much or as intensily as occurs in Southeast Alaska, but the climate is adverse to landfill disposal of sludge. In order to make sludge landfilling work, extreme care and precautions must be taken to assure that both ground and surface water are excluded from the fill. The landfill approach appears to be the least costly alternative if ocean disposal is outlawed.

D. Incineration

Sludge is basically water, even at a peak of 18% solids thickened condition, 82% of the weight is water. It takes a lot of energy to evaporate water, and that must occur before the organic solids in the sludge can burn. Sludge incineration may become the only game in town for the City of Kodiak and under those conditions the City fathers would have to give it serious consideration. Otherwise, it is not a serious contender from a cost standpoint.

In three of the City's options, the solid waste must be disposed of on land. The overall solid waste disposal program should consider the available options for solid waste disposal. Of the four City options, two require landfilling sludge or incinerator ash.

11. SEWAGE SLUDGE LANDFILLING

If the Kodiak area sewage sludge is to be landfilled, it must be done with extreme caution and done in a manor that avoids future problems. Sludge is mostly water and has a strong affinity to absorb more water if given the chance.

The Alaska Department of Environmental Conservation requires that special provisions be made for the landfilling of processed sewage sludge. The ADEC requires that the sludge be concentrated to a minimum of 15% solids. As stated in the Introduction to this Chapter, the City currently has the basic equipment to concentrate the sludge to the minimum level, however, the current plant configuration does not allow it to be delivered to a truck at that concentration. Furthermore, a centrifuge operating at 15 to 18% solids level may not consistently provide the 15% concentration level if conditions change. Other Alaska plants utilizing centrifuges only get 11 to 12% solids.

The City and Borough of Juneau Mendenhall Sewage Treatment Plant has the same treatment process as Kodiak. The Mendenhall system utilizes a belt filter for sludge dewatering instead of a centrifuge. They get 18 to 20% solids concentration and produce 9 to 10 cubic yards of sludge per day (7 days/wk) from a sewage treatment plant operating at 1 to 4 mgd depending on the weather. Kodiak can expect 6 to 10 cubic yards of dewatered sludge per day. Juneau currently operates a sludge landfill, but is considering going to land disposal. Their landfill utilizes a trench method and does not have positive surface sealing. Several points learned at the Juneau sludge landfill are:

A. Sludge (even at 15 to 18% solids) cannot be worked but must be placed carefully and covered with substantial quantities of binder material. Even with the binder material it cannot be traveled on with heavy trucks.

B. A trench method cannot be utilized, particularily not in a wet climate with tight soils around the trench. It is impossible to keep water out of the trench and the sludge becomes an impossible mud bath.

C. The top surface must be sealed, with surface and ground water being kept away from the sludge. If there is any chance of ground water coming up under the fill, the bottom must also be sealed.

Any leachate that is produced from a sewage sludge landfill can be expected to have a high BOD/COD strength and probably will require treatment. While there are heavy metals in sewage sludge, it is not anticipated that they would provide a problem serious enough to require physical-chemical treatment to remove them.

III. KODIAK PROGRAM

A. Baseline Conditions

The City must first decide what method of sludge processing and disposal best meets their needs. If the method is landfill disposal then this plan must provide the mechanism for implimentation. If it is ocean or land, the plan is not affected. If the City chooses incineration, the plan is only affected in a minor way. Ash would have to be disposed of.

The Kodiak solid waste plan presents two methods for landfilling. Both methods are discussed in Chapters 4 and 5 of this report. In Chapter 3 the various sites are discussed and the number of sites is narrowed down to three (3) sites for conventional landfill and three (3) for bale fill consideration.

The sites are:

1) Conventional Landfill:
   - Solone Creek Gunnery Range
   - Solone Creek on Borough Land
   - Swampy Acres

2) Bale Landfill
   - City of Kodiak Existing Landfill
   - Solone Creek Gunnery Range
   - Solone Creek on Borough Land

B. Kodiak Plan

While the City has not selected a method for sludge disposal, it is absolutely necessary that this plan addresses the procedures for sludge landfill so that it can be implimented if necessary.

The site and type of landfill practice selected for the Kodiak area will have bearing on the specific management method of sludge landfilling.

It is therefore necessary to consider two basic plans for landfilling sludge. In both cases, the plan must place primary importance on sealing the sludge away from the wet surrounding environment.

At 8 cubic yards of dewatered sludge per day, the community has 2,920 cubic yards per year to be concerned with. This represents 1/10 of an acre, six feet deep per year

For a number of reasons, it will be important to keep the sludge landfill completely separate from the general solid waste landfill.

Two options will be discussed. They are:

1) Both landfill operations at the same general site.
   If the community elects to use either of the Solone Creek sites, both the solid waste landfill and the sludge landfill should be located at the same general site. This allows for increased security plus joint use of equipment, manpower, and management services.

2) Landfill operations at separate sites.
   If the solid waste landfill is located at the City of Kodiak existing landfill or the Swampy Acres site, the sewage sludge landfill must be located elsewhere. Neither site is acceptable for a sewage sludge landfill operation.

The sewage sludge landfill must be constructed a certain way and be operated in a manner that assures that water will not enter the system. The two sites at Solone Creek have the necessary ingredients to allow effective landfill disposal

C. Construction Requirements

1) Bottom Seal. The bottom seal can be clay, tight silt, chlorinated polyethylene, or hypolon. The bottom seal must be continuous and durable enough to allow vehicles to travel on it.

2) Side berms must be provided to contain the sludge and protect it from erosion, sloughing, etc. The trench method of fill operation <u>can not</u> be utilized. Trouble is guaranteed if the trench method is tried. The bottom should slope to the sides and the side slope to a sump so that seepage can be collected and either ponded for treatment or discharged to surrounding land as land application disposal.

3) The fill must be completed as quickly as possible, therefore it is imperative that the facility be laid out so that segments, say on a weekly basis, can be closed out. Interim weather protection must be provided so that water will not get into the active fill. This can be provided by using a heavy duty chlorinated polyethylene sheet that later becomes the top sealer.

4) Top Seal. It is imperative that the top be sealed, therefore, a heavy duty chlorinated polyethylene cover should be provided. Along with the plastic cover, the final cover should be constructed to assure longevity. The facility manager is not going to want to go back in and make major repairs or worse yet have to redo substantial sections.

Items 1 through 4 can be adapted to an operation quite similar to earthen silo systems used in the farm country to produce silage. Figure 6-1 shows a prospective view of the construction approach recommended. Figure 6-2 shows sections of the bottom seal and the final cover with top seal.

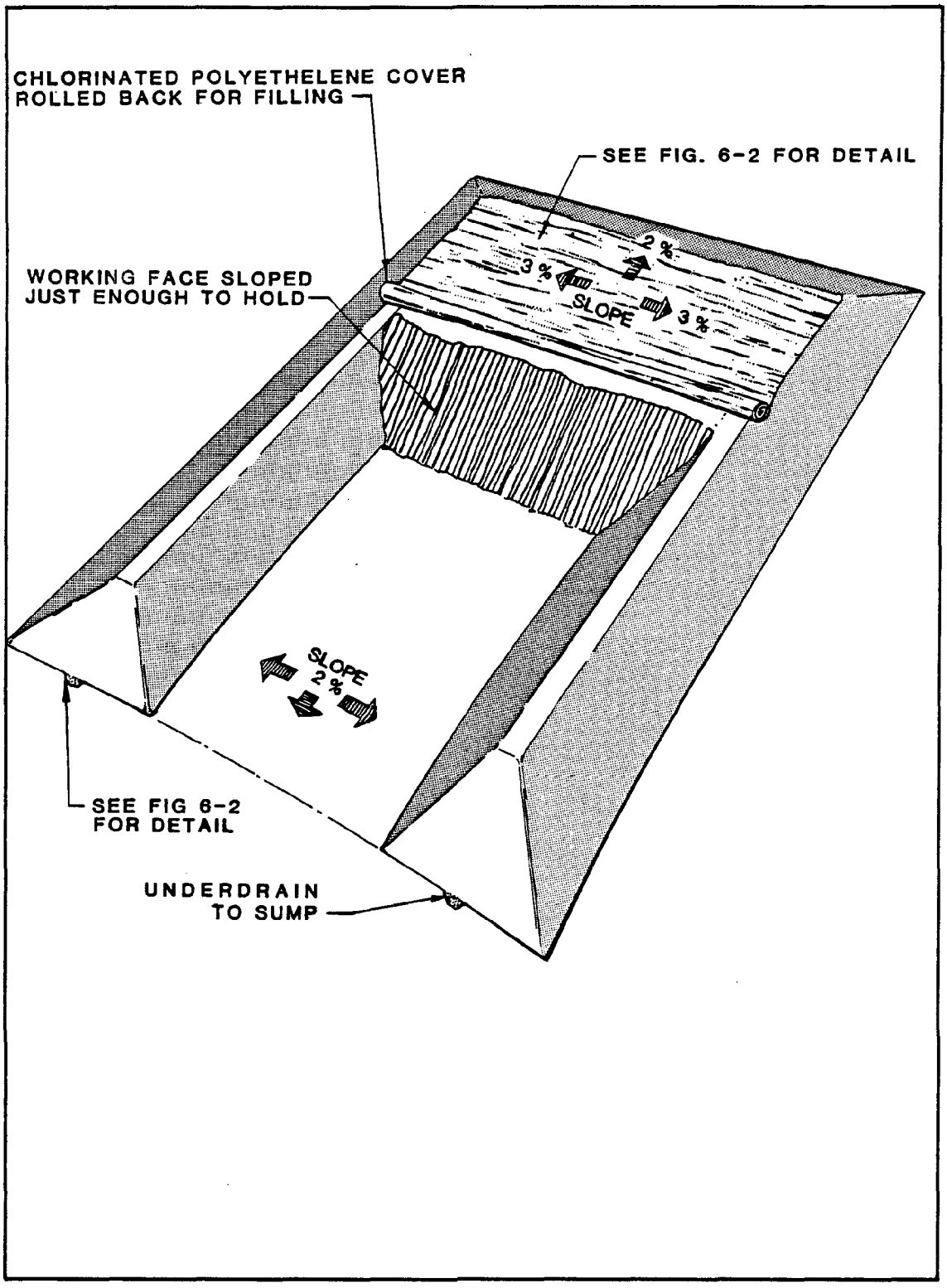
D. Operation Requirements

1) Water, both ground and surface, must be kept out of the active and completed sludge landfill.

2) The operation must be planned so that tractors or other vehicles do not run on the fill until the final cover is completed and then the traffic must be minimized.

