DAGGETT COUNTY LANDFILL

STATE PERMIT APPLICATION TO OPERATE A CLASS II LANDFILL

Application produced by Town of Manila
with contributions from Daggett County, Forest Service
and various Utah State Agencies
January, 1998

UTAH DEPART OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE
Application for a Permit to operate a Class II Landfill

PART I GENERAL DATA

1. Name of Facility	Daggett County Landfill
2. Site Location	3 miles South of Town of Manila
3. Facility Owner	Town of Manila and Daggett County
4. Facility Operator	Town of Manila
5. Contact Person	Mayor Chuck Dickison Town of Manila Office Manila Utah, 84046 435-784-3143
6. Type of Application	(x) Initial application
7. Property Ownership	(x) Joint Ownership with Daggett County

Proof Of Ownership

Copies of United States Forest Service Permit for 5 acre expansion and Quit-Claim Deed showing joint County/Town ownership accompany this application.

Plan of Operation

Construction Schedule

Improvements include a future storage/attendant shed, refurbished fencing around landfill, enhanced security gate, and improved access roads. These improvements will be in place by end of 1998.

On-Site Solid Waste handling Procedures

Incoming loads will be evaluated by the on-site attendant on days of operation and documented using included "Landfill Log." An example of this log is included with this application. Waste depositors will be then directed to the appropriate area for dumping. As needed, the waste will be spread and compacted in the cell. A contracted Caterpillar will be utilized for this purpose and to additionally cover the spread, compacted, waste with the prescribed inches of suitable covering material. Final coverage of the filled cells will be accomplished with the prescribed inches of suitable covering material.

Acceptable Types of Wastes

The following types of waste will be accepted at the Daggett County Landfill.

household Wastes: Vegetable wastes, trash, discarded animals, and household waste generated from single, multiple residences, hotel, motels, campgrounds, and day use recreation areas.

Commercial Wastes: All types of wastes generated by stores, offices, restaurants, storage facilities, and other non-manufacturing activities.

Waste Tires: Tires will be separated as accepted and placed into a segregated area. When significant volume exists, efforts will be made to dispose of the tires with a commercial outlet.

Common household Hazardous Wastes: Acceptance of this type of wastes will be minimized at the Daggett County Landfill.

Appliances: Appliances will be separated from the landfill cells, properly stored, and disposed of with a commercial outlet in the business to accept such appliances.

Procedures for the Exclusion of Unacceptable Types of Wastes.

All incoming landfill users will be asked to identify the types of wastes included in their load and to specify waste, to their knowledge, may require special handling. In addition, inspections of incoming loads of waste will be made at time of unloading. The purpose of this inspection will be to determine the presence of hazardous types of waste or suspicious containers. Identification of potentially hazardous materials could initiate the immediate closure of the landfill and notification of proper officials.

Monitoring and Self Inspection

No ground water monitoring facility is proposed at this landfill site due to low potential for ground water contamination.

Routine inspections will be made by Town of Manila personnel on-site for such things as litter control, unauthorized burning, and improper waste disposal. Assessments will be made periodically for cover material integrity, erosion impact, and determination of other adverse conditions. These inspections will be documented on the form labeled "Landfill Inspection Form". The results of this inspection will be submitted yearly to the Utah Solid and Hazardous Waste department.

Contingency Plans

The following actions will be taken in case of ground water contamination, fire, explosion, or presence of hazardous materials.

Ground Water Contamination

No ground water monitoring facility will be present at the landfill due to low potential for water contamination. However, if significant levels of ground water contamination are detected in down gradient locations and the problem can be directly linked to landfill operations, corrective action as deemed necessary to correct the problem will be taken.

Fire Control

Due to the method of landfill operation and site land composition, fire hazard does not pose a significant threat. On-site landfill attendants will be on hand to discourage waste and debris fires started on purpose or accidently. Proper officials will be notified in the event of a landfill fire and the fires will be extinguished. If necessary, landfill operations will be altered to allow for the proper handling of the fire. On-site posting will prohibit fires.

Explosion

An explosion at the landfill will cause the site to be secured and proper officials to be notified. Landfill operations will discontinue until safe to do so.

Alternative Waste Handling Procedures

In the event it should become necessary to discontinue using an open cell, another will be readied to accept waste and to act as a backup cell. Necessary use discontinuance of the landfill would require temporary negotiation with a landfill operator close enough and able to handle Daggett County Waste.

Maintenance of Installed Equipment

Required maintenance at the landfill would be limited to site machinery.

Disease Vector Control

The remoteness of the landfill should not contribute to problems with disease vectors. However, if problems were to arise, remedial action would be taken in the form of rodent trapping or other measures of extermination. Covering of waste and dead animals should inhibit problems with scavenging vermin.

Recycling Program

Daggett County Landfill management intends to accept, separate, and dispense to a commercial outlet, all waste tires brought to the landfill. Only an amount deemed to be reasonable will be stored prior to release to the outlet. Appliances, automobiles, and other metals brought to the landfill will be released to an appropriate commercial business. No other recycling programs are currently proposed at the Daggett County Landfill.

Training

Landfill attendants and operators will be required to review the contents of this operation plan. Additional training will be required with emphasis on hazardous waste identification and appropriate handling. Appendix attachments include materials for the identification of hazardous wastes. Landfill attendants and operators will be required to be familiar with identification of hazardous wastes. Appropriate out of agency training will be obtained.

Landfill Access Control

Daggett County Landfill staff will be present during times when the landfill is open for acceptance of public waste. Town of Manila, Daggett County, and the United States Forest Service collection vehicles will be allowed access to the landfill for waste deposit purposes during non-public access hours.
The purposed times the landfill is open to the public are Mondays, 0900-1200, and the first Saturday of each month, 0900-1200 during the winter months. Summer hours begin May 1st and end the last day of October. These hours include landfill opening each Saturday, 0900-1200 hours. Hours of operation for public waste deposits are posted within the county.

Methods of Access Control

When not open to the public, the landfill will be secured behind fencing and a locked gate at the access road. The position of locked gates preventing access will enhance discouragement of illegal dumping due to potential detection by passing motorists.

Closure Plan

Ongoing Activities

The Daggett County Landfill closure plan is intended to provide the ability to minimize need for extensive maintenance and the threat to human health and the environment.
Landfilling operations on the jointly owned 20 acre site have consisted of developing open cells, filling with waste, and properly covering. Efforts have been made to ensure that closure covering does not provide for excessive mounding not consistent with natural terrain.
Future closure efforts will include proper closure of each cell upon reaching waste capacity. A new cell will be opened at this time for continued landfill operation. Closure activities will include:

1) As each cell has reached waste capacity, landfill operators will grade excess cover material to form an earthen mound over the cell. The graded mound should provide for effective surface drainage to prevent water infiltration.

2) Cover material derived from cell excavation will be used to cover the expended cell at a cover material depth of 18 inches or more.

After each phase of cell completion, review for proper closure will be made by the landfill operator.

PART II GENERAL REPORT

GENERAL BACKGROUND

Daggett County's landfill is an existing landfill seeking a permit to continue operation with appropriate expansion. The landfill has been receiving waste since 1974. The landfill area of operation is currently a small parcel of land covering 20 acres jointly owned by Daggett County and the Town of Manila. An additional 5 acres is available for landfill expansion under special permit from the United States Forest Service.

Location

The Daggett County Landfill is located approximately 3 miles South of the Town of Manila with access from Utah State Highway 44. Public access is restricted to days of operation by a locked gate. Lands surrounding the landfill are currently owned privately and by BLM. The general location is described in Special Use Permit from the Forest Service dated 4/13/82, and Quit-Claim Deed demonstrating joint Town/County ownership.

Current Status

Presently, the landfill activities are confined to developed cells within the fenced 20 acre site jointly owned by the County and Town. Disposal is regulated to specific areas of the cells in order to provide the ability to close the cell in stages with appropriate cover. Landfill waste will be covered daily by tarps and permanent coverage will be done in phases. Final cover will consist of dirt in depths of 18 inches.

Landfill Service Area

Daggett County landfill serves all of Daggett County. Town solid waste is collected by the Town of Manila weekly and deposited in the landfill. Waste generated by county residents and the county is deposited into the landfill by individual users. The United States Forest Service is the largest by volume user of the landfill with waste generated from users of the Flaming Gorge National Recreation Area.

Legal Description

The following identifies the limits of ownership and landfilling operations for the Daggett County Landfill:

Land under joint County/Town ownership
NE 1/4 NE 1/4 NW 1/4, N 1/2 SE 1/4 NE 1/4 NW 1/4,
E 1/2 SW 1/4 NE 1/4 NW 1/4, Section 5, Township 2 North,
Range 20 East, Salt Lake Meridian.

Permit Land for Future Expansion
NW 1/4 NW 1/4 of Lot 2, Sec 5, T2N, R2OE, SLM

Name and address of facility
Calendar year covered by the report
Results of monitoring processes

FINANCIAL ASSURANCE PLAN

The Daggett County Landfill, in accordance with Financial Assurance provisions as outlined in R315-309-2, establishes the following estimated costs for closure and post-closure activities. The guide for the preparation cost estimates for closure and post-closure care at landfills was followed in this process. This guide is found in Appendix G of Utah Solid Waste Permitting and Management Rules. Cost estimates are based upon currently experienced landfill costs utilizing resources available in Daggett County. Third party costs might differ in the closure and post-closure process depending upon resources used.

PART III - TECHNICAL INFORMATION

GEOHYDROLOGICAL ASSESSMENT

General Description

The landfill site is located between the north flank of the Uinta Mountains of Utah and on the south margin of the Green River basin of Wyoming. This area's subregion is the Uinta Mountains Section (McNab and Avers 1994). The geomorphology of this section is characterized by the anticlinal uplifting of the Uinta Mountains with an east-west orientation. Periglacial and glacial processes have shaped higher elevation landforms with freezing and thawing activitity as a crucial role. In the lower elevations, alluvial and colluvial activity is the dominant landforming processes.

Geologic Assessment

The following geological summary was taken from two sources: 1) Geology of the Flaming Gorge Area Utah-Colorado-Wyoming, Geolgoical Survey Professional Paper 490 (Hansen 1965) and 2) Geology of the Manila Quadrangle Utah-Wyomying (Hansen and Bonilla 1952).

Regional Geology

The landfill is located is in the Uinta Mountain section within the Southern Rocky Mountain physiographic province. The surrounding Phil Pico Highlands subsection (Nelson, 1994) is a series of hogback ridges along the north flank of the Uinta Anticline. The Curtis, Entrada and Carmel formations from the Jurassic form the hogbacks that contain and surround the landfill site.

Local Geology

The site is located in a small enclosed basin of alluvium near the top of a hogback in the Entrada formation. To the southeast is a scarp slope composed of the Carmel Formation and to the northwest is the broad dipslope of the Curtis formation. There are alluvially blanketed strike valleys on either side of the hogback.

The Entrada is a crossbedded, finegrained, well-cemented sandstone. This formation is very thick, with depths up to 325 feet, forming cliffs, hogbacks and strike ridges. The drainage is fair to good with high slope stability.

The Carmel, is very similar to the Entrada. It is more blocky with thin bedded oolitic and coquinal limestone interbedded in lower parts with gray to greenish-gray shale and gypsum with some red beds locally evident. The drainage is poor due in areas with undisturbed limestone and moderate where the limestone is fractured. Slope stability is high.

The surficial geology of the landfill is mapped as Quaternary older alluvium, between the Jurassic formations of Entrada and Carmel sandstones. The greater part of the alluvium is fine grain material,

containing loose silt and silty sands, and also includes stringers and lenses of dirty subangular gravel. The thickness of the alluvium ranges between five to thirty feet deep forming a flat valley bottom. Alluvial drainage characteristics include rapid surface runoff with low permeability. Slope stability is low, which is subject to slumping along steep slopes and forming gullies along floodplains and benches.

The subsurface geology, mainly underneath the Quaternary older alluvium, probably contains the Entrada, Carmel and possibly the Navajo sandstone formations. The Navajo is a very light gray to cream color sandstone that is very homogeneous. It consists almost entirely of fine to medium grained sandstone composed of subangular to rounded frosted quartz grains. It is the deepest of the three sandstones, with depths reaching 800 feet. The drainage and permeability is very good and slope stability is excellent.

The landfill site is about 1500 feet northeast from the South Valley Fault. This fault trends about North 70° West from a junction with the Uinta fault, five miles into South Valley where it eventually dies out. The fault is downthrown on the southwest and dips steeply southwest. Its stratigraphic throw probably does not greatly exceed 300 feet and by its apparent horizontal displacement, it is classified as a dip slip fault.

Hydrologic Assessment

Surface Water

Regionally, the landfill is located within the Upper Green/Flaming Gorge subbasin. This subbasin captures all surface runoff that drains into the Flaming Gorge Reservoir and the Green River. The landfill is also located within the Sheep Creek Watershed. This watershed drains the North, Middle and South Forks of Sheep Creek, Lodgepole Creek, Hope Creek, Death Valley, Birch Spring Draw, and the area around South Valley. The South Valley subwatershed is where the landfill is located. This subwatershed is approxiamtely 16.0 square miles in area. It primarily includes all intermittant, empherial and perennial streams that drain into Flaming Gorge around the Lucerne and South Valley.

