FEASIBILITY REPORT
ON
THE PHETCHABURI-KAENG KRACHAN IRRIGATED AGRICULTURE DEVELOPMENT PROJECT
IN
THE KINGDOM OF THAILAND

VOLUME II APPENDIX

MARCH 1982

JAPAN INTERNATIONAL COOPERATION AGENCY

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GLOSSARY AND ABBREVIATION

Glossary and Abbreviation

RID	Royal Irrigation Department
MOAC	Ministry of Agriculture and Cooperatives
DAE	Department of Agricultural Extension
EGAT	Electricity Generating Authority of Thailand
JICA	Japan International Cooperation Agency
Changwat	Province
Muang	Capital of Province
Amphoe	District
Tambon	Sub-district
Muban	Village
O & M	Operation and Maintenance
HYV	High Yielding Varieties
LV	Local Varieties
IERR	Internal Economic Rate of Return
Rai	Unit of land measurement
Baht	Unit of Thai currency
mm	Millimeter
cm	Centimeter
m	Meter
cu.m	Cubic meter
MCM	Million Cubic Meter
cu.m/s	Cubic meter per second
km	Kilometer
sq.km	Square kilometer
g	Gram
kg	Kilogram
ton	Metric ton
ha	Hectare
El	Elevation above mean sea level
MSL	Mean Sea Level
°C	Degree Centigrade
mmho/cm	Millimho per centimeter
HP	Horsepower

Units of Measure

Rai = 0.16 hectares = 1,600 sq.m
Hectare = 6.25 rai = 10,000 sq.m

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APPENDIX A HYDROLOGY

A-1 Meteorological and Hydrological Data

There are 25 of rainfall stations, four of meteorological stations and six of streamflow stations in and around the Project Area. Table A-1 shows the list of stations, and the location of the various stations is given in Figure A-1. In Table A-2 the meteorological means are given for Hua Hin, which may be considered representative for the Project Area.

Table A-1 List of Stations

A Rainfall Station	
37012	A. Muang Phetchaburi
37022	A. Ban Lat
37032	A. Ban Laem
37042	A. Khao Yoi
37052	A. Cha-am
37062	Tha Yang
37072	Nikhom Khuan Phet
37082	Cha-am forest plantation station
37090	Khuan Phet
37111	Mae Nam Sap, T. Song Phi Nong, A. Tha Yang (KKc-1)
37121	Mae Maraeo, A. Tha Yang (KKc-2)
37131	Huai Khrok, A. Tha Yang (KKc-3)
37150	Mae Nam Phet, T. Song Phi Nong, A, Tha Yang (B-3)
37160	Mae Nam Phet, Kaeng Krachan (B-4)
37170	Khuan Phet (B-2A)
37190	1L-2R of Main canal No. 3 (PET-2)
37200	Phetchaburi water use experimental station
37210	1R of Main canal No. 2 (PET-4)
37220	1L of Main canal No. 3 (PET-5)
37230	2L of Main canal No. 3 (PET-6)
37240	1R of Left Main canal (PET-7)
37250	2R of Left Main canal (PET-8)
37260	2L of Left Main canal (PET-9)
37270	3R of Left Main canal (PET-11)
37280	3R-1L of Main canal No.3 (PET-12)

B Meteorological Station

37101	Kaeng Krachan, A. Tha Yang (B-5)
37141	Huai Mae Prachan (B-7)
37181	Huai Phak, T. Klatluang, A. Tha Yang (B-8)
48475	Hua Hin

C Streamflow Station

B.1A	Ban Rai Phaniat (A=4,188 sq.km)
B.2A	Phet diversion dam (A=4,060 sq.km)
B.3	Ban Song Phi Nong (A=2,246 sq.km)
B.4	Kaeng Krachan damsite (A=2,206 sq.km)
B.5	Takhian Ha Bat (A=2,207 sq.km)
B.6	Tha Yang (A=1,015 sq.km)

Table A-2 Meteorological Data for Hua Hin

Station; Hua Hin
Latitude 12° 35' N.
Longitude 99° 57' E.

Elevation of station above MSL.	5.00 metres
Height of barometer above MSL.	6.23 metres
Height of thermometer above ground	1.50 metres
Height of wind vane above ground	13.48 metres
Height of raingauge above ground	0.60 metres

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Pressure (+1000 or 900 mbs.)													
Mean	12.37	10.98	10.03	08.60	06.98	06.57	06.76	06.76	07.60	09.60	11.24	12.30	09.15
Ext. Max.	22.90	20.42	17.76	17.03	13.56	19.36	13.40	13.38	13.70	16.06	18.90	21.26	22.90
Ext. Min.	04.63	04.06	02.23	02.23	99.33	98.66	99.05	99.96	99.44	01.00	03.50	04.60	98.66
Mean daily range	4.03	4.19	4.26	4.26	4.02	3.60	3.45	3.71	4.17	4.27	4.10	4.05	4.01
Temperature (°C) 1/													
Mean	25.3	26.8	28.2	29.4	29.0	28.4	28.2	28.1	27.7	27.0	26.3	25.2	27.5
Mean Max.	29.0	30.4	31.8	33.0	32.9	32.8	32.3	32.2	31.6	30.4	29.6	28.8	31.2
Mean Min.	20.6	22.2	23.4	24.7	25.0	24.9	24.5	24.0	24.0	23.6	22.6	21.3	23.4
Ext. Max.	32.3	33.4	36.2	36.6	37.2	37.4	37.2	36.3	36.3	34.4	33.0	32.1	37.4
Ext. Min.	13.9	15.4	18.8	21.9	21.4	22.3	22.0	21.9	21.2	20.3	17.2	13.9	13.9
Relative Humidity (%)													
Mean	70.0	74.0	72.0	72.0	75.0	73.0	74.0	75.0	78.0	81.0	77.0	71.0	74.0
Mean Max.	84.9	88.8	87.6	86.4	88.6	87.0	88.2	88.6	91.4	93.3	88.8	80.7	87.9
Mean Min.	59.3	60.6	59.4	59.6	60.4	59.6	60.8	60.4	64.9	69.9	66.4	60.5	61.8
Ext. Min.	30.0	26.0	32.0	34.0	42.0	37.0	34.0	39.0	41.0	48.0	39.0	36.0	26.0
Dew Point (°C)													
Mean	19.2	21.4	22.7	23.5	23.8	23.1	22.8	22.9	23.2	23.3	21.6	19.4	22.2

- to be continued -

- continued -

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Evaporation (mm.) 2/													
Mean-Piche	82.3	71.9	88.7	88.8	84.4	86.5	85.4	81.8	62.0	53.5	64.0	81.0	930.3
Mean-Pan						No Observation							
Cloudiness (0-8)													
Mean	3.2	3.1	3.3	4.1	5.8	6.7	6.9	7.0	6.7	5.9	4.7	3.6	5.1
Visibility (km)													
0700 L.S.T.	7.9	7.7	7.6	9.7	12.3	11.7	11.0	10.8	11.0	10.2	10.3	9.7	10.0
Mean	8.7	8.5	8.1	10.3	12.2	11.8	11.2	10.9	11.0	11.0	11.0	10.2	10.4
Wind (Knots)													
Prevailing Wind	NE	SE	SE	SE	SW	SW	SW	SW	W	W	NE	NE	-
Mean Wind Speed	5.5	5.4	6.1	6.3	5.1	5.3	5.0	4.7	3.9	4.5	5.9	6.2	-
Max. Wind Speed	31NNE	27 E. SSE	34 S	35NE,E	34SW	33 W	50 W	35 W	33WSW	35 W	38NW	35NE	-
Number of Days with													
Haze	19.1	18.4	22.5	13.9	3.1	0.5	1.7	1.4	1.2	2.4	7.0	13.3	104.5
Fog	1.2	1.8	1.4	0.5	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.2	5.4
Hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thunderstorm	0.6	1.3	4.1	10.2	17.4	9.1	8.1	8.7	11.9	14.0	6.2	0.8	92.4
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1

Remark: 1/ Temperature 1954-1975

2/ Evaporation 1956-1975

A-2 Rainfall

Observations of rainfall in and around the Project Area can be traced back to 1952, however, a complete series of record from 1952 to date is available at only two stations; Phetchaburi(37012) and Ban Lat (37022). For the mountainous area of the Phetchaburi river, no rainfall station is installed. Table A-4 shows the period of available data. Rainfall for the Project area is adequately represented by the record at the Phetchaburi station located at the middle portion of the Area.

Annual rainfall in the Area varies from 950 mm along the seaside to 1,150 mm along the western boundary of the Project. More important than the aerial distribution are the yearly variations in rainfall. This is illustrated in Table A-3, which indicates considerable variations of annual rainfall from year to year. The minimum annual rainfall ever recorded is 435 mm in 1979, while the maximum is 1,600 mm in 1966.

Table A-3 Yearly Variations in Rainfall (mm)

Water year	Annual Rainfall	Max.1Day Rainfall	Rainy Days	Water Year	Annual Rainfall	Max.1Day Rainfall	Rainy Days
1952	1,157	76.8	85	1967	1,035	64.7	57
1953	882	57.2	84	1968	1,103	97.8	70
1954	1,003	79.4	63	1969	1,384	93.7	73
1955	1,467	240.8	81	1970	1,268	180.5	53
1956	1,470	214.4	94	1971	1,203	213.4	85
1957	920	52.4	69	1972	1,172	82.5	92
1958	1,115	206.4	50	1973	1,205	222.7	103
1959	1,025	79.5	63	1974	927	56.1	91
1960	916	97.5	55	1975	919	69.2	75
1961	770	62.5	40	1976	1,016	63.2	89
1962	704	64.7	44	1977	1,045	168.4	67
1963	1,064	76.6	60	1978	1,144		
1964	1,100	113.7	49	1979	435		
1965	813	76.6	47	1980*	756		
1966	1,600	104.6	63	Mean	1,055		

Note: *: Rainfall at water use experimental station

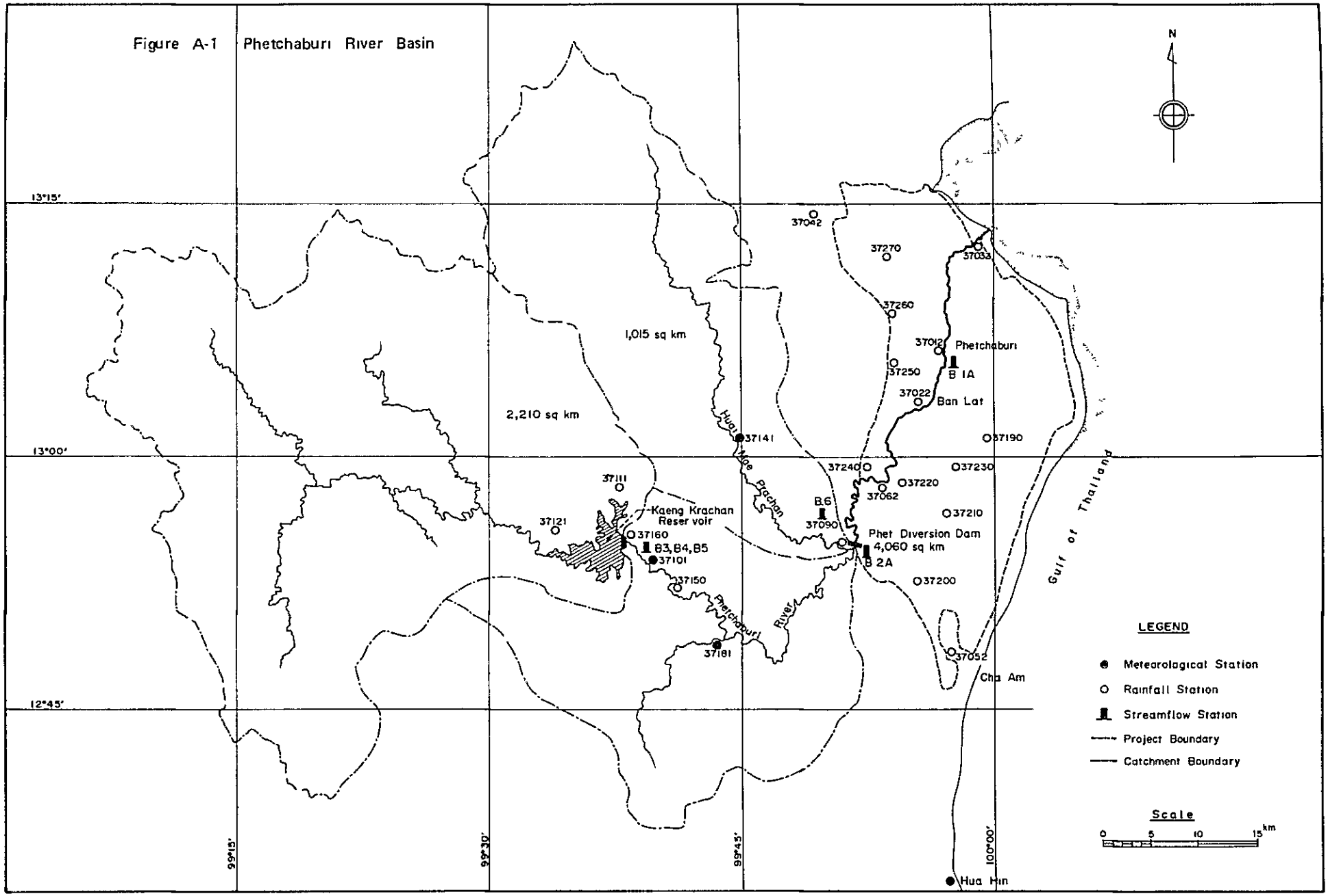


Figure A-1 Phetchaburi River Basin
N
13°15'
13°00'
12°45'
99°15'
99°30'
99°45'
100°00'
37042
37270
37033
37260
37012
Phetchaburi
B 1A
37250
37022
Ban Lat
1,015 sq km
2,210 sq km
Huai Mae Phachan
37141
37190
37240
37230
37220
37062
37111
Kaeng Krachan Reser voir
37121
37160
B 3,B4,B5
37101
B 6
37090
37210
Phet Diversion Dam
4,060 sq km
B 2A
37200
37150
Phetchaburi River
37181
37052
Cha Am
Gulf of Thailand
Hua Hin
LEGEND
Meteorological Station
Rainfall Station
Streamflow Station
Project Boundary
Catchment Boundary
Scale
0 5 10 15 km

Table A-4 Period of Available Data on Rainfall

Code No. \ Year	1952	1953	1954	1955	1956	1057	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
37012	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
37022	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
37032	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+	
37042	o	o	o	o	o	o	o	o	o	o	o	o	o	+	+	o	o	+	o	o	o	o	o	o	o	o	o	+	
37052	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+	
37062	+	o	+	+	+	-	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+	
37072	-	-	-	-	-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+	o	+	
37082	-	-	-	-	-	o	o	+	o	+	+	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
37090	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	+	o	o	+	+	
37101	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	+	o	o	o	o	o	o	o	o	o	o	+	o	o
37111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	o	-	-	-	-	-	-	-	-	-	-	
37121	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	o	-	-	-	-	-	-	-	-	-	-	
37131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	o	-	-	-	-	-	-	-	-	-	-	
37141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	o	o	+	o	o	+	o	
37150	-	-	+	o	o	o	o	o	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
37160	-	-	-	-	o	-	o	o	+	o	o	o	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
37170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
37181	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	o	o	o	o	+	o	
37190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	
37200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	o
37210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	
37220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	
37230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	
37240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	
37250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	o	o	o	o	o	+	o	o	+	+	
37260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	o	o	o	o	o	+	o	o	+	+	
37270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	o	o	o	o	o	+	o	o	+	+	
37280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	+	o	o	+	+	

Notes: -: No data +: Incomplete o: Complete

The monthly distribution of rainfall for the Project Area is shown in Table A-5. It starts with very light rain in April, about 20 mm, then comes the Southwest Monsoon bringing the monsoon shower of about 120 mm in May. There is a series of short drought between June to July. Rainfall increased in August and reaches the peak month in October, around 260 mm.