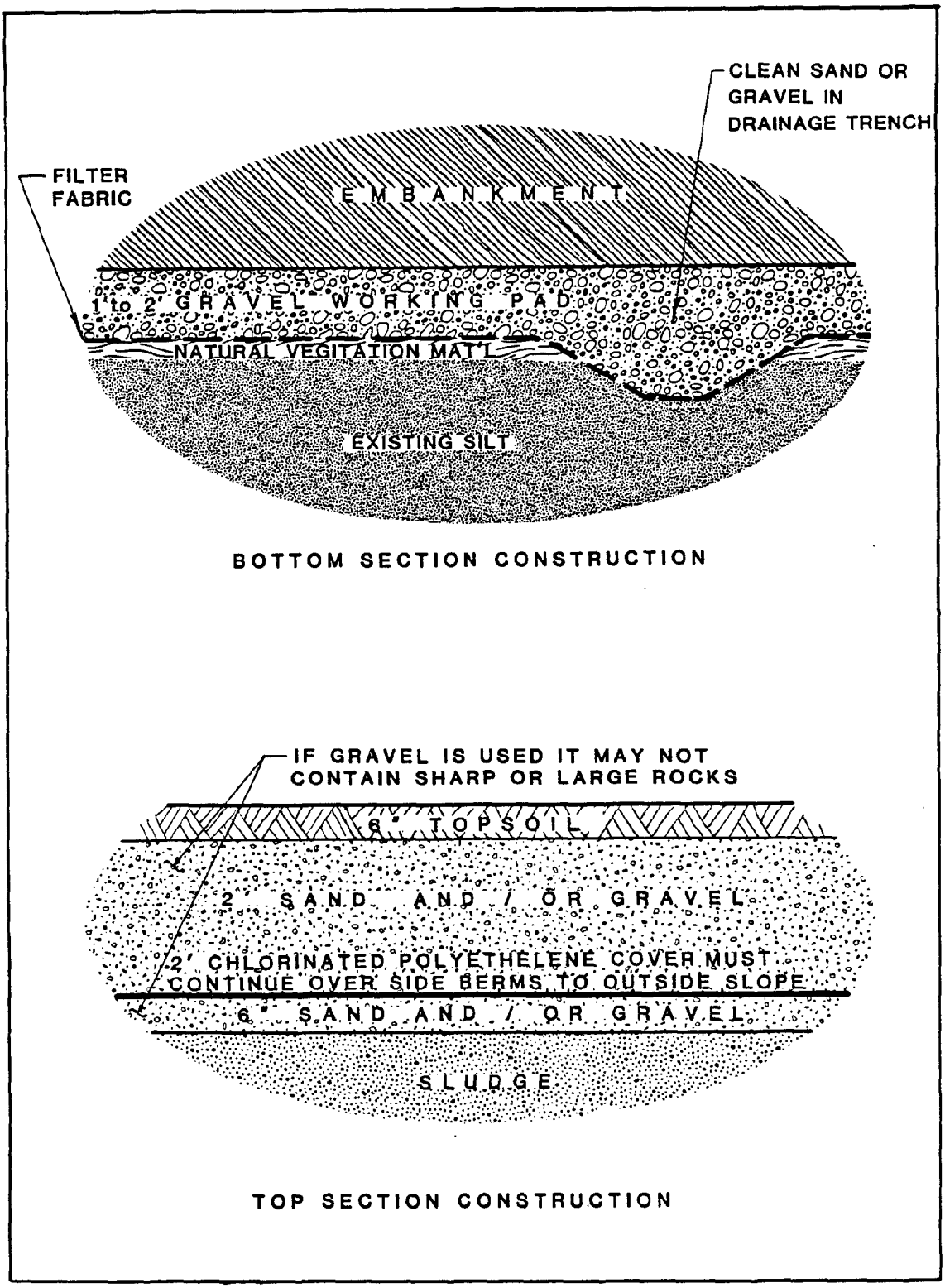
3) The active area or face of the landfill must be protected after each filling operation with a thin layer of dirt and a plastic cover.

These steps are important to insure a fill that creates a minimum of problems.



SLUDGE LANDFILL SILO

FIGURE 6-1



TOP & BOTTOM SECTION SCHEMATICS

FIGURE 6-2

CHAPTER 7

CHAPTER 7

JUNK AUTO AND SCRAP METAL DISPOSAL

I. INTRODUCTION

Kodiak Island's economy is heavily biased toward fishing and the fish processing industry. Tourism also has impact on the area. Government activities for various levels of government have major impact on the economy.

Kodiak Island's remoteness from the Alaska Transportation hub and Alaska's remoteness from the contiguous United States creates substantial difficulties for marketing recovered resources.

Except for high grade scrap, it has only been in the last few years that junk autos and scrap metal could be marketed successfully in the Anchorage area. The junk auto recycling business has historically had to be subsidized in the Greater Anchorage Area.

The Municipality of Anchorage has had an active program to recycle junk autos for more than ten years. The program has never been able to stand on its own financially. The Municipality of Anchorage currently pays ABC recycling $57.50 per vehicle ($75/vehicle for Girdwood). Not all the junk vehicles are towed at municipal expense. Vehicles brought in by private parties are priced according to value or cost for disposal depending on the vehicle.

Anchorage currently generates about 4000 to 6000 junk vehicles annually. At the current time, transportation to the Seattle market poses the major obstacle. Vehicles are bringing $50/ton with freight and handling costing $44/ton. Six dollars per ton is not enough margin for risk, handling and overhead, to say nothing about the costs of towing, storage, processing, and profit. It is obvious that freight alternatives are necessary if recycling of junk autos is to be viable.

II. KODIAK

The Kodiak Borough is currently developing a program for the disposal of junk autos. Borough planning has a grant from Environmental Conservation to initiate the program. As outlined by planning personnel, the program includes:

A. Identification and tagging of junk vehicles
B. Towing to impound areas
C. Impounding and storage
D. Sale if value exceeds $200.00
E. Processing
F. Salvage sale

The Borough is currently concentrating on the development of the mechanisms to take care of the first four items. At the present time, Kodiak Auto Wrecking (Smokey Stover) is taking care of getting the vehicles crushed. In the past, the vehicles have been buried on Borough land approximately one mile north of the City limits. Kodiak Auto Wrecking has recently arranged to have an auto crusher brought into Kodiak periodically to process the vehicles on hand. Mr. Stover believes that the market for junk autos will improve, that he can salvage enough value out of the vehicles, and that he can solve the transportation problems so that the Borough will not have to subsidize the operation once the vehicles are delivered to his facility.

Kodiak Auto Wrecking also handles other scrap metals. It appears that the junk auto and scrap metal disposal requirements may be minimized through the efforts of the Borough and Kodiak Auto Wrecking. In the event that salvage is totally impractical because of a depressed market, the community should have the means for disposal locally. There are three ways that the community can insure proper junk vehicle disposal. They are:

A. Subsidize the recycling as is currently done in Anchorage

B. Obtain a State permit to dispose of junk autos and non-marketable scrap at the same landfill as other community solid wastes. If this alternative is used, the landfill plan must recognize the need for special handling.

C. Provide a separate landfill for junk autos and non-marketable scrap metal. Any landfill must have a State permit to operate. In order to get a State permit, all of the steps, stipulations and requirements set forth in Chapter 4 are necessary.

According to Mr. Stover, the Greater Kodiak Area is currently producing 1 and one-half to two junk vehicles per day but the number can be expected to increase into the range of two to four per day. At two per day that represents 730 per year.

Each junk auto represents a crushed volume of four and one-half cubic yards. The annual volume is 3,285 yards of crushed autos plus twenty five percent for cover or a total of 4,100 cubic yards. This represents 0.85 acres three feet deep. A ten year accumulation of nearly three acres 10 feet deep can be expected if all junk vehicles must be disposed of locally. Obviously, the Borough should continue its efforts to encourage salvage and recycle. However, a contingency plan is always in order.

If the community intends to continue to utilize Kodiak Auto Wrecking and the existing junk vehicle landfill site, the operating agent for the overall solid waste disposal program should initiate steps to acquire State permits and develop all long range plans necessary to the landfill operation.

CHAPTER 8

CHAPTER 8
COST COMPARISONS

I. INTRODUCTION

Cost comparisons are developed in this chapter for six landfill systems. There are three conventional landfills and three balefills. They are:

A. Conventional Landfills

1. Solone Creek Gunnery Range
2. Solone Creek on Borough Land
3. Swampy Acres

B. Bale Landfills

1. City of Kodiak Existing Landfill
2. Solone Creek Gunnery Range
3. Solone Creek on Borough Land

The cost comparisons will involve three major cost categories. They are:

A. Capital Costs

1. Engineering, planning, and administration of construction.
2. Site development in preparation.
3. Any trenches, berms, pump stations, or other equipment necessary for leachate control

4. Environmental monitoring systems and wells.
5. Process systems costs
6. Transfer station costs
7. Transfer tractor and drop box costs
8. Landfill equipment costs.

B. Operation Costs

1. Manpower
2. Utilities
3. Equipment fuel and maintenance
4. Cover material and transportation
5. Sealer materials
6. Subsidy for wreck auto salvage
7. Equipment depreciation

C. Life cycle costs

1. Capital costs amortized over useful life.

2. Operation costs extended at net effective interest rates. (Actual Interest minus inflation)

3. Site closure costs required.

II. CONVENTIONAL LANDFILLS

Kodiak's rainy climate, wind and general lack of high quality cover material makes site selection complicated and the risks of unforeseen future operating costs high. In order to minimize those dangers, area fills with general mounding design, positive top surface seals, and curtain drain cutoff systems are recommended as appropriate to the particular area.

A. Solone Creek Gunnery Range

The gunnery range is generally a very good site. It has a foundation of silty soil, does not have a groundwater problem, and should allow long term operation without running into leachate control problems. The area is extremely flat with the exception of a man-made mound. The general site does have some area that will probably be classified as wetland, thus requiring Corps permit.

Critical Improvements:

1. Access road. There is approximately 1.6 miles of trail to the site that must be upgraded substantially to handle two way traffic safely.

2. Some site clearing will be required. It is minimal.

3. A peripheral drain must be provided and the landfill area should be isolated with a berm enclosure. The berm can serve several purposes, including drainage control, visual access, and wind blown litter reduction.

4. Initial cover supply. It is extremely important to have a one year cover supply at the site to assure that proper cover practices are initiated from the start.

5. Equipment specifically equipped for landfill operation.

6. A facility for equipment storage and maintenance.

7. Site security with a fence and locking gate.

8. Positive final cover seal.

Table 8-1 develops capital costs for the site.

Table 8-4 develops the operation costs for the site as a loose garbage landfill.

B. Solone Creek Borough Land

The Borough land recommended lies directly east of the Gunnery Range. It is a reasonable site, but does present more difficult conditions for development and operation than the Gunnery Range. Portions of the site will definitely fall in the wetlands category and require that a Corps permit be obtained.

Critical Improvements:

1. Access road. There is approximately 1.2 miles of trail to the site that must be upgraded substantially to handle two way traffic safely.

