



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

November 16, 1999

Commanding Officer
Engineering Field Activity, West
Naval Facilities Engineering Command
Attn: Mr. Stephen Chao
900 Commodore Drive
San Bruno, CA 94066-2402

Dear Mr. Chao:

The U.S. Environmental Protection Agency has conducted an inspection of the Site 1 Landfill Cap at Moffett Federal Airfield. This inspection was performed by TRC, a subcontractor to TechLaw Inc., under an EPA contract. EPA performed this inspection to assess whether the remedial action is consistent with the Remedial Design. Detailed comments are attached.

In general, the Site 1 Landfill Cap at Moffett appears to be in good condition despite deficiencies in the vegetative cover and surface water drainage systems which are described in the attached comments. Through implementation of repairs for the deficiencies found during our inspection and periodic maintenance, the constructed landfill cap is expected to continue to minimize infiltration to the landfill. Please let us know how and when you intend to address these concerns.

At the time of the inspection concealed conditions such as the integrity of the low permeability clay layer, could not be determined as part of this surface inspection. The findings and recommendations herein are limited to surface conditions observed at the time of the site visit.

If you have any questions regarding the inspection, please call Roberta Blank at (415) 744-1685. Thank you for your continued cooperation.

Sincerely,

A handwritten signature in cursive script that reads "Roberta Blank".

Roberta Blank
Remedial Project Manager, Moffett

cc: Joseph Chou, RWQCB

INSPECTION OF THE SITE 1 LANDFILL CAP AT MOFFETT FEDERAL AIR FIELD MOUNTAIN VIEW, CALIFORNIA

1. Cracking of Vegetative Cover

Several areas where cracking in the vegetative cover had occurred were observed. The cracking appears to be caused by two separate mechanisms: 1) mechanical stress and 2) desiccation (drying of plastic soils).

While some degree of cracking was observed over the entire surface of the landfill, the most severe cracking is apparent on the eastern side of the landfill on the flat area between the toe of slope and the perimeter road (Photos 1-3); some cracking is also present in the v-ditch flow line (Photo 4). Larger cracks were also observed on the slope of the northwestern side of the landfill (Photo 5). These cracks are unconnected and generally 1 to 2 inches wide, up to 5 feet long, and more than 6 inches deep running parallel or perpendicular to the slope. The location, size, and alignment indicate that these cracks are likely due to mechanical stress with desiccation being a contributing factor. Stress cracking can be caused by settlement or soil creep (movement) and usually occurs at the toes of slopes or at transitions in slopes. No cracking was observed at the tops of slopes at the landfill, although heavy vegetation made it difficult to see cracks in these areas.

Desiccation cracking was also observed on the surface of the landfill and was most severe on the western side of the top deck area (Photo 6) where only sparse vegetation existed. Desiccation cracking is indicated by interconnected or "alligator" cracks, and is caused by drying and subsequent shrinking of plastic soils. The desiccation cracks observed were generally up to 0.5 inches wide and 4 inches deep.

There is no indication that any of the surface cracks extend into the low-permeability clay layer, however the cracks will create pathways for surface runoff which could cause a head buildup and increased infiltration and/or erosion. Smaller desiccation cracks may seal themselves when initial rainfall increases the moisture content of the vegetative soil. The larger stress-related cracks may also "self-seal" to some extent but could remain and continue to propagate.

To maintain the integrity of the landfill cap, the cracks in the v-ditch should be repaired as part of periodic maintenance before the rainy season. Other stress-related cracking should be monitored and repaired as necessary and within reason. Long-term maintenance could be reduced by lining the v-ditch with concrete, gravel with geotextile, or an impermeable geomembrane.

2. Culvert Blockage

The inlets and outlets of the culverts which carry surface water across the perimeter road to the storm water retention pond were observed to be blocked with soil and vegetation (Photos 7-11), with the exception of the outlet of the southeastern culvert which is

INSPECTION OF THE SITE 1 LANDFILL CAP
PAGE 2

THE ABOVE IDENTIFIED PAGE IS NOT
AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY
NAVFAC SOUTHWEST TO LOCATE THIS PAGE.
THIS PAGE HAS BEEN INSERTED AS A
PLACEHOLDER AND WILL BE REPLACED
SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

To ensure the integrity of the landfill cap, these areas should be repaired before the rainy season. Long-term maintenance of erosion damage could be lessened by lining the v-ditch with concrete, gravel with geotextile, or an impermeable geomembrane and retrofitting the top deck of the landfill cap with down-drains in problem areas.

7. Odors

Some odors were noticed on the perimeter road to the northeast and northwest of the landfill. These odors may indicate that landfill gas is migrating through the landfill cap (these pathways may also allow infiltration of surface water), however the odors could have also originated from the adjacent San Francisco Bay and/or the stormwater retention pond.

Since odors are an indication of landfill gas migration, the odors at the landfill should be monitored periodically following an approved protocol (e.g., by the Integrated Waste Management Board or the Bay Area Air Quality Control Board) and their cause should be studied if they persist or become a nuisance.

8. Vegetation in Ditches

Moderate to heavy vegetation exists in the v-ditch on the northeast side of the landfill (Photo 19). This vegetation will block the surface water runoff from the landfill and, subsequently, increase the likelihood of landfill erosion.

To ensure proper surface water drainage, all v-ditches should be cleared of any vegetation which could affect flow performance prior to the rainy season.

9. V-ditch Depth

The v-ditch along the southeast side of the landfill appears to be approximately 6 inches deep, which is less than the depth (1-foot) shown on the Design Drawings (Photo 20 and 21).

Since the shallow depth of the v-ditch could adversely affect the ability of the ditch to perform as designed and remove surface water from the landfill, the depth of the ditch should be increased to 1 foot.