Table A-5 Monthly Rainfall (mm)

Month	Rainfall	Rainy Days	Month	Rainfall	Rainy Days
Jan.	9	0.7	Aug.	125	9.7
Feb.	7	0.6	Sep.	174	10.2
Mar.	10	0.6	Oct.	263	9.8
APr.	20	1.7	Nov.	98	3.9
May	123	7.1	Dec.	17	0.9
Jun.	89	7.7	Total	1,055	61.6
Jul.	120	8.7			

A-3 Effective Rainfall

For the water studies of the Mae Klong Irrigation Project, RID made the analysis of effective rainfall to rice crop on daily rainfall basis on the assumptions that if rain falls one another, the effective rain of the following day would be depleted to half of that of the antecedent effective rainfall. By these assumptions, the monthly percentage of effective rainfall to the total monthly rainfall was worked out from rainfall data for 10 years using the data of 11 rainfall stations.

The master plan study for the Greater Mae Klong River Basin Development Project made by JICA in 1980 analysed the effective rainfall to rice crop and upland crop, on daily basis for the 26 years duration

from 1952 to 1978. The results of simulation by using the rainfall records at 21 stations indicated much the similar results to the estimation by RID, and were summarized as below;

Crop	Effective Rainfall	Upper Limit of Effective Rainfall (mm)	
		Monthly Basis	10 Days Basis
Paddy	0.75 x R	200	70
Upland crop	0.75 x R	120	40
Sugar cane	0.75 x R	150	50

In this irrigation study, the effective rainfall is estimated by the method applied to the afore-mentioned Master Plan Study. The probable minimum monthly rainfall is analysed for 29 years from 1952 to 1980 as illustrated in Table A-6. The minimum monthly rainfall with the return period of five years is used in the canal capacity calculation as design rainfall to estimate effective rainfall.

Table A-6 Probable Minimum Monthly Rainfall

- Unit: mm -

Month	Return Period			
	2 years	5 years	10 years	20 years
Jan.	1.2	-	-	-
Feb.	3.6	-	-	-
Mar.	5.2	-	-	-
Apr.	11.9	2.1	-	-
May	122.5	68.1	40.0	16.9
Jun.	89.0	43.7	20.4	1.2
Jul.	115.8	77.8	62.0	50.7
Aug.	121.8	70.7	48.1	31.2
Sep.	171.8	116.4	89.0	67.1
Oct.	248.0	153.7	111.8	80.7
Nov.	71.9	25.5	10.3	0.9
Dec.	4.2	-	-	-

A-4 Streamflow

In the Phetchaburi river basin, five of streamflow stations are in operation, of which four stations are installed on the mainstream and one station is on Mae Prachan river, the biggest tibutary of Phetchaburi river. Table A-7 shows the period of available data on streamflow. The natural flow of mainstream has not been recorded since the Kaeng Krachan reservoir was constructed in April, 1965, as the gaging stations were located downstream of the reservoir. The daily inflow to the reservoir has been estimated in the report of reservoir operation made by EGAT since August, 1974. The monthly inflow to the reservoir is summarized as shown in Table A-8, basing on these data. The annual inflow to the reservoir fluctuates between 578.8 to 1,393.8 MCM with an average of 851.8 MCM.

Table A-7 Period of Available Data on Streamflow

Year	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Station																														
B. 1 A	-	-	-	-	-	-	-	-	-	-	o	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
B. 2 A	-	-	-	-	-	-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
B. 3	-	-	-	+	o	o	o	o	o	+	+	+	o	+	o	o	o	o	o	o	o	o	o	+	+	o	o	o	o	o
B. 4	-	-	-	-	-	-	-	-	-	o	o	o	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B. 5	-	-	-	-	-	-	-	-	-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
B. 6	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

Year	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
B. 3	+	o	o	o	+	o	o	+	+	+	+	+	-	-	-	-	-	-	-	-	-

Notes: 1. -; no data +; incomplete o; complete

2. catchment area

B.1A Ban Rai Phainat, 4,188 sq.km

B.2A Phet diversion dam, 4,060 sq.km

B.3 Ban Song Phi Nong, 2,246 sq.km

B.5 Kaeng Krachan damsite, 2,206 sq.km

B.6 Huai Mae Prachan at Tha Yang, 1,015 sq.km

Table A-8 Monthly Inflow to Reservoir in MCM

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1955	7.6	5.1	7.6	26.1	24.3	57.8	61.5	52.7	65.6	370.0	183.9	28.1	890.3
1956	13.5	6.9	7.6	27.3	31.4	25.5	61.0	127.9	117.0	128.8	61.0	18.2	626.1
1957	10.2	6.4	4.1	11.5	9.1	72.2	93.2	176.1	190.8	165.2	42.6	19.8	801.2
1958	10.8	7.7	6.0	9.8	15.6	46.7	137.7	120.0	151.5	184.9	45.1	19.4	755.2
1959	12.2	8.6	12.4	6.3	20.4	30.3	58.5	99.3	90.5	212.4	34.9	15.4	601.2
1960	11.1	7.2	6.6	7.1	9.6	38.4	53.7	127.0	103.0	240.0	43.3	29.2	674.2
1961	14.5	10.0	10.8	12.3	48.8	75.0	268.0	485.0	231.0	159.0	52.6	26.8	1,393.8
1962	15.6	8.7	14.6	17.0	24.4	61.5	170.0	278.0	232.0	115.0	46.3	23.5	1,006.6
1963	15.3	10.4	11.3	14.7	7.5	35.0	127.0	154.0	193.0	214.0	83.5	28.0	893.7
1964	15.1	9.4	8.3	14.1	30.2	30.9	62.2	138.0	222.0	176.0	91.5	33.8	831.5
1965	18.0	16.4	20.5	–	–	–	–	–	–	–	–	–	–
1966	–	–	–	–	–	–	–	–	–	–	–	–	–
1967	–	–	–	–	–	–	–	–	–	–	–	–	–
1968	–	–	–	–	–	–	–	–	–	–	–	–	–
1969	–	–	–	–	–	–	–	–	–	–	–	–	–
1970	–	–	–	–	–	–	–	–	–	–	–	–	–
1971	–	–	–	–	–	–	–	–	–	–	–	–	–
1972	–	–	–	–	–	–	–	–	–	–	–	–	–
1973	–	–	–	–	–	–	–	–	–	–	–	–	–
1974	–	–	–	–	–	–	–	326.4	139.8	310.2	89.7	33.4	–
1975	30.8	13.5	23.6	32.6	54.0	103.5	77.1	201.6	124.7	157.4	43.2	30.0	892.0
1976	21.7	17.7	19.8	20.1	67.5	67.8	93.9	134.3	154.0	71.4	107.0	24.4	799.6
1977	14.9	10.1	25.3	15.0	40.4	38.1	73.1	166.5	184.9	117.0	42.8	24.8	752.9
1978	17.7	18.0	14.9	29.8	51.8	60.6	76.6	306.8	167.7	258.2	59.3	24.7	1,086.1
1979	23.1	22.5	16.2	27.5	29.2	57.1	132.8	277.5	95.0	77.2	35.8	18.6	812.5
1980	15.9	22.6	21.7	20.5	44.8	42.9	62.3	85.4	104.9	94.8	40.0	23.0	578.8
Mean	15.8	11.8	13.6	18.2	31.8	52.7	100.5	191.6	151.0	179.5	66.2	24.9	851.8

Note: Jan. 1955-Mar. 1960 ..... modified area by Ban Song Phinong (B.3)
Apr. 1960-Mar. 1965 ..... Kaeng Krachan damsite (B.5)
Aug. 1974-Nov. 1980 ..... Reservoir Record of Kaeng Krachan (EGAT)

A-5 Groundwater

RID started the observation of groundwater in the Area in 1964 at 300 of observation wells having a depth of 2.5 m, of which 73 of wells have been used for the observation of groundwater levels to data. The groundwater levels are recorded every 10 days. Figure A-2 shows the location of the observation wells.

The fluctuation of average groundwater table for 15 years from 1965 to 1979 is illustrated in Figure A-3. The average groundwater table for the whole area has a tendency to rise year by year since 1968 as irrigation develops. In the rainy season, the average groundwater table rises as a result of percolation and reaches 25 cm below ground surface in October and November. The groundwater movement in 1976 is given in Figure A-4 by using the average groundwater table records for six sub-area; Cha-am (A), Tha Yang (B), Phetchaburi (C), Ban Laem (D), Left bank (E), riverine area (F) and seaside (G).

The average movement of groundwater in the Area can be classified under three types according to the monthly fluctuation of water table, namely I, II and III as described as below (refer to Figure A-5);

Type I The groundwater table varies between 0.26 m and 0.07 m in depth below ground surface with a slight fluctuation of only 0.19 m through the year. Type I represents the groundwater movement for the area where is located along the seaside developed on the tidal flat with an elevation of below 2.0 m MSL, and the area occupies 35 percent of the Project Area.

Type II The groundwater table rises to the depth of 0.14 m below ground surface in July from 0.62 m in March with a fluctuation of 0.48 m in depth, and keeps high water levels for six months during the rainy season. The area under rhe Type II of groundwater movement is situated at the middle portion of the Project Area with an area

of 18,000 ha or equivalent to 25 percent of the Project Area, having elevations of two to five m MSL.

Type III The groundwater movement of this type is characterized by a comparatively sharp fluctuation of water table, which can be found in the southern and southwestern portions of the Project area, being situated on river alluvia with an elevation of above five m MSL. The area occupies 40 percent of the Project Area. The groundwater table varies between 1.06 m and 0.05 m in depth below ground surface with a fluctuation of 1.01 m. The groundwater table falls sharply in March to 1.06 m in depth below ground surface, the lowest level, and afterward starts rising at a fast rate to reach the highest level in October.

Figure A-2 Location of Groundwater Observation Wells

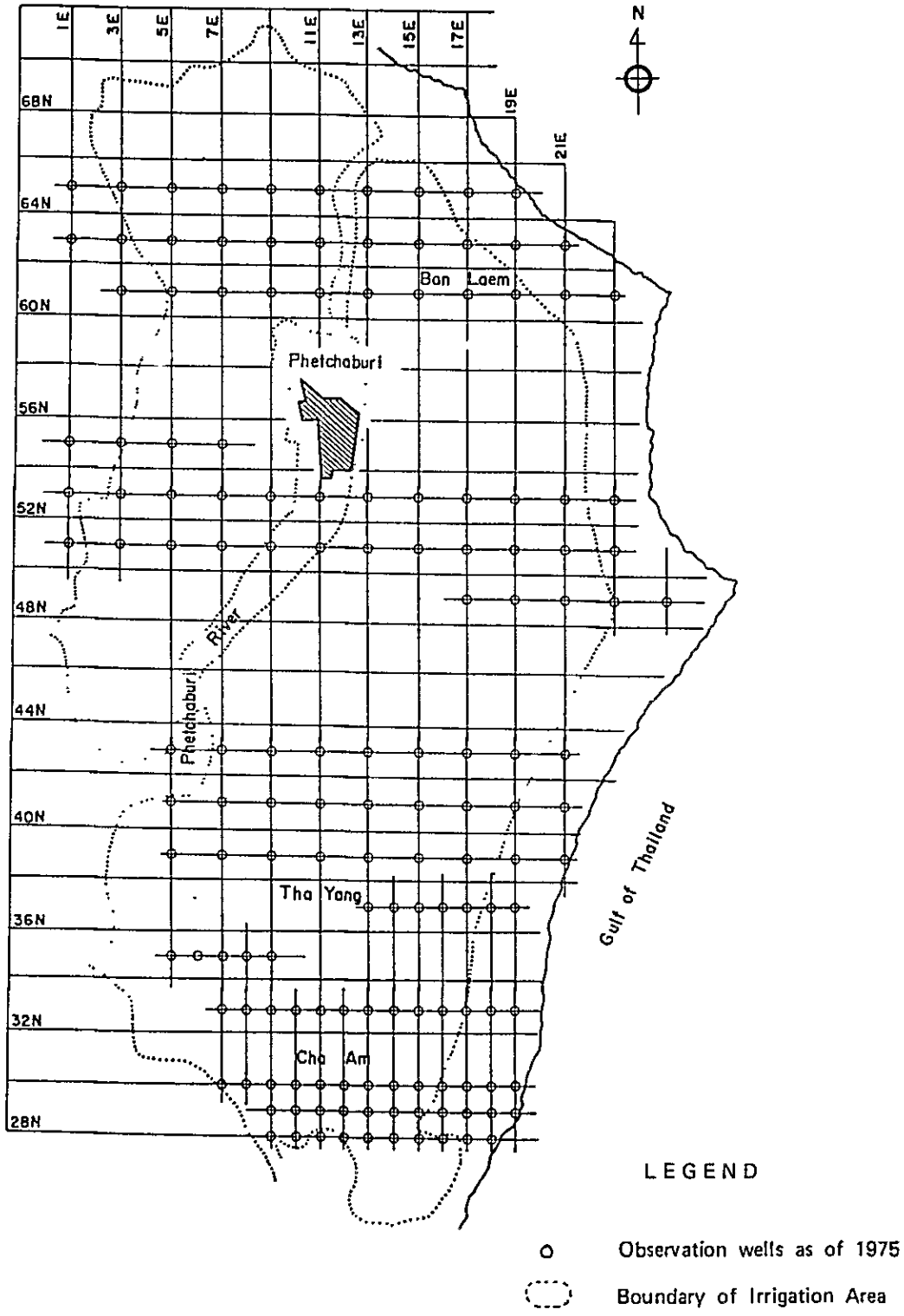
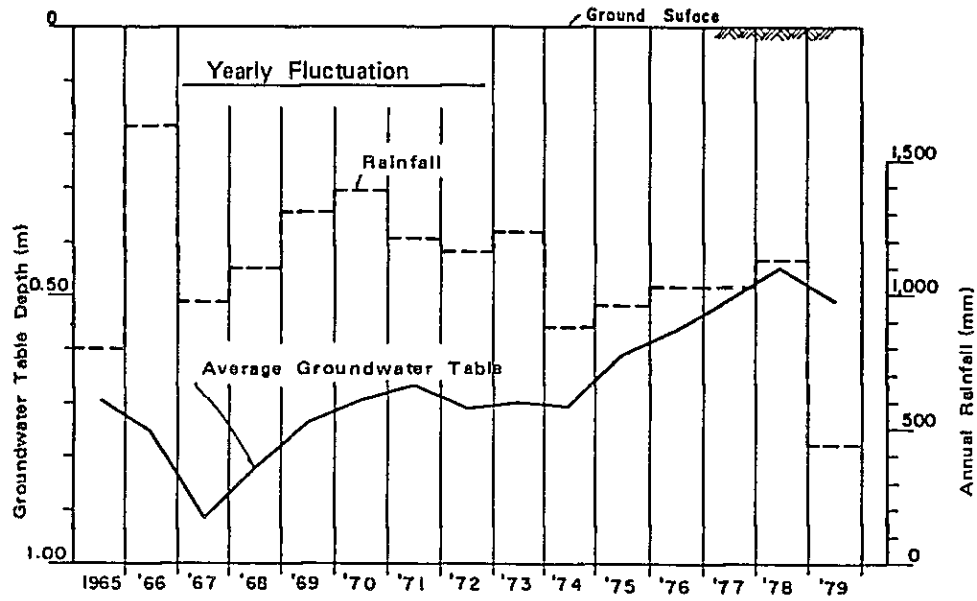