2. Approximately one half of the site will require clearing.

3. Peripheral drainage must be provided and the landfill are should be isolated with a berm enclosure. The berm can serve several purposes, including drainage control, visual access, and wind blown litter reduction,

4. Initial cover supply. It is extremely important to have a one year cover supply at the site to assure that proper cover practices are initiated from the start.

5. Equipment specifically equipped for landfill operation.

6. A facility for equipment storage and maintenance.

7. Site security with a fence and locking gate.

8. Positive final cover seal.

Table 8-2 develops the capital costs for this site when used as a conventional loose garbage landfill.

Table 8-4 develops the operation costs for the site as a loose garbage landfill.

C. Swampy Acres

The swampy acres site would have to be developed on the west and north side of the existing lake. The site will be the most difficult site to develop. Portions of the site will definitely fall in the wetlands category and require that a Corps permit be obtained.

Critical Improvements:

1. Access road. There is approximately one half mile of new road that will need to be developed.

2. Approximately two-thirds of the site will require clearing and preparation.

3. Peripheral drainage must be provided and the landfill area should be isolated with a berm enclosure. The berm serves for drainage control, visual access, and wind blown litter reduction.

4. Initial cover supply. It is extremely important to have a one year cover supply at the site to assure that proper cover practices are initiated from the start.

5. Equipment specifically equipped for landfill operation.

6. A facility for equipment storage and maintenance.

7. Site security with a fence.

8. Positive final cover seal.

Table 8-3 develops the capital costs for this site when used as a conventional loose garbage landfill.

Table 8-4 develops the operation costs for the site as a loose gatbage landfill.

III. BALER FACILITY

A. Baler Facility

The baler facility should be located in or on the edge of the City of Kodiak. One of the benefits of the facility will be its accessibility. The costs are generated based on the configuration recommended in Chapter 5. Table 8-6 gives the cost estimate.

B. Transfer Stations

In addition to the baler facility, drop box transfer stations should be considered for the area at the Coast Guard and the rural area of Bell Flats. A cost estimate will be developed and included.

All a transfer station amounts to is a site where a large 40 cubic yard trash box can be left for people to use. The site should have a bulkhead along side the trash box and a dirt and gravel approach ramp for the convenience of users.

More elaborate systems can be used including enclosed box and loading areas for user convenience, but they are not normally necessary. In Kodiak a basic metal structure that provides rain protection might make sense. The estimates in Table 8-5 are for both basic and enclosed transfer stations.

IV. BALE LANDFILLS

Kodiak's rainy climate, wind and general lack of high quality cover material all work to make a baling operation more attractive for Kodiak. One major area that has not and probably cannot be quantified in the cost estimates is the potential costs associated with the risks of unforeseen future operation costs. This is particularly true related to leachate treatment if it were to become necessary.

A. Renovation of City of Kodiak Existing Site

The existing site has a considerable number of good points, such as, visual isolation, wind protection, no wetlands, ease of environmental isolation and current public acceptance. It has one major detrimental factor. Cover material is not available in the area. The City has had to resort to shot rock for cover. Shot rock is a very poor cover because it does not seal the landfill.

Major Improvements Needed Are:

1. Some minor site clearing.

2. Rerouted surface drainage around the site.

3. Minor access road improvements.

4. Initial cover supply. It is extremely important to have a one year cover supply at the site to assure that proper cover practices are initiated from the start.

5. Existing site must be properly closed. First, the site must be properly prepared to serve as a foundation for a balefill and secondly by sealing it, the potential for leachate production is reduced.

6. Equipment specifically equipped for bale landfill operation.

7. A facility for equipment storage and maintenance.

8. Site security with fence where necessary and locking gate system.

9. Positive final cover seal.

Table 8-7 gives the capital costs for utilization of the existing City of Kodiak site. Table 8-10 gives the operation costs.

B. Solone Creek Gunnery Range

The pertinent conditions are the same as for a conventional landfill. See Table 8-8 for capital costs and Table 8-10 for operation costs.

C. Solone Creek Borough Land

The pertinent conditions are the same as for conventional landfill. See Table 8-9 for capital costs and Table 8-10 for operation costs.

V. LIFE CYCLE COSTS

All costs for the various options will be compared both on the Present Worth Basis and on the Annual Cost Basis. Each method has its good and bad points. The reader must remember that the cost comparisons do not factor in any State grant funds. Tables 8-11 and 8-12 give the costs summaries, present worth, and annualized costs.

A. Present Worth

In order for all calculations to be correct, the analysis must have the same life cycle or series of life cycles for all components of the system. In order to make the comparisons correct, the analysis has to be for a twenty year period, with replacement equipment figured into the series at the appropriate replacement years.

Using interest alone does not tell the whole story. Inflation caused the annual costs to increase with time. The growth of waste quantities disposed of annually also causes annual costs to grow. When replacement components must be figured in at a future time, the cost of inflation is off-set by the savings in interest that is not needed until the replacement time occurs. The net rate equals 13% interest minus 8% inflation for a net rate of 5%

B. Annual Costs

Again for all costs to be comparable, the basis of the comparison must be the same. All capital costs are depreciated at the net rate difference between inflation and interest. The net rate is 13% interest minus 8% inflation for a net rate of 5%.

C. Junk Auto Disposal

The Borough is initiating a program for the disposal of junk autos. Currently the program depends primarily on a local salvage operator for its existence.

In the future, the community has a high probability of having to subsidize the disposal. Anchorage pays $57.50 per vehicle in subsidy. It is projected that Kodiak will pay $60.00 per vehicle.

TABLE 8-1

CAPITAL COST ESTIMATE
CAPITAL LOOSE GARBAGE LANDFILL
APRIL 1982

Solone Creek Gunnery Range

Prepare 20 Acre Site - 10 year life: Secure 40 acres plus 15 acres along ridge for cover material borrow pit.

1.	Site Clearing and Access		$ 22,000
2.	Access Road (1.6 miles of road)		$ 784,000
3.	Enclosing Berm 28,000 cu. yd. @ $5.75/yd.^{3}		$ 161,000
4.	1 year cover supply 10,000 cu. yd. @ $11.50/yd.		$ 115,000
5.	30 mil chlorinated polyethlene cover material 98,000 ft.^{2} @ $1.50/ft.^{2}		$ 147,000
6.	Signs		$ 7,000
7.	Fence 3400 feet @ 20/ft.		$ 68,000
8.	Engineering		$ 60,000
9.	Monitor Wells (3 @ 500 ea.)		$ 15,000
10.	Equipment Building Storage 1000 ft.^{2} @ $70/ft.		$ 70,000
		SUBTOTAL	$1,449,000
11.	Contingency (15%)		$ 217,000
	4/1982 Cost Estimate Total (Capital)		$1,666,000
12.	Landfill 977 Cat 4 in 1 Bucket		$ 192,000
13.	6 x 6 Truck (10 yd.)		$ 87,000
	4/19/82	SUBTOTAL	$1,945,000
14.	Land - 40 acres at $6000/acre (Borough owns the land where cover must be obtained).		$ 240,000
		TOTAL	$2,185,000

TABLE 8-2

CAPITAL COST ESTIMATE
LOOSE GARBAGE LANDFILL
APRIL 1982

Solone Creek (Borough Land)

Prepare 20 Acres Site - 10 year life; Secure 40 acres plus 15 acres along ridge for cover material borrow pit.

1.	Site Clearing	$ 56,000
2.	Access Road Improvements (1.2 mi. of road)	$ 588,000
3.	Filter Fabric Installation Material 80¢/yd.^{2} Installation 80¢/yd.^{2} $1.60/yd. (10) (43,560)/9	$ 78,000
4.	1 Foot of sandy gravel fill over 10 acres 16,000 cu. yd. @ $11.50/yd^3	$ 184,000
5.	Enclosing Berm 28,000 cu. yd. @ $5.75/yd^3	$ 161,000
6.	1 year cover supply 10,000 cu. yd. @ $11.50/yd	$ 115,000
7.	30 mil chlorinated polyethlene cover material 98,000 ft.^{2} @ $1.50/ft^2	$ 147,000
8.	Signs	$ 7,000
9.	Fence 3400 feet @ $20/ft.	$ 68,000
10.	Engineering	$ 60,000
11.	Monitor Wells (3 @ 5000 ea.)	$ 15,000
12.	Equipment Storage Building 1000 ft.^{2} @ $70/ft.	$ 70,000
	SUBTOTAL	$1,549,000
13.	Contingency (15%)	$ 230,000
	4/19/82 Cost Estimate Total (Capital)	$1,779,000
14.	Landfill 977 Cat 4 in 1 Bucket	$ 192,000
15.	6 x 6 Truck (10 yd.)	$ 87,000
	4/19/82 TOTAL	$2,058,000

TABLE 8-3

CAPITAL COST ESTIMATE
LOOSE GARBAGE LANDFILL
APRIL 1982

Swampy Acres

Prepare 20 Acre Site - 10 year life; Secure 40 acres plus 15 acres on Borough land for cover material borrow pit. (The alternate borrow appears to be Bell Flats area).

1.	Site Clearing and Access	$ 84,000
2.	Access Road	$ 392,000
3.	Filter Fabric Installation Material 80¢/yd.^{2} Installation 80¢/yd^2 $1.60/yd. (20) (435,60)/9	$ 155,000
4.	1 Foot of sandy gravel fill 32,280 cu. yd. @ $16.80/yd.^{3}	$ 542,000
5.	Enclosing berm 28,000 cu. yd. @ $5.75/yd^3	$ 161,000
6.	Curtain drain drainage channel coarse rock, filter cloth & cover in 6' deep trench - 2000 ft. @ $58/ft.	$ 116,000
7.	1 year cover supply 10,000 cu. yd. @ $16.80/yd.	$ 168,000
8.	30 mil chlorinated polyethlene cover material 98,000 ft.^{2} @ $1.50/ft.^{2}	$ 147,000
9.	Signs	$ 7,000
10.	Fence 3400 feet @ $20/ft.	$ 68,000
11.	Engineering	$ 48,000
12.	Monitor Wells (3 @ 5000 ea.)	$ 15,000
13.	Equipment Storage Building	$ 70,000
	SUBTOTAL	$1,973,000
14.	Contingency (15%)	$ 294,000
	4/1982 Cost Estimate (Capital)	$2,267,000
15.	Landfill 977 Cat 4 in 1 Bucket	$ 192,000
16.	6 x 6 Truck (10 yd.)	$ 87,000
	6/1981 TOTAL	$2,546,000

Site Availability dependent upon Federal and State government land transfers.