Within a mile radius of the Manila City landfill, surface water is present in a number of unnamed intermittent streams, with none of them flowing through or around the landfill. Plus, there are no perennial streams within the one mile radius. Sheep Creek, a 4th order stream channel is the nearest perennial stream, which is about 2.5 miles to the southwest. The closest surface water feature is an intermittent stream approxiamtely 300 feet to the southeast that flows through an alluvial valley. The intermittent stream is more defined as a small gully that probably only runs during the snowmelt season and during high intensity, long duration rainfall periods.

The landfill is located within a depressional swale. This swale concentrates snowmelt and probably rainfall within and around the landfill. During the site visit, frozen water was apparent throughout the landfill. The road leading into the site was also concentrating water into the landfill. Given the physiographic characteristics of the landfill, snowmelt is the only source of water into the site. Also, the swale does not allow runoff or overland flow to leave the landfill into another drainage. Everything is captured as subsurface flow.

Subsurface Water

No test boring or core drilling was conducted onsite at the landfill. However, near the gate leading into the landfill, a private well was drilled in 1976 for stockwatering purposes. This site is approximately 500 feet southwest of the landfill. The well log was used to interprete the depth of groundwater and the geologic stratigraphy below the landfill.

Groundwater was not encountered until about 700 feet below the surface. The test boring stratigraphy showed homogenous material of sandstone with red soft sandstone with white hardstreaks to 660 feet. This would be interpreted as Entrada sandstone, underlined by the Carmel, then probably the Navaho. A small layer of blue-greyish shale was encountered next then finally water at 700 feet. The well log did not go into any great detail on depths of different formations and characteristics.

Groundwater monitoring that includes the flow direction and rate is unknown at this well. I would speculate that flow direction would parallel the direction of the bedding planes, therefore draining towards the Northwest, into South Valley.

Water Quality

To my knowledge, there has been no surface or subsurface water quality monitoring completed at the landfill facilities. Therefore, the impacts upon the ground water and surface water from leachate discharges is unknown. Given the physical, geologic and climatic characteristics of the landfill, the potential for ground water contaminations from landfill leachate discharge is probably minimal and does not justify the need for ground water monitoring. With the combination of the soil and geologic formations underlining the landfill and with the water table about 700 feet, makes the migration of contaminates to the water very unlikely.

Water Rights

Table 3.1 displays all the tabulated water rights and wells, located within a 2000 foot radius of the landfill. There are three water rights within the 2000 foot radius and no filed water rights on-site at the landfill. The one well, is located at 1000 South, 1200 East from the Northwest corner of Section 5, Township 2 North, Range 20 East, with the Salt Lake base meridian.

Water Right Number	*Ownership Name*	*Water Use*	*Source*
41 2519	United States Forest Service	Stockwatering	Cottonwood Wash
41 3246	State of Ut. School & Inst. Trust	Stockwatering	Well
41 2619	Broadbent. D. Clay	Stockwatering	Cottonwood Wash

Water Balance

From precipitation data gathered in Manila, average annual precipitation is 9.68 inches (Ashcroft et al 1992). Unfortunately, there is no evaporation data at this site, so to equate the loss due to evaporation, data will be used from evaporation pan data near Flaming Gorge Reservoir. Annual evaporation loss is calculated to be 43.33 inches per year with a average annual precipitation of 12.50 inches (Ashcroft et al

1992). By equating the Manila data with the Flaming Gorge data, evaporation is calculated at 33.56 inches.

Since evaporation is higher than precipitaion, this equates to a negative water balance, which is typical for desert, arid environments. Water is also lost through infiltration but the majority is through evaporation and there is no surplus of water.

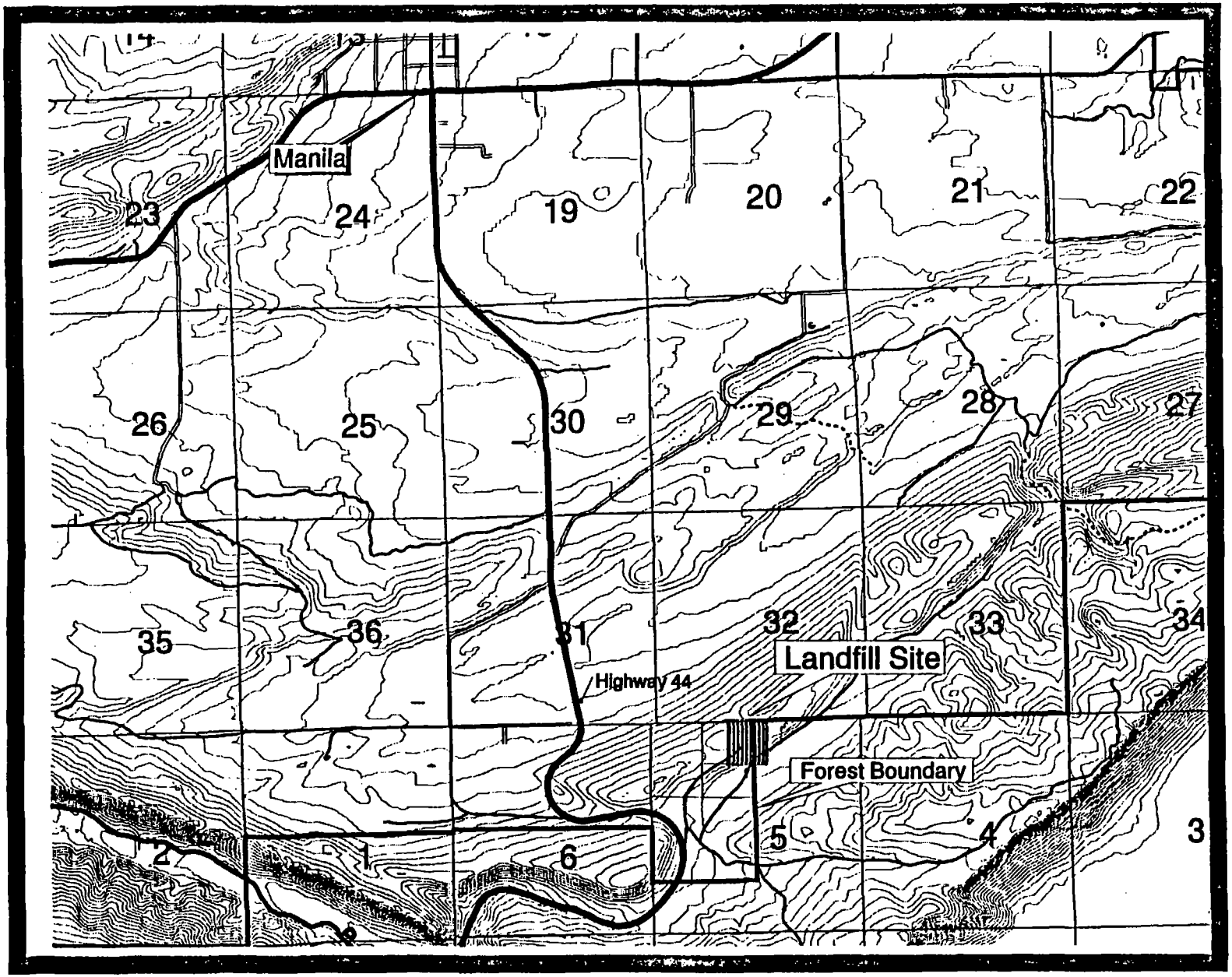
Soil types and Properties

Soil Description

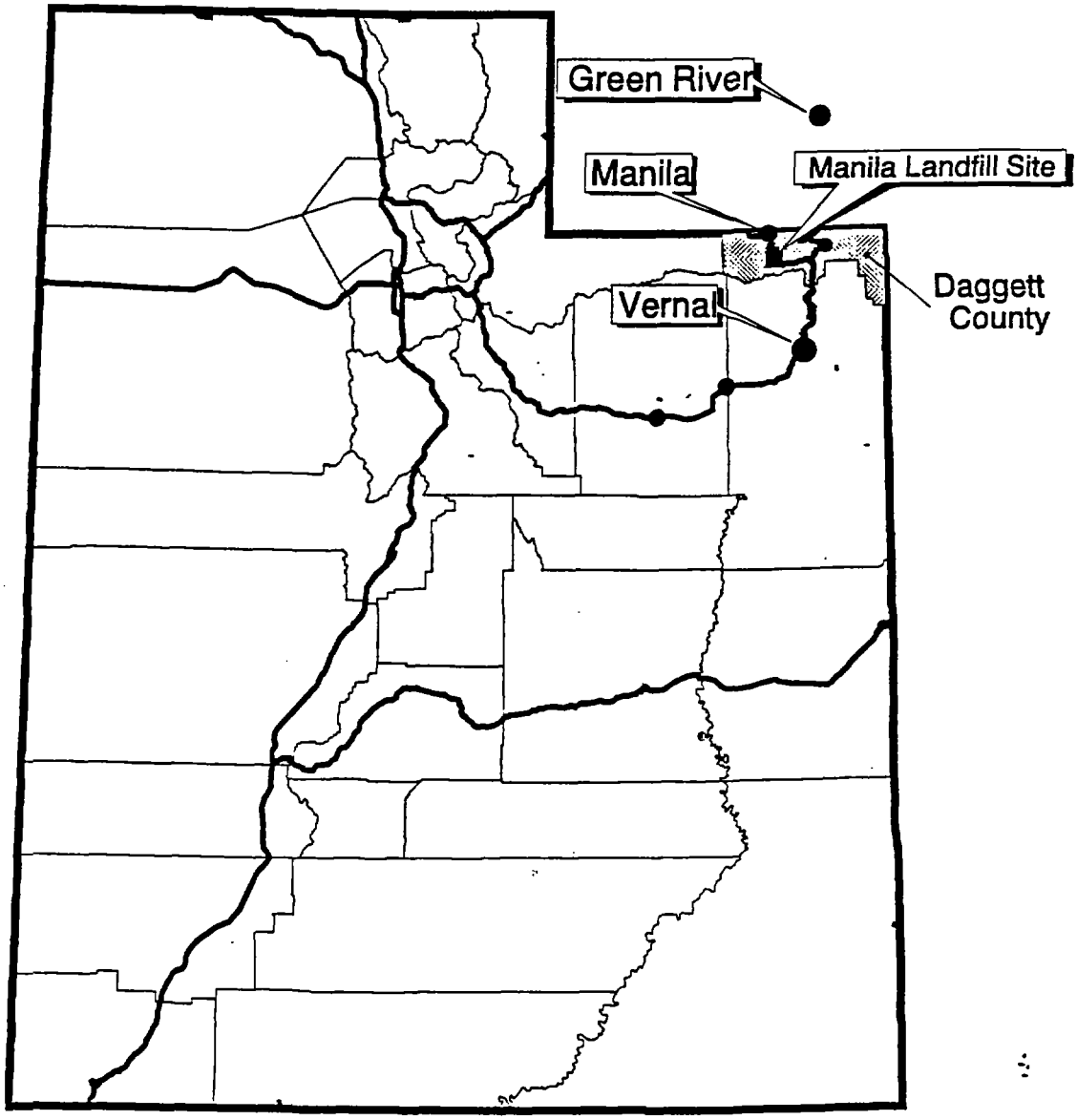
The landfill area was frozen during the time of the soil and water field investigations. Only one soil description was done at the latest landfill trench which showed approximately 50 inches of profile. The top 4 inches was too disturbed to describe.

The profile shows a silt loam, very deep, moderately well drained soil that formed predominantly from colluvium from sandstone and shales. The subsurface is very pale brown silt loam about 40 inches thick. The underlying material is a reddish brown gravelly loam with an abrupt broken boundary is about 3 inches (at sampling site). The underlying horizon was light yellowish brown silt loam 4 inches to the top of the fill. The pH was around 8.0 for all but the reddish brown gravelly loam which was neutral. Permeability is moderately rapid. Slope is 5 to 10 percent

Manila Landfill Location Map



Manila Landfill Vicinity Map



Appendix A

Recorded at Request of _____

at _____ M. Fee Paid $_____ Recorded March 15, 1974

by Gene Briggs Dep. Book 74 Page 313 Ref. Entry # 8633

Mail tax notice to _____ Address _____

QUIT-CLAIM DEED

[CORPORATE FORM]

DAGGETT COUNTY, a corporation organized and existing under the laws of the State of Utah, with its principal office at Manila, of County of Daggett, State of Utah, grantor, hereby QUIT CLAIMS to Daggett County and the Town of Manila, as tenants in common

grantee of Manila, Daggett County, State of Utah for the sum of Ten dollars and other good and valuable consideration DOLLARS,

the following described tract of land in Daggett County, State of Utah:

NE 1/4 NE 1/4 NW 1/4, N1/2 SE 1/4 NE 1/4 NW 1/4, E 1/2 SW 1/4 NE 1/4 NW 1/4, Section 5, Township 2 North, Range 20 East, Salt Lake Meridian. Subject to all existing rights of record.