Figure A-3 Yearly and Monthly Fluctuation of Groundwater Table



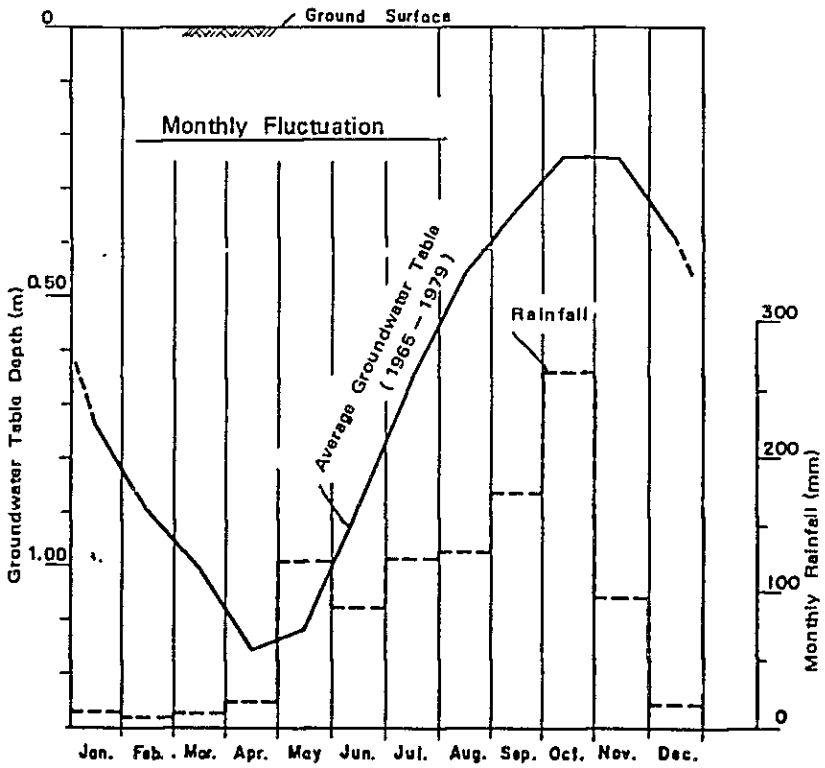


Figure A-4 Fluctuation of Groundwater Table by Zone

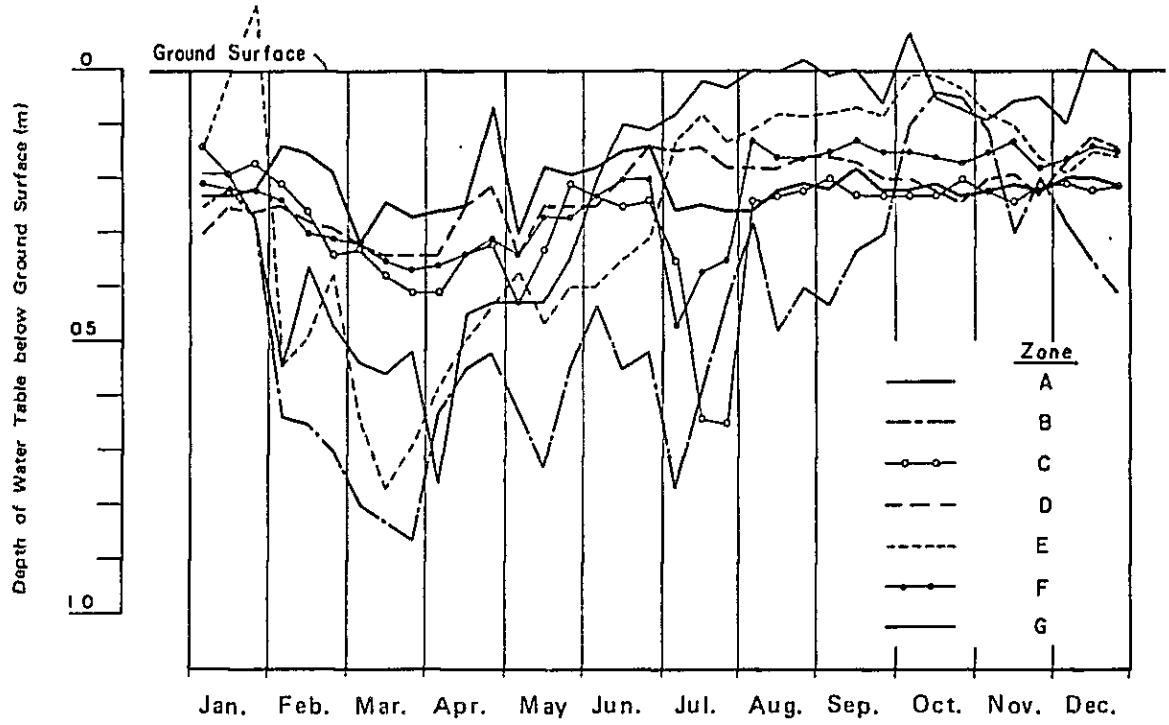
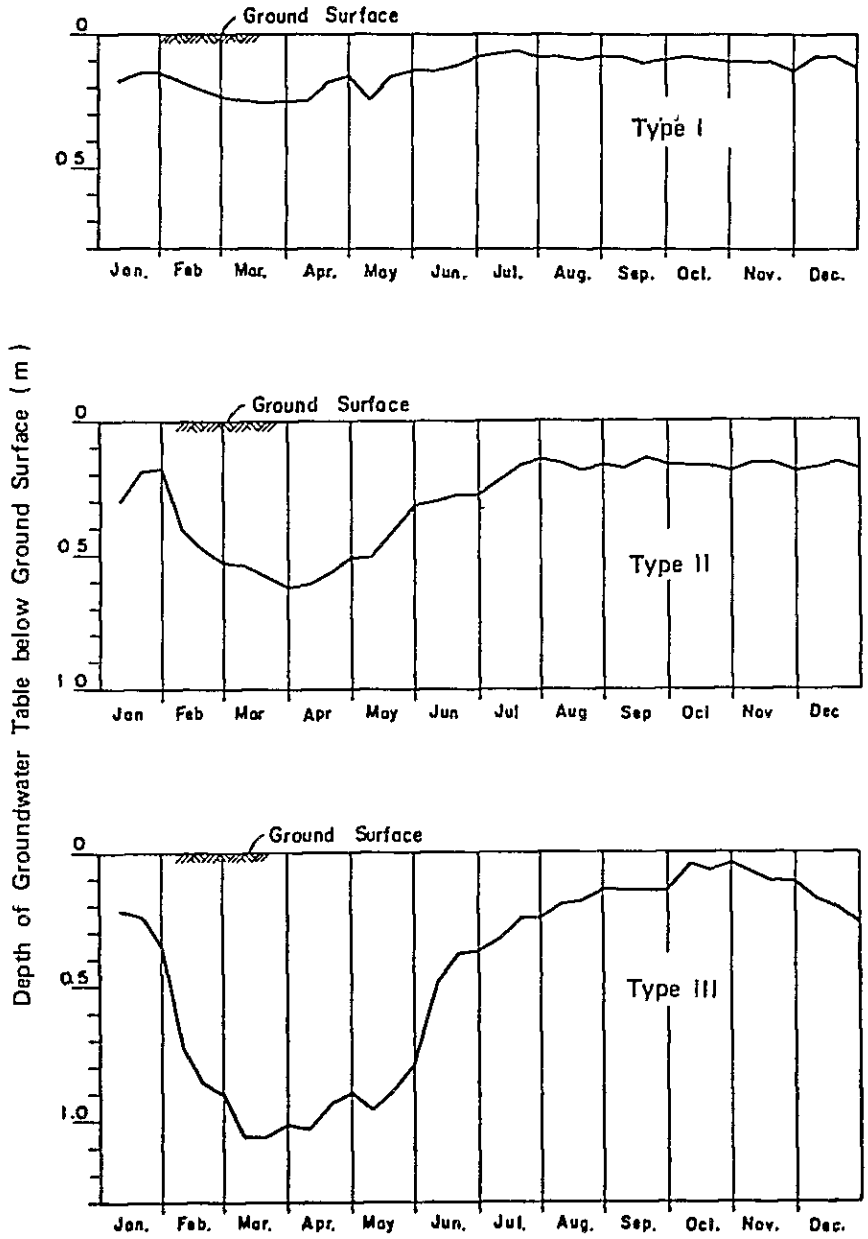


Figure A-5 Fluctuation of Groundwater Table by Type



A-6 Reference Crop Evapotranspiration

The report entitled as water requirements for paddy cropping, prepared in 1979 by RID has drawn a conclusion that, among six of empirical methods, the Penman method was recommendable for estimation of consumptive use of water by paddy from the results obtained at three of water use experimental stations operated by RID. Table A-9 shows the summary of the study on water requirements for paddy.

In this study the reference crop evapotranspiration (ETo) was calculated based on the modified Penman method and meteorological data at Hua Hin, and the calculation followed out the procedure described in the report "crop water requirements" published in 1977 by FAO.

The form of the equation used in this method is:

$$ETo = c\ [\ W.Rn + (1-W).(f(u).(ea-ed)\ ]$$

where:
- ETo = reference crop evapotranspiration in mm/day
- W = temperature-related weighting factor
- Rn = net radiation in equivalent evaporation in mm/day
- f(u) = wind related function
- (ea-ed) = difference between the saturation vapour pressure at mean air temperature and the mean actual vapour pressure of the air, both in mbar
- c = adjustment factor to compensate for the effect of day and night weather conditions

The calculation of ETo is given in Table A-10.

Table A-9 Water Requirements for Paddy Cropping observed by RID

Items	Mae Tang		Samchook		Phetchaburi
Season	Rainy	Dry	Rainy	Dry	Dry
Varieties	RD 6	RD 9	RD 9	RD 9	RD 11
Period of Observation					
from :	Aug.12	Jan.16	Jul.26	Feb. 7	Feb. 5
to :	Nov.15	Apr.25	Nov. 6	Apr.23	May 16
Days :	96	(100)	104	76	101
Evaporation (E)					
mm :	149.10	316.70	218.61	236.73	389.39
mm/day:	1.55	(3.17)	2.10	3.11	3.86
Transpiration (T)					
mm :	247.45	385.22	301.50	356.51	454.94
mm/day:	2.58	(3.85)	2.90	4.69	4.50
Evapotranspiration (ET)					
mm :	396.55	701.92	520.11	593.24	844.33
mm/day:	4.13	(7.02)	5.00	7.81	8.36
Percolation (P)					
mm :	111.55	150.31	122.81	109.53	153.16
mm/day:	1.16	(1.50)	1.18	1.44	1.52
E + T + P					
mm :	508.10	852.23	642.92	702.77	997.49
mm/day:	5.29	(8.52)	6.18	9.25	9.88
Average Crop Factor (Kc) by Penman Method					
	1.06	1.35	1.17	1.16	1.19

Notes: - Source: Water requirements for paddy cropping, 1979,RID

- Observations were made in 1978 for rainy season cropping and 1979 for dry season cropping.
- Figures with a parenthesis were calculated by the team

Table A-10 Calculation of ETo

Items	Unit	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Notes
Mean temperature	°c	25.3	26.8	28.2	29.4	29.0	28.4	28.2	28.1	27.7	27.0	26.3	25.2	* 1
RHmean	%	70.0	74.0	72.0	72.0	75.0	73.0	74.0	75.0	78.0	81.0	77.0	71.0	* 2
Wind speed/day (U_1)	knot	5.5	5.4	6.1	6.3	5.1	5.3	5.0	4.7	3.9	4.5	5.9	6.2	* 3
Monthly sunshine	hr	247.4	259.2	264.4	258.0	215.9	159.6	147.4	147.0	155.0	192.9	228.1	269.2	* 4
Cloudness oktas(0to8)		3.2	3.1	3.3	4.1	5.8	6.7	6.9	7.0	6.7	5.9	4.7	3.6	* 5
100 α	%	25	25	25	25	25	25	25	25	25	25	25	25	* 6
RHmax	%	84.9	88.8	87.6	86.4	88.6	87.0	88.2	88.6	91.4	93.3	88.8	80.7	* 7
ea	mbar	32.3	35.3	38.3	41.0	40.1	38.7	38.3	38.0	37.2	35.7	34.2	32.1	* 8
ed	"	22.6	26.1	27.6	29.5	30.1	28.3	28.3	28.5	29.0	28.9	26.3	22.8	* 9
(ea - ed)	"	9.7	9.2	10.7	11.5	10.0	10.4	10.0	9.5	8.2	6.8	7.9	9.3	*10
$U_2 = 30.2U_1$	km/day	166	163	184	190	154	160	151	142	118	136	178	187	*11
Wind function f(u)		0.718	0.710	0.767	0.783	0.686	0.702	0.678	0.653	0.589	0.637	0.751	0.775	*12
Weighting factor(1-W)		0.257	0.242	0.229	0.223	0.225	0.228	0.229	0.230	0.233	0.240	0.247	0.258	*13
W		0.743	0.758	0.771	0.777	0.775	0.772	0.771	0.730	0.767	0.760	0.753	0.742	*14
Ra	mm/day	12.68	13.81	15.04	15.70	15.73	15.56	15.56	15.63	15.17	14.31	13.16	12.36	*15
N	hr/day	11.45	11.70	12.00	12.40	12.70	12.85	12.75	12.50	12.15	11.80	11.50	11.35	*16
n	"	7.98	9.26	8.53	8.60	6.96	5.32	4.75	4.74	5.17	6.22	7.60	8.68	*17
n/N	"	0.697	0.791	0.711	0.694	0.548	0.414	0.373	0.379	0.426	0.527	0.661	0.765	*18
Rs	mm/day	7.59	8.91	9.11	9.37	8.24	7.11	6.79	6.87	7.02	7.34	7.64	7.82	*19
Rns	"	5.69	6.68	6.83	7.03	6.18	5.33	5.09	5.15	5.27	5.51	5.73	5.87	*20
f(T)		15.73	16.06	16.34	16.58	16.50	16.38	16.34	16.32	16.24	16.10	15.96	15.70	*21
f(ed)		0.131	0.115	0.109	0.101	0.099	0.106	0.106	0.105	0.103	0.103	0.114	0.130	*22
f(n/N)		0.727	0.812	0.740	0.725	0.593	0.473	0.436	0.441	0.483	0.574	0.695	0.789	*23
Rnl	mm/day	1.50	1.50	1.32	1.21	0.97	0.82	0.76	0.76	0.81	0.95	1.26	1.61	*24
Rn	"	4.19	5.18	5.51	5.82	5.21	4.51	4.33	4.39	4.46	4.56	4.47	4.26	*25
1 W.Rn	"	3.11	3.93	4.25	4.52	4.04	3.48	3.34	3.20	3.42	3.47	3.37	3.16	*26
2 (1-W).f(u).(ea-ed)	"	1.79	1.58	1.88	2.01	1.54	1.66	1.55	1.43	1.13	1.04	1.47	1.86	*27
3 = 1 + 2	"	4.90	5.51	6.13	6.53	5.58	5.14	4.89	4.63	4.55	4.51	4.84	5.02	*28
c		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	*30
ETo = c X 3	mm/day	4.90	5.51	6.13	6.53	5.58	5.14	4.89	4.63	4.55	4.51	4.84	5.02	
Monthly ETo	mm	151.9	154.3	190.0	195.9	173.0	154.2	151.6	143.5	136.5	139.8	145.2	155.6	