TABLE 8-4

ANNUAL OPERATION COSTS
LOOSE GARBAGE LANDFILL OPTIONS
APRIL 1982

Personnel	
1 Operator Manager	$ 47,000
1 Laborer Part-time	$ 13,000
Equipment Maintenance, Fuel, Oil, Etc.	$ 62,400
977 Track Loader - Compactor	
4 hrs/day; 6 days/wk @ $50/hr	
6 x 6 Truck Expenses	$ 30,000/yr.
SUBTOTAL	$ 152,400

VARIABLE ANNUAL COSTS
LOOSE GARBAGE LANDFILLS

ITEM	SOLONE CREEK GUNNERY RANGE	SOLONE CREEK BOROUGH LAND	SWAMPY ACRES
Monitoring Tests	$ 1,500	$ 1,500	$ 1,500
Cover Material	$ 30,000	$ 30,000	$ 60,000
CPE Seal Cover $ft.^2$ ($1.50/$ft.^2$)	---	----	----
Surface Drain Pipe	$130,000	$130,000	$130,000
Variable Cost Subtotals	$161,500	$161,500	$191,500
Fixed Cost Subtotals	$152,400	$152,400	$152,400
Operation Cost Totals	$313,900	$313,900	$343,900

TABLE 8-5

TRANSFER STATION COST ESTIMATE

Basic Station:	
Bulkhead 6' x 40'	$ 7,500
Wing Wall Tie Backs	$ 4,000
Guard Rails	$ 3,000
270 cu. yds. at $25/yd^3	$ 6,800
40 cu. yd. drop boxes (2)	$ 8,000
Miscellaneous	$ 3,000
Engineering	$ 2,000
Contractor Mark-Up 15%	$ 4,800
Basic Sation SUBTOTAL	$ 39,100
Contingency	$ 5,900
TOTAL	$ 45,000
Basic Station Plus Metal Weather Closure:	
Basic Station	$ 39,100
Building @ $35/ft.^{2} (16 x 45)	$ 25,200
Basic Station with Weather Enclosure SUBTOTAL	$ 64,300
Contingency	$ 9,700
TOTAL	$ 74,000

TABLE 8-6

BALING SYSTEM COST ESTIMATE

Building	$ 830,000
Mechanical & Electrical	$ 83,000
Conveyor Pit	$ 60,000
Installation	$ 46,000
Bailer	$ 248,000
Conveyor	$ 126,000
Site Work	$ 84,000
Contractor 1,477,000 (0.15)	$ 222,000
Front End Loaders	$ 42,000
1 Semi-Tractor Trailer	$ 79,000
Engineering	$ 80,000
SUBTOTAL	$ 1,900,000
Contingency (15%)	$ 285,000
4/ 1982 TOTAL	$ 2,185,000

TABLE 8-7

CAPITAL COST ESTIMATE
BALED GARBAGE LANDFILL
APRIL 1982

Renovation of Existing City of Kodiak Landfill - 10 years plus life secure 10 acres of Borough land for cover material borrow pit.

1.	Drainage Diversion	$ 75,000
2.	Cover Existing Fill 1½ over 5 acres (12,100 yd. 3 @ $28/yd.)	$ 338,000
3.	1 year Cover Supply 1.700 cu. yd. @ $28/yd.	$ 48,000
4.	30 mil chlorinated polyethlene cover material 49,000 ft.^{2} @ $1.50/ft.	$ 74,000
5.	Signs	$ 4,000
6.	Fence 1,200 ft. @ $20/ft.	$ 24,000
7.	Engineering	$ 40,000
8.	Monitor Wells (3 @ 5000/ea.)	$ 15,000
9.	Equipment Storage Building 600 ft.^{2} @ $70/ft.	$ 42,000
	SUBTOTAL	$ 660,000
10.	Contingency (15%)	$ 97,000
	SUBTOTAL	$ 757,000
11.	10 yard 4 x 6 Dump Truck	$ 60,000
12.	End loader w/forklift & blade	$ 60,000
	4/1982 COST ESTIMATE	$ 877,000

TABLE 8-8

CAPITAL COST ESTIMATE
BALED GARBAGE LANDFILL

Solone Gunnery Range; Secure 30 acres plus 15 acres along ridge for cover material borrow pit.

Prepare 10 Acre Site - 10 year life

1.	Site Clearing		$ 11,000
2.	Access Road (1.6 miles of road)		$ 784,000
3.	1 year cover supply 1.700 cu. yd. @ $10/yd^3		$ 17,000
4.	30 mil chlorinated polyethlene cover material 49,000 ft.^{2} @ $1.50/ft.		$ 74,000
5.	Signs		$ 7,000
6.	Fence 1700 ft. @ $20/ft.		$ 34,000
7.	Engineering		$ 60,000
8.	Monitor Wells (3 @ 5000/ea.)		$ 15,000
9.	Equipment Storage Building 600 ft.^{2} @ $70/ft.		$ 42,000
		SUBTOTAL	$1,044,000
10.	Contingency (15%)		$ 154,000
		SUBTOTAL	$1,198,000
11.	10 yard 4 x 6 Dump Truck		$ 60,000
12.	End loader w/forklift & blade		$ 60,000
		SUBTOTAL	$1,318,000
13.	Land - 30 Acres @ $6000/Acre (Borough owns the land where cover must be obtained).		$ 180,000
		TOTAL	$1,498,000

TABLE 8-9

CAPITAL COST ESTIMATE
BALED GARBAGE LANDFILL

Solone Creek on Borough Land; Secure 30 acres plus 15 acres along ridge for cover material borrow pit.

Prepare 10 Acre Site - 10 years life

1.	Site Clearing		$ 28,000
2.	Access Road Improvements (1.2 mi. of road)		$ 588,000
3.	Filter Fabric Installation 24,200 sq. yd. @ $1.60		$ 39,000
4.	1 foot sandy gravel fill 8,000 cu. yd. @ $11.50/yd.^{3}		$ 92,000
5.	1 year cover supply 1,700 cu. yd. @ $10/yd.^{3}		$ 17,000
6.	30 mil chlorinated polyethlene cover material 49,000 ft.^{2} @ $1.50/ft.		$ 74,000
7.	Signs		$ 7,000
8.	Fence		$ 34,000
9.	Engineering		$ 60,000
10.	Monitor Wells (3 @ 5000/ea.)		$ 15,000
11.	Equipment Storage Building 600 ft.^{2} @ $70/ft.		$ 42,000
		SUBTOTAL	$ 996,000
12.	Contingency (15%)		$ 147,000
		SUBTOTAL	$1,143,000
13.	10 yard 4 x 6 Dump Truck		$ 60,000
14.	End loader w/forklift & blade		$ 60,000
	4/1982	TOTAL	$1,263,000

TABLE 8-10

ANNUAL OPERATION COSTS
BALING FACILITY AND LANDFILL OPERATION
APRIL 1982

Personnel		
1 Operation Manager		$ 47,000
1 Operator		$ 40,000
Equipment Maintenance, Fuel, Oil, Etc.		
2-930 Loaders		
4 hrs./day; 6 days/wk @ $20.00/hr.		$ 25,000
Long Flat Bed Truck Expenses		$ 8,000
SWD - 2 Wire Tie Baler		
Operation 2 hrs./day		
General Maintenance		$ 8,000
Dump Truck 4 x 6		$ 10,000
Power		$ 10,000
Wire		$ 4,000
Building Expenses $800/Mo.		$ 10,000
	SUBTOTAL	$ 162,000

VARIABLE ANNUAL OPERATION COSTS
BALING FACILITY AND LANDFILL

ITEM	SOLONE CREEK GUNNERY RANGE	SOLONE CREEK BOROUGH LAND	EXISTING CITY SITE
Cover Material	$ 5,000	$ 5,000	$ 20,000
Chlorinated Polyethlene Cover Seal 32,000 @ $1.50	$ 48,000	$ 48,000	$ 48,000
Variable Cost Subtotals	$ 53,000	$ 53,000	$ 68,000
Fixed Cost Subtotals	$162,000	$162,000	$162,000
Operation Cost Totals	$215,000	$215,000	$230,000

TABLE 8-11

COST SUMMARY

	CAPITAL COST	OPERATION COST
Conventional Landfills		
A. Solone Creek Gunnery Range	$ 2,185,000	$ 313,900
B. Solone Creek Borough Land	$ 2,058,000	$ 313,900
C. Swampy Acres	$ 2,546,000	$ 343,900
Transfer Station Per Station w/Shelter	$ 64,300	--
Baler Facility	$ 2,185,000	-- ①
Baled Landfills		
A. Renovation of Existing City of Kodiak Landfill	$ 877,000	$ 230,000
B. Solone Creek Gunnery Range	$ 1,498,000	$ 215,000
C. Solone Creek on Borough Land	$ 1,263,000	$ 215,000

① In Landfill Operation Costs

TABLE 8-12

COST COMPARISON

	CONVENTIONAL LANDFILL			BALEFILL		
SITE	SOLONE CREEK GUNNERY RANGE	SOLONE CREEK BOROUGH LAND	SWAMPY ACRES	RENOVATION CITY LANDFILL	SOLONE CREEK GUNNERY RANGE	SOLONE CREEK BOROUGH LAND
PRESENT WORTH						
Capital	2,185,000	2,058,000	2,546,000	3,122,000	3,683,000	3,448,000
Operation	6,278,000	6,278,000	6,878,000	4,600,000	4,300,000	4,300,000
Replacement	171,000	171,000	171,000	148,000	148,000	148,000
TOTAL PRESENT WORTH	8,634,000	8,507,000	9,595,000	7,870,000	8,131,000	7,896,000
ANNUALIZED COSTS						
Capital	175,300	165,100	204,300	250,500	295,500	276,700
Operation	313,900	313,900	343,900	230,000	215,000	215,000
Replacement	22,200	22,200	22,200	19,200	19,200	19,200
Junk Auto Subsidy	44,000	44,000	44,000	44,000	44,000	44,000
TOTAL ANNUALIZED COSTS	555,400	545,200	614,400	543,700	573,700	554,900

CHAPTER 9

Leachate Study of Kodiak Landfill

Discussion

City of Kodiak Landfill
Leachate Sampling Analysis

November 12, 1981

On November 12, 1981 leachate samples were collected from the City Landfill located off Monaska Bay Road. Heavy rainfall was recorded for several days prior to sampling and water was noted standing in many areas when samples were collected.

Nine sampling locations were selected to obtain data from the site and creeks in the adjacent area. The locations are shown on the attached aerial photograph.

Also attached are the results of the leachate samples and the maximum contaminant concentrations allowed by the State of Alaska according to Mr. Carl Harmon. It is noted that most of the test results closely correlate with those specified by Mr. Harmon. Additional tests are included beyond those specified, however, tests for fluoride and nitrates were not performed on the samples in addition to organic, physical and radioactive contaminants. The laboratory used cannot measure mercury below 0.05 ppm and the State requires no more than 0.002 ppm. Similarily, selenium concentrations cannot be analyzed below 0.05 ppm with 0.01 ppm being the requirement. In all samples collected, the mercury and selenium concentrations were found to be less than 0.05 ppm.