The officers who sign this deed hereby certify that this deed and the transfer represented thereby was duly authorized under a resolution duly adopted by the board of ~~directors~~ of the grantor at a lawful meeting duly held and attended by a quorum. commissioners

In witness whereof, the grantor has caused its corporate name and seal to be hereunto affixed by its duly authorized officers this _____ day of _____, A. D. 19

Attest:

_____ Secretary.

[CORPORATE SEAL]

DAGGETT COUNTY

By _____

Albert Neff, Chairman

_____

Gene Briggs, Recorder

STATE OF UTAH,

County of Daggett ss.

On the 11th day of March, A. D. 1974 personally appeared before me Albert Neff and Gene Briggs who being by me duly sworn did say, each for himself, that he, the said Albert Neff is the ~~president~~ Chairman and he, the said Gene Briggs is the Recorder of Daggett County Company, and that the within and foregoing instrument was signed in behalf of said corporation by authority of a resolution of its board of directors and said Albert Neff and Gene Briggs each duly acknowledged to me that said corporation executed the same and that the seal affixed is the seal of said corporation.

_____

Notary Public.

My commission expires 5/21/75 My residence is Manila, Utah

FORM NO. 1030— © LAW PUB. CO. — 3218 SO. 3RD EAST — SALT LAKE CITY

United States Department of Agriculture Forest Service	a. Record no. (1-2)	b. Reg. No. (3-4)	c. Forest (5-6)
SPECIAL USE PERMIT	70	04	Ashley 01
P.L. 94-579 Act of ~~xxxxxxxx~~Oct. 21, 1976	d. District (7-8) Flaming Gorge 01	e. User number (9-12) 1033	f. Kind of use (13-15) Disposal Area 313
This permit is revocable and nontransferable (Ref. FSM 2710)	g. State (16-17) Utah 49	h. County (18-20) Daggett 009	k. Card no. (21) 1
36 CFR 251.50, et seq.			

Permission is hereby granted to Daggett County % Carl Collett, Chairman

of Manila, Utah 84046

hereinafter called the permittee, to use subject to the conditions set out below, the following described lands or improvements: A small parcel of land located in the

NW¼ NW¼ of lot 2, Sec. 5, T2N, R20E, SLM

This permit covers 5 acres ~~and xxxxxxxxxxxxxxxxxxxx~~ and is issued for the purpose of:

Operating and maintaining a sanitary landfill for Daggett County

1. Construction or occupancy and use under this permit shall begin within N/A months, and construction, if any, shall be completed within N/A months, from the date of the permit. This use shall be actually exercised at least N/A days each year, unless otherwise authorized in writing.

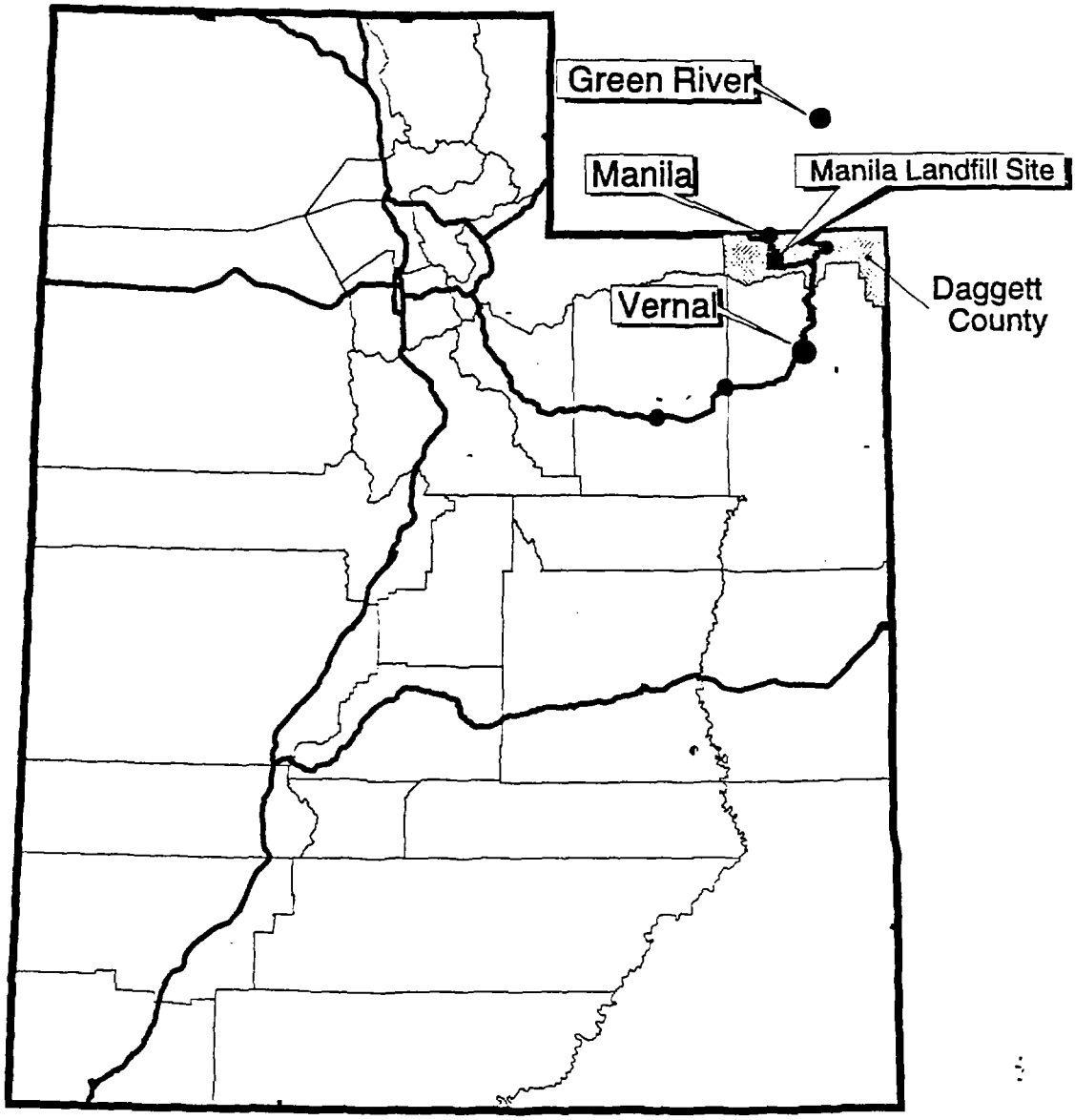
2. In consideration for this use, the permittee shall pay to the Forest Service, U.S. Department of Agriculture, the sum of N/A Dollars ($) for the period from 19, to , 19, and thereafter annually on Free Use (36 CFR 251.2 a & b), Dollars ($): *Provided, however,* Charges for this use may be made or readjusted whenever necessary to place the charges on a basis commensurate with the value of use authorized by this permit.

3. This permit is accepted subject to the conditions set forth herein, and to conditions 18 to 32 attached hereto and made a part of this permit.

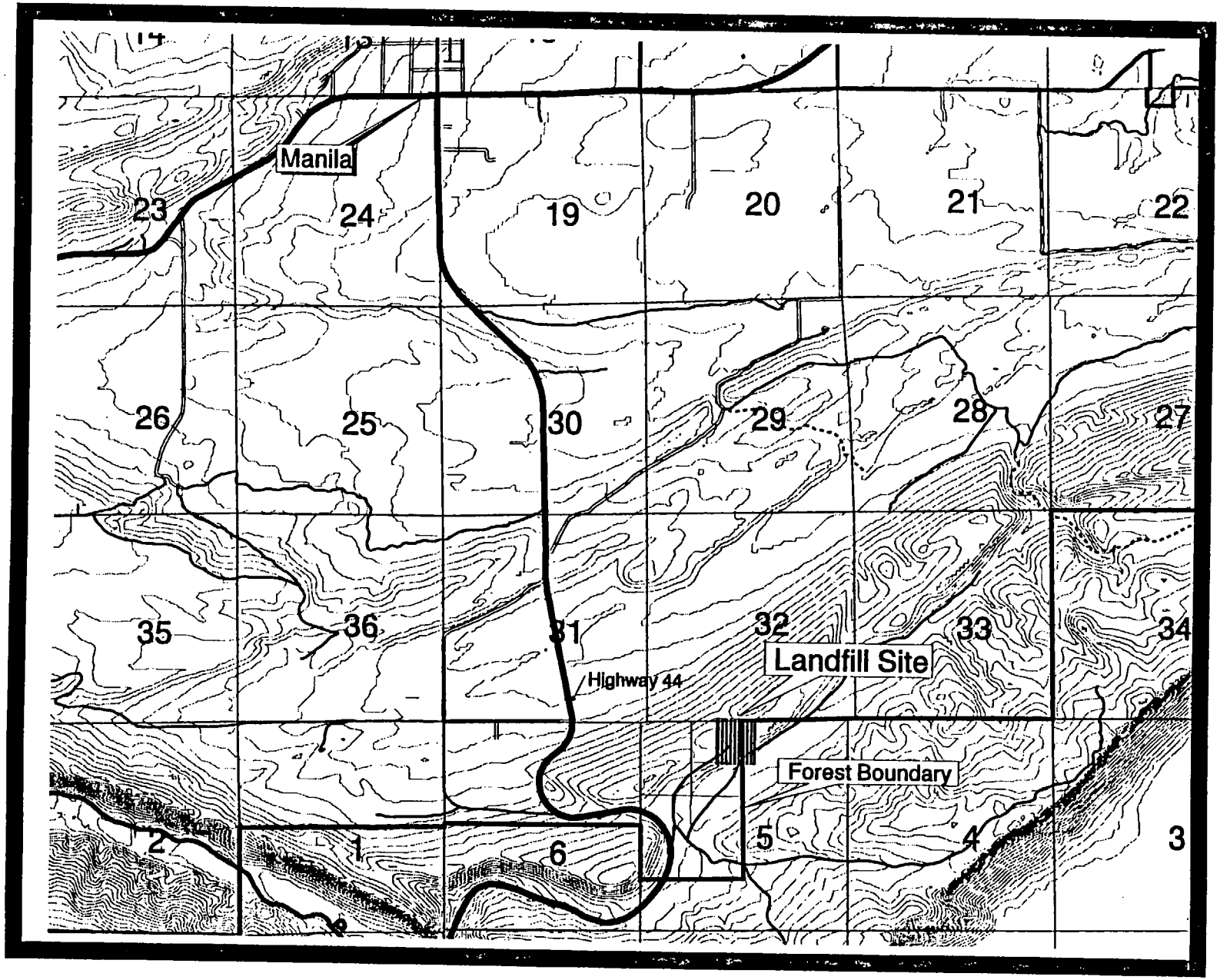
	NAME OF PERMITTEE	SIGNATURE OF AUTHORIZED OFFICER	DATE
PERMITTEE	DAGGETT COUNTY	Carl S. Collett TITLE CHAIRMAN	4-13-82
ISSUING OFFICER	NAME AND SIGNATURE JAMES N. CRAIG	TITLE FOREST SUPERVISOR	DATE 4/15/82

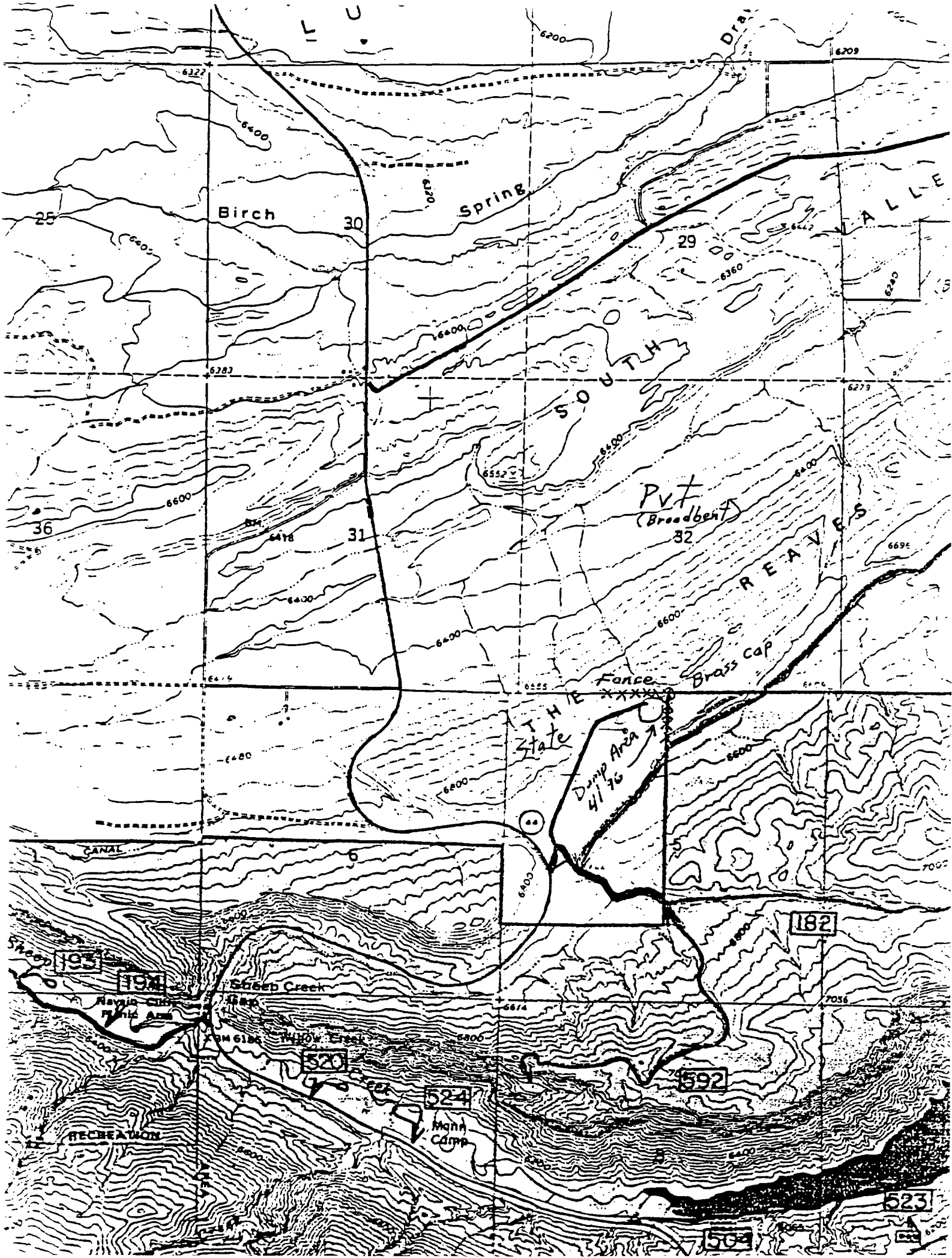
(CONTINUED ON REVERSE)