Explanation of Table A-10

1... mean monthly temperature in C° at Hua Hin
2... mean monthly relative humidity in % at Hua Hin
3... mean monthly wind run in knot/day at 13.48 m height at Hua Hin
4... mean monthly sunshine hour at Hua Hin
5... mean monthly cloudness expressed in oktas(0 to 8) at Hua Hin
6... reflection of solar radiation (α), assumed to be 0.25
7... mean monthly maximum relative humidity in % at Hua Hin
8... mean saturation water vapour pressure in mbar, obtained from table-5 in the FAO report
9... mean actual water vapour pressure in mbar, (ea) x (RHmean)
11... 24-hr wind run in km/day at two m height, converted from U^1 using the following equation;

$$U^2 = U^1.(\frac{2}{Z})^{0.2}$$

where; U^1 = 24-hr wind run in km/day at Zm height
U^2 = 24-hr wind run at two m height

12... wind function, given by the following equation

$$f(u) = 0.27(1 + U_2/100)$$

13... weighing factor for the effect of wind and humidity on ETo at different temperature and altitudes, given in table 8 of the FAO report
15... extra terrestrial radiation expressed in equivalent evaporation in mm/day, given in table 9 of the FAO report
16... mean daily duration of maximum possible sunshine hours for different months and latitudes, given in table 11 of the FAO report
17... mean sunshine hour per day at Hua Hin
19... solar radiation, given by the equation of $Rs = (0.25 + 0.5n/N)Ra$
20... net shortwave radiation = $(1 - \alpha)Rs$
21... effect of temperature on longwave radiation, given in table 13 of the FAO report
22... effect of vapour pressure on longwave radiation, $f(ed) = 0.34 - 44\sqrt{ed}$
23... effect of the ratio actual and maximum bright sunshine hour on longwave radiation, $f(n/N) = 0.1 + 0.9n/N$
24... net longwave radiation, $Rnl = f(T).f(ed).f(n/N)$

APPENDIX B SOIL

APPENDIX B SOIL

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APPENDIX B SOIL

Introduction

The study on the soils of the Project Area has been undertaken under the feasibility study on the Phetchaburi-Kaeng Krachan Irrigated Agricultural Development Project since November 19, 1980, in which the first stage survey was completed in February 1981 and the second stage survey lasted from June 1981 to August 1981, excepting for the field leaching test in Water Use Experiment Station, which was finished in October 21, 1981.

The report compiles the findings and results of these studies in the said first survey on the sample area of on-farm development scheme, the extension area and the salinity study sample plot, and the said second survey on the salinity study sample plot and the leaching test. And also arrangement of the basic data and information available was studied during the field survey period.

B-1. Progress of Survey

The base map for the field survey was the topographic maps of 1:50,000. Both the aerial photographs at the scale of 1:10,000 for the survey on the extension area and those of 1:4,000 for the survey on the sample areas of the on-farm development and the salinity study sample plots were used. And also both detailed reconnaisance soil map of Changwat Phetchaburi Province and the semi-detailed soil map of Phetchaburi Irrigation Project were referred to.

The field survey was conducted under the cooperation of the staff of Land Classification Branch, Soil and Geology Division, RID and the soil analysis on the collected soils and water samples during the field survey was made in Soil Chemistry and Phisics Laboratory, Research and Laboratory Division, RID. The field reaching test had been executed under the cooperation of Water Use Experimental Station, Phetchaburi, RID.

B-1-1. The Survey on the Sample Area of On-farm Development

The field survey was conducted on the five(5) sample areas selected for the on-farm development scheme as shown in the following process;

Name of sample area	Boring density	No.of boring	No.of Test pit
No. 1	1/5 ha.	52	1
NO. 2	"	74	1
No. 3	"	70	1
No. 4	"	50	1
No. 5	"	75	1

The soil auger test was made at the rate of one(1) boring per five(5) ha. The soil samples for the measurement of pH (1:1 water) and electrical conductivity (ECe x 10^3) were collected from the surface soil (0 - 30 cm) and the subsoul (30 - 60 cm) in each test site. And also pH and electrical conductivity of the groundwater and/or the surface water were measured on the samples collected at boring sites at the field site by using portable measurement instruments. The test pit survey on the representative soils in each sample area were taken, and the samples of soils and waters were collected for analysis.

B-1-2. The Survey of the Extension Area

The extension area which lies between the existing irrigation area and the sea dike was surveyed by the boring test at the rate of one (1) boring per 200 ha. The surface soils and subsoils were collected from the total 96 boring sites for pH and soil salinity measurement in the laboratory.

pH and salinity of ground and surface water collected from each boring site were measured using the portable measurement instruments.

B-1-3. The Survey on the Salinity Study Sample Plot.

Four(4) areas were selected in order to study the change of

soil salinity between the dry and rainy season. For this purpose, the boring test at the rate of one(1) boring per two(2) ha and two(2) pits were dug out for the test pit survey as follows;

Name of plot	No. of boring	No. of test pit
Plot A	30	2
Plot B	25	2
Plot C	27	2
Plot D	28	2

Soil sampling for pH and soil salinity measurement and for chemical analysis were made in the same way as the case of sample area of the on-farm development.

B-1-4. Leaching Test

For the purpose of improvement of the salt-affected soil, the soil salinity at the root zone shall be reduced to the tolerable level to allow plant growth. The field leaching test and the initial leaching test were carried out in order to study the basic data for estimating the amount of water to be required for salt leaching.

(1) Field Leaching Test

This test have been carried out using the test field (about 700 m^2 in total) which was newly constructed for the test in Water Use Experimental Station, Phetchaburi, RID. An outline of experimental design is as follows;

Block name	Plot No.	Watering schedule	
		Preirrigation (100 mm.)	Puddling
I	1 2	Jun.13	Jun.26 (150 mm.)
II	3 4	Jun.14	Jun.27 (200 mm.)
III	5 6	Jun.14	Jun.26 (100 mm.) Jun.27 (100 mm.)
IV	7 8	Jun.14	Jun.27 (250 mm.)

The test field consists of four(4) blocks being different in puddling water depth from 150 mm to 250 mm. Each block is subdivided into two(2) plots for replication, thus totalling eight(8) plots, and each plot has three(3) sets of leachate samplers. A set of leachate sampler is composed of four(4) leachate sampling P.V.C. pipes installed at the depth of 20 cm, 40 cm, 60 cm and 100 cm, respectively, as shown in Table B-1 and Figure B-1.

Soil samples were taken from each plot (each 20 cm from 100 cm depth) for laboratory analysis before the test, 10 days after the test commencement and after the test.

The surface water of each plot and leachate from each sampler were collected at the fixed sampling day. The electrical conductivity and pH of daily collected water samples were measured at the station by laboratory scale Electric Conductivity (EC) and pH measurement instruments expect samples for special analysis in the laboratory.

(2) Initial Leaching Test

Four(4) test sites were selected for this test, and these sites were in the upland field in Water Use Experiment Station, and the paddy field in salinity study sample plot A, B and C.

The test was made with concentric cylinders having diameters of 45 cm, as used for infiltration rate measurement. The cylinders were pressed into the soil for about 10 cm and poured with water varying depths as follows; 150 mm/day, totaled 300 mm in two(2) days (2) days and totaled to 450 mm in three(3) days. At each location the test was carried out in duplication.

Soils for analysis were sampled before the test and after the pured water reached to the designed depth.

B-2. Soils in the Project Area

The soils in the Project Area can be grouped roughly into three (3) major regions from the point of their landform and parent materials. Tidal flat covering the northern and the eastern parts of the Project Area consists of marine deposits. The river alluvial deposits are formed into the semi-recent terrace which occupies the

larger part of the south-eastern area along the Phetchaburi River. The former tidal flat with old brackish water deposits and old marine terrace are situated on the transitional region between the above mentioned two(2) regions (refer to Map 1)

(1) Tidal Flat Region (refer to Table B-2)

The soils of the tidal flat region (34,970 ha. 47.3 percent) are composed of Tha Chin and Samut Prakan series covering the northern part and the coastal area. This flat has been developed on the marine deposits which have been sedimented in the marine or brackish water environment. The northern and eastern area along sea coast consists of Tha Chin series (6,800 ha. 9.2 percent) which is unripened soil whith swampy vegetation with mangrove and nipa palm. This undeveloped saline soil on the active tidal flat is very soft and regularly flooded by brackish water and/or sea water. The soil texture is mostly very poor drained heavy clay. The soil reaction is moderately alkaline throughout the profile, except in the ridges of some coconut plantation, where the pH has dropped to medium or strongly acid. This indicate that at least part of the Tha Chin soils might be more or less potentially acid.

In a great part adjoining to the area of the Tha Chin soils, Samut Prakan series occurs. The Samut Prakan soils are more or less ripend and slightly saline or saline soils. A greater part of these soils have been used for paddy field. In general, the soil is poorly drained heavy clay, having the reaction from neutral to mildly alkaline throughout the profile. Shell fragments, lime concretions and gypsum are frequently found in the subsoils. These soils distributed on the lowlying parts are very saline and occasionaly flooded by sea water.

In the southern stretch, Hua Hin series is found on sandy beach of duneformations, consequently the soil texture is sand and/or loamy sand. The soil reaction varies from strongly acid in the older Hua Hin soil to neutral or mildly alkabline in the younger Hua Hin soil. The Hua Hin soil is rarely cultivated with a poor vegetation of cactus, thron shrubs, bamboo and trees in general.

(2) Semi-recent Terrace Region

The semi-recent terrace formed from river alluvial deposits covers a greater part of south-western area along the Phetchaburi River. The topography is flat to slightly undulating. The prevailed soil series in this region is Phetchaburi, Kamphaeng Saen, Shanphaya and Chai Nat series.

Phetchaburi series (12,000 ha. 16.2 percent) mainly occurs in the lower river basin between the levees. The soil texture is mostly loam in the surface soil and clay loam in the subsoil containg some mica. The soil reaction varies from acid to mildly alkaline. They are moderately well to somewhat poorly drained and most of the soil have been used for paddy field.

On the natural levees, Kamphaeng Saen series (8,950 ha. 12.1 percent) is found. The soil texture is variable with the places. In general, the surface soil consists of sandy loam to loam, while the texture of subsoil is loam to clay loam. The soil is usually well drained and mostly used for upland field and fruit garden excepting for paddy field.

The soil reaction is extremely variable in ranging from strongly acid to slightly acid.

Along the Phetchaburi River and east of Phetchaburi Town, Sanphaya series (1,650 ha.) is found in slightly lower parts. The soil texture is loam to silt loam in the surface soil and loam to silty clay loam or clay loam in the subsoil. The soil is moderately well drained and the soil reaction is slightly acid to neutral. In general, this soil has been used for paddy field.

Chai Nat series (1,520 ha.) is found on the transitional parts between levees and river basins in north-east Phetchaburi Town. This soil is somewhat poorly drained silty clay loam to clay loam in the surface soil and overlying silty clay loam, silty clay or clay

in the subsoils. The soil reaction is slightly acid to neutral throughout the profile. Chai Nat soil situated in the lower course of the Phetchaburi River and on the seaward stretches of the breach deposits are underlain by Samut Prakan soil at the depth of less than about 50 cm. The drainage of this soil is somewhat poor to poor.

(3) Transitional Region between the Tidal Flat and the Semi-recent Terrace

The soils of transitional region mostly belong to Bangkok and Ransit series. Rangsit soil (6,310 ha. 8.5 percent) is distributed in the north (along the Petchkasem Highway) and the seaward stretches of south-eastern part of the Project Area. This soil is formed from former brackish water deposits and occur on the former tidal flat. This soil is poorly drained very fine clayey soil and extremely acid soil which has pH value ranging from 4.0 to 5.0. And also Rangsit soil is characterized by greyish brown or dark greyish brown clay with red, yellowish red and yellow jarosite mottles which occur below 40 cm and within 100 cm.

Bangkok series (5,250 ha. 7.1 percent) is found on the southern part from the Phetchaburi - Hat Chao Samran Road and the seaward stretche of south-eastern part. This soil is formed by marine and brackish water deposits and occurs in deeper inland parts. Bangkok soil is poorly drained clay and the soil reaction varies from slightly acid to mildly alkaline. Slickensides and pressure faces are found in the subsoil.

The land suitability for paddy production based on the suitability class adopted by Soil Survey Division, MOAC is as shown in Table B-2. As shown in this table, Bangkok, Chai Nat and Rachaburi series, and Samut Prakan series except for their lowlaying part are classified into Class I meaning soil best suitable for paddy production. The soils moderately well suited for paddy production, having one(1) or two (2) limitations of different nature are classified into Class II. According to this classification, Sanphaya and Phetchaburi series which

have a somewhat too high permeability, Rangsit series, which is strongly acid, and Chonburi series which is somewhat too well drained and has a lower fertility than other soils, are classified into as the paddy field of Class II.

The soils in Class III is the soil to be only marginally suited for rice production owing to few complex limitations. The soil series and the limitations in Class III are as follows; Tha Muang and Kamphaeng Saen series are too permeable, their high topographic position with undulation hamper irrigation; Sattahip and Hup Kapong series are too well drained soil with rather low fertility; Samut Prakan series situated on the lowlaying part is strongly saline and subject to occasional flooding by sea water; HongKae and Hup Kapong series has a low fertility and an almost impenetrable B horizon and thin A horizon. Tha Chin and Hua Hin series are classified into Class IV which is the unsuitable soil for rice production owing to their high saline soil whith poor drainage for Tha Chin soil and sandy soil textured for Hua Hin soil.

B-3. Summary of Field Survey

B-3-1. Sample Area of On-farm Development

The soils of each sample area are composed of the following soil series according to the semi-detailed soil map, Soil Survey Division. SSR-45,1965.