Samples 1, 2, and 3 were taken from R-25 creek, just north of the landfill. At location #1 (above the landfill) the sodium concentration was 6.6 ppm. At location #2 (adjacent to the landfill) the concentration increased to 8.2 ppm while downstream at location #3 the results were 8.5 ppm. Iron was 0.09 ppm at location #1, 0.03 ppm at site #2 and 0.23 ppm downstream at site #3. A total increase of 1.9 ppm of sodium and 0.21 ppm of iron could be caused by the landfill.

Samples 4,5, and 6 were taken from the small creek that flows through the landfill. Iron was found to be over the required level (0.03 ppm) upstream from the landfill at site #4 (0.48 ppm) and increased to 0.53 ppm at site #5. Below the landfill at location #6 the concentration was 0.38 ppm of iron. Manganese results from this creek increased from 0.05 ppm upstream to 1.2 ppm below the landfill. Sodium concentrations increased substantially from 10.0 ppm at location #4 to 110 ppm at location #6. The State requirement is 250 ppm.

Samples 7, 8, and 9 were collected adjacent the landfill to the east and were staked for future reference. At location #8 iron was found to be 0.57 ppm over the State requirement of 0.3 ppm. At location #7 manganese was 0.16 ppm over the 0.05 ppm requirement. Soldium was slightly different at each site but was well within the desired level.

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ANALYTICAL REPORT

CUSTOMER Arctic Environmental Engineers SAMPLE LOCATION: —

DATE COLLECTED — TIME COLLECTED: —

SAMPLED BY — SOURCE 1

REMARKS

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RECVD BY GY LAB # 9487-1
DATE RECEIVED 11-17-81
DATE COMPLETED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag,Silver	<0.05	[]P,Phosphorous	<0.05	[]Cyanide	
[]Al,Aluminum	<0.05	[]Pb,Lead	<0.05	[]Sulfate	
[]As,Arsenic	<0.05	[]Pt,Platinum	<0.05	[]Phenol	
[]Au,Gold	<0.05	[]Sb,Antimony	<0.05	[]Total Dissolved Solids	
[]B,Boron	<0.05	[]Se,Selenium	<0.05	[]Total Volatile Solids	
[]Ba,Barium	<0.05	[]Si,Silicon	3.5	[]Suspended Solids	18
[]Bi,Bismuth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
[]Ca,Calcium	3.8	[]Sr,Strontium	<0.05	[]Hardness as $CaCO_3$	
[]Cd,Cadmium	<0.01	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co,Cobalt	<0.05	[]W,Tungsten	<1	[]	
[]Cr,Chromium	<0.05	[]V,Vanadium	<0.05	[]	
[]Cu,Copper	<0.05	[]Zn,Zinc	<0.05	[] COD	10
[]Fe,Iron	0.09	[]Zr,Zirconium	<0.05	[]	
				* * * * * *	
[]Hg,Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K,Potassium	0.8	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg,Magnesium	1.2	[]Nitrate-N		[]Turbidity NTU	
[]Mn,Manganese	<0.05	[]Nitrite-N		[]Color Units	
[]Mo,Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	0
[]Na,Sodium	6.6	[]Chloride		[]	
[]Ni,Nickel	<0.05	[]Fluoride		[]	

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DATE RECEIVED 11-17-81
DATE COMPLETED 11-20-81
DATE REPORTED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag, Silver	<0.05	[]P, Phosphorous	<0.05	[]Cyanide	
[]Al, Aluminum	0.33	[]Pb, Lead	<0.05	[]Sulfate	
[]As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
[]Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
[]B, Boron	<0.05	[]Se, Selenium	<0.05	[]Total Volatile Solids	
[]Ba, Barium	<0.05	[]Si, Silicon	4.0	[]Suspended Solids	35
[]Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	4.1	[]Sr, Strontium	<0.05	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
[]Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[]	
[]Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] ~~COD~~	~~16~~
[]Fe, Iron	0.30	[]Zr, Zirconium	<0.05	[]	
				* * * * * *	
[]Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K, Potassium	1.3	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	1.3	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	<0.05	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	8.2	[]Chloride		[]	
[]Ni, Nickel	<0.05	[]Fluoride		[]	

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DATE COMPLETED 11-20-81
DATE REPORTED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag,Silver	<0.05	[]P,Phosphorous	<0.05	[]Cyanide	
[]Al,Aluminum	0.28	[]Pb,Lead	<0.05	[]Sulfate	
[]As,Arsenic	<0.05	[]Pt,Platinum	<0.05	[]Phenol	
[]Au,Gold	<0.05	[]Sb,Antimony	<0.05	[]Total Dissolved Solids	
[]B,Boron	<0.05	[]Se,Selenium	<0.05	[]Total Volatile Solids	
[]Ba,Barium	<0.05	[]Si,Silicon	4.0	[]Suspended Solids	36
[]Bi,Bismuth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
[]Ca,Calcium	4.1	[]Sr,Strontium	<0.05	[]Hardness as $CaCO_3$	
[]Cd,Cadmium	<0.01	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co,Cobalt	<0.05	[]W,Tungsten	<1	[]	
[]Cr,Chromium	<0.05	[]V,Vanadium	<0.05	[]	
[]Cu,Copper	<0.05	[]Zn,Zinc	<0.05	[] COD	16
[]Fe,Iron	0.23	[]Zr,Zirconium	<0.05	[]	
				* * * * * *	
[]Hg,Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K,Potassium	1.4	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg,Magnesium	1.3	[]Nitrate-N		[]Turbidity NTU	
[]Mn,Manganese	<0.05	[]Nitrite-N		[]Color Units	
[]Mo,Molybdenum	0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	27
[]Na,Sodium	8.5	[]Chloride		[]	
[]Ni,Nickel	<0.05	[]Fluoride		[]	

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DATE COMPLETED 11-20-81
DATE REPORTED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag,Silver	<0.05	[]P,Phosphorous	<0.05	[]Cyanide	
[]Al,Aluminum	0.13	[]Pb,Lead	<0.05	[]Sulfate	
[]As,Arsenic	<0.05	[]Pt,Platinum	<0.05	[]Phenol	
[]Au,Gold	<0.05	[]Sb,Antimony	<0.05	[]Total Dissolved Solids	
[]B,Boron	<0.05	[]Se,Selenium	<0.05	[]Total Volatile Solids	
[]Ba,Barium	<0.05	[]Si,Silicon	4.6	[]Suspended Solids	23
[]Bi,Bismuth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
[]Ca,Calcium	10	[]Sr,Strontium	0.07	[]Hardness as $CaCO_3$	
[]Cd,Cadmium	<0.01	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co,Cobalt	<0.05	[]W,Tungsten	<1	[]	
[]Cr,Chromium	<0.05	[]V,Vanadium	<0.05	[]	
[]Cu,Copper	<0.05	[]Zn,Zinc	<0.05	[] COD	20
[]Fe,Iron	0.48	[]Zr,Zirconium	<0.05	[]	
				* * * * * *	
[]Hg,Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K,Potassium	1.0	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg,Magnesium	1.8	[]Nitrate-N		[]Turbidity NTU	
[]Mn,Manganese	0.05	[]Nitrite-N		[]Color Units	
[]Mo,Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na,Sodium	10	[]Chloride		[]	
[]Ni,Nickel	<0.05	[]Fluoride		[]	

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DATE REPORTED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag, Silver	<0.05	[]P, Phosphorous	<0.05	[]Cyanide	
[]Al, Aluminum	0.07	[]Pb, Lead	<0.05	[]Sulfate	
[]As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
[]Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
[]B, Boron	<0.05	[]Se, Selenium	<0.05	[]Total Volatile Solids	
[]Ba, Barium	<0.05	[]Si, Silicon	4.4	[]Suspended Solids	23
[]Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	12	[]Sr, Strontium	0.09	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
[]Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[]	
[]Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] COD	20
[]Fe, Iron	0.53	[]Zr, Zirconium	<0.05	[]	
[]Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K, Potassium	1.4	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	2.0	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	0.19	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	9.8	[]Chloride		[]	
[]Ni, Nickel	<0.05	[]Fluoride		[]	

* * * * * *

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	mg/l		mg/l		mg/l
[]Ag, Silver	<0.05	[]P, Phosphorous	<0.05	[]Cyanide	
[]Al, Aluminum	<0.05	[]Pb, Lead	<0.05	[]Sulfate	
[]As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
[]Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
[]B, Boron	0.45	[]Se, Selenium	<0.05	[]Total Volatile Solids	
[]Ba, Barium	<0.05	[]Si, Silicon	3.9	[]Suspended Solids	15
[]Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	58	[]Sr, Strontium	0.42	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
[]Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[]	
[]Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] COD	52
[]Fe, Iron	0.38	[]Zr, Zirconium	<0.05	[]	
[]Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		* * * * * * []mmhos Conductivity	
[]K, Potassium	30	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	15	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	1.2	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	110	[]Chloride		[]	
[]Ni, Nickel	<0.05	[]Fluoride		[]	

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DATE REPORTED 11-20-81
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	mg/l		mg/l		mg/l
[]Ag, Silver	<0.05	[]P, Phosphorous	0.10	[]Cyanide	
[]Al, Aluminum	<0.05	[]Pb, Lead	<0.05	[]Sulfate	
[]As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
[]Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
[]B, Boron	0.18	[]Se, Selenium	<0.05	[]Total Volatile Solids	
[]Ba, Barium	<0.05	[]Si, Silicon	3.6	[]Suspended Solids	40
[]Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	12	[]Sr, Strontium	0.07	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
[]Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[]	
[]Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] COD	68
[]Fe, Iron	0.25	[]Zr, Zirconium	<0.05	[]	
[]Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		* * * * * * []mmhos Conductivity	
[]K, Potassium	17	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	4.9	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	0.21	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	40	[]Chloride		[]	
[]Ni, Nickel	<0.05	[]Fluoride		[]	

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DATE REPORTED 11-20-81
SIGNED Stephen C. Cole

	mg/l		mg/l		mg/l
[]Ag, Silver	<0.05	[]P, Phosphorous	0.14	[]Cyanide	
[]Al, Aluminum	0.25	[]Pb, Lead	<0.05	[]Sulfate	
[]As, Arsenic	<0.05	[]Pt, Platinum	<0.05	[]Phenol	
[]Au, Gold	<0.05	[]Sb, Antimony	<0.05	[]Total Dissolved Solids	
[]B, Boron	<0.05	[]Se, Selenium	<0.05	[]Total Volatile Solids	
[]Ba, Barium	<0.05	[]Si, Silicon	4.9	[]Suspended Solids	128
[]Bi, Bismuth	<0.05	[]Sn, Tin	<0.10	[]Volatile Suspended Solids	
[]Ca, Calcium	4.8	[]Sr, Strontium	<0.05	[]Hardness as $CaCO_3$	
[]Cd, Cadmium	<0.01	[]Ti, Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co, Cobalt	<0.05	[]W, Tungsten	<1	[]	
[]Cr, Chromium	<0.05	[]V, Vanadium	<0.05	[]	
[]Cu, Copper	<0.05	[]Zn, Zinc	<0.05	[] COD	88
[]Fe, Iron	0.87	[]Zr, Zirconium	<0.05	[]	
				* * * * * *	
[]Hg, Mercury	<0.05	[]Ammonia Nitrogen-N		[]mmhos Conductivity	
[]K, Potassium	7.1	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg, Magnesium	2.8	[]Nitrate-N		[]Turbidity NTU	
[]Mn, Manganese	<0.05	[]Nitrite-N		[]Color Units	
[]Mo, Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na, Sodium	16	[]Chloride		[]	
[]Ni, Nickel	<0.05	[]Fluoride		[]	