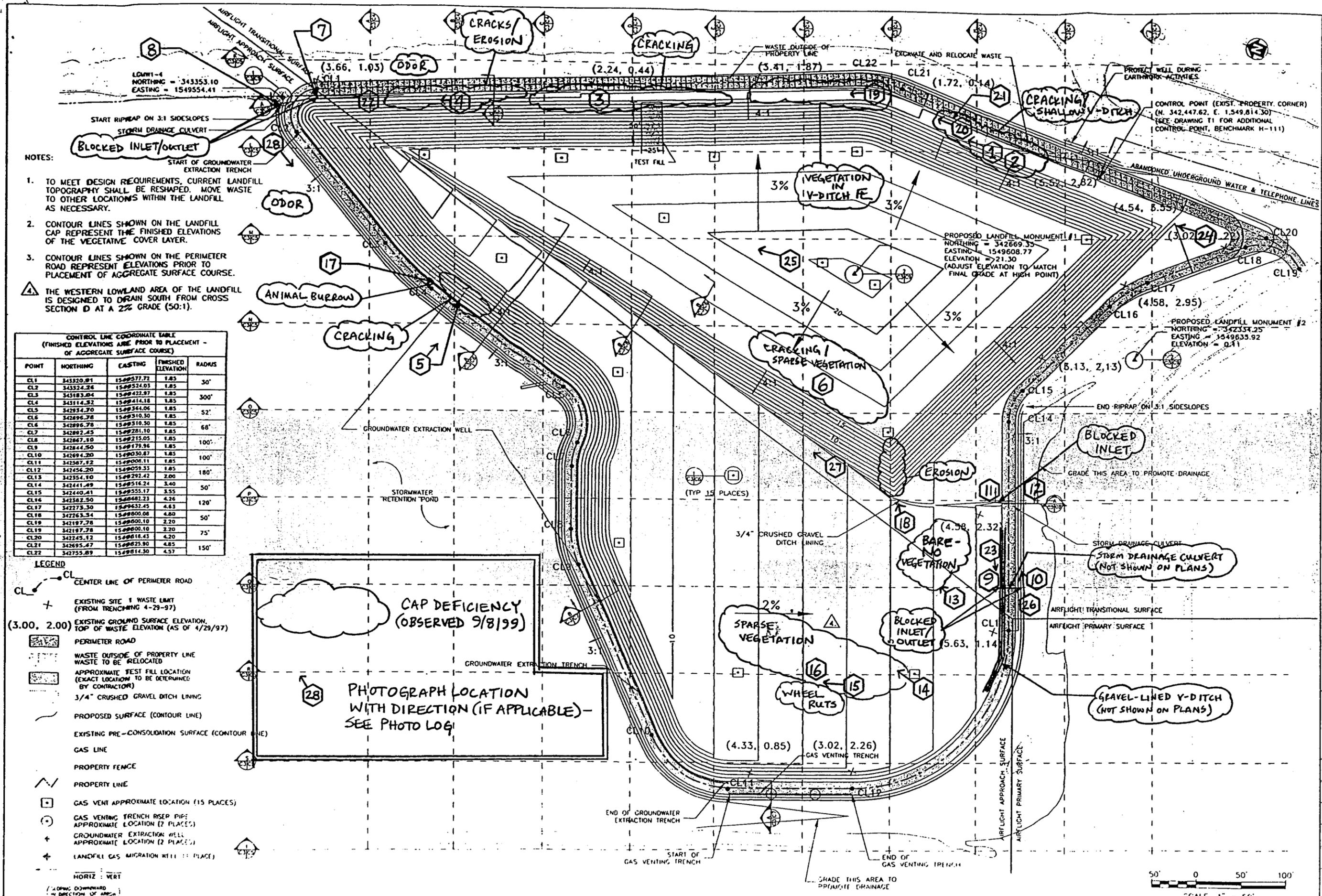
10. Items Not Shown on Plans

Gravel silt traps (Photo 22) and an additional gravel-lined v-ditch and culvert (Photo 23) were observed at the landfill although these components are not shown on the Design Drawings. Since the as-built drawings were not available for review, it is unclear whether these additional components are shown in the as-built drawings.

For consistency and completeness, these additional components should be shown on the as-built drawings.

In addition, the v-ditch is moderately blocked by vegetation. To ensure proper surface water drainage, the additional v-ditch should be cleared prior to the rainy season.

ATTACHMENT 1
DEFICIENCY LOCATION MAP



- NOTES:
1. TO MEET DESIGN REQUIREMENTS, CURRENT LANDFILL TOPOGRAPHY SHALL BE RESHAPED. MOVE WASTE TO OTHER LOCATIONS WITHIN THE LANDFILL AS NECESSARY.
 2. CONTOUR LINES SHOWN ON THE LANDFILL CAP REPRESENT THE FINISHED ELEVATIONS OF THE VEGETATIVE COVER LAYER.
 3. CONTOUR LINES SHOWN ON THE PERIMETER ROAD REPRESENT ELEVATIONS PRIOR TO PLACEMENT OF AGGREGATE SURFACE COURSE.
 4. THE WESTERN LOWLAND AREA OF THE LANDFILL IS DESIGNED TO DRAIN SOUTH FROM CROSS SECTION D AT A 2% GRADE (50:1).

CONTROL LINE COORDINATE TABLE
(FINISHED ELEVATIONS ARE PRIOR TO PLACEMENT - OF AGGREGATE SURFACE COURSE)

POINT	NORTHING	EASTING	FINISHED ELEVATION	RADIUS
CL1	343320.81	1549577.72	1.85	30'
CL2	343324.26	1549574.03	1.85	
CL3	343183.04	1549422.97	1.85	300'
CL4	343114.52	1549414.18	1.85	
CL5	342974.70	1549364.06	1.85	52'
CL6	342896.78	1549310.50	1.85	
CL7	342896.78	1549310.50	1.85	68'
CL8	342892.45	1549281.10	1.85	
CL9	342844.50	1549215.05	1.85	100'
CL10	342844.50	1549215.05	1.85	
CL11	342847.42	1549008.11	1.85	100'
CL12	342456.20	1549059.53	1.85	
CL13	342354.10	1549292.42	2.00	180'
CL14	342441.49	1549516.24	3.40	
CL15	342440.41	1549555.17	3.55	50'
CL16	342362.90	1549682.23	4.26	
CL17	342275.30	1549632.45	4.63	120'
CL18	342263.54	1549600.06	4.80	
CL19	342197.78	1549600.10	2.20	50'
CL19	342197.78	1549600.10	2.20	
CL20	342245.12	1549618.43	4.20	75'
CL21	342695.47	1549825.90	4.85	
CL22	342755.89	1549814.30	4.57	150'

- LEGEND
- CL - CENTER LINE OF PERIMETER ROAD
 - + - EXISTING SITE 1 WASTE LIMIT (FROM TRENCHING 4-29-97)
 - (3.00, 2.00) - EXISTING GROUND SURFACE ELEVATION, TOP OF WASTE ELEVATION (AS OF 1/29/97)
 - [Pattern] - PERIMETER ROAD
 - [Pattern] - WASTE OUTSIDE OF PROPERTY LINE WASTE TO BE RELOCATED
 - [Pattern] - APPROXIMATE TEST FILL LOCATION (EXACT LOCATION TO BE DETERMINED BY CONTRACTOR)
 - [Pattern] - 3/4" CRUSHED GRAVEL DITCH LINING
 - [Line] - PROPOSED SURFACE (CONTOUR LINE)
 - [Line] - EXISTING PRE-CONSOLIDATION SURFACE (CONTOUR LINE)
 - [Line] - GAS LINE
 - [Line] - PROPERTY FENCE
 - [Line] - PROPERTY LINE
 - [Symbol] - GAS VENT APPROXIMATE LOCATION (15 PLACES)
 - [Symbol] - GAS VENTING TRENCH RISER PIPE APPROXIMATE LOCATION (7 PLACES)
 - [Symbol] - GROUNDWATER EXTRACTION WELL APPROXIMATE LOCATION (2 PLACES)
 - [Symbol] - LANDFILL GAS MIGRATION WELL (1 PLACE)

28 CAP DEFICIENCY (OBSERVED 9/8/99)

28 PHOTOGRAPH LOCATION WITH DIRECTION (IF APPLICABLE) - SEE PHOTO LOG

REVISIONS

NO.	DATE	DESCRIPTION
1	10 AUGUST 97	ISSUED FOR CONSTRUCTION

ENGINEERING FIELD ACTIVITY WEST

NAVY FACILITIES ENGINEERING COMMAND

MOYETT FEDERAL AIRFIELD MOUNTAIN VIEW, CALIFORNIA

SIZE D
IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT
SCALE REDUCED ACCORDINGLY

CODE IDENT. NO. 00000

PROJECT LOCATION MOUNTAIN VIEW, CA

CONSTR. CONTR. NO. N62474-93-D-2151

SPECIFICATION 12-93-5151 (D.C. 59)

NAVIFAC DWG NO. 6449628

DWG NO. C3

SHEET 4 OF 10

ATTACHMENT 2
PHOTOGRAPHS

PHOTO LOG

TRC

5052 Commercial Circle
Concord, California 94520
(925) 688-1200
Fax: (925) 688-0388

Photographer: Huvane Date: 9/8/99

Weather: 65° F (overcast); clearing to 75° F (sunny, breezy) [1030 - 1300]

Location: Moffett Federal Airfield - Site 1 Landfill Cap

Purpose: Landfill Cap Inspection

Photo	Time	Direction	Description
1	1132	N	Cracks in vegetative cover on SE side between toe of slope and v-ditch (flat area) - crack in upper center left (bare spot) is approximately 1" wide x 4' long x > 6" deep; crack in lower center right (with scale) is approximately 1" wide x 5' long x > 6" deep.
2	1132	--	Close-up view of Photo No. 1.
3	1137	--	Crack in vegetative cover on NE side at v-ditch - approximately 2" wide x 3' long x > 6" deep.
4	1140	NW	Cracking and erosion in v-ditch flow line on NE side.
5	1200	W	Cracking on NW slope (up and down) - approximately 2" wide x 4' long x > 6" deep.
6	1250	--	Alligator cracking on W side of top deck with sparse vegetation, cracks approximately 4" deep.
7	1145	--	N culvert inlet blocked by soil and vegetation.
8	1146	--	N culvert outlet blocked by soil and vegetation.
9	1208	--	SW culvert inlet blocked by soil and vegetation
10	1210	--	SW culvert outlet blocked by soil and vegetation.
11	1220	--	SE culvert inlet blocked by soil and vegetation; flared inlet broken at top.