Manila Landfill Vicinity Map



Manila Landfill Location Map




Birch
Spring
SOUTH
Pvt
(Broadbent)
32
31
30
29
25
36
REAVES
Fence
Brass cap
THE
State
Dump Area
41 76
CANAL
Navajo Cliffs
Picnic Area
Sheep Creek
Gap
Willow Creek
RECREATION
Mann
Camp
182
193
194
520
524
592
523
504

County, Daggett County Landfill

P. M. Township Range 20E P. M.

1	6	5	4	3	2	1
12	7	8	9	10	11	12
13	18	17	16	15	14	13
24	19	20	21	22	23	24
25	30	29	28	27	26	25
36	31	32	33	34	35	36
1	6	5	4	3	2	1
12	7	8	9	10	11	12
13	18	17	16	15	14	13
24	19	20	21	22	23	24

Tom Doyle

John Mitchell

U.S. Forest

SE. SW SW
SW SE SW
20 Acres

3N

2N

Broadhurst
Tinker

Appendix B

COUNTY LANDFILL LOG					
DATE	VEHICLE LICENSE NO.	ESTIMATE VOLUME (In Cubic Yards)	WASTE SOURCE	DRIVERS & SELF-INSPECTED DESCRIPTION OF THE TYPES OF WASTE	INSP Y/N

FORM INSTRUCTIONS: (All incoming loads must be recorded)

*Estimated Volume--should be estimated as accurately as possible and should state if the load is compacted or not.

*Waste Source--how the waste was generated (e.g. commercial, campground, residential, agricultural etc.)

*Driver & Self-Inspected Description of Waste-- record a general statement as to the types of waste in the load both from your own observations and the drivers description.

*Insp.--specif ith an "X" in this column if the load was flagged for a more intensive inspec (to be recorded on "Waste Inspection Form").

LANDFILL INSPECTION FORM

On-site landfill inspections must be completed on a quarterly basis. Inspectors should consider each of the factors listed and record the findings in narrative on this form. As well, the location of any problem areas should be marked on a landfill site map and referred to in the narrative.

Inspector's Name _____ Title _____

Inspection Date _____ Inspection Time _____

Inspection Categories

Conformity with Landfill Design Scheme & Methods: Make note of any variation from design guidelines or landfilling methods.

Integrity of Run-on Control Berms and Ditches: Note any undo erosion or failures of current systems and specify any needed expansion or upgrades.

Evaluate the Adequacy of Daily Cover for Active Cells: Inspect to insure daily cover conforms to operating plan.

Inspect the Integrity of Cells that have Already Received Final Cover: Note the status of vegetative cover that has established, any erosional impacts, and any evidence of subsidence.

Inspect for Litter, Disease Vectors, Evidence of Burning, and also the adequacy of the access gate, fencing and signage.

Update with a describe of any remedial action taken to rectify or repair any problems encountered in the inspection and indicate the date the corrective action was taken.

Inspector's Signature: _____

WASTE INSPECTION FORM

To be completed on a random basis (about every 20th load) or when a suspicious load is encountered.

Inspected by _____ Date_____

Vehicle License Number _____ Drivers Name _____

Drivers Address:

_____ _____ _____ _____
Street City State Zip

Drivers Description of the Types of Waste Contained in the Load

Source of the waste (according to driver) _____

_____

Types of waste (according to driver) _____

_____

Inspectors Analysis of Waste Material
Segregate and break-down the load in the presence of the landfill user and indicate existence and relative volume of the following types of waste contained in the load:

Infectious Waste _____ Asbestos _____ Liquids _____

Radio Active _____ Animals _____ Furniture _____

Automobiles _____ Ag. waste _____ Sludge _____

Ash _____ Tires _____

Other Types of Hazardous Wastes (describe) _____

_____

Action Taken _____

Appendix C

Chapter 2

BACKGROUND FOR DEFINING HAZARDOUS WASTES

There are two major methodologies presently in use to identify wastes as hazardous–a list approach and a criteria approach. Both approaches are difficult to implement. The criteria approach addresses the problem more directly. It identifies those properties of waste that cause hazardous effects to the environment and then recommends methods and procedures to measure these properties (or effects). The list approach, on the other hand, is more indirect. The waste is analyzed for certain prescribed species, and depending upon the presence of these species (and possibly their concentration), a hazard judgement is made. The following discussion will address methods presently available to implement a criteria approach.

Since some aspects of the safe management of hazardous waste are identical to safe management of other regulated substances, some of the methods mentioned herein are those recommended by other agencies for the testing of these other regulated substances. Waste materials, however, do possess certain peculiarities of form and function for which existing criteria may not be adequate or appropriate to characterize a waste's hazardousness. In these cases, the differences are mentioned and the problems addressed. The criteria that will be discussed are: flammability, corrosiveness, and reactivity. These criteria can be viewed as properties of the waste as disposed and can be measured by directly testing the waste.

There are other criteria, such as waste toxicity, etiologic activity, genetic activity, and tendency to bioconcentrate, which must be considered in the context of their routes of exposure. A waste containing a contaminant conforming to these criteria can only be a hazard if there exists a vector (exposure route) by which this contaminant can be made available to the environment under disposal conditions. In order to measure these criteria in a meaningful way, the measurement must be done on the exposure vector, be it eluent from the waste, vapor due to waste evaporation and sublimation, or air float particles from waste particulates. For example, a waste may contain a toxic constituent, but if this toxicant is bound up in the waste matrix in such a way that it cannot leach (elute), vaporize, air-float particulate, or sublimate under disposal conditions, the waste does not present a toxicity hazard. Therefore, any testing done to identify wastes that would conform to the above criteria should ideally be done on these vectors. Testing of this sort is complex and still under development in both the public and private sectors. This chapter will not deal with these criteria further.

FLAMMABILITY

Flammability is one criterion for defining a waste as hazardous. Flammable wastes may cause damage directly, from heat and smoke production, or indirectly, either by providing a vector by which other hazardous wastes could be dispersed (such as convection currents carrying toxic particulates or dust), or could cause otherwise benign wastes to become hazardous (such as plastics which, when ignited, undergo condensation reactions or depolymerize to emit toxic fumes). For these reasons, it is desirable to identify wastes that are flammable, so they can receive proper handling.

One method by which the degree of flammability

TAKEN FROM: "STATE DECISION-MAKERS GUIDE FOR HAZARDOUS WASTE MANAGEMENT" U.S. E.P.A. 1977 #10320

of a material can be defined is by the flashpoint (FP) of the substance. This is the lowest temperature at which evaporation produces sufficient vapor to form an ignitable mixture with the air, near the surface of the liquid, or within the vessel used. (By "ignitable mixture" is meant a mixture that, when ignited, is capable of the initiation and propagation of flame away from the source of ignition. By "propagation of flame" is meant the spread of flame from layer to layer independently of the source of ignition.)

The initiation of flame is always the result of the progressive auto-acceleration of reaction, which becomes possible only under definite thermal conditions brought about by an external source (for example, spark discharge, hot walls of a vessel, etc.) Most combustion reactions are exothermic (heat producing), and as they proceed they raise the temperature of the surroundings. Since reaction rate is a function of temperature (a measure of available energy), these reactions accelerate themselves by the thermal energy they release in reaction. (The reaction here is oxidation, that is, the exhaustive combination of the vapors with the elemental oxygen in the atmosphere.)

In defining flammability, only the flash point need be considered since direct vigorous oxidation of a substance not in the gaseous state is very rare at normal temperatures. While all agencies and organizations that define flammability use flash points as their limiting criteria there is no consensus as to what that limit should be (for example, Department of Transportation F.P. $< 100^{\circ}F$, California F.P. $< 80^{\circ}F$). In landfill situations, there are many available external sources of energy which could provide the impetus for combustion–electrical energy resulting from sparks generated by bulldozers, thermal energy resulting from the heat of neutralization when wastes of differ-pH's are mixed, biologically initiated thermal energy from the decomposition of organic wastes, etc. These sources could raise the temperature at the landfill surface above the ambient temperature. Data should be gathered on the temperature and energy sources at landfills to help address the question of what flashpoint limit should be chosen to avoid conflagrations due to these external sources.

Another source of concern is the fact that disposal sites often contain wastes that are not hazardous by themselves, but when burned become hazardous (for example, certain plastics give off noxious fumes when burning, beryllium dust may leave the site by a vector supplied by the fire, etc.) For this reason, it may be desirable not only to require that flammable wastes be placed in a hazardous waste facility, but also combustible wastes. Combustible wastes can be managed in a safe manner at these facilities by being segregated from those wastes which become hazardous upon burning.

The established tests for flammability take the physical state of the substance into consideration, since the state will affect the vapor pressure and consequently change the flash point. Therefore, flammability will be examined for the four following physical states of wastes: (1) pure liquid; (2) solution; (3) sludge; (4) solid. The testing modifications that must be made for each state, and a short discussion of each state follow:

I. Pure Liquids

The vapor, as measured by the vapor pressure, produced by a pure substance is directly proportional to the ambient temperature. (The reference is primarily to liquids, although there are certain solids, e.g., camphor, that sublime, that is, change from a solid to a vapor, at ordinary temperatures, and that have a meaningful vapor pressure.) The "ideal vapor pressure" of a substance is defined as the sum of the vapor pressure of each constituent multiplied by its mole fraction. Temperature is a manifestation of molecular motion, which in turn is a physical consequence of the kinetic energy of the molecules themselves. At any given temperature, the molecules in a sample will have a "spread" of kinetic energies that can be statistically described as a Boltzman distribution.

A molecule must possess a certain minimum threshold energy in order to overcome the attractive forces of its neighboring molecules in the close-packed liquid state. As the temperature is raised, the entire curve shifts toward higher kinetic energy and more molecules now possess the prerequisite energy to escape into the gaseous state.

It has been suggested that flash points be standardized to a particular atmospheric pressure, since barometric pressure does vary with different locations, and with time at the same location. The reason for

this suggestion is as follows: Atmospheric pressure is the measure of the amount of air available at any given point. Thus, as the atmospheric pressure drops, less vapor (that is, lower vapor pressure) is necessary to attain that concentration which defines an ignitable mixture, and the temperature which produces this lower vapor pressure (that is, the flash point) is also lower. One might assume then that if the barometer drops appreciably after a flash-point determination is made, what was tested as a nonflammable substance at the higher reading may be flammable at the new pressure. However, this seems to be an unrealistic concern since according to the National Oceanic and Atmospheric Administration (NOAA), the largest barometric deviation in a single day (excluding hurricanes and tornadoes) *is less than 20 mm Hg,* and this would change a flash point of 80°C by less than 3°C.

There are several common methods of determining the flash point of a liquid. The methods vary only slightly with the apparatus used, and these apparatus are of two types—open cup testers and closed cup testers. The method is basically as follows: the sample is placed in the sample cup and heated at a slow but constant rate. A small test flame is passed across the cup at regular, specified intervals. The flash point is taken as the lowest temperature at which application of the test flame causes the vapor at the surface of the liquid to flash.

The apparatus on the market differ in four ways: (1) sample cup type; (2) cup insulation type; (3) heating mechanisms; (4) agitation.

The most important of these is the type of sample cup. Open cup testers as a class give higher flash points than closed cup testers, and are normally used for determinations on liquids with relatively high flash points. These higher determinations result from the fact that the design of the top of the sample cup in an open cup tester allows the sample to be in greater contact with the atmosphere, preventing any quantitative buildup of vapors over the liquid as it is heated. Closed cup testers have smaller openings above the sample cup; this keeps the vapor from quickly dissipating and results in a mixture richer in vapor. Thus, closed cup testers would be representative of the worst, or most dangerous situation.

There are two types of cup insulators (temperature baths): liquid bath and air bath. Since the purpose of these temperature baths is to ensure a uniform temperature around the entire sample, a liquid bath is superior to an air bath, due to the better thermal transport properties of liquids as compared to air.