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

TELEPHONE (907)-279-4014
274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

CUSTOMER Arctic Environmental Engineers SAMPLE LOCATION: —

DATE COLLECTED — TIME COLLECTED: —

SAMPLED BY — SOURCE 9

REMARKS

FOR LAB USE ONLY
RECVD.BY GY LAB # 9487-9
DATE RECEIVED 11-17-81
DATE COMPLETED 11-20-81
DATE REPORTED 11-20-81
SIGNED Stephen C. Ede

	mg/l		mg/l		mg/l
[]Ag,Silver	<0.05	[]P,Phosphorous	<0.05	[]Cyanide	
[]Al,Aluminum	<0.05	[]Pb,Lead	<0.05	[]Sulfate	
[]As,Arsenic	<0.05	[]Pt,Platinum	<0.05	[]Phenol	
[]Au,Gold	<0.05	[]Sb,Antimony	<0.05	[]Total Dissolved Solids	
[]B,Boron	<0.05	[]Se,Selenium	<0.05	[]Total Volatile Solids	
[]Ba,Barium	<0.05	[]Si,Silicon	4.6	[]Suspended Solids	0.8
[]Bi,Bismuth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
[]Ca,Calcium	4.3	[]Sr,Strontium	<0.05	[]Hardness as $CaCO_3$	
[]Cd,Cadmium	<0.01	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co,Cobalt	<0.05	[]W,Tungsten	<1	[]	
[]Cr,Chromium	<0.05	[]V,Vanadium	<0.05	[]	
[]Cu,Copper	<0.05	[]Zn,Zinc	<0.05	[] COD	33
[]Fe,Iron	0.25	[]Zr,Zirconium	<0.05	[]	
[]Hg,Mercury	<0.05	[]Ammonia Nitrogen-N		* * * * * * []mmhos Conductivity	
[]K,Potassium	3.5	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg,Magnesium	3.2	[]Nitrate-N		[]Turbidity NTU	
[]Mn,Manganese	<0.05	[]Nitrite-N		[]Color Units	
[]Mo,Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na,Sodium	12	[]Chloride		[]	
[]Ni,Nickel	<0.05	[]Fluoride		[]	

18 AAC 80.050. MAXIMUM CONTAMINANT CONCENTRATIONS. (a) The maximum contaminant concentrations for public water systems are as follows:

(1) Inorganic Chemical Contaminants

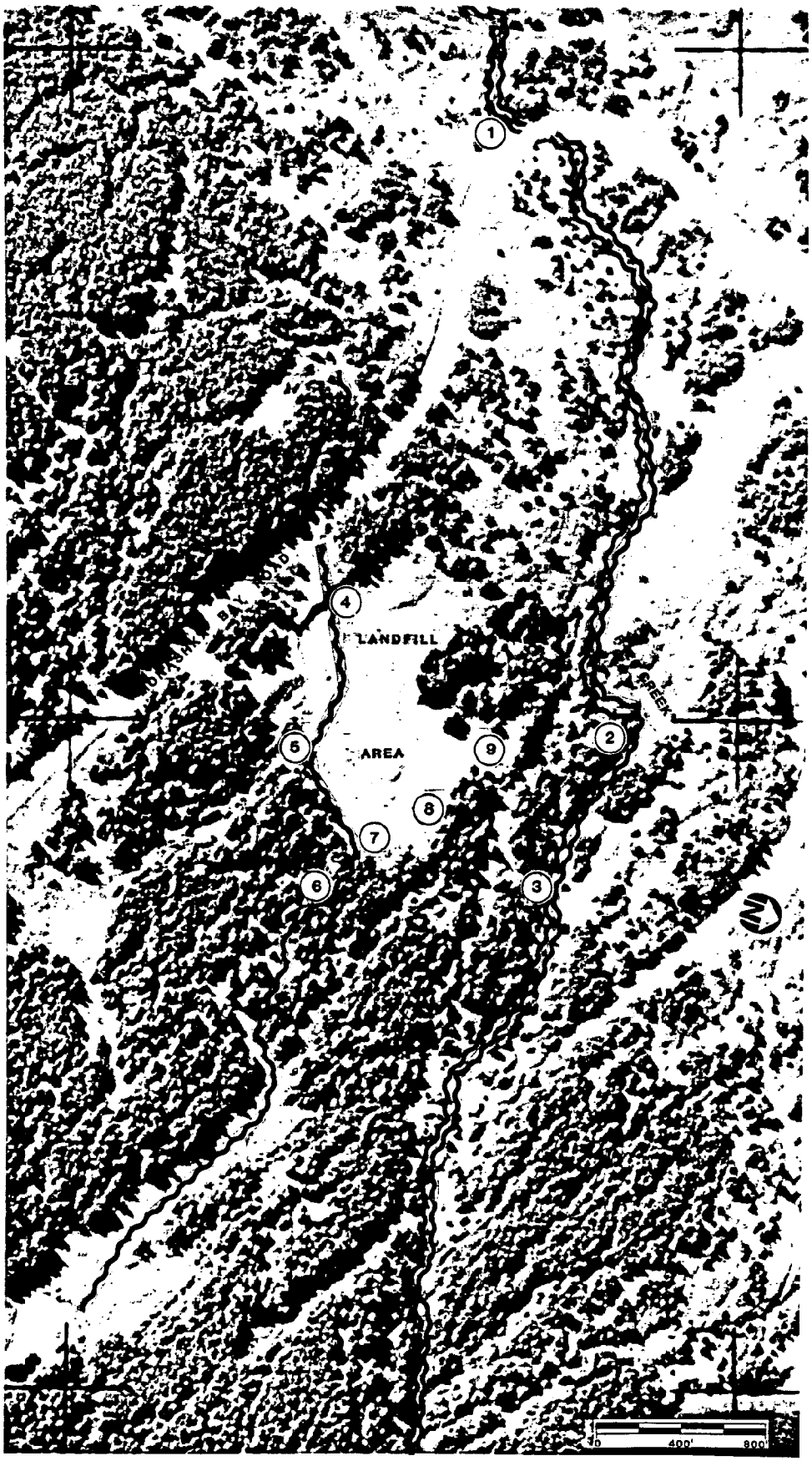
Contaminant	Maximum Contaminant Concentration (mg/l)
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Fluoride	2.4
Iron[a]	0.3
Lead	0.05
Manganese[a]	0.05
Mercury	0.002
Nitrate (as Nitrogen)	10.
Selenium	0.01
Silver	0.05
Sodium[a]	250.

(2) Organic Chemical Contaminants

Contaminant	Maximum Contaminant Concentration (mg/l)
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.1
2,3,5-TP Silvex	0.01

(3) Physical Contaminants

Contaminant	Maximum Contaminant Concentration
Color	30[b] units
Turbidity	one[c] unit as a monthly average of samples required, or taken by the department, and five units as an average for two consecutive days


1
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LANDFILL
AREA
400'
800'

ADEC Regulations Application

CHAPTER 60.
SOLID WASTE MANAGEMENT

Section
10. General requirements
20. Solid waste management permit
30. Operating requirements
40. Incineration
50. Disposal on land
60. Reclamation facilities
70. Solid waste management responsibility
80. Solid waste management on public property
90. Junked vehicle and equipment disposal
100. Presumptive proof of illegal disposal
110. Abatement order
115. Identification of solid waste management regions
120. Penalties
130. Definitions

18 AAC 60.010. GENERAL REQUIREMENTS. (a) Solid waste shall be collected, stored, transported, utilized, processed, disposed or reclaimed in a manner consistent with this chapter in order to control, prevent and abate pollution of the air, water, land and subsurface land of the state.

(b) Local and regional authorities are not prohibited from adopting solid waste management regulations that are the same as or more stringent than the requirements of this chapter. (Eff. 7/19/73 Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)
AS 46.03.710

18 AAC 60.020. SOLID WASTE MANAGEMENT PERMIT. (a) No person may establish, modify or operate a solid waste disposal facility without a permit, except the following:

(1) a single-family or duplex residence on which solid waste is generated and disposed of, on-premises;

(2) a farm on which solid waste generated from the operation of that farm is disposed;

(3) incinerator facilities having a total rated capacity of less than 200 pounds of solid waste per hour.

(b) An application for a permit shall contain two sets of the following, submitted to the department for approval:

(1) a completed permit application form;

(2) detailed plans and specifications for the facility;

(3) certification of compliance with local ordinances and zoning requirements;

(4) a report detailing the proposed method of operation, population and area to be served, the characteristics, quantity and source of material to be processed, the use and distribution of processed materials, method of residue disposal, emergency operating procedures, the type and amount of equipment to be provided, and the proposed ultimate land use plan.

(c) A person operating a solid waste disposal facility on the effective date of these regulations and requiring a permit shall apply for such permit within 90 days of the effective date of the regulations.

(d) A permit shall be valid for a specified period but in no case exceeding five years. Application for renewal shall be made at least 30 days prior to the expiration of an existing permit. Any alteration or deviation in operating procedure from the provisions of an existing permit shall first be submitted to the department for approval. Prior to renewing a permit the department may conduct an inspection to determine whether the solid waste disposal facility and its operation are in compliance with state law, regulations and permit conditions.

(e) A permit may not be transferred without the written consent of the department.

(f) A permit for a solid waste disposal facility may be revoked or suspended whenever the department finds, after investigation, that the facility is being operated, maintained or used in violation of state law, regulations or permit conditions.

(g) If a permit is denied, revoked, suspended or permit renewal is refused the applicant or permittee shall be notified in writing of the reasons for the action. Such action shall not prevent a person from submitting another application.

(h) The department will issue a permit under this section if the applicant demonstrates that

(1) the disposal facility meets the requirements of this chapter and chs. 50, 70 and 72 of this title; and

(2) the establishment or continued operation of the disposal facility will not result in avoidable proliferation of solid waste disposal facilities in the affected area. (Eff. 7/19/73, Reg. 47; am 8/21/78, Reg. 67)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)
AS 46.03.100(a)
AS 46.03.110(a)
AS 46.03.110(d)

18 AAC 60.030. OPERATING REQUIREMENTS. (a) A permittee shall be required to

(1) provide a permanent sign posted at the facility entrance identifying the facility, the hours and days the facility is open for public use, the name and address of the operator and other information pertinent to the operation of the facility;

(2) provide effective methods, approved by the department, to control insects, birds, rodents, other disease vectors and nuisance conditions;

(3) obtain specific departmental approval for the processing and disposal of hazardous waste.