PHOTO LOG

TRC

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Concord, California 94520
(925) 688-1200
Fax: (925) 688-0388

Photographer: Huvane Date: 9/8/99

Weather: 65° F (overcast); clearing to 75° F (sunny, breezy) [1030 - 1300]

Location: Moffett Federal Airfield - Site 1 Landfill Cap

Purpose: Landfill Cap Inspection

Photo	Time	Direction	Description
12	1221	--	SE culvert outlet clear (some sediment).
13	1225	N	Large (70' x 50') area bare of vegetation on lower deck.
14	1231	N	Sparse vegetation on lower deck; typical gas vent in good condition.
15	1232	NW	Sparse vegetation on lower deck (right side); also wheel rut 6" - 12" deep.
16	1253	--	Wheel rut on lower deck between gas vents - 12" deep.
17	1151	--	Animal burrow at toe of slope/road on NW side.
18	1252	NE	Erosion on slope from SW corner of top deck.
19	1128	NW	Vegetation in v-ditch along NE side.
20	1122	N	Wider, shallower (approximately 6") v-ditch on SE side.
21	1112	--	Side view of shallow v-ditch on SE side.
22	1142	NW	Gravel silt traps (2) in v-ditch on NE side - not shown on plans (silt trap in background obscured by vegetation).
23	1223	SW	Gravel lined v-ditch along SE side of lower deck - not shown on plans; vegetation in flow line and blocking culvert inlet.

PHOTO LOG

TRC

5052 Commercial Circle
Concord, California 94520
(925) 688-1200
Fax: (925) 688-0388

Photographer: Huvane Date: 9/8/99

Weather: 65° F (overcast); clearing to 75° F (sunny, breezy) [1030 - 1300]

Location: Moffett Federal Airfield - Site 1 Landfill Cap

Purpose: Landfill Cap Inspection

Photo	Time	Direction	Description
24	1100	N	View of SE corner (flat), SE side, and slope to top deck on SE side from site entrance.
25	1245	NW	Top deck at crest; good vegetation.
26	1230	NE	S side perimeter road; good condition.
27	1240	N	Gravel lined ditch at toe of slope from top deck; good condition
28	1147	SW	Riprap slope to stormwater retention pond; good condition - riprap may be undersize ($d_{50} < 6''$).

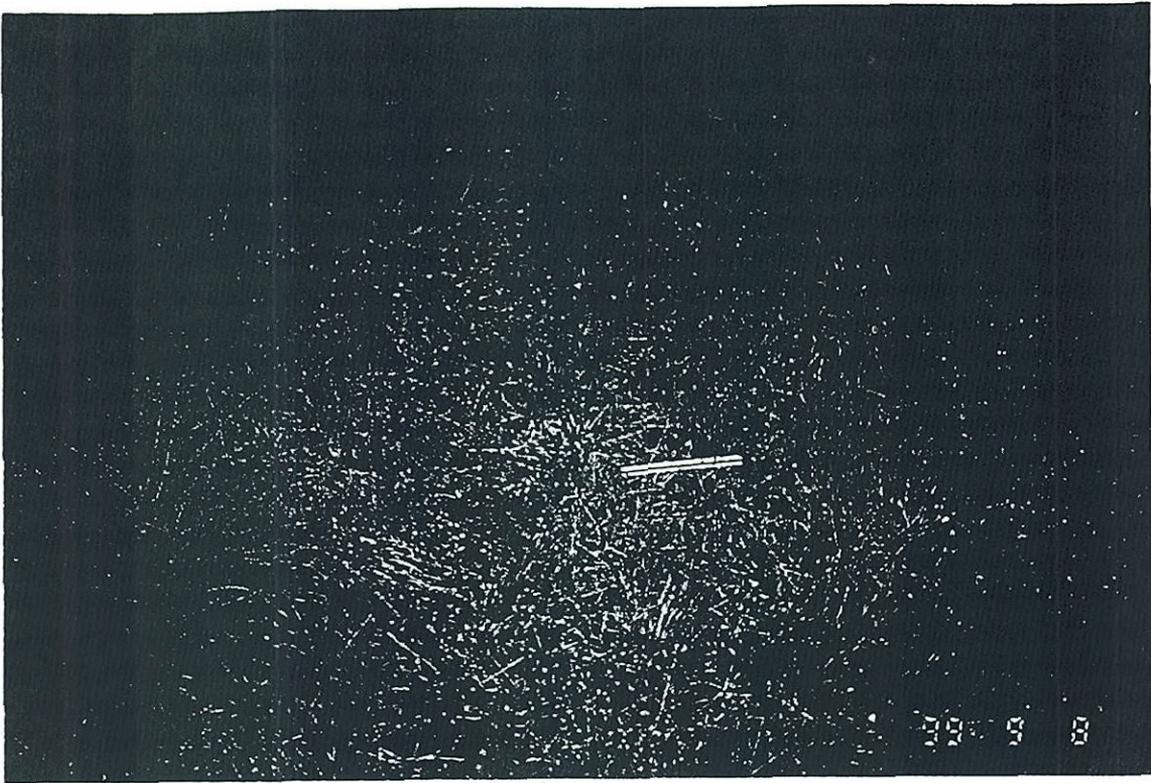


Photo 1 - Cracks in vegetative cover on SE side.



Photo 2 - Close-up view of Photo 1.



Photo 3 - Crack in vegetative cover on NE side at v-ditch.



Photo 4 - Cracking and erosion in v-ditch flow line on NE side.



Photo 5 - Cracking on NW slope.



Photo 6 - Alligator cracking/sparse vegetation on W side of top deck.

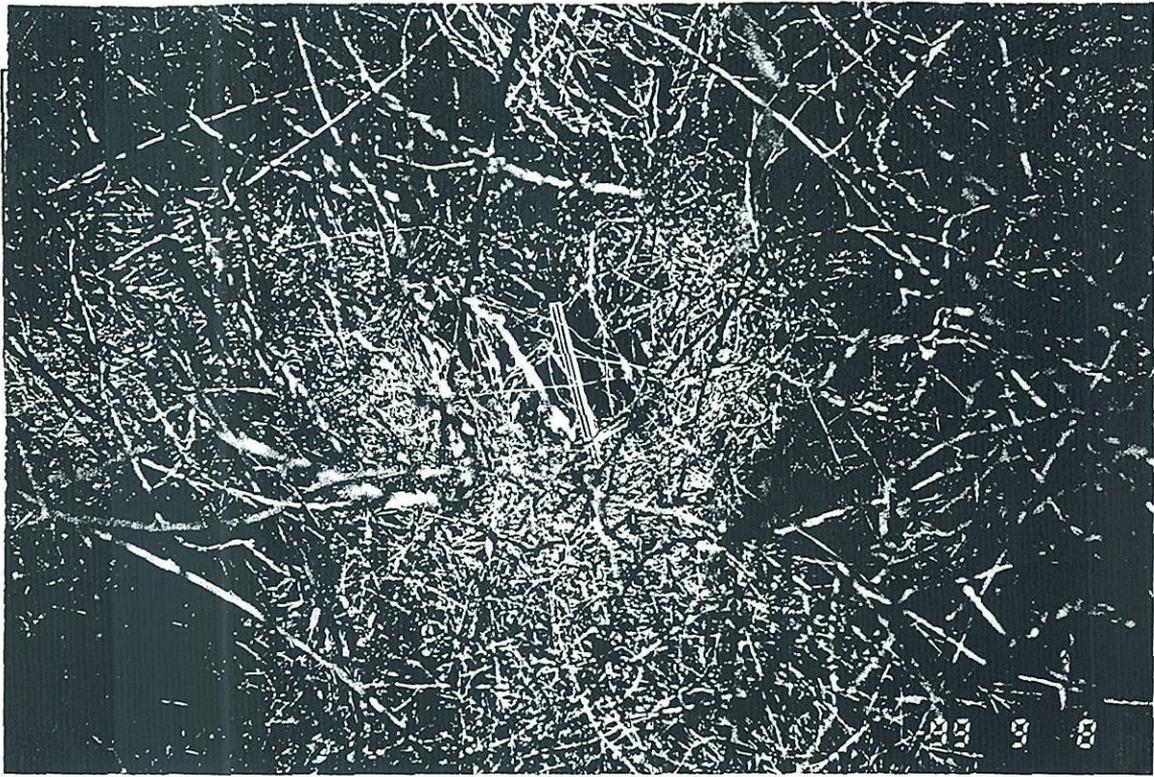


Photo 7 - N culvert inlet blocked by soil and vegetation.



Photo 8 - N culvert outlet blocked by soil and vegetation.