Sample Area No.1 Phetchaburi series
Sample Area No.2 Samut Prakan series
Sample Area No.3 Chai Nat and Sanphaya series
Sample Area No.4 Kamphaeng Saen and Phetchaburi series
Sample Area No.5 Bangkok, Chai Nat and Kamphaeng Saen series

From these soil series prevailing in each sample area, it can roughly be said that Sample areas of No.1, No.3 and No.4 are situated on the semi-recent terrace. Sample area No.2 is situated in the tidal flat and Sample area No.5 is in transitional region between the semi-recent terrace and the tidal flat. A greater part of each sample area has been used for paddy field with the characteristic land use as shown in Figure B-2 and the outline is as follows;

Sample Area No.1: The banana gardens on former termite mounds are scattered in the area. The southern part of the area is used only for the rainy season paddy. The northern part is used for double cropping with mungbeans as the dry season crops and also fruit garden (mainly banana) are scattered in this part.

Sample Area No.2: Most of the paddy field is used only for the rainy season paddy but the field along irrigation canal is used for the double cropping of rice. There is a considerable acreage of the low portion in the central part.

In the rainy season, surface runoff originating from rainfall and irrigation water flows over the land to the said lower portion, where the water depth may reach as high as 50 cm above ground level. The abandoned arable lands due to salt damage are scatterd in this area, especially in the eastern side.

Sample Area No.3: Most of the area is used only for the rainy season paddy except shrubs and barren lands in the south-east corner. The paddy field with sugar palm occupies about 70 percent of the existing paddy field. The fruit gardens are scattered in the western corner.

Sample Area No.4: Most of the area is used only for the rainy season paddy but the paddy fields with sugar palm are found in the eastern and southern corner.

Sample Area No. 5: Most of paddy fields are used only for the rainy season paddy field and about half of them is paddy field with sugar palm except fruit gardens, shrub areas and swampy areas existing in the southern boundary.

The summary of survey is shown as in Table B-3. As soil texture is affected by parent materials, the soils of Area No.1 and No.4 situated in the semi-recent terrace widely vary from moderately coarse textured soil (sandy loam), medium textured soil (loam, silt loam) to fine textured soil (sandy clay silty clay, clay). While the soil texture of Area No.2 located in marine deposit area is clay. The soil texture of Area No.3 and No.5 had been influenced by both marine and river alluvial deposits.

The tendency of soil reaction is as follows;

Sample area		<pH 6.5	pH 6.6-7.3	pH 7.4<
No.1	surface soil	76.9 %	19.2 %	3.9 %
	subsoil	69.2	23.0	7.8
No.2	surface soil	13.5	48.6	37.9
	subsoil	5.4	21.6	73.0
No.3	surface soil	44.3	44.3	11.4
	subsoil	12.9	42.9	44.2
No.4	surface soil	80.0	16.0	4.0
	subsoil	74.0	20.0	6.0
NO.5	surface soil	94.6	2.7	2.7
	subsoil	88.0	9.3	2.7

This table shows that percentage of samples having similar pH range in the total sample of each area by surface soil (0 - 30 cm) and subsoil (30 - 60 cm). From this table, it is clear that soils having acidic reaction are mainly found in the area formed form river alluvium. While soils having neutral or alkaline reaction are found in the area formed from marine deposits. In Area No.3 formed from both marine and river alluvial deposits, about 50 percent of samples collected from surface soil shows neutral and/or alkaline reaction and about 87 percent of subsoils shows neutral and/or alkaline reaction. It seems that the tendency mentioned above may be due to the influence by Samut Prakan soil having neutral and/or alkaline reaction occurred under Chai Nat soil. Most of the soils consisting of old brackish water deposits as in Area No.5 indicate acidic reaction throughout the soil profile.

The following figures indicate the percentage of samples having similar salinity grade in total sample.

ECe x 10^3(m mho/cm)

Sample Area		< 4	4 - 6	6 - 8	8 <
No.1	surface soil	98.0 %	2.0 %	0 %	0 %
	subsoil	98.0	2.0	0	0
No.2	surface soil	36.4	23.0	8.1	32.5
	subsoil	35.7	18.9	9.5	37.9
No.3	surface soil	71.4	11.4	4.3	12.9
	subsoil	51.4	17.1	12.9	18.6
No.4	surface soil	92.0	4.0	2.0	2.0
	subsoil	96.0	0	0	4.0
No.5	surface soil	72.0	10.7	4.0	13.3
	subsoil	62.7	14.7	9.3	13.3

As shown in the above table, a large number of soil sample having above 6.0 m mhos/cm, which is considered as the untolerable salinity for many crops, are found in the soils originated from marine deposits, especially in Area No.2. The percentage of the surface soil having above 6.0 m mhos/cm among the total sample is 41 percent and that of the subsoil is 47 percent.

The soils originated from river alluvial deposits in Area No.1, No.3, No.4 and No.5 have the salinity below 4.0 m mhos/cm.

Figure B-3 shows the distribution of samples having the similar range of pH and EC values.

Table B-4 and Figures B-4, 5 & 6 give the soil analysis data, which can be summarized as follows;

Test Pit No.2 (Area No.1): Clay with neutral reaction is found throughout the profile. Electric Conductivity by extracted saturation (ECe) is below 2.0 m mhos/cm and this soil has little influence from salts. They have medium organic matters, nitrogen content and somewhat less available phosphorus, although CEC is high.

Test Pit No.10 (Area No.2): The soil texture is clay and soil reaction varies from slightly acid to alkaline. Soil salinity is high such as 14 m mhos/cm at the surface soil and 24 m mhos/cm at the subsoil. Main components of soluble salts is sodium chloride. ESP ranges from 6.9 to 12 percent with soil depth. The content of organic matters and nitrogen content is somewhat high in the surface soil and decrease with soil depth. In general, available phosphorus increase with soil depth.

Test Pit No.11 (Area No.3): The soil texture is clay having strong acidic reaction in the surface soil and neutral to mild alkaline reaction in the subsoil. ECe value is 1.9 m mhos/cm, in the surface soil and increase upto 10 m mhos/cm with soil depth. This is the saline soil having 2 - 9.5 percent of ESP. CEC value in the surface soil is low and poor in soil nutrients.

Test Pit No.1 (Area No.4): The soil is loam or clay loam with strong acidic reaction and ECe value is 25 m mhos/cm in the surface soil and 7.0 m mhos/cm in the subsoil. ESP is below two percent in the surface soil and increase with soil depth. The subsoil is the saline soil having 15 percent of ESP and main component is sodium chloride. They have medium content of organic matters and available phosphorus, but nitrogen content is low.

Test Pit No.9 (Area No.5): The soil is clay with acidic reaction. ECe value is below 2.0 m mhos/cm except 6.2 m mhos/cm between 14 and 52 cm soil depth and ESP is below 3.3 percent. Available phosphorus is high in the surface soil though other nutrients is medium content.

All of sample areas area fine or medium textured soils with considerably deep effective depth of soil. From the results of soil analysis, natural fertility of these soils can be estimated as moderate class except high soil salinity in certain paddy field. Most of the paddy field are used for the dry season transplanting paddy cultivation. In view of the present land use of paddy fields by single dry season paddy cultivation, annual alternated swell and shrinkage of the soils with long drying period will give a favorable effect for keeping well

drainage of the fields. Essentially, however the soils of sample areas are composed mainly of clay with high water holding capacity. Consequently, introduction of the double cropping of paddy and/or the double cropping with paddy and the dry season crops, the main objective of the Project, will unavoidably induce degrading the drainability of soils due to excessive moisture kept long in the soils.

In order to cope with such a situation, a proper countermeasure by reasonable water management should be established for eliminating the excessive surface water as well as the drainage facilities should be provided adequately. The soils with salinity above 4.0 m mhos/cm are found throughout the sample areas, especially in Area No.2, No.3 and No.5. The best way to eliminate excessive salts is the leaching by irrigation water. Consequently, successful desalination by this method requires to establish the reasonable on-farm level water management system as well as to provide functional drainage facilities.

B-3-2. Extension Area

Extension area stretches southward from Ban Laem to Cha-am between the existing irrigation area and the sea dike. This area can be separated into the north area and the south area by the road from Phetchaburi to Hat Chao Samran. The soils of the north area are composed of Tha Chin and Samut Prakan series originated from marine deposits. While the south area is composed of soils developed on the former brackish water deposits and/or marine old terrace such as Samut Prakan, Hua Hin, Bangkok and Rangsit series.

In the north area, lowlying land with weed, poor mangrove stretches along the sea dike, and a few salt fields exist among them. Paddy field spreads out eastward from the lowlying area. The present land use of the south area is much different from that of the north area. Especially in the southern parts of this area, land is rarely cultivated with bearing a poor vegetation of cactus, thorn shrubs, bamboo, etc. The area between these shrub or idle lands and the edge of northern area used for paddy fields.

The summary of field survey on the extension area is shown in Table B-3. As shown in this table, the north and the south areas show quite difference in soil texture of the surface soil, pH and salinity, and this may be due mainly to their process of soil formation as mentioned before.

The majority of the subsoil texture are clay. In general, the surface soils in the north area are fine texture soil such as silty clay and clay. While medium to coarse textured soils are found in many parts of the south area. The soil reaction of north area indicate from neutral to alkaline, while acid soils are found in the south area. Especially strong acid soil below pH 3.8 is found in the southern tip of the Extension Area. These strongly acid may due to mainly their parent materials originated from old brackish water deposits (Acid Sulphate Soil)

Among the samples of the surface soil, 36 percent in the out of totaled 96 samples shows neutral reaction, 30 percent shows alkaline reaction and 34 percent shows acidic reaction. While in the subsoil, 50 percent of sample shows alkaline reaction, 28 percent shows acidic reaction and 22 percent is neutral reaction.

The soil samples having above 10 m mhos/cm is 59 percent surface soil and 68 percent in the subsoil. The soil salinity below 4.0 m mhos/cm salinity effect mostly negligible, is 27 percent in the surface soil and 17 percent in the subsoil. These figure will indicate the extremely high salinity in this area.

In general, soil salinity in the north area is slightly higher than that of the south area. This higher salinity in the north area may be due to the prevailed poorly drained swampy areas and invading brackish water and/or sea water.

At the time of field survey, most of the area had stagnated water on their ground surface except the south area. The collected

surface water from the boring sites dominantly indicate below 4.0 m mhos /cm in salinity, however groundwater collected mainly from the south area was measured with extremely high salin (above 10 m mhos/cm). These differences in salinity may be due to the influence of soils and also some parts of the area are still affected by sea warter or brackish water.

pH (1:1 water) and soil salinity (ECe x 10^3)

pH	>4.5	4.6/5.0	5.1/5.5	5.6/6.0	6.1/6.5	6.6/7.3	7.4/7.8	7.9/8.5	8.5<	Total
surface soil	4	7	9	6	6	35	24	3	2	96
Subsoil	8	7	2	3	7	21	31	14	3	96

ECex10^3	>1	1/2	2/4	4/6	6/8	8/10	10<	Total
Surface soil	3	6	17	11	2	-	57	96
Subsoil	2	6	8	13	2	-	65	96

B-3-3. Salinity Study Sample Plot

The areas having following soil series were selected as the salinity study sample plot in order to study the change in soil salinity of both the dry and the rainy seasons. The soil series occurring on these plots are as follows;

Plot A Samut Prakan series
Plot B Samut Prakan Series
Plot C Kamphaeng Saen and Phetchaburi series
Plot D Bangkok series

An outline of each sample plot is as follows;

Sample Plot A: This plot is located in the active tidal flat, certain parts of which are still considerably influence by brackish water. Most part of this plot is used only for the rainy season paddy

except the north-eastern corner occupied by fruit gardens (banana), coconut palm fields and shrubs. In general, silty clay or clay in surface soil and clay in subsoil are dominant soil texture, but in certain parts sandy clay loam or silty clay containing many fine shell fragments are found below about 70 cm from the ground surface as indicated in test pit No.13.

According to the soil analysis data, these soils seem to be saline soil having ESP ranging from 5.9 to 35 percent in the surface soil (refer to Tables 4, 5 & 6). Soil salinity is extremely high ranging from 11 to 17 m mhos/cm throughout soil profile and salinity measured in the rainy season is higher than that of the dry season and slso concentration of soluble cations and anions of soils collected in the rainy season is higher than that of the dry season. These facts mean that salts upward movement and accumulation occurring during the dry season are still retained throughout the profile at the begining of the rainy season.

From the results of soil analyses, these soils seem to be moderately fertile soil expect their extremely high soil salinity.

Sample plot B: This plot is located in the eastern corner of Sample Area No.2. The farm ditch had been constructed diagonally from the southern corner to northern corner and the northern boundary is adjacent to drainage canal. A greater part of this plot is used only for paddy field during the rainy season except paddy field along the irrigation canal in the southern part. About 25 percent of this plot is left to idle owing to salts accumulation in the surface soil.

In general, clay with soil reaction ranging from neutral to alkaline is dominant throughout the profile, however, the soils indicating strong acidic reaction were found in the southern corner as shown in Test pit No.4. According to the soil analysis data, the salinity of subsoil is higher than that of surface

soil and also salinity measured in the rainy season shows higher value than that of the dry season. In Pit No.3, salinity of top soil (0 - 14 cm) measured in the dry and the rainy season are 4.7 m mhos/cm and 15 m mhos/cm respectively, and the soil salinity below 14 cm depth ranged from 11 to 19 m mhos/cm throughout both the dry and rainy season. In Pit No.4, the soil salinity of 0 - 39 cm depth is below 6.1 m mhos/cm in the dry season and below 5.9 m mhos/cm in the rainy season. However, soils below 39 cm depth have salinity ranging from 10 to 18 m mhos/cm throughout two seasons.

ESP varies from 7.5 to 35 percent in both test pits and the dry season indicates lower value than the rainy season. From the result of the soil analysis, these soils seem to be the slightly less fertile soil.

Sample plot C: This plot is located on the border part of semi-recent terrace, and consists of banana garden and adjoining paddy field areas. The majority of paddy fields used for double cropping of rice.

Silty loam and clay having slightly to strong acidic reaction are dominant soil. In Test pit No.5 situated in banana garden, the soil salinity measured in the dry season ranges from 25 to 16 m mhos/cm decreasing with soil depth and 30 to 25 m mhos/cm decreased with soil depth is found in the rainy season. This difference in the soil salinity between both survey periods means that there is a high upward movement of salts in the soil of garden with irrigation during the dry season.

Test pit No.6 located in the paddy field has the salinity below 4.0 m mhos/cm throughout both survey periods, but the salinity of groundwater is 23.5 m mhos/cm in the dry season survey and pH was 4.3. The salinity of groundwater collected from Pit No.5 was 77 m mhos/cm and this value is 1.43 times as much as that of sea water at Hat Chao Samran which was 54 m mhos/cm, as shown

in Table B-7. Pit No.5 is located in the banana garden reclainmed three years ago without drainage system and soil texture is silty loam throughout the profile. The pond water having salinity of 1.2 m mhos/cm have being applied to this garden. From the analysis data of the soil and the water, there is clear evidence to indicate that the salts in the applied water have been concentrated too much during these last few years.