As far as temperature control mechanisms are concerned, it makes no difference whether the apparatus has a gas or electric burner. Both are equally accurate at the low temperature of concern, and the choice becomes one of convenience (electric) versus economy (gas).

The final choice that must be made is whether or not to include a method of sample agitation in the apparatus. If the sample to be tested is very viscous, tends to skin over, or contains suspended solids, a stirrer should be incorporated into the apparatus to agitate the sample and prevent local temperature variations. Since a pure nonviscous liquid can also be run on such an apparatus without a stirrer, it is recommended that a stirrer be incorporated into the apparatus.

There are a number of different flash-point testers offered by the vendors, Fischer and Sargent to name two, with various combinations of the above features (Table 1).

The following is a short discussion on three types of physical state deviations from a pure liquid and and how they should be handled.

II. Solution

A solution is the least complex deviation from a pure liquid, and the procedures for ascertaining flash points of solutions have also been developed. The vapor pressure of solutions will vary either positively or negatively from the ideal vapor pressure (where the "ideal vapor pressure" is defined as the sum of the vapor pressure of each constituent multiplied by its mole fraction). Solutions can be tested in the same manner as pure liquids with the following procedural change. If the flash point is determined to be 6.6°C (20°F) or higher, a sample of the liquid evaporated to 90 percent of its original volume should be tested. The lower value of the two tests can then be used as the flash point of the material. The purpose of this procedure is as follows: Since the different components in the mixture have different volatilites,

Table 1. Commonly Encountered Hazardous Materials and Products Found in Small Batches of Waste

TYPICAL WASTE SOURCES	HAZARDOUS MATERIALS
1. ACIDS	
Pickling Liquor Battery Acid Acidic Chemical Cleaners Spent Acid Plating Operations Laboratory Glassware Acid Baths Glass Etching Solutions	Chromic-sulfuric acid mixture, hydrobromic acid, hydrochloric acid, hydrofluoric acid, nitric acid, perchloric acid, sulfuric acid
2. ALKALIES	
Miscellaneous Caustic Products Alkaline Battery Fluid Caustic Wastewater Cleaning Solutions Lye	Ammonia, lime (calcium oxide), potassium hydroxide, sodium hydroxide, sodium silicate
3. ORGANICS *(Mainly Non-Halogenated)*	
Capacitor Fluids Chemical Cleaners and Solvents Chemical Toilet Wastes Electrical Transformer Fluids Furniture and Wood Polishes Laboratory Chemicals Paint Removers Silver Cleaning Agents Shoe Polish	Aromatic compounds, organic amides, organic mercaptans, organonitriles, nitrobenzene, phosgene, thioureas
4. HALOGENATED ORGANICS	
Cleaning Solvents Laboratory Chemicals Paint and Varnish Removers Dry Cleaning Solutions Capacitors and Transformers Containing PCB	Carbon tetrachloride, chloroform, methylene chloride, polychlorinated biphenyls (PCB)
5. INORGANICS	
Catalysts Chemical Toilet Wastes Laboratory Chemical Wastes Paint Sludge Plating Solutions Fluorescent Lamps Germicidal and "Disinfectant" Solutions Paints Fluxes Aluminum Cleaning Agents	Ammonium fluoride, ammonium silicofluoride, antimony salts, arsenic salts, asbestos products and fibers, beryllium compounds, barium salts, borane compounds, cadmium salts, chromium salts, cyanide compounds, inorganic halides (potassium bromide, sodium iodide), lead compounds, mercury salts, selenium salts, sodium silicofluoride, vanadium compounds, zinc chloride

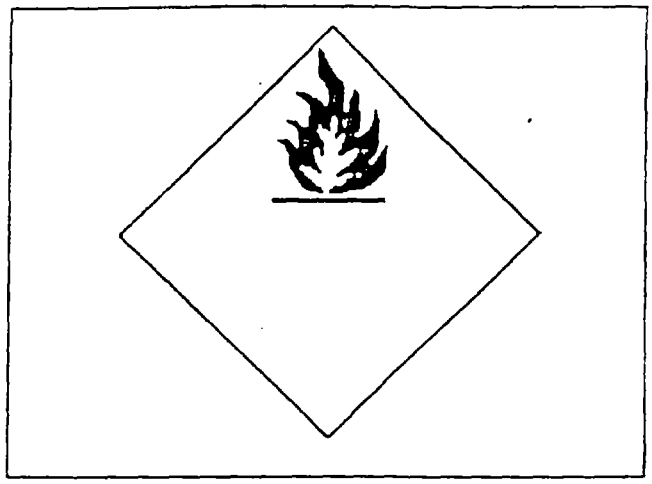
Table 1. Commonly Encountered Hazardous Materials and Products Found in Small Batches of Waste (Continued)

TYPICAL WASTE SOURCES	HAZARDOUS MATERIALS
6. EXPLOSIVES	
Illegal Explosive "Firecrackers" Laboratory Wastes Obsolete Explosives Track Torpedoes Blasting Caps Detonators Commercial Pyrotechnics for Private Use	Ammonium nitrate, ammonium nitrate-fuel oil mixtures (ANFO), dynamite, mercury fulminate, nitroglycerin, 2,4,6-trinitrotoluene (TNT), water-gel explosives
7. PESTICIDES	
Waste Pesticides House and Garden Discarded Pesticide Cans Waste Water from Cleaning of Pesticide Containers Containers and Pesticide Application Equipment	Chlorinated hydrocarbon pesticides, organophosphate pesticides, phosphorothioate pesticides, organic carbamates, organic thiocarbamates
8. GASES	
Welding Gases Laboratory Gas Cylinders Local Anesthetic "Aerosol" Cans Medical Oxygen Cylinders	Acetylene, ammonia, carbon monoxide, chlorine, ethyl chloride, hydrogen, hydrogen sulfide, methyl chloride, nitrogen dioxide, oxygen, other gases under high pressure
9. BANNED PRODUCTS	
Banned Pesticides Banned Hair Sprays Banned Aerosol Bathroom Cleaners Waste Lead-Base Paints	Aerosol products containing vinyl chloride as propellant, aldrin products, lead-based paints containing 0.5 percent lead or greater

Table 2. Reference Manuals on Hazardous Properties of Laboratory Chemicals and Commercial/Industrial Products

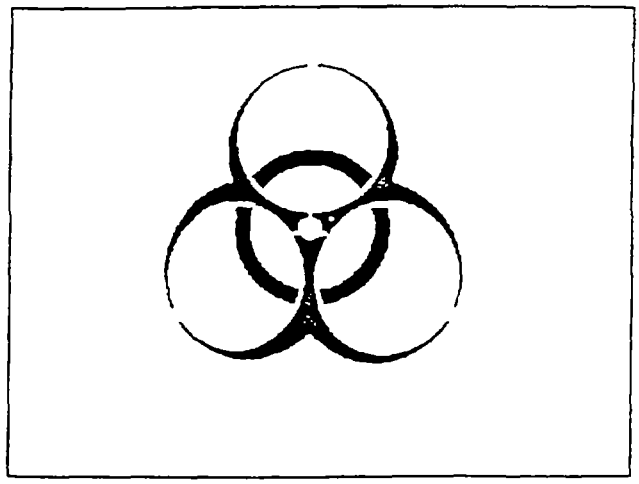
REFERENCE	CONTENTS
Gleason, Marion N., et al. *Clinical toxicology of commercial products; acute poisoning.* 3d ed. Baltimore, The Williams & Wilkins Co., 1969. various pagings.	Contains alphabetical compilation of 3,000 major chemical substances (ingredients) found in widely used commercial products, and gives toxicity information and a toxicity rating for each ingredient. In addition, the manual contains a trade name index for 17,000 products, identifies the manufacturers and lists the ingredients for each product and identifies the toxic components.
Stecher, P.G., et al. *The Merck index; an encyclopedia of chemicals and drugs.* 8th ed. Rahway, N.J., Merck & Co., Inc., 1968. 1713 p.	Describes 10,000 individual substances, provides data on their toxic effects on humans and test animals, and lists common uses for selected entries. In addition, the index lists poison control centers and first aid procedures. A cross-index of chemical names and formulas is also given.
Sax, N.I., et al. *Dangerous properties of industrial materials.* New York, Reinhold Publishing Corporation, 1957. 1467 p.	Lists 9,000 general chemicals and products; gives descriptions of physical properties and toxicity, explosion, fire, and radiation hazard ratings. For each chemical, pertinent data are provided on personal hygiene, ventilation, disaster control, shipping regulations, and storage/handling procedures.
Weast, R.C. *Handbook of chemistry and physics.* 56th ed. Cleveland, CRC Press, 1975-1976. various pagings.	Identifies physical and chemical properties of most organic and inorganic chemicals. The handbook gives toxicity of select chemicals, and general information on chemical hazards, fire precautions and first aid.
Christensen, H.E., Luginbyhl, T.T., and B.S. Carroll. *Registry of toxic effects of chemical substances; 1975 edition.* Washington, U.S. Government Printing Office, June 1975. 1296 p.	Identifies toxicity (to man, animals, and aquatic life) of most known organic and inorganic chemicals and identifies carcinogenic, teratogenic, and mutagenic nature, if any.

FLAMMABLE SYMBOL



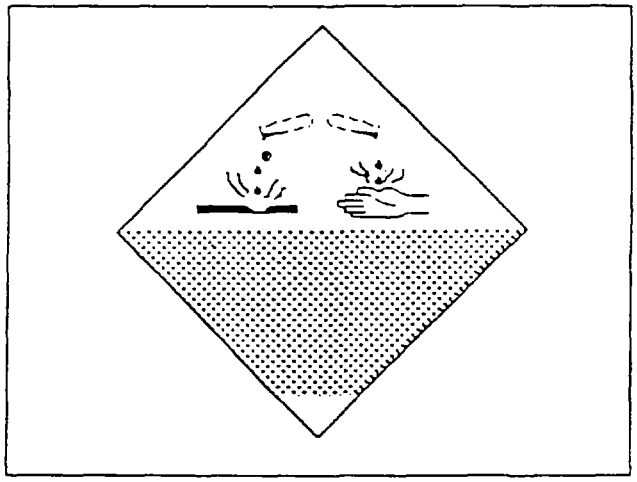
Category	Message	Symbol	Background (shape/color)
Flammable Liquid	Flammable Liquid (black/white	Flame (black/white)	(diamond) (red)
Flammable Solid	Flammable Solid (black)	Flame (black)	(diamond) (red/white strip)
Spontaneously Combustible	Spontaneously Combustible (black)	Flame (black)	(diamond) (white top) (red bottom)
Dangerous When Wet	Dangerous When Wet (black/white)	Flame (black/white)	(diamond) (blue)

BIOMEDICAL SYMBOL



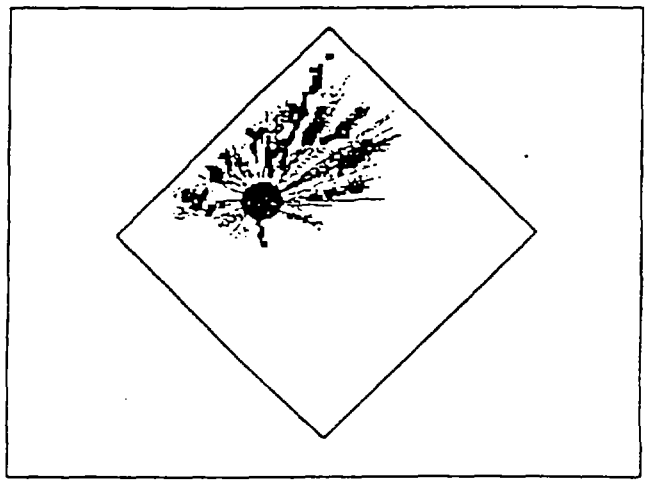
Category	Message	Symbol	Background (shape/color)
Biomedical	Biomedical Material Etiologic Agents (black/white)	(special symbol) (black)	(rectangle) (black/white)

CORROSIVE SYMBOL



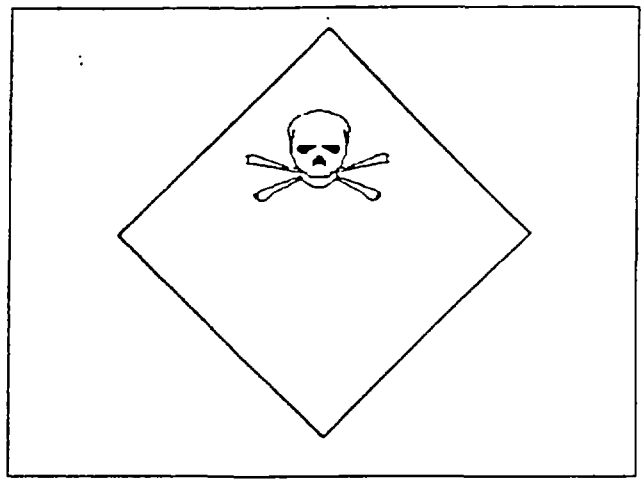
Category	Message	Symbol	Background (shape/color)
Corrosive	Corrosive (black/white)	(special symbol) (black/white)	(diamond) (white top) (black bottom)