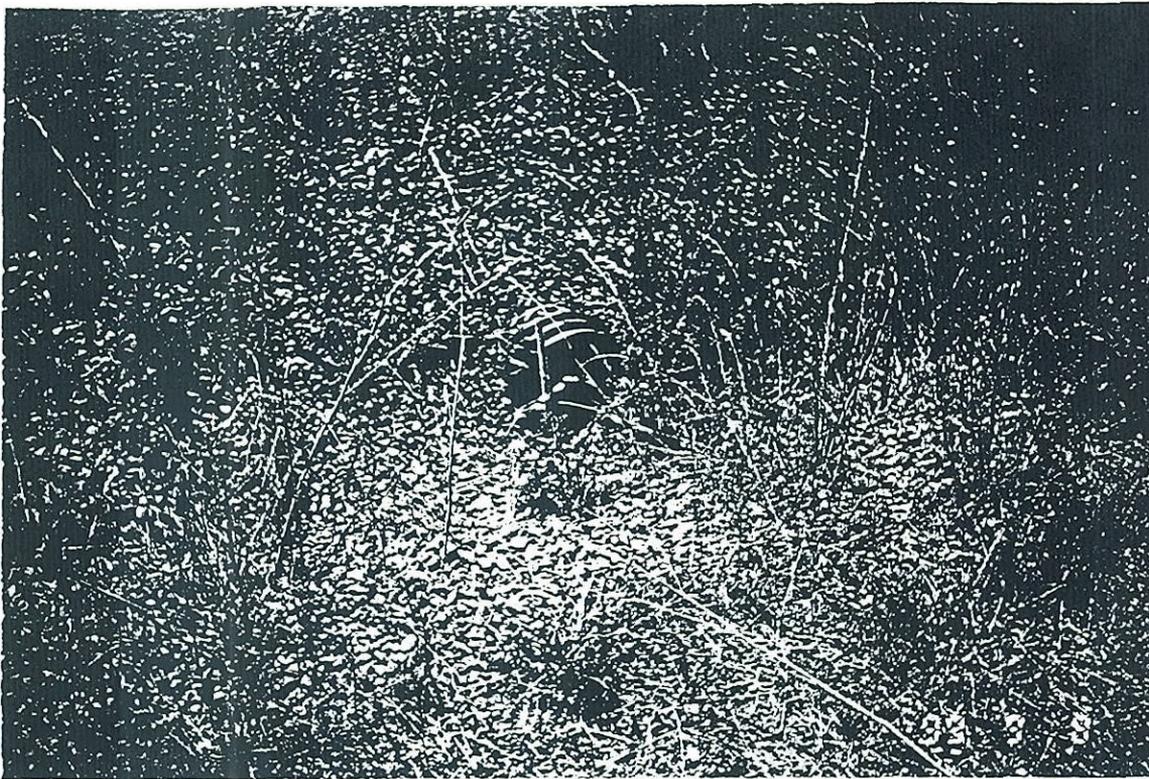


Photo 9 - SW culvert inlet blocked by soil and vegetation.



Photo 10 - SW culvert outlet blocked by soil and vegetation.



Photo 11 - SE culvert inlet blocked by soil and vegetation.

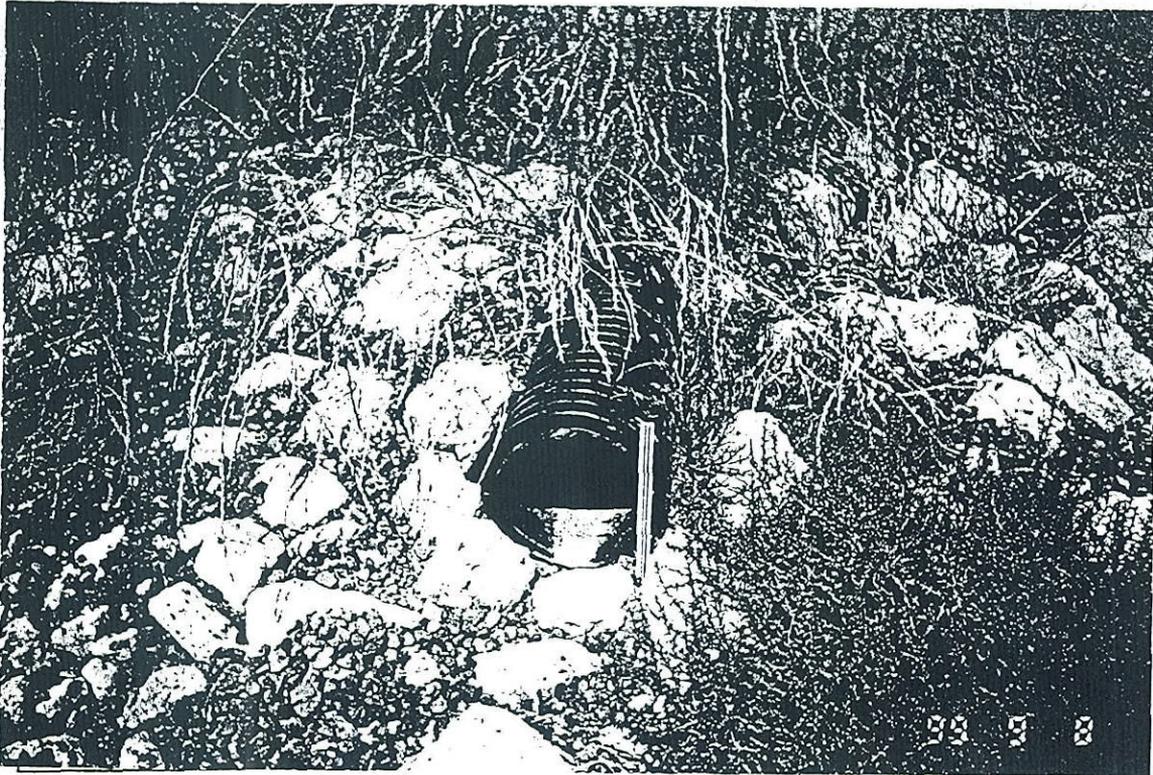


Photo 12 - SE culvert outlet (clear).

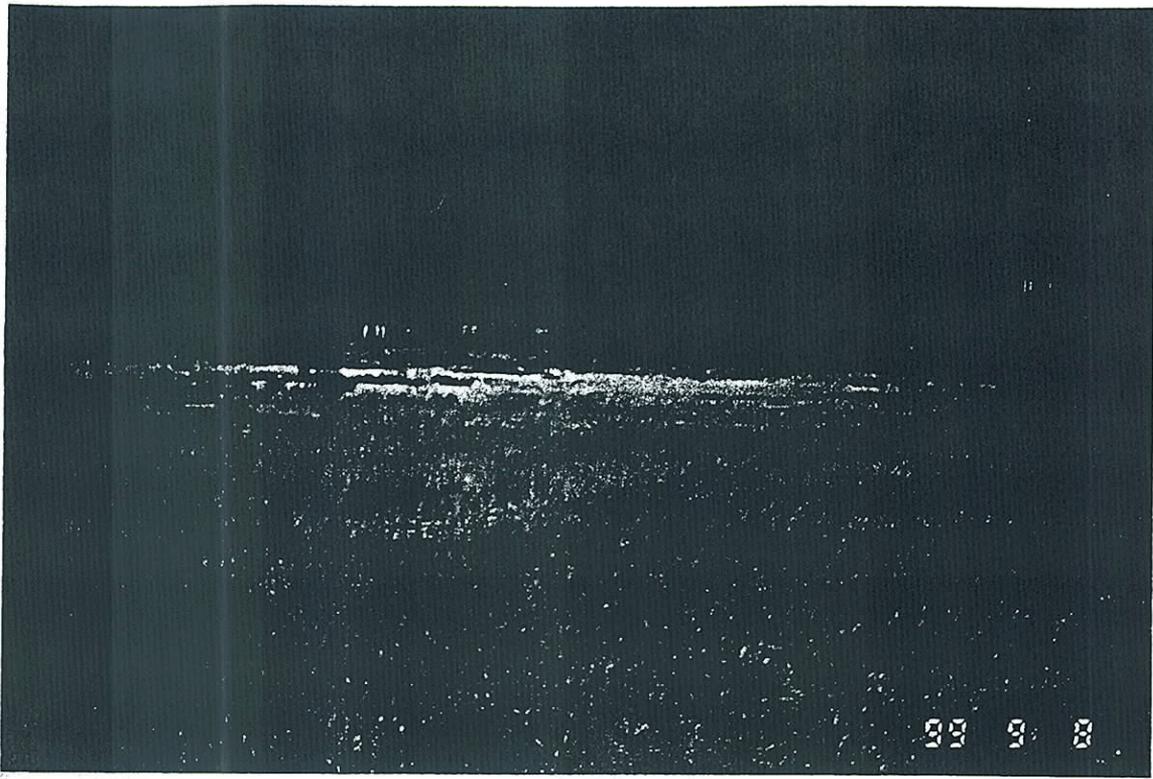


Photo 13 - Bare vegetation area (70' x 50') on lower deck.