Sample plot D: The plot D is situated in the former tidal flat and irrigation canal is constructed in the central part of the plot. A greater part of the plot is used only for the rainy season paddy, excepting for the east-western corner which is used for paddy double cropping with sugar palm. The clayey soils with acidic reaction are found throughout the profile. The soil salinity is below 2.0 m mhos/cm at surface soil and increase with soil depth from 5.8 to 11 m mhos/cm, and concentration of soluble sulphate is higher than that of soluble chloride. From the distribution of salts throughout the profile, salts leached from the upper layer appers to be retained at the lower layers.

The contents of organic matters in the surface soils are slightly high but soil fertility is seems to be poor.

A number of boring hole with ground water is as follows;

Sample Plot	Survey period	
	in the dry season (first survey)	in the rainy season (second survey)
A	13 (43.3 %)	10 (33.3 %)
B	22 (88.0 %)	14 (56.6 %)
C	20 (74.1 %)	20 (76.9 %)
D	18 (64.3 %)	22 (78.6 %)
Total	73 (100 %)	60 (100 %)

Note: figure in parenthsis means the percentage of boring holes with groundwater in the total boring holes.

As shown in this table, a number of boring hole having groundwater in the dry season survey is found more than that of the rainy season survey. The dry season survey was made during the begining of the dry season (Dec. 1980 - Jan. 1981) and mostly paddy field had standing rice plants with shallow ponded water. While the rainy season survey was carried out during the beginng of the rainy season (Jun. & Jul. 1981) following the dry season period and most of paddy fields were before the land preparation. Therefore, it seems that the soil moisture is maintained under the transitional situation from the dry to the rainy season although there were about 300 mm of precipitation during June through July. Consequently a number of boring hole with groundwater in the rainy season is less than taht of the dry season.

A number of boring hole having groundwater found in the hoth survey was 48 holes. Figure B-8 whows the change in salinity of the groundwater collected from both surveys. 32 holes out of 48 samples have lower salinity in the dry season compared with salinity in the rainy season.

As a general tendency, groundwater collected from considerably well drained portions or parts along farm ditchs have higher salinity in the rainy season survey.

The general tendency of pH and salinity is given in Table B-8. In general, it seems that pH value of the soil samples in the rainy season is lower than that of the dry season. As learned cleary from this table, the soil reaction is affected by their parent materials of the soils. That is, the soils originated from marine deposits have the soil reaction ranging from neutral to alkaline, and acidic reaction is dominant in the soils developed on river alluvial deposit and old blackish water deposit. In the soils originated from marine deposits, the subsoils have higher pH value than that of the surface soils and pH value of surface soils is higher than that of subsoils in the case of soils originated from the river alluvium deposits. In the soils developed on the old brackish water deposits indicating below pH 6.5, soil reaction of the surface soil is higher than that of the subsoil.

On the other hand, the subsoils have a higher soil reaction than the surface soils have under the soil reaction above pH 6.5.

The general tendency of the soil salinity by the plot are given in Table B-8 and Figure B-9. The soils having salinity above 6.0 m mhos/cm are dominant in the soils originated from the marin deposits, particularly the ratio of salinity above 10 m mhos/cm is high in Plot A and B as shown as follows;

		Number of sample		Total
		in dry season (first survey)	in rainy season (second survey)	
Plot A	Surface soil	21 (70 %)	24 (80 %)	30
	Subsoil	29 (97 %)	28 (93 %)	
Plot B	Surface soil	10 (40 %)	13 (52 %)	25
	Subsoil	12 (48 %)	12 (48 %)	
Plot C	Surface soil	9 (33 %)	6 (23 %)	Dry season 27
	Subsoil	6 (22 %)	5 (19 %)	Rainy season 26
Plot D	Surface soil	3 (11 %)	2 (7 %)	28
	Subsoil	4 (14 %)	3 (11 %)	

In Plot A and D, most of the subsoils have higher salinity compared with that of the surface soils. In Plot B, about 70 percent of samples collected from the surface soils shows higher salinity than that of the subsoils and in Plot B about 48 percent of samples collected from the surface soils show higher salinity than that of the subsoils in the rainy season which only 12 percent of the dry season shows higher salinity than that of the subsoils.

The general tendency mentioned above may depend upon the situation of the soils surveyed; that is, the surface soils having higher salinity are mostly situated on slightly dried soils while the subsoils having higher salinity are mostly situated on moist and/or wet soils.

The average paddy yield per ha was estimated to be 2.16 tons in the salinity study sample plot according to the field survey. Table B-9 gives the relations between the yield and the soil pH and salinity.

47 out of the totaled 90 surveyed fields were yieled above the average yield and 37 of them are situated in the paddy field having salinity below 6.0 m mhos/cm. On the other hand, among 43 with below the average yield, 32 fields show the salinity above 6.0 m mhos/cm and among them 27 fields have the salinity above 8.0 m mhos/dm.

As regard to the relations between the paddy field and the soil reaction, 37 fields with the average yield indicate below the neutral reaction, while 20 fields have the alkaline reaction among the surveyed paddy field having below the average yield.

From these facts, a close relationship was found to exist between a soil salinity and yield of rice, and also between pH of soil and yield of rice.

B-3-4. Salt Leaching Test

The concept of the soil desalinization is based on the very simple that irrigation water shall wash the salts away to the soils below the plant root zone. The improvement of the salt-affected soils inevitable requires reliable estimate of the necessary leaching water amount which can reduce the soil salinity to the desirable level to allow plant growth.

For this purpose, the field leaching test and the initial leaching test were carried out in order to get the usefull data.

(1) Field Leaching Test

The field leaching test was performed in the paddy field of Water Use Experimental Station based on the aforementioned design of test. The progress of daily measurement is shown in Table B-10 and Figure B-10.

The results of 20 days observation by the group of installed soil depth can be summarized as follows;

1) at 20 cm depth

EC value in every leachate increases with time, and kept higher level than that of the early stage. Sampler No.13 in Plot 2, No.37 and 39 in Plot 4 and No.49 in Plot 5 have extremely high EC value which increased from the early stage.

From these facts, it can be said that leaching by preirrigation and puddling water would not be so effective at the shallow soil layer except the day after every watering. However, most of the leachate salinity is below 4.0 m mhos/cm.

2) at 40 cm depth

From the general tendency of leachate salinity through 20 days measurement, it seems that about half of samples show somewhat clear leaching effect and remaining samples increase in their EC values during 20 days.

11 out of 24 samples indicate salinity below 4.0 m mhos/cm through the observation period; however, samplers No.16, 40, 52 and 53 show higher EC values ranging from 7.1 to 11.3 m mhos/cm during the observation period.

3) at 60 cm depth

The decreasing tendency in salinity was found in most of samplers. Especially, samplers No.20 in Plot 2, No.55, 56 and 57 in Plot 5, Bi.80 in Plot 7, and No.92 and 93 in Plot 8 show considerably well leaching effect. 14 out of 24 samplers have salinity below 4.0 m mhos/cm and the samplers No.44 and 45 in Plot 4, No.56 in Plot 5, No.93 in Plot 8 show higher EC values ranging from about 9.0 to 14 m mhos/cm during the observation period.

4) at 100 cm depth

79 percent (19 samplers) of the total sampler have the salinity above 4.0 m mhos/cm and samples from sampler No.10 in Plot 1, No.22 in Plot 2, No.46, 47 and 48 in Plot 4, No.59 and 60 in Plot 5 and No.96 in Plot 8 had high salinity above 10 m mhos/cm through the observation period. In general, the leaching effect on soil is recognized, though it is not very high. Among the collected samples, a considerably clear leaching effect was found in sampler No.23, 24 and 25 in Plot 2, No.34 and 36 in Plot 3, No.47 and 48 in Plot 4, No.58, 59 and 60 in Plot 5 and NO.71 in Plot 6.

The leachates collected from sampler No.12 in Plot 1, No.35 in Plot 3, No.72 in Plot 6, and No.96 in Plot 8 show higher EC value than the initial EC value during the observation period.

EC value of leachate collected from the same sampler fluctuates day by day, however, the fluctuation inervals becomes narrow gradually in most of the cases. As the general tendency in salinity change of leachate through 60 days observation, it can be said that the leaching effect by preirrigation seems relatively clear, particularly in a day after the preirrigation as shown the decreased EC values in that day. These lowered EC values rise after a few days but their EC values are kept below the initial salinity except some cases. For example, in the samplers No.13, 29 and 49 installed at 20 cm, EC values extremely rise within a few days after the preirrigation and this tendency continues till 60 days from the preirrigation, with a little variation. They had the EC values ranging from 1.42 to 1.95 m mhos/cm at a day after preirrigation, these EC values increase with the day such as ranged from 9.84 to 11.92 m mhos/cm at 10th day, 9.71 to 10.80 m mhos /cm at 20th day, 9.73 to 11.38 at 40th day and 9.43 to 10.58 m mhos/ cm at 60th day. This variation may be due to the causes as the followings.

EC values of ground water was about 3.0 m mhos/cm at 20 cm depth of soil and also the groundwater having EC values ranging from 7.6 to 11.5 m mhos/cm was observed at 40 cm depth of soil.

When the construction of test field was commenced, this field had been plowed about 20days before the construction with soaking water and also the precipitation at the station was 187 mm in May and 111.9 mm in June. And again 100 mm of water was applied for the leaching test as the preirrigation.

Under the situation mentioned above, it seems that the downward movement of salts have been occurred, consequently salts leachated from the upper layer might be resulted in to higher salinity in the leachate of the lower layer. Such higher salinity was decreased as a passing phenomenon by the applied preirrigation water but decrease in salinity is kept in only a few days and salinity in leachate becomes more high. As the cause of this change in salinity, it seems that salinity in the given layer is decreased temporary due to salts leaching by downward movement of preirrigation water but leached salts may be mixed with existing considerably high saline groundwater. Consequently the salinity becomes higher with a high water table.

The points with high leachate salinity in 20 cm depth are situated in the slightly high parts formed by uneven land preparation, Consequently, salts accumulation on these points might be accelrated and leached salts from these parts might be added to the temporary decteased leachate salinitv, resulted in higher salinity.

In general, the soil salinity (ECe) is lower than the leachate salinity. The initial soil salinity at each layer is as follows;

Depth of soil	Initial salinity	after 10 days
0 - 20 cm.	1.1 - 5.0	1.0 - 3.4
20 - 40 cm.	1.4 - 5.5	1.4 - 5.0
40 - 60 cm.	1.3 - 4.5	1.0 - 5.1

60 - 80 cm.	1.4 - 5.9	1.3 - 5.8
80 - 100 cm.	1.2 - 5.9	1.2 - 6.0

In generaly, leaching effect is recognized at the surface layer (0 - 40 cm) from the above table. Below 40 cm depth of soil, the leacing effect is observed in some of the soils; on the other hand, soluble sodium and chloride are slightly increased, Consequently the increased EC value is observed. The EC value below 40 cm depth of the soils indicates less leaching effect than above 40 cm of the soil depth.

Table B-11 gives soil analysis data before testing and 10 days after the beginning of the test, and also Figure B-11 shows the initial concentration of soluble salts and concentration of soluble salts after 10 days leaching. The general tendency of the downward movement of salts shows that a marked decrease appears in the upper layer. Sodium and chloride ions are dominant followed by magnesium, calcium and sulphate ions. Sodium and chloride ions are readily leached out from the surface layer, while magnesium, calcium and sulphate remained in the surface layer without a marked decrease.

As shown in Table B-12, salinity of leachate collected from samplers installed at 0 - 40 cm depth was gradually increased except some cases during the 20 days observation while the soil salinity indicated a decreasing tendency in the same layer. In the soil below 40 cm depth, the EC value in leachate shows a decreasing tendency but the soil salinity seems to have an increasing tendency and the content of clay particle is high in these soil profiles. Sodium and chloride ions are dominant in leachate followed by sulphate, dicarbonates, calcium and magnesium. The observation on soil moisture indicated that these soils seem to have a low water conductivity.

The difference in leachate salinity after preirrigation and application of puddling water are illustrated in Figure B-12.

These figures are based on the measurement result of leachates collected from following samplers.

Plot No.	soil depth and sampler number			
	20 cm.	40 cm.	60 cm.	100 cm.
1	2	5	7	10
2	13	16	20	23
3	26	29	33	36
4	39	42	44	47
5	49	52	56	59
6	61	64	68	71
7	75	78	80	83
8	87	90	92	95

Figure B-11 reveals that the interval between a line of the initial salinity (before the preirrigation) and a dotted line (the following day of preirrigation), and also the interval between a dotted line of 14th day and a dotted line of 16th day look like the leaching effect by watering. From the difference in both intervals, leaching by puddling water seems to be less effectiveness than leaching by preirrigation. From these results, it seems that the preirrigation effects on the decrease in soil salinity though this effect is decreased with time. However, this decrease in salinity may be continued when drainage system is provided. Most of the examples shown in Figure B-11 indicate that watering effect on salt leaching is more effective in the lower layer than the upper layer.

(2) Initial leaching test

Initial leaching test was made in order to get an available data about the leaching practices by the preirrigation. Four(4) test sites were selected for this test, and there are the upland field in Water Use Experimental Station, and the paddy field in Salinity Study Sample Plot A, B and C. The progress of water pouring and

sampling are shown in Table B-14. As indicated in Table B-14, the leaching water purred in cylinders of L-III did not infiltrated owing to their high ground water table (33 to 38 cm from the ground surface), consequently the test at this site was abandoned.

Following Table shows the change in soil salinity (ECe) in relation to the amount of leaching water over different soil depths. From the actual soil salinity (ECe) and the initial soil salinity (EC eo) shown in this table, the leaching efficiency varies with the location of test site and also with the cylinder. There are the soils having the less ECe values than their initial ECe value, while, the soils having more ECe value than their initial ECeo value, are found.

Location	Depth(cm.)	initial ECex10^3	amount of water applied 150 mm. 1*	2	300 mm. 3	4	450 mm. 5	6
	0 - 20	20	9**	13	6.2	18	4.8	9
L - I	20 - 40	4.8	4.8	9.8	4.6	12	4.1	6
Water Use Experiment	40 - 60	4.1	3.8	6.0	4.0	9.2	4.0	6.4
Station	60 - 80	4.2	3.3	4.4	2.5	6.9	2.9	8.0
	80 - 100	3.4	1.9	4.6	2.2	5.6	2.6	4.7
	0 - 20	21	22	19	12	18	11	-
L - II	20 - 40	20	19	22	14	20	19	-
Salinity Study	40 - 60	19	22	22	20	20	19	-
Sample Plot B	60 - 80	22	20	25	20	24	22	-
	80 - 100	24	24	24	23	26	22	-
	0 - 20	27	29	29	25	32	19	22
L - IV	20 - 40	22	24	26	23	22	19	18
Salinity Study	40 - 60	22	26	28	24	25	18	18
Sample Plot C	60 - 80	16	23	22	20	20	15	13
	80 - 100	17	22	21	17	19	12	12

Remark: * mark means cylinder number.