EXPLOSIVE SYMBOL



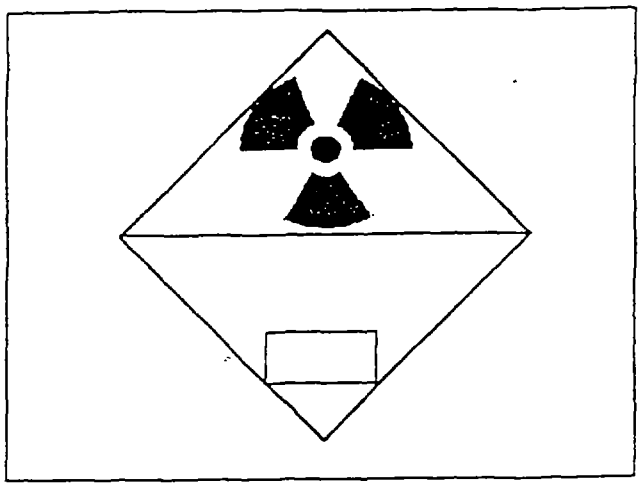
Category	Message	Symbol	Background (shape/color)
Explosives	Explosive A (black)	Exploding Ball (black)	(diamond) (orange)
	Explosive B (black)	Exploding Ball (black)	(diamond) (orange)
	Explosive C (black)	Exploding Ball (black)	(diamond) (orange)
	Blasting Agent (black)	(none) (black)	(diamond) (orange)

POISON AND IRRITANT SYMBOL



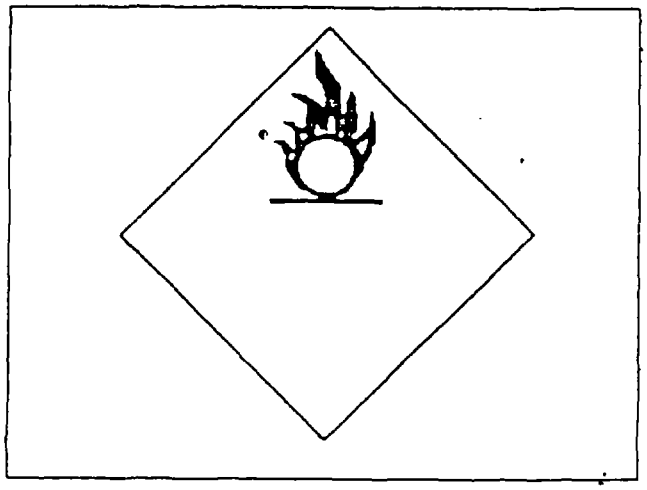
Category	Message	Symbol	Background (shape/color)
Poison	Poison (black)	Skull/X Bones (black)	(diamond) (white)
Poison Gas	Poison Gas (black)	Skull/X Bones (black)	(diamond) (white)
Irritant	Irritant (red)	(none) (none)	(diamond) (white)
	Irritant (black)	Skull/X Bones (black)	(diamond) (white)

RADIOACTIVE SYMBOL



Category	Message	Symbol	Background (shape/color)
Radioactive	Radioactive (black/red)	(special symbol) (black)	(diamond) (white or yellow or yellow/white)

OXIDIZER SYMBOL



Category	Message	Symbol	Background (shape/color)
Oxidizer	Oxidizer (black)	Flaming Circle (black)	(diamond) (yellow)
Organic Peroxide	Organic Peroxide (black)	Flaming Circle (black)	(diamond) (yellow)

Appendix D

DUCHESNE, UINTAH & DAGGETT SOIL CONSERVATION DISTRICTS

AS OF MAY 1997

Snowpacks across the Uintah Basin and North Slope areas are much above average. The North Slope areas are much above average. The North Slope is at 166% and the Uintah Basin is near 146% of average Snowpacks in these areas had only 43% of normal snowmelt last month.

Precipitation during April was above average at 120%, bringing the seasonal accumulation (Oct-Apr) to 130% of average.

Reservoir storage is at 77% of capacity.

Water supply conditions are excellent and much above average streamflow expected, high peak flows and a high potential for agricultural inundation.

RESERVOIR STORAGE

(Measured in 1,000s of Acre Feet)

RESERVOIR	USABLE CAPACITY (total water that can be drained)	USABLE STORAGE 1996	1997	AVERAGE
FLAMING GORGE	3749.0	3107.3	3087.0	-*-
MOON LAKE	35.7	29.1	26.2	19.9
RED FLEET	25.7	22.1	17.9	-*-
STEINAKER	33.4	30.9	25.6	23.0
STARVATION	165.3	144.8	129.3	113.5
STRAWBERRY-ENLARGED	1105.9	719.1	880.3	-*-

-*- NOT ENOUGH YEARS OF DATA TO ESTABLISH AN AVERAGE

The data provided in this report is available on our Home Pages at the following http sites:
utdmp.ut.nrcs.usda.gov or www.wcc.nrcs.usda.gov

** FORECAST ** WATER SUPPLY FOR THE UINTAH BASIN ** FORECAST **

NATURAL RESOURCES CONSERVATION SERVICE (formerly SCS)

Further information contact USDA-NRCS Paul Percival or Brent Draper 722-4621or 789-2100

AS OF FEBRUARY 1998

FORECAST POINT *on the river system*	STREAMFLOW FORECASTS* APRIL through JULY 1996	1997	1998	30 YEAR AVERAGE	PERCENT OF AVERAGE
WEST FORK DUCHESNE RIVER *near Hanna*	30	45	20	26	77
DUCHESNE RIVER *near Tabiona*	120	155	89	105	85
STILLWATER RESERVOIR *inflow*	90	125	75	81	93
ROCK CREEK *near Mountain Home*	100	140	85	94	90
DUCHESNE RIVER *above Knight Diversion*	210	290	165	189	87
STARVATION RESERVOIR *inflow Strawberry River*	150	260	95	117	81
CURRANT CREEK RESERVOIR *inflow*	27	45	16	21	76
MOON LAKE *inflow*	75	100	65	69	94
YELLOWSTONE RIVER *near Altonah*	70	100	58	65	89
DUCHESNE RIVER *at Myton*	325	550	210	263	80
UINTA RIVER *near Neola*	56	135	76	85	89
WHITEROCKS RIVER *near Whiterocks*	37	95	52	58	90
DUCHESNE RIVER *near Randlett*	350	700	260	328	79
ASHLEY CREEK *near Vernal*	35	80	43	51	84
BIG BRUSH CREEK *above Red Fleet Res.*	13	27	18	20	88
HENRY'S FORK *near Manila*	45	70	33	42	79
FLAMING GORGE RESERVOIR *inflow*	1550	1800	950	1197	79
YAMPA *near Maybell*	1300	1500	835	947	88

* FORECAST VALUES ARE FOR THE NATURAL FLOW (actual flow may be affected by upstream water management)
Measured in 1,000s of Acre Feet

Station - MANILA Month - FEBRUARY, 1998

Day of Month	Day of Year	Total Sol Rad lyø	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg Fahrenheit	Air Temp Max Deg Fahrenheit	Air Temp Min Deg Fahrenheit	Soil Temp Mean Deg Fahrenheit	Soil Temp Max Deg Fahrenheit	Soil Temp Min Deg Fahrenheit	Rel Humidity Mean Percent	Rel Humidity Max Percent	Rel Humidity Min Percent	Dew Point Deg Fahrenheit	Soil 20 in Deg Fahrenheit	Total Precip inch	Penman Evap inch
1	32	202	1.3	49	14.9	27	39	18				70	91	42	18	32	0.00	0.04
2	33	154	1.9	118	10.7	31	45	22				74	88	44	23	32	0.00	0.05
3	34	78	1.8	44	17.9	33	42	25				79	89	59	27	32	0.00	0.04
4	35	177	1.6	128	10.7	37	47	27				74	89	56	29	32	0.00	0.04
5	36	204	5.8	230	39.4	39	52	30				71	89	49	30	32	0.00	0.08
6	37	199	1.0	67	8.9	33	44	22				73	87	53	25	32	0.00	0.04
7	38	145	1.1	25	10.7	37	44	32				81	91	61	32	32	0.00	0.03
8	39	121	3.4	244	25.0	42	58	29				82	95	60	37	32	0.00	0.08
9	40	226	7.8	249	32.2	30	36	24				55	66	49	17	32	0.00	0.06
10	41	262	4.0	222	19.7	27	36	19				54	79	42	13	32	0.00	0.06
11	42	112	3.4	244	32.2	25	33	17				76	88	53	15	32	0.00	0.04
12	43	231	3.5	117	31.4	27	36	16				57	80	42	15	32	0.00	0.06
13	44	119	1.1	98	7.2	31	42	22				80	88	64	26	32	0.00	0.04
14	45	208	6.4	333	32.2	36	42	21				64	89	37	24	32	0.00	0.07
15	46	132	3.6	157	17.9	37	51	26				71	89	37	28	32	0.00	0.07
16	47	147	3.0	160	16.1	38	54	29				86	89	77	34	32	0.11	0.07
17	48	184	1.0	58	8.9	31	36	25				81	90	67	26	32	0.00	0.03
18	49	204	3.9	91	26.8	30	37	25				74	90	52	23	32	0.00	0.05
19	50	300	1.9	71	16.1	26	38	15				53	72	30	12	32	0.00	0.06
20	51	271	1.6	61	10.7	22	31	13				78	87	69	17	32	0.00	0.04
21	52	263	1.9	87	16.1	30	46	16				69	89	40	20	32	0.00	0.06
22	53	92	2.4	88	19.7	36	51	26				82	90	66	31	32	0.01	0.06
23	54	157	0.5	59	12.5	28	35	18				84	90	71	24	32	0.13	0.03
24	55	220	13.4	317	57.3	38	44	29				68	89	52	28	32	0.00	0.07
25	56	310	19.6	260	50.1	26	31	19				51	71	38	12	32	0.00	0.07
26	57	176	10.3	255	35.8	22	27	16				53	66	46	9	32	0.00	0.05
27	58	299	13.6	255	32.2	21	26	17				48	55	40	6	32	0.00	0.06
28	59	335	7.7	256	26.8	21	28	13				38	49	27	1	32	0.00	0.07

MONTHLY STATISTICS

	Total# Sol Rad lyø	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg Fahrenheit	Air Temp Max Deg Fahrenheit	Air Temp Min Deg Fahrenheit	Soil Temp Mean Deg Fahrenheit	Soil Temp Max Deg Fahrenheit	Soil Temp Min Deg Fahrenheit	Rel Humidity Mean Percent	Rel Humidity Max Percent	Rel Humidity Min Percent	Dew* Point Deg Fahrenheit	Soil 20 in Deg Fahrenheit	Total Precip inch	Penman Evap# inch
TOTAL	2764															0.25	1.51
AVE	197	4.6	102	22.8	30.6	40.5	21.9				69	83	51	22	32		0.05
MAX	336	19.6		57.3	42	58	32				86	95	77	37	32	0.13	0.08
MIN	78	0.5		7.2	21	26	13				38	49	27	1	32		0.03

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average (of days with day) value for each missing value before the total is obtained.

ø 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.6855 BTU/ft² = .01163 KW/m²

Station - MANILA Month - JANUARY, 1998

Day of Month	Day of Year	Total Sol Rad lyd	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean	Air Temp Max	Air Temp Min	Soil Temp Mean	Soil Temp Max	Soil Temp Min	Rel Humidity Mean	Rel Humidity Max	Rel Humidity Min	Dew Point	Soil 20 in	Total Precip inch	Penman Evap inch
						Deg Fahrenheit			Deg Fahrenheit			Percent			Deg Fahrenheit			
1	1	170	1.2	235	16.1	34	50	21				58	75	39	20	32	0.00	0.04
2	2	117	3.9	168	23.3	41	52	33				80	71	50	23	32	0.00	0.07
3	3	166	2.0	176	17.9	35	46	25				67	91	33	25	32	0.00	0.04
4	4	155	3.6	24	26.8	29	38	18				75	91	66	21	32	0.00	0.04
5	5	85	9.0	248	41.2	26	34	19				62	89	39	16	32	0.00	0.04
6	6	179	2.3	154	28.6	21	33	10				49	83	24	5	32	0.00	0.03
7	7	128	1.0	102	8.9	20	32	12				65	84	44	11	32	0.00	0.02
8	8	182	2.2	1	14.3	26	38	18				60	85	44	15	32	0.00	0.03
9	9	182	1.2	209	8.9	25	40	14				56	86	21	11	32	0.00	0.03
10	10	133	1.2	275	8.9	29	43	20				54	74	37	15	32	0.00	0.04
11	11	174	6.1	327	46.6	35	47	24				55	83	30	20	32	0.00	0.06
12	12	177	4.9	254	59.0	33	61	20				48	90	23	15	32	0.00	0.11
13	13	104	6.7	257	46.6	32	56	25				61	89	49	21	32	0.02	0.05
14	14	194	2.9	231	30.4	27	38	16				51	66	41	12	32	0.00	0.05
15	15	111	3.3	35	34.0	31	48	18				72	89	53	23	32	0.00	0.06
16	16	109	3.4	209	28.6	28	44	14				70	89	51	20	32	0.09	0.06
17	17	120	7.0	231	62.6	41	65	31				75	92	47	33	32	0.18	0.11
18	18	169	5.2	138	44.7	36	48	27				67	70	28	18	32	0.00	0.07
19	19	144	9.0	300	44.7	34	44	25				56	81	43	21	32	0.00	0.06
20	20	188	10.6	259	46.5	27	33	16				47	62	36	11	32	0.00	0.05
21	21	197	4.2	252	26.8	22	30	16				49	70	32	7	32	0.00	0.04
22	22	138	2.4	11	35.8	22	35	10				62	84	47	12	32	0.00	0.04
23	23	182	2.6	135	28.6	31	41	24				69	90	47	22	32	0.00	0.04
24	24	180	4.3	199	44.7	34	42	27				65	89	36	23	32	0.00	0.06
25	25	180	8.8	242	37.6	33	40	26				51	80	32	17	32	0.00	0.05
26	26	216	1.1	138	10.7	32	48	22				61	88	30	19	32	0.00	0.04
27	27	155	1.1	259	7.2	29	44	20				58	89	38	20	32	0.00	0.04
28	28	213	1.3	151	11.6	32	49	22				61	80	32	20	32	0.00	0.05
29	29	155	1.0	113	6.9	26	31	18				83	91	74	22	32	0.00	0.02
30	30	115	2.8	75	19.7	34	40	29				82	91	65	29	32	0.00	0.03
31	31	202	3.5	331	23.3	30	38	21				70	89	52	22	32	0.00	0.05