Photo 14 - Sparse vegetation on lower deck/gas vent (good condition).

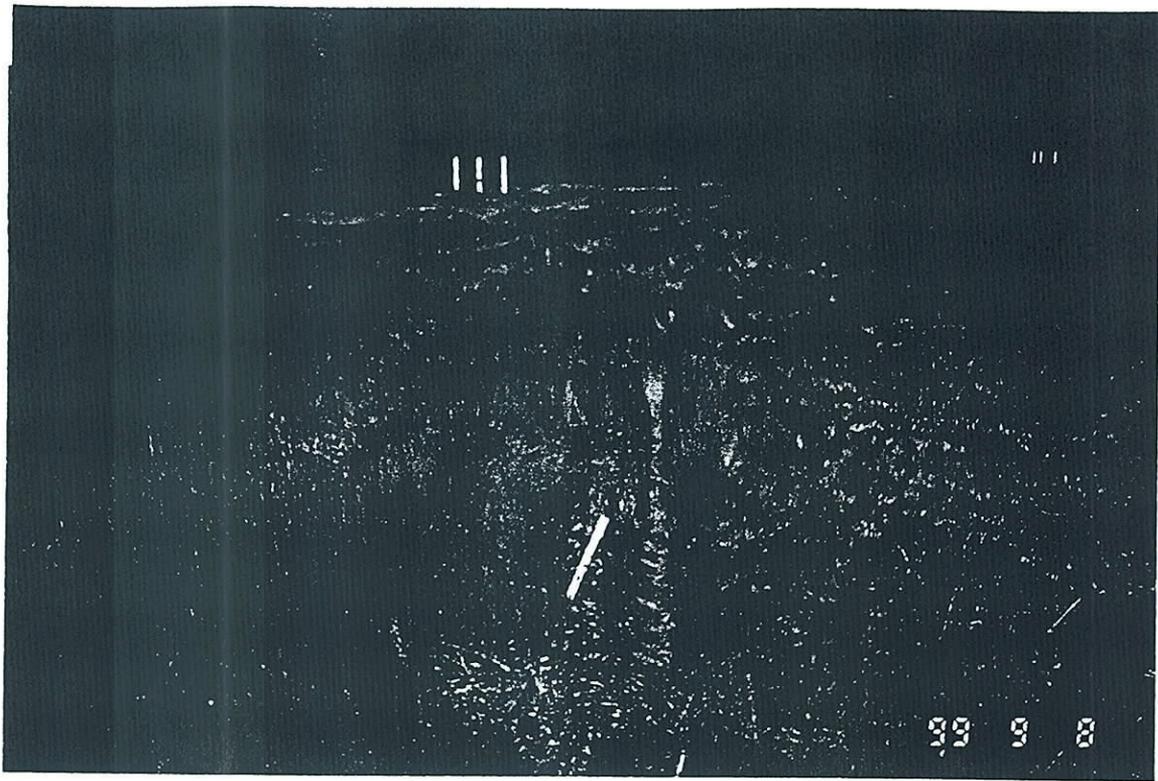


Photo 15 - Sparse vegetation on lower deck/wheel rut.



Photo 16 - Wheel rut on lower deck (12" deep).

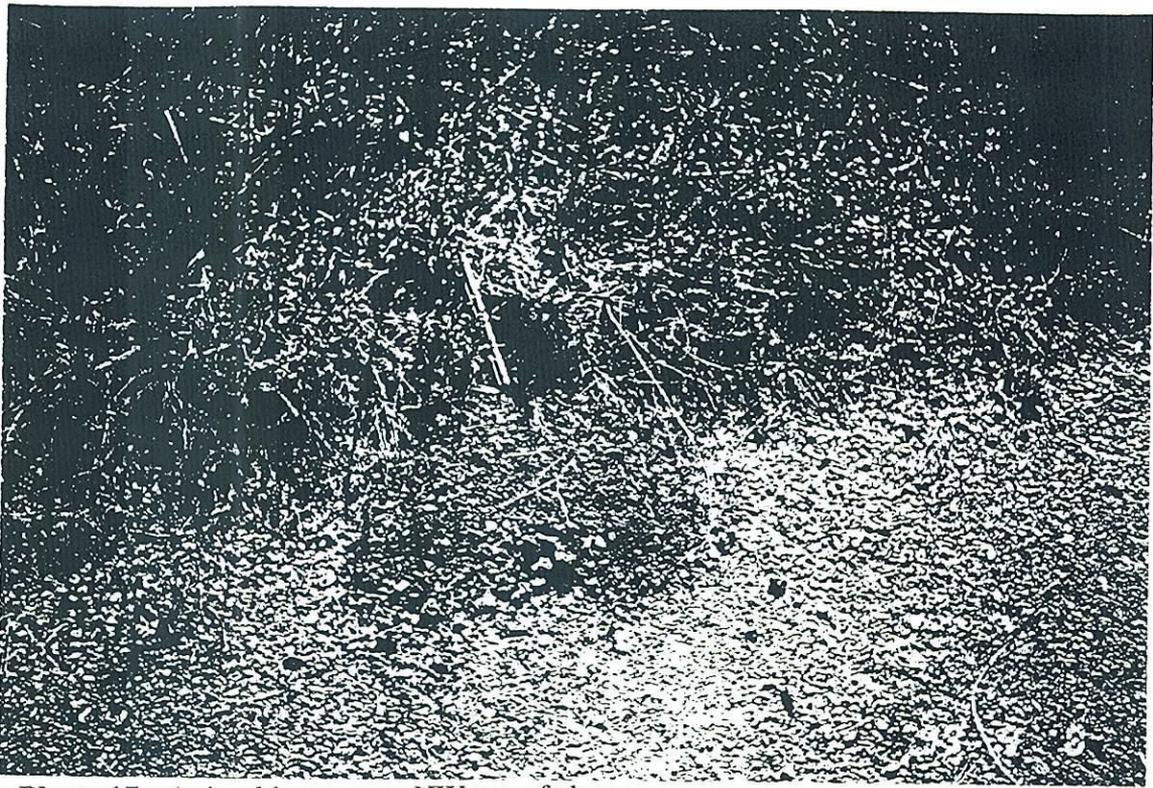


Photo 17 - Animal burrow on NW toe of slope.

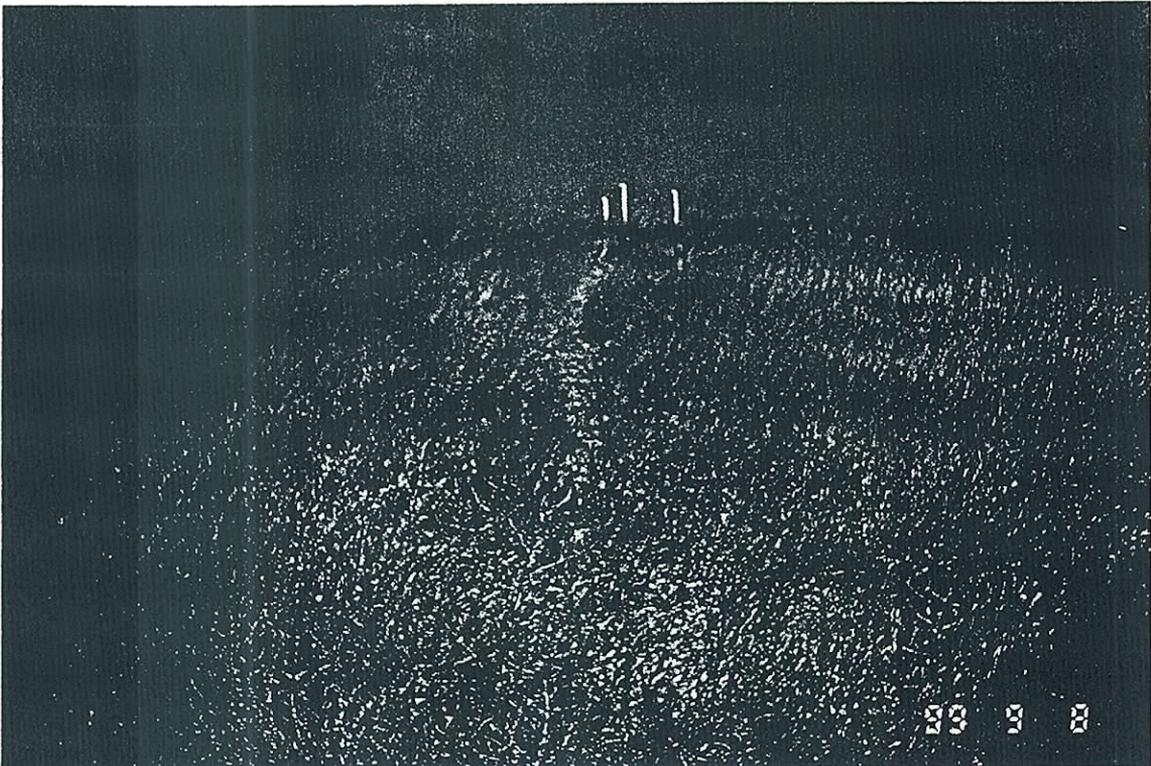


Photo 18 - Erosion on slope from top deck.