** ECe x 10^3 after leaching

As shown in the table, a marked decrease in soil salinity is found in 0 - 20 cm of soil depth at L-I test site. This site has been used for upland field. The surface soil had a soil salinity ranging from 2.8 to 4.9 m mhos/cm in 1979 (refer to Table B-15); however, the initial soil salinity is 20 m mhos/cm in 0 - 20 cm depth and 4.8 m mhos/cm in 20 - 40 cm depth. From these figures, it is clear that salts have been accumulated in the top soils during the dry season. A marked decrease in soil salinity in L-I site may result from their rapid initial infiltration velocity ($I = 695\ T^{-0.39}$) and the basic intake rate is 83 mm/hr. The site of L-II and L-IV are situated on fallow land during the dry season consequently the ground surface was covered with hard crust and also many cracks were developed. Initial infiltration velocity of L-II and L-IV was $I = 120\ T^{-0.74}$ and $I = 91\ T^{-0.69}$, and also basic intake rate was 1.3 mm/hr and 1.4 mm/hr, respectively. From these physical conditions and soil salinity after leaching, it seems that the majority of the first pouring water (150 mm depth of water) passed through the existing cracks without remakable leaching effect and leaching effect appeared at the time of the second and third watering.

With regard to soluble cations and anions in the soil after leaching, sodium and chloride concentration decrease in the surface soil (0 - 40 cm) but slightly increase with depth in general. From a decrease in ECe value, and sodium and chloride concentration, it seems that the effect of initial leaching in the surface soil is recognized but insufficient to leach out the excess salts.

There is not large change in soil moisture of subsoil by differently applied water depth, from this point it seems that lateral flow occurred by applied water is larger than vertical flow. This may be one of the reason that the leaching effect is larger in the surface soil.

B-4. Salt Problem

Figure 4, 5 & 6 shows the distribution of the soils having the soil salinity classified by the following grades; 1) below 4.0 m mhos/cm

2) 4.0-6.0 m mhos/cm 3) 6.0-8.0 m mhos/cm 4) above 8.0 m mhos/cm according to the salinity survey by RID 1975. As shown in this Figure, the surface soils (0 - 30 cm of depth) having more than 6.0 m mhos/cm are mainly found in the eastern boundary and northern parts of the existing irrigation area, except scattered spots in the inland area.

The soils having more than 6.0 m mhos/cm are mainly found in the area of the tidal flat developed in marine deposits and the former tidal flat developed on old brackish water deposits. On the other hand, most of the soils below 6.0 m mhos/cm are found in the area of semirecent terrace originated from river alluvium. From these evidences, it seems that the soil salinity is strongly affected by the parent materials concerned.

The soils originated from marine deposits are considered to have high salinity potentiality, that is, Samut Prakan, Tha Chin, Rangsit and Bangkok series occupy about 46,500 ha (62.3 percent) in total out of 74,000 ha of the Project Area. Among them, Samut Prakan soils (25,700 ha) is widely distributed in the area from the eastern coastal part to the northern part and the area between Samut Prakan area and the coastal area is occupied by Tha Chin soil (6,800 ha).

Tha Chin soil and the narrow strip of Samut Prakan soil area adjoining to Tha Chin soil are classified as unsuitable for paddy field due to the limitations of high salinity and occasional flooding according to the criteria of the land classification by RID. The land covering by these soils seems to be difficult to adapt a drastic measurement for land improvement.

The salinity surveyed by RID can be summarized as follows;

ECe x 10^3	Soil depth (cm.) 0 - 30	30 - 60	150 - 200
<4 m mhos/cm	304(58.7%)	288(55.6%)	197(38.0%)
4-6 "	65(12.5%)	69(13.3%)	29(5.6%)
6-8 "	40(7.7%)	44(8.5%)	33(6.4%)
8 m mhos/cm<	109(21.1%)	117(22.6%)	259(50.0%)
Total	518(100%)	518(100%)	518(100%)

With regard to the surface soils, about 59 percent of total surveyed soils, seems to be non-saline soils and the remaining 41 percent may be saline soils or saline-alkaline soils. On the other hand, about 62 percent of the subsoils seems to be the saline and alkaline soils. Especially, the soils having ESP above 15 percent are found in the soils above 8.0 m mhos/cm consequently occurrance of saline-alkaline soils in these soils is clear.

From the tendency of salts contents in the profile, the soils can be roughly grouped into the soils which show clear tendency of salt accumulation at the upper layer and those which has a declining tendency in salt accumulation at the upper layer as shown in followings.

salinity EC x 10^3	Profile showing clear tendency in salts accumulation at the surface layer		Profile showing a declining tendency in salts accumulation at the surface layer	
	surface soil	subsoil	surface soil	subsoil
8 m mhos<	109	99	0	162
6-8 m mhos	11	10	29	21
4-6 "	20	10	45	19
<4 "	0	21	304	176
Total	140	140	378	378

A clear tendency in salt accumulation at the upper layer is found in 140 profiles and such high salt accumulation seems to coincide with the high salinity in their lower layers. While 378 profiles show a declining tendency in salt accumulation at the upper layer and these profiles seem to have less influence from salts retained in the lower layer. This difference in tendency of salts accumulation seems to depend upon the soil texture and the drainage conditions, and also the parent materials.

Under the climate prevailing in the Project Area for such a long and distinct dry season and a rainy season with relatively less rainfall, the salinization of the soils takes place very quickly if saline groundwater is present at shallow depth. During the field survey scattered idle lands were found even in paddy field area due to the salinity of the soils and lack of water. Where rice plants are planted, they are discernible by stunting or poor growth of rice plants and scattered barren spots. These salt affected spots may be relatively high microrelief enough so that their water supply is depleted earlier than the surrounding portions and their surface is exposed for significantly longer period. Consequently, the salts accumulation on the surface soils occur as a result of evaporation and upward movement of salts-bearing groundwater.

As mentioned before, the areas located on active tidal flat and former tidal flat have saline groundwater at relatively shallow depth. The groundwater is in: direct contact with the salt formation or other salt-bearing strata, and is in capillary contact with the land surface whenever it is not irrigated. In these areas, mainly used for paddy field, seasonal and/or spotted salinity occur on the field surface as a result of the above mentioned causes. When these fields are left in fallow and no irrigation water is applied during the dry season.

The principal pattern of salinization in the Project Area seems to be as follows;

1) the sea water and brackish water influence directly and/or indirectly resulting in salinization of soils, and

2) the salinization results from the migration and deposition of salts during the process of soil formation.

Besides above mentioned salinization itself, it seems that secondaly salinization have been started on some upland fields with the introduction of irrigated agriculture without adequate drainage systems and as a result of a raising the groundwater above the minimum level. These factors seem to contribute to soil salinization by independent cause and/or complex causes.

It is said that the excess soluble salts can be easily leached out from the soil. However, due to lack of proper drainage coupled with fallow during the dry season, resalinization usually takes place in the upper layer of paddy field. Therefore, the fallow during the dry season is not recommendable as a general rule. Even in the present water situation, the soil should not be left in fallow from the point of desalinization for salt-affected soils. According to the results of leaching test, it would be said that when the surface soil was tilled, it is easy to leach soluble salts out of the surface soil. Therefore, when the fallow can not be avoided due to shortage of water during the dry season, the surface soil should be tilled after the harvest of paddy. And before the land preparation for the rainy season paddy, water should be ponded to flush out the salts accumulated on the surface soil through adequate surface drainage system. Applied water is expected to result in displacement of salts initially in the soils below the shallow root zone of paddy plants. Salts that might move upward into the surface soil during the dry season, would again be displaced below the root zone by preirrigation, puddling water and following irrigation water. Through these processes, soluble salts are expected to be maintained at low levels and these would be no significant reduction of rice yield.

The extensive surface drainage system that is planned with project

development will result in improved surface drainage to a limited depth, espesially in the vicinity of the canals, as well as enabling efficient removal of surface water. Also, the planned land development will allowing efficient water distribution and application. All of these factors plus the increased availability of water for displacement are expected to improve a large parts of the presently salt-affected lands.

Table B-1 Number of Leachate Sampler

Block No.	Plot No.	A: 20 cm depth	B: 40 cm depth	C: 60 cm depth	D: 100 cm depth
I	1	1	4	7	10
		2	5	8	11
		3	6	9	12
(150 mm)	2	13	16	19	22
		14	17	20	23
		15	18	21	24
II 1)	3	25	28	31	34
		26	29	32	35
		27	30	33	36
(200 mm-A)	4	37	40	43	46
		38	41	44	47
		39	42	45	48
III 2)	5	49	52	55	58
		50	53	56	59
		51	54	57	60
(200 mm-B)	6	61	64	67	70
		62	65	68	71
		63	66	69	72
IV	7	73	76	79	82
		74	77	80	83
		75	78	81	84
(250 mm)	8	85	88	91	94
		86	89	92	95
		87	90	93	96

Note: 1) Block II (200 mm-A); Block to be supplied 200 mm depth of water at the day of puddling.

2) Block II (200 mm-B): Block to be supplied 200 mm depth of water within two days, previous day of puddling and the puddling day.

Table B-2 Existing Soil Series in Surveyed Area

Soil Series No.	Soil Series Name	Occupied Area in Surveyed Area	Occupied %	Suitability Sub-group for Paddy	Capability Subclass for Upland Crops
1.	Hua Hin (Hh)	2,350	3.17	IV	IV
2.	Hua Hin, Acid (Hh-a)	110	0.15	IV	IV
3.	Samut Prakan (Sm)	25,710	34.75	III x f	IIIsdx
5.	Tha Chin (Tc)	6,800	9.19	IV	IV
6.	Bangkok (BK)	5,250	7.09	I	IIIsd
7.	Rangsit (RS)	6,310	8.53	IIs	IIsx
8.	Chon Buri (Cb)	450	0.61	IIsp	IIIs
9.	Sattahip (Sh)	490	0.66	IIIsp	IIIs
10.	Nong Kae (NK)	50	0.07	IIIsp	IV
12.	Chai Nat (CN)	1,520	2.05	I	IIdf
13.	Phetchaburi (Pb)	12,000	16.21	IIp	I
14.	Nakon Pathom (Np)	250	0.34	IIIpt	IIIdx
15.	Kamphaeng Saen (Ks)	8,950	12.09	IIIpt	IIf(x)
16.	Rachaburi (Rb)	220	0.30	I	IIIsdf
17.	Sanphaya (Sa)	1,650	2.23	IIp	IIf
18.	The Muang (Tm)	890	1.20	IIIpt	IIv
28.	Hup Kapong (Hg)	270	0.37	IIIsp	IIs
34.	Slope Complex (Sc)	730	0.99	IV	IV
	Total	74,000 ha	100%		

Limiting Factors for Land Use (by Phetchaburi Project IRD 1977)

Land Suitability for Paddy

I	Good land, no limitation
II	Moderately good land, some limitations
IIp	with moisture limitations
IIs	with soil limitations
IIsp	with soil and moisture limitations
III	Marginal land, severe limitations
IIIs	with soil limitations
IIIsp	with soil and moisture limitations
IIIpt	with moisture and topographic limitations
III(pt)	with topographicand/or moisture limitations
IIIxf	with salinity and flooding limitations
IV	Unsuitable land
(IV)	Unsuitable land, unless reclaimed

Land Suitability for Upland Crops

I	Good land, no limitations
II	Moderately good land, some limitations
IIt	with topographic limitations
IIx	with salinity limitations
IIf	with flooding limitations
IId	with drainage limitations
IIs	with soil limitations
IIfx	with topographic and salinity limitations
IIfx	with flooding and salinity limitations
IIdx	with drainage and salinity limitations
IIsx	with soil and salinity limitations
IIdf	with drainage and flooding limitations
III	Marginal land, severe limitations
IIIs	with soil limitations
IIIsd	with soil and drainage limitations
IIIsx	with soil and salinity limitations
IIIsdx	with soil, drainage and salinity limitations
IIIsdf	with soil, drainage and flooding limitations
IIIsdfx	with soil, drainage, flooding and salinity limitations
IV	Unsuitable land