MONTHLY STATISTICS

	Total* Sol Rad lyd	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean	Air Temp Max	Air Temp Min	Soil Temp Mean	Soil Temp Max	Soil Temp Min	Rel Humidity Mean	Rel Humidity Max	Rel Humidity Min	Dew* Point	Soil 20 in	Total Precip inch	Penman Evap# inch
					Deg Fahrenheit			Deg Fahrenheit			Percent			Deg Fahrenheit			
TOTAL	2461															0.29	1.38
AVE	159	3.9	224	28.9	30.2	43.0	21.6				61	83	40	18	32		0.05
MAX	216	10.6		62.6	41	65	33				83	92	74	33	32	0.18	0.11
MIN	85	1.0		7.2	20	30	10				47	62	21	5	32		0.02

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average (of days with day) value for each missing value before the total is obtained.

@ 1 ly = 1 cal/cm² = 4.1855 J/cm² = 3.9655 BTU/ft² = .01163 KW/m²

Station - MANILA Month - DECEMBER, 1997

Day of Month	Day of Year	Total Sol Rad lys	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew Point Deg	Soil 20 in Fahrenheit	Total Precip inch	Penman Evap inch
1	335	61	1.7	186	10.7	40	59	27				87	90	84	37	32	0.00	0.05
2	336	93	3.6	196	14.3	31	38	21				88	90	84	28	32	0.03	0.04
3	337	177	1.0	317	8.9	22	35	13				81	91	54	16	32	0.02	0.02
4	338	114	0.5	254	5.4	23	34	11				73	92	45	15	32	0.00	0.02
5	339	133	0.4	320	5.4	20	31	10				64	87	46	10	32	0.00	0.02
6	340	113	0.5	330	7.2	22	32	16				80	88	59	17	32	0.00	0.02
7	341	127	0.7	336	7.2	25	41	20				74	88	43	22	32	0.00	0.03
8	342	61	5.9	281	44.7	32	44	26				76	91	56	26	32	0.00	0.15
9	343	80	16.0	264	51.9	25	29	21				62	68	57	15	32	0.00	0.04
10	344	102	12.6	267	48.3	20	24	15				53	84	37	7	32	0.00	0.04
11	345	178	2.0	298	19.7	15	27	4				63	84	38	6	32	0.00	0.03
12	346	162	1.1	312	7.2	19	35	8				66	90	31	10	32	0.00	0.03
13	347	168	0.7	112	5.4	22	37	12				77	90	47	16	32	0.00	0.02
14	348	89	0.5	97	8.9	16	26	9				66	90	83	14	32	0.00	0.02
15	349	82	2.2	331	17.9	23	35	12				78	89	61	18	32	0.00	0.03
16	350	164	0.8	14	5.4	25	38	13				68	89	46	16	32	0.00	0.02
17	351	138	0.6	323	5.4	29	43	20				62	74	43	19	32	0.00	0.03
18	352	91	1.8	313	19.7	29	37	22				67	80	46	20	32	0.00	0.03
19	353	169	4.4	273	26.8	23	31	11				65	87	51	14	32	0.00	0.04
20	354	153	1.1	51	8.9	16	26	5				83	90	62	12	32	0.00	0.02
21	355	58	0.9	76	8.9	15	23	7				88	90	87	13	32	0.00	0.01
22	356	126	1.1	241	10.7	19	28	9				85	90	68	15	32	0.00	0.02
23	357	145	1.6	153	25.0	16	30	-1				73	90	34	5	32	0.00	0.03
24	358	84	5.0	204	19.7	19	28	11				80	90	55	14	32	0.00	0.03
25	359	145	2.8	260	14.3	15	28	0				84	91	70	11	32	0.00	0.03
26	360	143	0.5	222	5.4	8	20	-4				87	90	84	5	32	0.00	0.01
27	361	92	11.1	238	60.8	18	36	4				65	90	29	9	32	0.00	0.06
28	362	76	10.1	243	46.5	29	40	19				41	50	24	9	32	0.00	0.07
29	363	100	5.2	246	37.6	40	46	33				49	58	43	22	32	0.00	0.07
30	364	170	4.0	224	32.2	37	46	26				53	71	36	21	32	0.00	0.06
31	365	156	0.8	163	7.2	32	48	19				64	86	35	20	32	0.00	0.03

MONTHLY STATISTICS

	Totals Sol Rad lys	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew* Point Deg	Soil 20 in Fahrenheit	Total Precip inch	Penman Evap# inch
TOTAL	1873															0.05	1.00
AVE	121	3.4	267	19.3	23.5	34.7	13.6				72	84	53	16	32		0.03
MAX	178	16.0		60.8	40	59	33				88	92	87	37	32	0.03	0.07
MIN	58	0.4		5.4	8	20	-4				41	50	24	5	32		0.01

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average for days with day value for each missing value before the total is obtained.

@ 1 ly = 1 cal cmy = 4.1855 J cmy = 3.6855 BTU/fty = .01163 KW/my

Station - MANILA Month - NOVEMBER, 1997

Day of Month	Day of Year	Total Sol Rad lys	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew Point Deg	Soil 20 in Fahrenheit	Total Precip inch	Penman Evap inch
1	305	256	13.5	263	42.9	35	47	34				34	43	24	19	32	0.00	0.10
2	306	252	5.0	228	23.3	39	51	26				29	46	19	9	32	0.00	0.10
3	307	192	1.3	155	8.9	40	56	27				45	64	23	20	32	0.00	0.06
4	308	246	9.2	242	31.9	50	60	33				26	65	17	14	32	0.00	0.11
5	309	244	1.3	195	8.9	44	63	29				28	47	15	11	32	0.00	0.07
6	310	240	1.0	129	7.2	44	64	30				32	46	19	15	32	0.00	0.07
7	311	213	3.4	296	25.0	45	64	30				35	55	18	17	32	0.00	0.11
8	312	141	3.3	161	25.0	40	54	29				62	86	36	27	32	0.16	0.07
9	313	97	0.9	141	14.9	35	61	19				84	90	75	31	32	0.01	0.06
10	314	166	0.2	4	7.2	22	30	10				84	90	73	18	32	0.01	0.02
11	315	59	2.8	190	12.5	30	37	25				87	90	80	27	32	0.00	0.03
12	316	157	1.0	279	8.9	29	38	24				62	89	69	25	32	0.16	0.03
13	317	194	2.0	265	23.3	32	39	25				71	90	48	23	32	0.00	0.04
14	318	219	4.1	99	23.3	18	34	1				65	90	35	6	32	0.00	0.05
15	319	223	0.6	323	5.4	11	26	-1				65	82	42	2	32	0.01	0.02
16	320	223	0.6	276	5.4	22	39	5				62	83	30	10	32	0.00	0.03
17	321	148	1.5	222	19.7	29	42	17				71	85	43	21	32	0.00	0.04
18	322	193	3.7	297	26.8	32	42	22				48	65	33	15	32	0.00	0.06
19	323	134	1.9	297	35.8	34	53	21				65	89	38	23	32	0.00	0.05
20	324	142	7.6	253	32.2	36	59	27				67	88	51	26	32	0.08	0.11
21	325	108	6.9	264	41.2	32	39	28				57	66	47	19	32	0.00	0.05
22	326	205	1.6	289	12.5	25	40	14				56	74	29	12	32	0.00	0.04
23	327	164	0.9	90	7.2	29	44	16				65	81	47	20	32	0.00	0.03
24	328	196	1.5	152	10.7	35	51	23				61	85	26	23	32	0.01	0.04
25	329	169	4.9	266	41.2	36	50	27				47	71	18	16	32	0.00	0.08
26	330	117	9.7	6	41.9	40	51	24				50	69	39	23	32	0.00	0.08
27	331	64	4.0	75	55.5	45	59	30				77	90	31	37	32	0.14	0.08
28	332	70	0.6	86	8.9	51	73	29				85	89	81	46	32	0.42	0.06
29	333	96	0.1	81	7.2	43	64	31				87	89	82	39	32	0.00	0.04
30	334	70	1.3	126	8.9	38	50	29				87	90	85	34	32	0.00	0.04

MONTHLY STATISTICS

	Total# Sol Rad lys	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew Point Deg	Soil 20 in Fahrenheit	Total Precip inch	Penman Evap- inch
TOTAL	2490															0.63	1.76
AVE	166	3.2	225	21.5	34.8	49.3	22.8				61	76	42	21	32		0.06
MAX	256	13.5		55.5	51	73	34				87	90	85	46	32	0.20	0.11
MIN	59	0.1		5.4	11	26	-1				26	43	15	2	32		0.02

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average (of days with day) value for each missing value before the total is obtained.

@ 1 ly = 1 cal/cm^2 = 4.1855 J/cm^2 = 3.6855 BTU/ft^2 = .01163 KW/m^2

Station - MANILA Month - JUNE, 1997

Day of Month	Day of Year	Total Sol Rad Ly/d	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg Fahrenheit	Air Temp Max Deg Fahrenheit	Air Temp Min Deg Fahrenheit	Soil Temp Mean Deg Fahrenheit	Soil Temp Max Deg Fahrenheit	Soil Temp Min Deg Fahrenheit	Rel Humidity Mean Percent	Rel Humidity Max Percent	Rel Humidity Min Percent	Dew Point Deg Fahrenheit	Soil 2" in Deg Fahrenheit	Total Precip inch	Penman Evap inch
1	152	425	4.7	72	25.9	84	72	51				48	69	24	40	72	0.00	0.21
2	153	384	3.8	86	25.1	81	74	53				72	89	48	61	72	1.41	0.14
3	154	377	6.6	82	26.9	69	96	54				86	92	14	49	72	0.00	0.23
4	155	421	3.8	214	26.8	87	92	53				31	89	11	31	72	0.00	0.23
5	156	397	5.5	318	28.6	66	80	60				24	56	12	26	72	0.00	0.28
6	157	371	3.7	135	26.8	80	93	51				42	85	11	37	72	0.00	0.26
7	158	519	3.9	98	23.3	83	80	60				35	81	16	38	72	0.00	0.24
8	159	196	2.1	81	26.8	62	73	57				79	89	52	56	72	1.42	0.19
9	160	401	2.4	103	25.3	62	72	56				69	85	42	51	72	0.00	0.16
10	161	313	3.1	126	27.6	64	81	52				75	96	42	55	72	0.12	0.17
11	162	460	2.2	117	10.7	69	74	62				59	89	27	46	72	0.00	0.17
12	163	371	5.1	263	27.6	58	71	51				58	96	19	42	72	0.01	0.17
13	164	286	5.6	67	28.6	59	69	51				39	89	25	43	72	0.02	0.14
14	165	342	5.4	248	44.7	58	68	47				61	86	16	42	72	0.20	0.16
15	166	384	4.4	320	28.9	58	72	48				58	89	21	40	72	0.00	0.22
16	167	489	6.0	258	34.1	64	74	53				43	69	24	41	72	0.01	0.22
17	168	538	6.1	244	23.3	69	81	57				32	58	16	36	72	0.00	0.26
18	169	215	3.4	190	27.6	67	87	51				71	97	43	57	72	0.57	0.22
19	170	552	3.9	229	26.8	82	109	62				83	89	11	59	72	0.00	0.41
20	171	520	5.6	231	35.8	66	80	57				40	74	15	43	72	0.01	0.22
21	172	561	2.9	36	17.9	73	98	56				47	89	14	48	72	0.02	0.24
22	173	613	6.3	293	34.1	72	85	55				21	44	11	27	72	0.10	0.31
23	174	542	5.0	197	32.2	66	81	51				29	54	12	31	72	0.00	0.27
24	175	599	5.2	223	28.6	61	74	48				22	44	13	20	72	0.01	0.27
25	176	612	5.1	119	17.9	61	80	41				24	46	12	22	72	0.00	0.26
26	177	449	5.1	271	23.3	66	87	49				21	41	13	24	72	0.01	0.25
27	178	558	5.6	256	22.2	72	89	56				17	34	11	29	72	0.00	0.29
28	179	581	5.2	291	31.2	66	81	51				26	29	11	19	72	0.00	0.29
29	180	614	6.0	325	29.6	67	81	49				17	37	11	20	72	0.00	0.30
30	181	621	9.1	331	44.7	69	81	51				14	21	11	16	72	0.00	0.31

MONTHLY STATISTICS

	Total* Sol Rad Ly/d	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg Fahrenheit	Air Temp Max Deg Fahrenheit	Air Temp Min Deg Fahrenheit	Soil Temp Mean Deg Fahrenheit	Soil Temp Max Deg Fahrenheit	Soil Temp Min Deg Fahrenheit	Rel Humidity Mean Percent	Rel Humidity Max Percent	Rel Humidity Min Percent	Dew* Point Deg Fahrenheit	Soil 2" in Deg Fahrenheit	Total Precip inch	Penman Evap inch
TOTAL	7221															1.81	7.16
AVE	480	4.7	219	29.2	65.9	80.8	51.6				43	89	21	38	72		0.24
MAX	621	9.1		44.7	82	109	62				79	96	52	59	72	0.57	0.41
MIN	196	2.1		10.7	58	68	41				14	21	10	16	72		0.09

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

• Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average (of days with day) value for each missing value before the total is obtained.