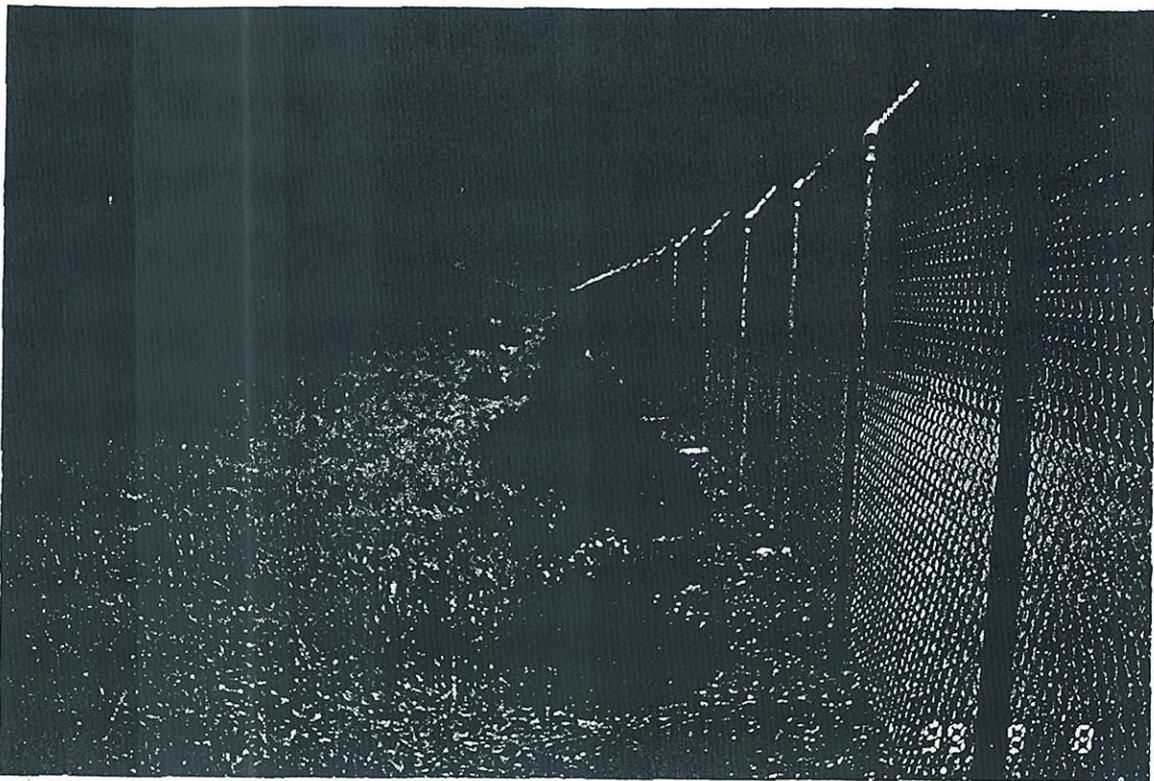


Photo 19 - Vegetation in v-ditch on NE side.

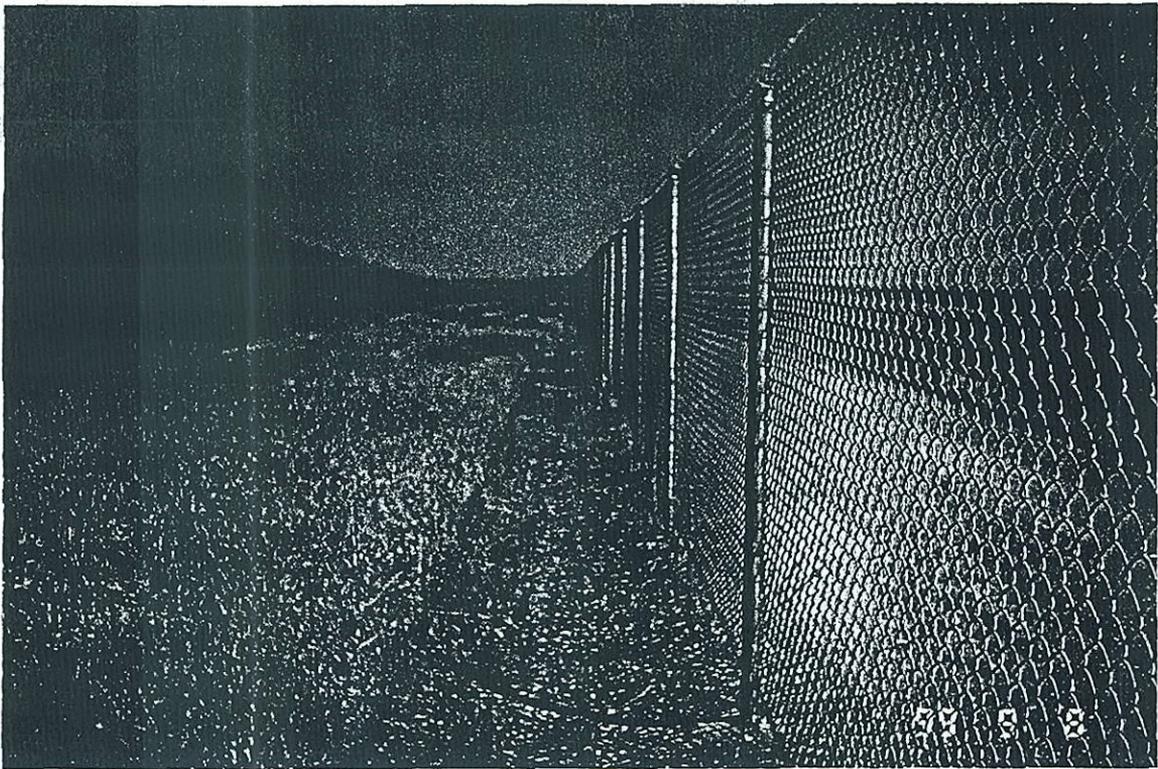


Photo 20 - Wider/shallower (approximately 6" depth) v-ditch on SE side.