(b) A permittee may be required to

(1) compact and cover all solid waste accumulated after each day's operation with earth or other approved material in an approved manner safeguarding the environmental quality of the surrounding area, except that solid waste processed by milling, baling or other operations, specifically approved by the department, may not require daily cover;

(2) install, maintain and operate monitoring equipment, for the detection of pollution or

contamination resulting or tending to result from the operation of the facility, in accordance with methods and procedures prescribed by the department, at specified locations and intervals, and to provide the resulting data to the department;

(3) provide controlled access to the facility in the form of fences and gates that shall be kept locked when an attendant is not on duty;

(4) submit quarterly reports itemizing the type and quantity of solid waste processed, the quantity of waste requiring final disposal, hours of facility operation and market value of any reclaimed material.

(c) A permittee shall not be required to provide daily cover for solid waste comprised of mine tailings, gravel pit and quarry spoils or overburden, but remains responsible for restoring the area by grading, contouring and seeding in accordance to plans approved by the department. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.040. INCINERATION. (a) Incineration is the required method for the destruction of infectious and pathological wastes generated at medical and veterinary facilities, prior to final disposal.

(b) Incineration shall be considered as a viable processing alternative in the detailed plan required in sec. 20(b)(2) of this chapter.

(c) No person may use an incinerator facility for solid waste processing that has a total rated capacity equal to or greater than 200 pounds per hour unless it complies with the following:

(1) an incinerator shall be designed and operated so that emitted air contaminants, including odors, gases and particulate matter do not exceed the standards established in ch. 50 of this title;

(2) upon completion of an incinerator facility and prior to initial operation, the department shall be notified in order that it may conduct an inspection. The department may waive the initial inspection and conduct an operational inspection at a later date.

(3) liquids and solid residues generated by the incineration of solid waste shall be treated or disposed in a manner approved by the department. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.050. DISPOSAL ON LAND. The disposal of solid waste on the land shall comply with the following requirements:

(1) the disposal of putrescible waste in areas subject to permafrost or leachate generation is restricted and shall be allowed only in conjunction with special procedures approved by the department;

(2) open burning on a landfill is prohibited;

(3) solid waste shall be deposited in a manner to prevent waste materials, leachate or eroded soil particles from entering the waters of the state;

(4) a minimum separation of two feet shall be maintained between putrescible solid waste and the anticipated high ground water table; non-putrescible and non-water-soluble materials such as brick, stone, concrete and similar materials may be deposited below the anticipated high ground water table if such deposition will result in a nuisance-free operation and no pollution to the ground waters;

(5) surface water drainage from areas outside a landfill shall not be allowed to flow over or through a landfill;

(6) the working face of a landfill shall be limited to as small an area as practicable and designed to confine wind-blown waste, which shall be collected and returned to the working face;

(7) scavenging is prohibited;

(8) uncontrolled live, domestic animals are prohibited within the landfill area;

(9) the approach road to a landfill shall be maintained to provide access and kept clean of solid waste;

(10) solid waste shall be spread in shallow layers not exceeding a depth of two feet prior to compaction, completed lifts shall be no greater than eight feet in vertical depth unless otherwise allowed by permit requirements;

(11) solid waste shall be compacted and covered with earth or other approved material at a frequency specified by permit requirement;

(12) within one month after termination of a landfill, or a major portion thereof, the area shall be covered with at least two feet of compacted earth material, graded and finished to allow surface water to run off without erosion; areas completed during winter operation may receive final cover the following spring;

(13) ten days prior to removal of earth moving equipment from a completed landfill, the department shall be notified so that an inspection may be conducted. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.060. RECLAMATION FACILITIES. (a) No person may maintain or operate a reclamation facility, or permit the use of property for such an operation, unless the operation complies with the following:

(1) open burning of solid waste at a reclamation facility is prohibited;

(2) by-products removed during processing shall be handled in a sanitary and nuisance free manner and shall be recycled or disposed in a manner approved by the department;

(3) reclaimed materials offered for sale shall not contain pathogenic organisms or their indicators, putrescible waste or other characteristics which could cause injury to persons purchasing the reclaimed materials. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.070. SOLID WASTE MANAGEMENT RESPONSIBILITY. (a) The aesthetic, nonhazardous and sanitary storage of solid waste is the responsibility of the person owning, operating or managing the property, premises, business establishment or industry where the solid waste is accumulated.

(b) A person not exempted in sec. 20 of this chapter, owning, operating or managing a property, premises, business establishment, or industry has the responsibility of removing accumulated solid waste to an approved solid waste disposal facility. Contractual or other arrangements for the removal of accumulated solid waste shall not relieve a person of this primary responsibility. Solid waste shall be removed to an approved disposal facility, prior to creating nuisance conditions.

(c) A person sponsoring any public activity, including but not limited to, recreational, sporting or entertainment events is responsible for the collection, storage, transportation and disposal of all solid waste generated as a result of the event. Solid waste shall be collected, removed and disposed in an approved solid waste disposal facility.

(d) The disposal of animal carcasses is the responsibility of the land owner or land occupant or both upon whose land the animal carcass is found to be creating a nuisance. Disposal of the carcass shall be by immediate burial, covered by at least two feet of compacted earth, incineration or by other methods approved by the department.

(e) Solid waste shall be collected in a sanitary manner and transported to an approved disposal facility in a covered leak-proof container. Solid waste spilled during collection shall be immediately retrieved by the collector or transporter, returned to the vehicle or container and the area cleaned.

(f) Vehicles and containers used for the collection and transportation of hazardous waste shall be loaded, moved and unloaded in a secure manner. Transportation of radioactive material in addition shall comply with 18 AAC 85.320. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.080. SOLID WASTE MANAGEMENT ON PUBLIC PROPERTY. (a) No person may deposit solid waste in, on or along a highway right-of-way, road, street, trail, spur, turn around, tunnel, drainage structure, water of the state, public recreation facility or other public property, unless

(1) such property is designated by the state as an authorized solid waste disposal facility, or;

(2) the solid waste is deposited in a public litter receptacle.

(b) A person providing a litter receptacle for use by the traveling public shall maintain the receptacle in a sanitary condition so as to prevent the propagation of flies, odors and overflowing conditions.

(c) A public litter receptacle shall be used only by the traveling public for travel-generated solid waste. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.090. JUNKED VEHICLE AND EQUIPMENT DISPOSAL. (a) Junked vehicles and equipment shall not be used for slope stabilization and erosion preventive purposes.

(b) The disposal of junked vehicles and equipment into waters or upon the lands of the state requires the approval of the commissioner.

(c) Junked vehicles and equipment shall be disposed of by crushing and burial in a landfill, stored in an approved manner for recycling, or processed by other methods approved by the department. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.100. PRESUMPTIVE PROOF OF ILLEGAL DISPOSAL. Solid waste, disposed of in violation of this chapter, which contains three or more items bearing the name or address of one person, shall provide a rebuttable presumption that the person whose name or address appears on such items committed the unlawful act of disposal. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.110. ABATEMENT ORDER. When the department finds, after investigation, that solid waste is creating an environmental nuisance the commissioner may issue a written abatement order to the person owning, managing or operating the property. When an abatement order is received, or posted on the property, the person responsible for the property shall remove or abate the nuisance as directed by the commissioner. A person who neglects or refuses to abate the nuisance is guilty, and upon conviction is subject to the penalties provided for in sec. 120 of this chapter. In addition to such punishment the court may assess damages against the defendant for the expenses of abating the nuisance. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)
AS 46.03.800
AS 46.03.810

18 AAC 60.115. IDENTIFICATION OF SOLID WASTE MANAGEMENT REGIONS. (a) The department will identify appropriate geographic areas as solid waste management regions as required by the Federal Resource Conservation and Recovery Act of 1976, Public Law 94-580. Before identification, the department will examine the following characteristics of the area to determine the effects of identification upon the department's solid waste management goals of reducing or minimizing land, air, and water pollution and other environmental degradation, reducing public health and safety hazards, and increasing resource conservation and recovery:

(1) existing geographic and political boundaries;

(2) existing planning processes;

(3) size and population of the area;

(4) type and quantity of solid waste generated;

(5) transportation systems within the area and between the area and existing recycling markets;

(6) existence or ease of establishment of a regional planning agency approved by agencies with solid waste management powers and responsibilities;

(7) potential for eliminating duplicative solid waste management functions; and

(8) economic and environmental impacts expected.

(b) Any person may nominate a geographic area lying outside the areas specified in (c) of this section for identification as a solid waste management region by the department. Nominations must be submitted to the department in writing and must include an analysis of how identification of the additional area will meet the goals specified in (a) of this section.

(c) The following geographic areas are identified as solid waste management regions:

(1) the Municipality of Anchorage;

(2) the Fairbanks North Star Borough;

(3) the City and Borough of Juneau;

(4) the Kenai Peninsula Borough;

(5) the City and Borough of Sitka; and

(6) the City of Valdez. (Eff. 8/21/78, Reg. 67)

Authority: AS 46.03.020(8)
AS 46.03.020(9)
AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)

18 AAC 60.120. PENALTIES. A person who violates any provision of this chapter is punishable by the appropriate penalties contained in AS 46.03.760 (a) and AS 46.03.790. These penalties include the possibility of a maximum punishment by a fine of not more than $25,000 or imprisonment for not more than one year or both. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.760(a)
AS 46.03.790

18 AAC 60.130. DEFINITIONS. Unless the context indicates otherwise, in this chapter

(1) "commissioner" means the commissioner of the Department of Environmental Conservation;

(2) "department" means the Department of Environmental Conservation;

(3) "hazardous waste" means waste that is capable of causing injury, disease or impairment of health, or property damage, including but not limited to poisons, pesticides, acids, caustics, infectious or pathological wastes, radioactive materials, explosive materials and oil and petroleum products;

(4) "incineration" means the process of burning solid, liquid or gaseous combustible wastes to gases and a residue, within an incinerator;

(5) "incinerator" means any equipment, device or contrivance excluding fireplaces and burn barrels, used for the controlled thermal reduction of solid waste;

(6) "landfill" means a land area used for the disposal of solid waste;

(7) "leachate" means water that has percolated through solid waste and contains dissolved or suspended portions from the solid waste;

(8) "lift" means a compacted layer of solid waste and its overlying earth cover in a landfill;

(9) "open burning" means the burning of any material such that the products of combustion are emitted directly into the ambient air without passing through a stack or flare;

(10) "permit" means written authorization from the department;