1 Ly = 1 cal/cm² = 4.1868 J/cm² = 3.6878 BTU/ft² = .011629 kW/m²

Station - MANILA Month - MAY, 1997

Day of Month	Day of Year	Total Sol Rad Ly	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew Point Deg	Soil 10 cm Fahrenheit	Total Precip inch	Penman Evap inch
1	121	548	15.4	269	48.3	35	65	32				61	88	37	21	33	0.07	0.21
2	122	447	9.9	236	31.1	42	81	31				32	47	16	11	31	0.00	0.28
3	123	504	2.9	197	19.7	47	64	29				36	71	15	16	32	0.00	0.17
4	124	517	8.6	266	46.5	57	73	37				24	46	13	17	31	0.00	0.24
5	125	507	4.0	47	19.7	56	72	36				29	41	19	17	32	0.00	0.23
6	126	463	5.3	177	42.9	56	76	41				24	48	14	21	32	0.00	0.24
7	127	367	7.0	235	37.6	56	67	44				24	48	14	17	32	0.00	0.24
8	128	566	4.2	121	19.7	51	66	35				24	34	18	14	31	0.00	0.23
9	129	537	2.4	106	19.7	54	73	36				27	50	19	18	32	0.00	0.22
10	130	547	4.1	119	19.7	59	74	40				21	39	10	17	31	0.00	0.25
11	131	484	4.9	194	46.5	57	72	42				26	49	15	21	32	0.00	0.24
12	132	562	5.2	184	37.6	56	73	37				35	71	13	24	31	0.00	0.24
13	133	491	9.7	229	42.9	64	74	45				18	56	10	18	32	0.00	0.20
14	134	429	6.5	224	41.2	63	76	48				23	46	13	22	31	0.00	0.23
15	135	446	5.2	209	38.6	64	77	46				27	52	12	26	32	0.00	0.24
16	136	369	3.9	261	31.4	62	77	48				31	45	14	23	32	0.00	0.22
17	137	436	6.9	234	51.9	60	76	47				35	58	19	21	32	0.29	0.24
18	138	537	7.5	236	37.6	61	72	45				29	49	14	20	32	0.00	0.23
19	139	576	3.2	127	16.1	58	72	36				39	77	14	26	32	0.00	0.22
20	140	264	4.6	355	34.0	55	71	41				36	74	19	23	31	0.00	0.17
21	141	330	3.8	170	30.4	57	72	50				65	89	36	44	32	0.02	0.16
22	142	423	2.6	206	26.8	64	81	51				53	91	18	42	31	0.00	0.19
23	143	309	4.9	198	41.2	58	73	44				48	79	18	34	32	0.00	0.18
24	144	244	6.4	25	42.9	54	66	45				72	90	48	48	32	0.24	0.13
25	145	236	3.7	269	26.8	47	57	40				80	92	47	40	32	0.10	0.10
26	146	355	7.4	248	35.8	47	59	36				44	64	26	23	31	0.00	0.18
27	147	428	4.8	196	32.2	52	68	35				40	66	19	25	32	0.00	0.19
28	148	333	3.7	106	26.8	56	68	42				46	73	31	38	31	0.11	0.16
29	149	282	3.9	227	30.4	67	116	39				70	90	47	57	32	0.17	0.09
30	150	471	3.1	125	17.9	61	76	51				57	86	31	45	32	0.00	0.19
31	151	492	4.8	111	28.0	67	82	51				46	80	19	44	31	0.00	0.28

MONTHLY STATISTICS

	Total* Sol Rad Ly	Wind Ave mph	Wind V Dir Deg	Wind Max mph	Air Temp Mean Deg	Air Temp Max Fahrenheit	Air Temp Min	Soil Temp Mean Deg	Soil Temp Max Fahrenheit	Soil Temp Min	Rel Humidity Mean Percent	Rel Humidity Max	Rel Humidity Min	Dew Point Deg	Soil 10 cm Fahrenheit	Total Precip inch	Penman Evap* inch
TOTAL	6844															0.83	6.84
AVE	441	5.5	196	33.4	56.1	71.9	41.6				33	64	21	26	31		0.21
MAX	576	15.4		51.9	67	116	51				80	91	48	57	32	0.17	0.28
MIN	236	2.4		16.1	35	57	29				18	34	13	11	31		0.10

NOTE: Monthly averages might vary slightly from the average of the daily values printed due to rounding of the daily values.

* Maximum and minimum values of the dew point and wet bulb temperatures are hourly rather than daily values. Daily maximums and minimums can be obtained by scanning the values printed in the corresponding column.

* Total solar radiation and total Penman Evapotranspiration are corrected for missing daily values by substituting an average for days with day value for each missing value before the total is obtained.

* 1 Ly = 1 cal cm^{-2} = 4.1855 J cm^{-2} = 3.6855 BTU ft^{-2} = .01163 KW hr m^{-2}

Appendix E

Appendix F

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170
(801) 538-6715 Fax
(801) 536-4414 T.D.D.
www.deq.state.ut.us Web

May 1, 1998

Mayor Chuck Dickison
1st East Hwy 43
P.O. Box 189
Manila, Utah 84046

Re: Daggett County Landfill permit review

Dear Mayor Dickison:

Enclosed is the review of the permit application you submitted to the State of Utah for the construction and operation of a Class II solid waste landfill. Please review the enclosed *Request for Additional Information #1 (RAI #1)*. The *State Permit Application to Operate a Class II Landfill* submitted by the Town of Manila will require additional information to be complete. This additional information is noted in the grayed paragraphs with a vertical bar on the left margin. Please also review Sections R315-303 and R315-315 of the *Utah Solid and Hazardous Waste Permitting and Management Rules* for general operation of the landfill. Included in these sections of the *Rules* are the guidelines for developing **Plan of Operation** and **Inspection Schedule**.

Also enclosed is the form called the **Solid Waste Annual Report**. This form is required for all existing landfills to be submitted annually. A review of our records indicated that no Annual Report was submitted for this facility this year. Please complete this form and return to our office at the address noted on the form.

If you have any questions to any comments made in the enclosed *RAI #1* or the Annual Report, please call Roy Van Os at (801) 538-6879.

Sincerely,

Rusty Lundberg

for Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/RVO/sm

enclosures

c: Joseph B. Shaffer, M.A., M.B.A., E.H.S., Director of Health, Tri Counties Health Dept.
Ted Allen, DEQ District Engineer
Chad Reed, Commissioner, Daggett County

F:\SHW\SPB\RVANOS\WP\Daggett County RAI #1a.wpd
Daggett Co/Class II LF

Town of Manila

PO Box 189
Manila, UT 84046

PHONE: (435) 784-3143
FAX: (435) 784-3356

12/24/98

Dear Roy Van Os,

First let me express my thanks for the help and guidance you have given in the application process. It was an interesting experience and a challenge.

It took longer than anticipated, but enclosed is the additional information necessary to complete the application. I followed the guideline your office provided to compile the necessary information. Additionally, I have provided maps with the engineers seal.

Please advise me if there is more information needed. Again, thank you for your help and patience.

Sincerely,

Chuck Dickison

Chuck Dickison, Mayor

DAGGETT COUNTY LANDFILL
CLASS II PERMIT APPLICATION
PERMIT #98?
ADDITIONAL PERMIT INFORMATION

Additional information per sections:

Subsection R315-302-2(2) Plan of Operation

(f) Landfill gas monitoring will be performed by the district engineer. In the event the landfill can not be used, a contingency plan for alternative use will be in place until this landfill be suitable for continued use. An agreement is in the process of renewal with the Greenriver Wyoming landfill to accept Daggett County landfill waste.

(g) The road into the Daggett County Landfill is regularly maintained by the Daggett County Special Road District. The emphasis is on keeping the road in good condition to provide public access and dust minimization. The road and grounds within the landfill area are maintained by the Town of Manila, landfill operator.

(l) **Closure and Post-Closure care cost estimate**

Each open trench at the Daggett County Landfill tends to represent a 3-4 month operation depending upon time of year. Each trench is closed, graded and contoured upon cease of operations within that trench. Summer use can be heavy due to the tourist traffic in the National Recreation Area. Winter use is a product of full time residences which are minimal. Based upon these factors and considering costs of rental equipment and contract labor, a current practice, the following is the estimate for closure of the landfill with an open trench. The cost for closure and post-closure care can easily be a budget allocation for the Town of Manila and Co-owner, Daggett County.

Final Closure Costs:	Fifteen hours equipment and labor	$750.00
	Ten hours labor for area preparation	150.00
	Total	$900.00
Post-closure care and inspection:	Two hours monthly	$30.00

Subsection R315-302-3 General Closure and Post Closure Requirements.

(2) **Closure Performance Standard.**

(a) Closed cell grading to prevent water ponding and covering with 18 inches of native soil will minimize need for further maintenance at the Daggett County Landfill.

(b) No liners are required for this landfill. Ground water depth is anticipated at 660 feet or more. Gases from this landfill are not anticipated. Subsequently, threat to human health and the environment are not anticipated. Closure will not result in post-closure escape of products posing threats.

(c) Preparation for the post-closure period will include incremental closure of each cell upon discontinued use.

(3) **Closure Plan and Amendment**

(a) Closure will include grading and contouring of the landfill at time of closure.

(c) Incremental closure is not applicable at the Daggett County Landfill since each trench represents 3-4 month operations and each trench will be graded and contoured upon cease of operations within that particular trench.

(5) The Post-Closure plan shall provide activities for continued facility maintenance and monitoring for as long as the Executive Secretary determines necessary for facility stabilization and protection of human health and environment.

The financial responsibility for the closure and post-closure activities can be met by the respective budgets of the Town of Manila and co-owner Daggett County. Specific anticipated costs are as follows:

Final Closure last open trench: Fifteen hours equipment and labor	$750.00
Final area preparation: Ten hours labor	150.00
Closure Total	$900.00
Post-Closure Monthly cost of Facility care and Inspection:	$ 30.00

(6) Post-Closure Plan and Amendment.

(a) Post-Closure care at the Daggett County Landfill may include but is not limited to the following:

(1) Maintenance of the closed landfill area as needed
(2) Inspection of surface water
(3) Any other activities required by Executive Secretary

(b) As required by Subsection R315-302-2(1), the Town of Manila will keep this Post-Closure Plan on file and abide by its provisions. The Post-Closure plan will include monthly inspections of the closed facility with purpose of monitoring the progress of site stabilization, potential for gas production, and general facility inspection for conditions considered adverse. This maintenance activity shall continue until they may be safely stopped.

(c) The Post-Closure Plan shall provide for monthly time intervals for the inspection and monitoring of the closed Daggett Landfill at its current location. The cost estimate, anticipated as a budget item, is estimated at $30.00 monthly. These costs reflect anticipated labor costs for the monthly inspections by Town or contract employee.

*page 15 amendments.

(iv) Identification of closure costs including cost calculations and the funding mechanism.

(1) Closure cost estimates are based on experienced cost to close an open waste trench at time of use completion. These cost include labor and the equipment necessary to incrementally cover the waste in the trench and the final cover consisting of 18 inches of native soil. Additionally included in the closure costs are fifteen hours of labor or area final preparation.

Closure cost as anticipated by experienced costs: $900.00

(2) Post-Closure costs for the thirty year period are based upon the anticipated costs of two hours labor each month for site inspection.

Post-Closure cost as anticipated yearly: $360.00

(e) Post-Closure plan issues:

(l) The monthly inspections of the closed landfill site will include monitoring for landfill gas, and surface water. Ground water is estimated to be at a minimum depth of 660 feet.

(iv) The Post-Closure costs anticipated at $360.00 yearly will be a budgeted item for the Town of Manila, P.O. box 189, Manila Utah, 84046, Telephone (435)784-3143. The current mayor would be appropriately contacted. The Town of Manila Budget, specifically the garbage fund account, should be addressed for funding.