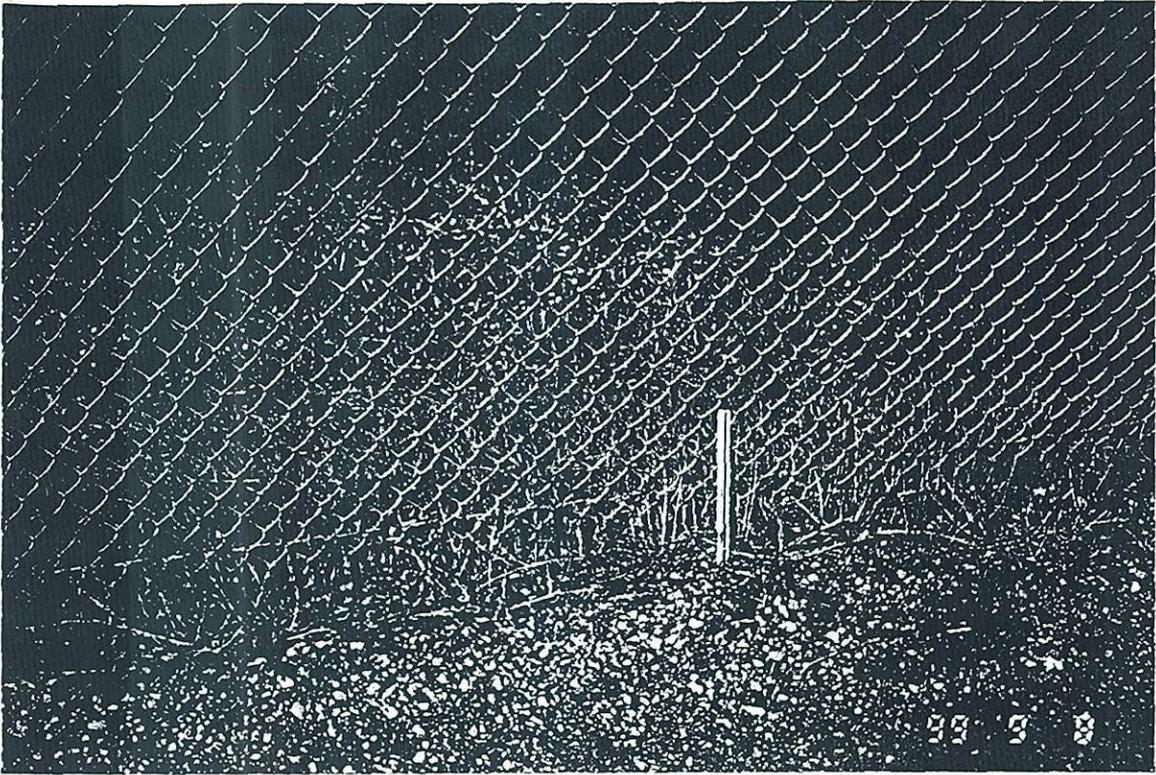


Photo 21 - Side view of Photo 20.

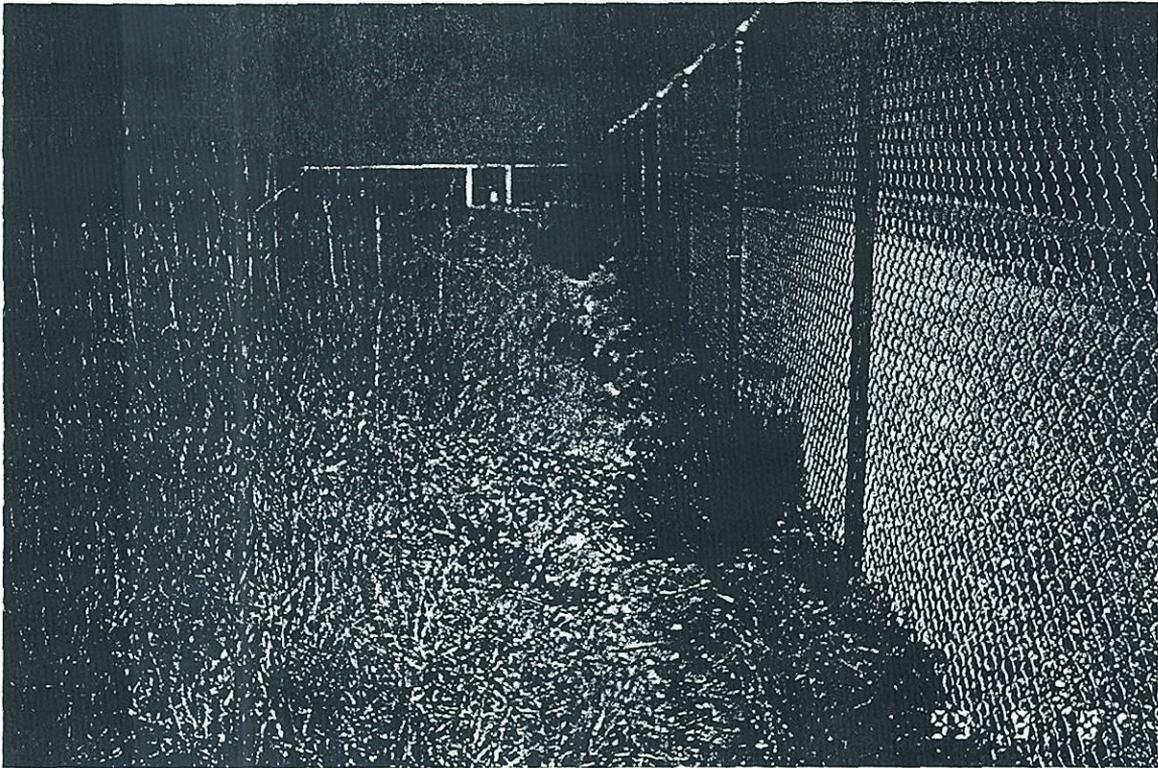


Photo 22 - Gravel silt trap in v-ditch on NE side (not shown on plans).

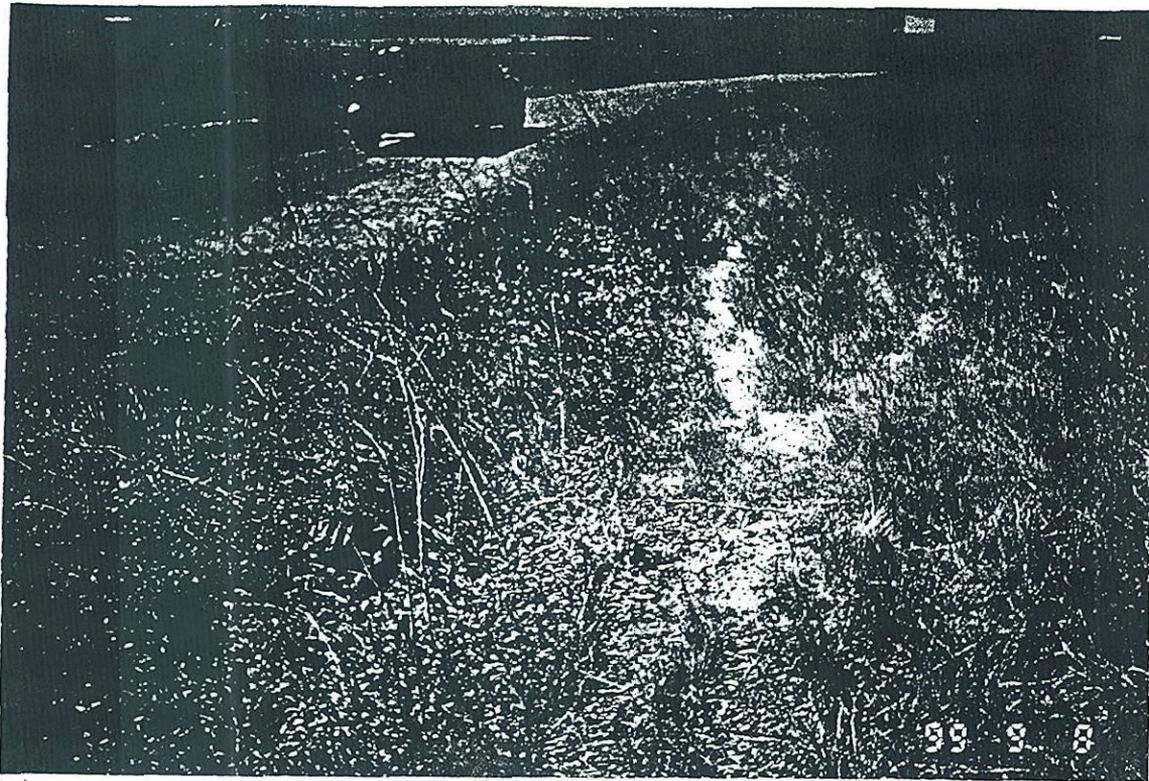


Photo 23 - Gravel-lined v-ditch on SE side of lower deck (not shown on plans); flow line blocked by vegetation.