(11) "person" means any individual, public or private corporation, political subdivision, government agency, municipality, industry, copartnership, association, firm, trust, estate, or any other entity whatsoever;

(12) "public litter receptacle" means a container provided for the public, as a convenience, in order to dispose of solid waste;

(13) "putrescible waste" means material capable of being decomposed so as to cause nuisance or obnoxious odors;

(14) "reclamation facility" means a facility in which solid waste is stored, dismantled or reprocessed to recover salvageable materials for purposes of sale or reuse;

(15) "solid waste" means all unwanted or discarded solid or semi-solid material whether putrescible or nonputrescible, originating from any source, including but not limited to garbage, paper, wood, metal, glass, plastic, rubber, cloth, ashes, litter and street sweepings, dewatered sewage sludge, dead animals, offal, junked vehicles and equipment, material and debris resulting from construction or demolition projects, abandoned and decaying structures, hazardous wastes, mine wastes, gravel pit and quarry spoils, and overburden except that originating from the construction of single buildings;

(16) "solid waste disposal facility" means an intermediate disposal facility, transfer station, landfill, incinerator, composting plant, recycling or reclamation facility or any site utilized for the reduction, consolidation, conversion, processing or disposal of solid waste;

(17) "working face" means that portion of the landfill in which solid waste is deposited and compacted prior to the placement of an earth cover. (Eff. 7/19/73, Reg. 47)

Authority: AS 46.03.020(10)(A)
AS 46.03.020(10)(E)
AS 46.03.020(10)(H)
AS 46.03.900

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

WASTE DISPOSAL PERMIT APPLICATION
FOR
SOLID WASTE MANAGEMENT ACTIVITIES

Part I. Background Information

A. Applicant's Name: _____
Mailing Address: _____
City/State/Zip Code: _____

B. Facility Location: (Use legal description of property) _____
_____

C. Application is for:
( ) A New Facility
( ) An Unpermitted, Existing Facility
( ) Renewal of Existing Permit No. _____
( ) Demolition Debris Exemption

D. Type of facility:

( ) Landfilling
( ) Land Spreading
( ) Oily Waste Disposal
( ) Hazardous Waste Processing
( ) Hazardous Waste Disposal
( ) Other _____

E. Complete the following:

1. Number of people served by the facility. _____

2. How much waste will be received? (tons) (cu. yds.) / (day) (wk) (month)

3. Check the wastes received and estimate their percent of total wastes received.

	Yes	No	% of Total
Domestic Refuse	( )	( )	_____%
Commercial Refuse	( )	( )	_____%
Seafood Processing Wastes	( )	( )	_____%
Industrial Wastes	( )	( )	_____%
Construction Wastes	( )	( )	_____%
Demolition Wastes	( )	( )	_____%
Oily Wastes	( )	( )	_____%
Ash and Incinerator Residue	( )	( )	_____%

4. Will the following wastes be accepted?

	Yes	No
Septic Tank Pumpings	( )	( )
Sewage Sludge	( )	( )
Drilling Muds	( )	( )
Waste Oil and Oil Spill Cleanup Wastes	( )	( )
Hazardous Wastes	( )	( )

5. What predisposal processing methods will be employed?

Incineration	( )
Baling	( )
Shredding	( )
Composting	( )
Other: _____	

6. The average annual precipitation in the area is _____ inches.

FOR LANDFILLS ONLY

7. The deposited refuse will be consolidated, compacted and covered with soil at least _____ times per (week) (month) during the summer and at least _____ times per (week) (month) during the winter.

8. The maximum width of the exposed working face will be _____ ft. The maximum vertical height of the working face will be ____ ft.

PART II

The applicant shall submit two copies of the following information with the completed, signed application form:

A. Maps of the site and surrounding area that clearly show the following:

( ) Geographic Location	( ) Buildings
( ) Surface Contours	( ) Airports w/in 2 Miles
( ) Site Boundaries	( ) All Surface Waters
( ) Roads and Railroads	( ) Wells w/in 1/4 Mile

B. Facility plans or drawings showing: (a) the existing site conditions, (b) the proposed development steps, and (c) the proposed appearance of the completed site. The plans shall include contours of five foot intervals or less, and shall utilize a scale no less than one inch equals forty feet unless specifically approved by the department. These plans shall include, at a minimum, the location and construction details of:

( ) Surface Drainage Controls	( ) Visual Screening
( ) Access and On-site Roads	( ) Pollution Control or Monitoring Devices
( ) Disposal Trenches or Cells	
( ) Fences and Gates	( ) Significant Storage, Processing or Disposal Features
( ) Buildings & Fixed Equipment	
( ) Soil Boring Locations	
( ) Monitoring Well Construction Details	

C. A narrative description of the proposed development and operation procedures including those intended to prevent or control ground and surface pollution, disease vectors, wildlife access, litter, fires, odor, noise, and safety and nuisance problems.

D. For all landfilling/landspreading facilities: A soils report based on test holes dug at representative locations to a depth at least four feet deeper than the lowest level of proposed solid waste deposition. The minimum number of holes based on facility size shall be:

less than 10,000 ft^2 ---------- one hole
10,000 ft^2 to one acre -------- two holes
larger than one acre ---------- two holes per acre

These numbers can be greatly reduced in large sites if the results of initial borings indicate a uniform, predictable soils/hydrology situation throughout the site.

The report shall include:

1. graphic representation of the soil profiles,

2. a discussion of the site's ground water hydrology based on the test holes and data from any wells in the nearby area.

E. For all HAZARDOUS WASTE PROCESSING AND DISPOSAL FACILITIES: Detailed plans and specifications of the facility, the wastes to be accepted, methods and equipment for waste handling, treatment, storage and disposal, pollution controls, safety equipment and precautions, and emergency operating plans.

F. A letter from the local government certifying compliance with local ordinances, zoning requirements, and coastal zone management plans and regulations. If the applicant is not the owner of the property, include a written statement from the property owner detailing the arrangement giving the applicant control of the facility for the proposed activity.

I, _____, certify under penalty of perjury, that all of the above information and exhibits are true, correct and complete.

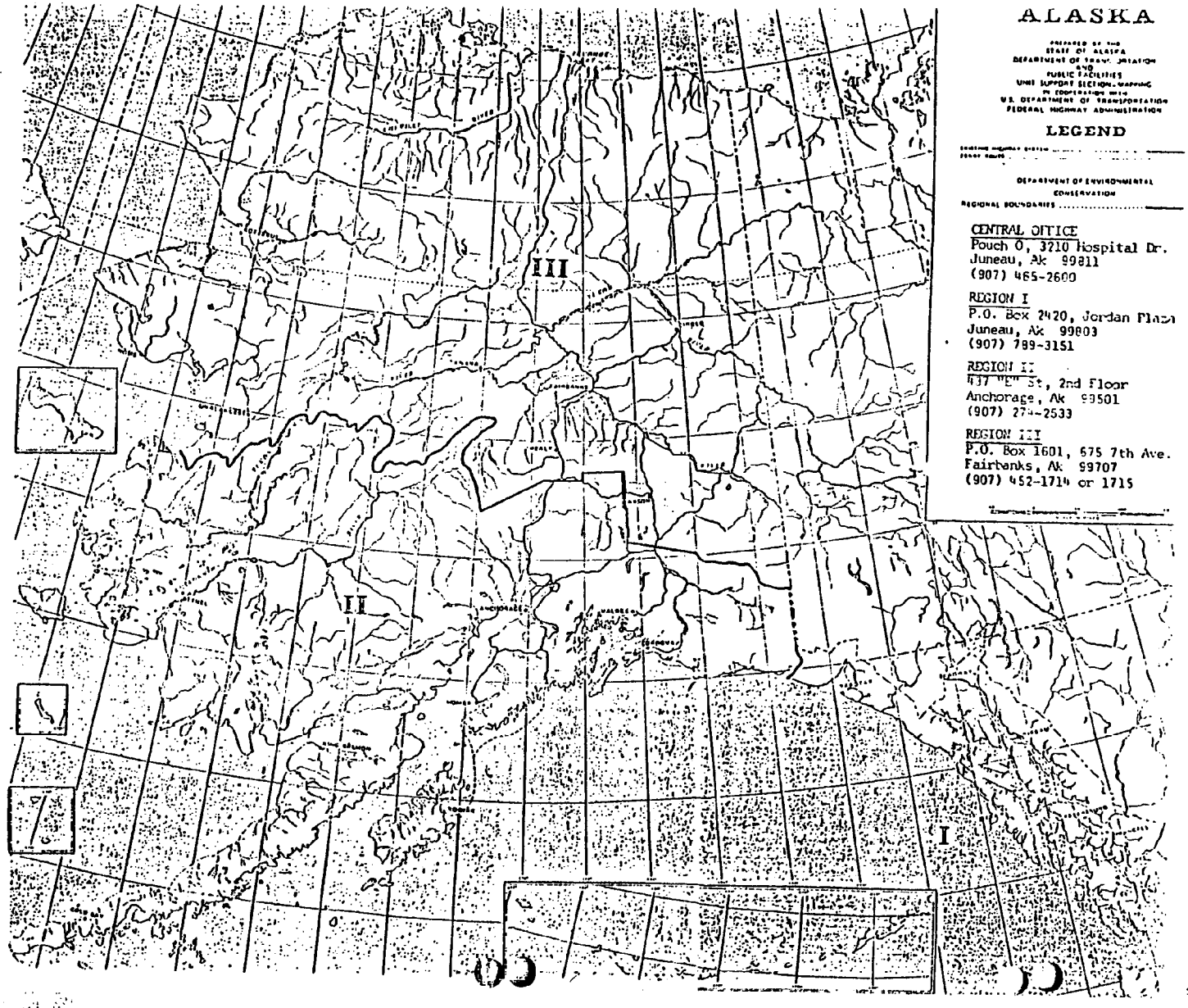
Applicant's Signature _____ Date _____

* *

Submit two copies of all application materials to the appropriate regional office indicated on the map on page 4.

PERMIT RENEWALS: A permittee that has a departmentally approved plan that meets the requirements specified in this application form may apply for a new permit by submitting a signed application form and a report of the changes and progress that has occurred during the preceding permit period.

Those facilities without a currently acceptable plan shall submit all the planning documents and data required by this application for departmental review and approval prior to receiving a new permit.


ALASKA
LEGEND
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
REGIONAL BOUNDARIES
CENTRAL OFFICE
Pouch O, 3210 Hospital Dr.
Juneau, Ak 99811
(907) 465-2600
REGION I
P.O. Box 2420, Jordan Plaza
Juneau, Ak 99803
(907) 789-3151
REGION II
437 "E" St, 2nd Floor
Anchorage, Ak 99501
(907) 274-2533
REGION III
P.O. Box 1601, 675 7th Ave.
Fairbanks, Ak 99707
(907) 452-1714 or 1715
III
II
I