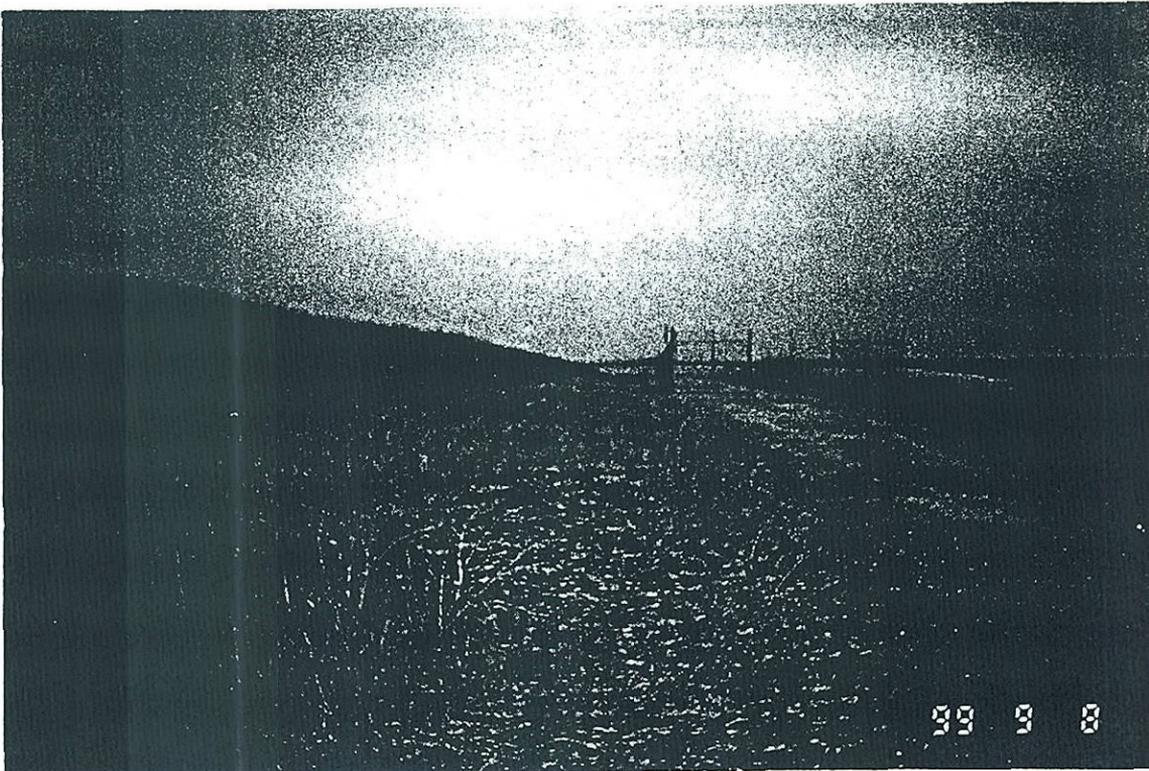


Photo 24 - View of SE corner, SE side, and slope to top deck.

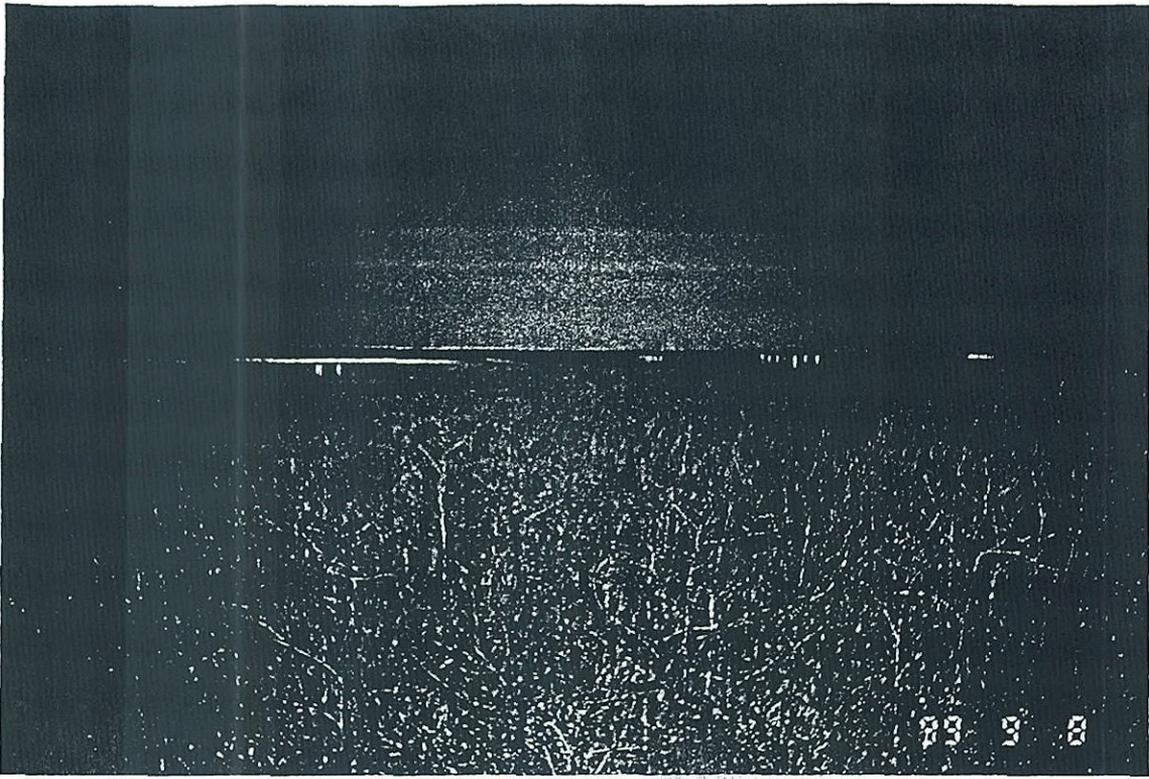


Photo 25 - Top deck at crest; good vegetative growth.



Photo 26 - Perimeter road on S side; good condition.

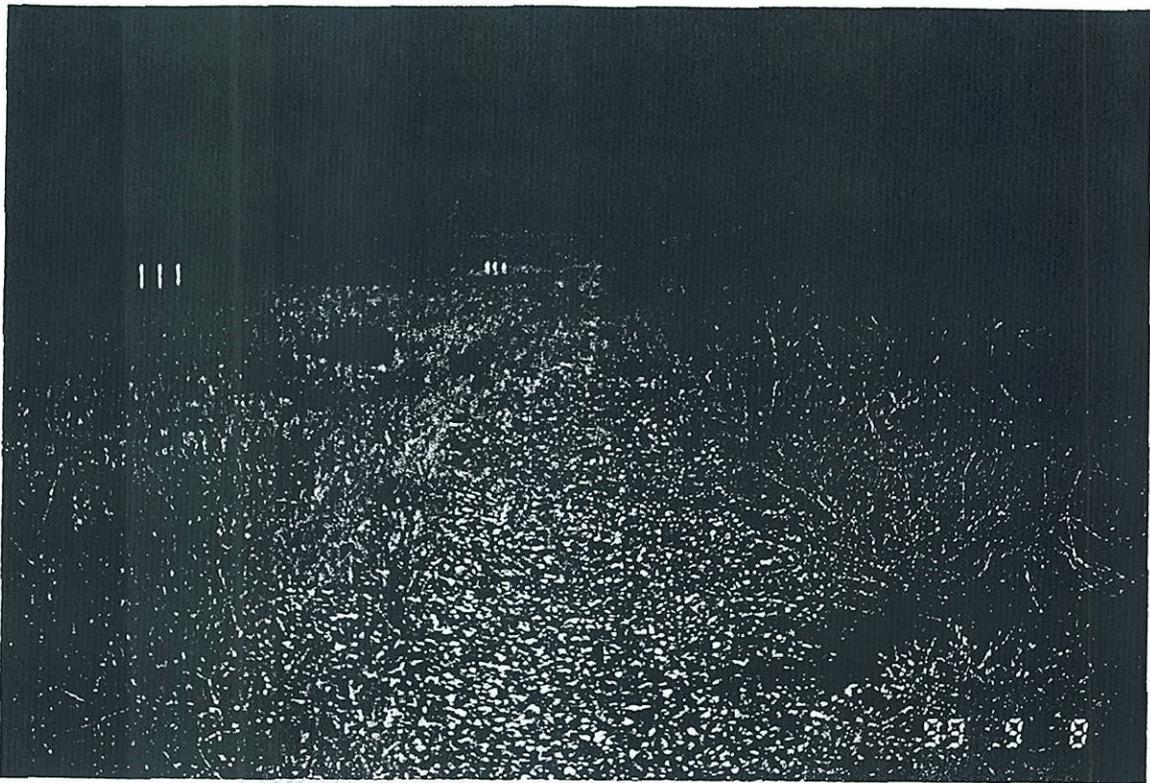


Photo 27 - Gravel-lined ditch at toe of slope from top deck; good condition.



Photo 28 - Riprap slope to stormwater retention pond (good condition); riprap may be undersize ($d_{50} < 6''$).