Table B-3 Summary of Field Survey

Boring No.	Soil 0 - 30 (cm)	Texture 30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	0 - 30 cm EC x 10^3	30 - 60 cm pH	30 - 60 cm EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	Surface Water pH	Ground Water EC x 10^3	Ground Water pH	Land Use
Extension Area												
1	SIC/C	C	7.2	2.3*	7.3	5.3*		8.65	8.5			Idle land (grass)
2	SIC/C	C	7.2	3.4	7.4	3.3		1.87	7.3			P.F.
3	SIC/C	C	7.9	1.5*	7.5	3.0*		4.02	7.7			Salt field
4	SIC/C	C	7.1	2.6*	7.2	1.7*		3.02	7.4			P.F.
5	SIC/C	C	6.0	5.5	6.4	7.0		1.14	7.1			P.F.
6	SIC	SIC	7.8	7.5**	7.9	9.0**		17.39	8.2			Salt field
7	C	C	7.4	2.1*	7.7	3.2*		1.19	7.6			Idle land (weed)
8	SIC	SIC	7.7	2.8*	7.7	3.1**		2.82	8.0			Salt field
9	C	C	7.5	2.4*	7.7	3.5*		1.08	7.4			P.F.
10	C	C	7.3	0.9*	7.7	2.2*		0.95	7.4			P.F.
11	C	C	7.6	1.1*	7.8	1.7*		2.08	7.7			P.F.
12	SIC/C	C	7.6	2.5*	7.7	4.8*		8.13	7.4			Idle land (weed)
13	SIC	SIC	7.5	6.5**	7.6	9.0**		38.04	8.8			Salt field
14	C	C	7.5	1.6*	7.6	2.4*		3.36	8.6			P.F.
15	SIC	SIC	7.6	3.6*	7.7	5.0*		5.79	8.3			Idle land (grass)
16	SIC/C	C	5.9	2.6	6.3	1.6		0.92	7.4			P.F.
17	C	C	7.3	2.1*	7.4	4.2*		-	-			P.F.
18	C	C	7.5	4.7*	7.6	4.8**		4.02	8.2			Idle land (weed)
19	C	C	7.6	2.7*	7.7	3.7*		0.93	7.7			P.F.
20	C	C	7.3	1.8*	7.4	3.5*		2.17	7.5			P.F.
21	C	C	7.3	6.0**	7.6	6.3**		5.54	8.3			Old salt field
22	C	C	7.1	3.3	7.1	6.0		0.69	7.4			P.F.
23	C	C	7.1	5.8	7.3	1.0		0.97	7.1			P.F.
24	SIC/C	C	7.0	1.8	7.7	1.7		0.43	7.2			P.F.
25	C	C	7.2	5.5*	7.3	4.6**		5.76	8.4			Idle land (weed)
26	C	C	7.3	1.8	7.3	2.8*		5.21	7.8			P.F.
27	C	C	7.1	5.0	7.5	5.7		1.15	7.2			P.F.
28	C	C	7.3	2.3*	7.2	1.3*		-	-			P.F.
29	C	C	7.3	2.1*	7.3	3.7*		2.82	7.4			P.F.
30	SIC/C	C	6.5	1.0*	6.7	1.5*		0.51	7.0			P.F.
31	SIC/C	C	7.2	6.0	7.3	1.1*		1.20	7.4			P.F.
32	C	C	7.3	5.0*	7.1	6.5*		25.48	8.4			Idle land (weed)
33	SIC	C	7.2	1.4*	7.3	2.4*		5.40	7.6			P.F.
34	SIC/C	C	6.7	1.2*	7.3	1.4*		2.05	7.5			P.F.
35	C	C	7.2	0.92*	7.6	1.4*		0.80	7.8			P.F.
36	C	SIC	7.5	2.4*	7.6	4.7*		2.66	7.8			P.F.
37	C	C	7.6	1.4*	7.6	2.5*		0.79	7.5			P.F.
38	C	C	7.4	2.1*	7.3	6.7*		2.03	7.8			Idle land (grass
39	SIC	C	7.5	6.5	7.8	1.0*		1.04	7.0			P.F.
40	C	C	7.7	3.6**	7.9	5.0**	30	-	-	120.0	7.0	Idle land (weed
41	SIC/C	C	7.5	4.5	8.0	6.0		0.39	6.9			P.F.
42	C	C	7.1	5.2	7.2	5.2		0.92	7.2			P.F.
43	SIC/C	C	8.0	1.7*	8.2	1.6*		39.84	7.9			P.F.
44	SL	LS	8.7	1.5	8.8	0.95*	48			3.88	7.7	Coconut field
45	SCL	C	7.4	0.95*	8.1	1.1*		1.05	8.0			P.F.
46	C	C	7.4	5.1	8.0	1.1*		2.29	7.9			P.F.
47	SIC/C	C	7.4	1.4*	7.7	2.0*	120	-	-	50.0	7.2	P.F.
48	SC	C	7.1	3.8**	7.2	5.0**		9.25	9.0	55.42	7.6	Idle land (gras
49	SIC/C	C	7.5	1.4*	7.5	1.9*		3.55	8.4			P.F.
50	C	C	7.5	2.3*	7.9	1.9*	65			18.25	7.4	P.F.
51	SC/C	C	8.6	1.4*	8.6	1.5*	90	1.60	7.9	33 89	7.8	Shrub
52	C	C	7.1	4.4**	7.9	5.0**	50			142.3	7.3	Idle land (gras
53	C	C	6.8	2.6	7.5	1.2		0.96	8.0			P.F.
54	C	C	5.4	0.82	7.5	1.2		0.20	7.1			Idle land (weed
55	C	C	6.7	3.4	6.9	5.5	120			32.33	7.5	P.F.
56	C	C	7.1	1.4*	7.7	2.5*		5.50	7.8			P.F.
57	SC/SL	SL/LS	8.1	4.6**	8.6	4.3**	20			27.08	7.3	Shrub
58	C	C	5.8	2.2	6.7	3.6		8.65	8.5			P.F.
59	C	C	7.1	2.4*	7.9	2.2*	50			36.5	7.3	P.F.
60	C	C	7.5	5.2	7.9	1.0*		4.17	7.7			P.F.
61	SIC/C	C	6.5	2.1	6.9	2.1		0.58	7.8			P.F.
62	SIC/C	C	7.3	1.1*	7.6	1.8*	140			24.47	7.2	P.F.
63	C	C	7.2	2.2	8.0	1.6	120	0.81	6.0			P.F.
64	C	C	7.2	6 0	7.9	1.2*	50	6.01	8.0	8.23	7.1	P.F.
65	C	C	6.1	1.2*	6.2	1.6		2.82	8.5			P.F.
66	SICL	C	5.4	3.8*	6.4	2.6*	55	2.64	7.3	37.24	7.0	Shrub
67	C	C	5.3	4.0	5.1	5.0		1.80	7.1			P.F.
68	C	C	6.4	2.8	6.3	1.8		0.17	6.9			P.F.
69	C	C	5.8	2.8	6.0	5.1		0.66	7.6			P.F.
70	C	C	5.9	1.0*	6.1	1.4*	100	1.69	7.8	33.37	6.8	P.F.
71	C	C	5.3	1.4*	7.7	1.9*		-	-			Cactus, Shrub
72	C	C	6.8	1.1*	7.1	1.5*	50	2.10	7.4	33.66	7.4	P.F.
73	C	C	6.2	2.0	6.7	4.3		0.24	6.9			P.F.
74	CL	C	5.5	1.4*	5.5	2.5*		-	-			Cactus, Shrub
75	C	C	5.2	6.0	4.8	1.1*	130	0.28	7.4	18.8	3.6	P.F.

Cont'd

Boring No.	Soil Texture 0 - 30 (cm)	30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	EC x 10^3	30 - 60 cm pH	EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	Surface Water pH	Ground Water EC x 10^3	Ground Water pH	Land Use
Extension Area (cont'd.)												
76	C	C	4.9	1.0*	4.9	1.0*		3.01	6.8			Idle land (grass)
77	C	C	6.7	1.8	8.0	2.2		0.32	8.8			P.F.
78	CL/C	C	6.3	1.0	5.9	2.2		-	-			Cactus, Shrub
79	SIC/C	C	5.1	2.6	4.7	4.2		0.27	7.1			P.F.
80	C	C	4.4	1.5*	4.2	1.5*		8.67	7.2			P.F. + S.P.
81	SICL/C	C/FSCL	7.3	1.5*	7.8	2.9*	60	-	-	20.40	7.2	P.F. + Shrub
82	SIC/C	C	4.7	2.4	4.6	2.1		0.12	6.9			P.F.
83	C	C	6.7	3.7	5.8	4.1		1.22	7.2			P.F.
84	C	C	5.5	3.7	4.6	3.6		2.34	7.4			P.F.
85	C	C	4.1	1.6*	3.8	1.4*		-				Shrub
86	SL	SL	7.7	0.85	7.9	1.0		-				U.P.
87	C	C	3.8	2.8*	3.8	1.6*		-				Cactus, Shrub
88	SIC/C	C	5.5	3.2	4.0	3.8		2.34	7.3			P.F.
89	SIC/C	C	4.6	0.95**	4.5	1.1*		6.04	7.1			P.F.
90	C	C	4.8	1.7*	4.4	2.3*		9.90	6.7			P.F.
91	SL	SL	6.2	0.50	6.3	0.30		0.40	7.5			U.P.
92	C	C	4.1	4.1	4.0	4.3		1.01	7.3			P.F.
93	C	C	4.7	6.5	4.3	6.1		-				Bush tree
94	SL	SL	7.2	1.5	7.5	0.90		-				U.P.
95	SIC/C	C	4.7	3.4	4.3	5.0		0.43	7.6			P.F.
96	SIC/C	C	4.8	1.6*	4.5	1.8*		2.81	7.2			P.F.
Sample Area No. 1												
1	C	C	6.3	1.3	7.5	1.8	62	-	-			P.F.
2	C	C	5.7	0.95	5.3	0.42		0.42	7.4			P.F.
3	CL/C	C	6.4	1.5	7.2	2.8						P.F.
4	C	C	6.6	2.5	5.8	2.2						Orchard
5	SIC/C	C	6.0	0.65	5.6	0.30	100			0.42	6.1	P.F.
6	C	C	7.1	0.50	7.6	0.45	70					P.F.
7	C	C	6.1	0.72	5.9	0.32	90			0.21	5.8	P.F.
8	CL/C	C	6.2	0.60	5.5	0.32	150					P.F.
9	CL/C	C	6.7	5.5	4.7	5.0						Orchard
10	C	C	7.0	0.60	7.3	0.70	90			0.54	6.9	P.F.
11	C	C	7.4	0.75	7.2	0.52	90					P.F.
12	SIC/C	C	5.5	0.37	5.3	0.40	50			0.18	5.2	P.F.
13	C	C	5.4	0.98	5.2	0.40	100			0.44	5.2	P.F.
14	C	C	5.9	0.70	5.2	0.38	100			0.24	5.2	P.F.
15	C	C	7.3	0.78	6.9	0.50	120			0.30	5.8	P.F.
16	SIC	C	6.6	0.52	6.6	0.42	70					P.F.
17	SIC/C	C	6.2	0.95	6.3	0.62	60			0.49	6.3	P.F.
18	SICL/C	C	6.3	0.45	6.7	0.40	90			0.54	6.9	P.F.
19	C	C	6.1	0.50	6.2	0.50	90			0.21	5.9	P.F.
20	C	C	5.7	0.60	5.5	0.40	90			0.14	5.7	P.F.
21	C	C	6.2	0.70	6.7	0.57	80			0.58	6.8	P.F.
22	SIC	SIC/C	5.7	0.40	5.7	0.25	90			0.33	6.2	Orchard
23	SIC/C	C	6.3	0.65	5.7	0.44	60			0.30	6.0	P.F.
24	SIC/C	C	6.4	0.65	5.9	0.45	90			0.29	6.4	P.F.
25	SIC/C	C	6.9	0.70	7.2	0.46	90			0.76	6.9	P.F.
26	SIC/C	C	6.8	0.60	7.1	0.45	90			0.69	6.9	P.F.
27	C	C	5.7	-	5.2	0.55	90					P.F.
28	SIC/C	C	5.8	0.70	6.8	1.20	90			0.83	6.9	P.F.
29	SIC/C	C	6.1	0.50	5.2	0.40	80			0.14	5.8	P.F.
30	C	C	6.6	0.40	6.7	0.58	30			0.37	6.6	P.F.
31	C	C	6.4	1.00	6.3	0.33	60			0.33	6.2	P.F.
32	C	C	6.7	1.1	6.9	0.70	60			1.10	6.8	P.F.
33	SIC/C	C	5.8	0.85	6.2	0.65	80			0.71	6.6	P.F.
34	SIC/C	C	5.7	1.1	5.5	0.25	80			0.18	5.8	P.F.
35	SIC/C	C	5.3	0.40	5.2	0.23	90			0.15	5.8	P.F.
36	SIC/C	C	5.9	0.52	5.7	0.40	120	0.53	5.9	-	-	P.F.
37	SIC/C	C	5.9	0.65	5.2	0.50	90			0.25	5.6	P.F.
38	C	C	5.7	0.35	5.3	0.25	120			0.95	5.7	P.F.
39	C	C	7.6	0.65	7.9	0.60	90			0.67	7.2	P.F.
40	SIC/C	C	5.4	0.90	5.1	1.3						P.F.
41	SIC/C	C	5.7	0.50	5.4	0.42	90			0.47	5.3	P.F.
42	SIC/C	C	6.1	0.45	6.3	0.30	80			0.24	6.1	P.F.
43	SIC	C	6.3	0.35	6.2	0.30	30			0.30	6.2	P.F.
44	SIC	C	5.9	0.25	6.1	0.25	80			0.10	5.5	Orchard
45	SIC/C	C/SIC	6.4	0.34	5.7	0.81	100			0.11	5.9	P.F.
46	SIC/C	C	5.6	0.40	5.3	0.30	50			0.11	5.4	P.F.
47	C	C	5.4	1.5	5.5	1.8	145			3.75	6.9	P.F.
48	C	C	5.7	0.70	5.5	0.38	70			0.76	5.6	P.F.
49	SIC/C	C	5.2	0.37	5.3	0.50	100			0.27	5.5	P.F.
50	SIC/C	C	5.6	0.45	5.8	0.32		0.14	6.8	-	-	P.F.
51	C	C	5.2	0.45	5.4	0.70		0.16	6.9	-	-	Orchard
52	SIC/C	C/CL	5.4	0.55	5.2	0.35	100	0.42	6.6	0.34	5.4	Orchard

Cont'd

Boring No.	Soil . Texture 0 - 30 (cm)	30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	EC x 10^3	30 - 60 cm pH	EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	pH	Ground Water EC x 10^3	pH	Land Use
Sample Area No. 2												
1	SIC/C	C	7.8	1.3	7.7	1.2		1.28	7.6			P.F.
2	C	C/SL	7.6	1.8*	7.7	2.0*		4.99	8.0			Orchard
3	C	C	7.7	4.9*	8.0	2.0*	100	0.67	8.0	31.11	7.3	P.F.
4	SIC/C	C	7.6	3.3	8.0	5.0	120			27.03	7.2	P.F.
5	C	C	7.2	1.8*	7.2	1.7*	120	2.39	7.8	27.03	6.9	P.F.
6	SIC/C	C	6.7	3.0	8.0	3.0	120	1.00	7.2	7.82	7.4	P.F.
7	C	C	7.7	1.9*	8.0	2.2*	100			32.13	7.1	P.F.
8	SIC/C	C	7.5	2.4*	8.1	2.4*	100			32.64	7.1	P.F.
9	SIC	C	7.4	5.8	7.8	5.3		1.56	7.7			P.F.
10	SIC/C	C	7.2	2.7	8.0	3.7		0.75	7.5			P.F.
11	SIC/C	C	7.4	5.3	7.7	5.8		1.63	8.2			P.F.
12	SIC/C	C	7.3	3.8	7.4	4.9		1.25	7.4			P.F.
13	SIC/C	C	7.2	1.3*	7.5	6.9		0.55	7.4			P.F.
14	C	C	6.9	1.6*	7.1	1.7*		3.16	8.0			P.F.
15	C	C	7.5	2.4*	7.8	1.9*	110			25.50	7.2	P.F.
16	C	C	7.2	1.2*	7.8	2.0*	80			36.44	7.2	P.F.
17	SL	SC/C	5.9	2.6	7.1	3.0	120			8.77	7.5	Waste land
18	C	C	7.1	4.5*	7.5	4.3*	140			64.14	7.2	Waste land
19	C	C	7.2	2.4	8.3	3.2	120			23.98	7.4	P.F.
20	C	C	7.7	1.2*	7.9	1.4*	80			34.00	7.2	P.F.
21	SL	SL	4.9	6.3	5.0	4.3						Orchard
22	SIL	SCL	6.9	1.0	6.4	0.90		0.29	7.2			P.F.
23	SIC/C	C	7.1	2.5	7.7	2.3		0.40	7.6			P.F.
24	SIC	C	7.3	2.5	7.4	3.1		1.66	7.8			P.F.
25	SIC/C	C	7.8	6.4	7.6	3.1	120	1.37	8.0	24.99	7.1	P.F.
26	C	C	6.9	2.8	7.3	3.3		0.87	7.6			P.F.
27	SIC	C	7.4	1.8*	7.7	2.5*		3.02	7.9			P.F.
28												
29	SIC	C	7.1	4.8	7.3	4.9		0.44	7.2			P.F.
30	SIC	C	7.0	3.0	7.1	4.0		0.58	7.2			P.F.
31	C	C	7.2	4.4*	7.5	4.0*	120			42.24	7.2	P.F.
32	C	C	7.1	1.1*	7.7	1.6*	120			41.19	7.2	P.F.
33	C	C	7.8	3.8	8.4	6.0	90			23.46	7.5	P.F.
34	C	C	7.4	1.6*	7.6	2.1*	110			45.00	7.0	P.F.
35	C	C	7.0	4.5	7.3	6.8	120			25.50	7.2	P.F.
36	C	C	7.4	2.6	8.2	3.4	110			39.78	7.2	P.F.
37	C	C	7.0	1.0*	7.3	1.4*		6.73	8.5			Waste land
38	FSC/SC	SC/C	7.8	5.6*	8.2	2.4*	80			45.75	7.2	Waste land
39	C	C	7.7	1.1*	8.3	3.1	100			4.79	7.5	U.P.
40	SIC/C	C	6.9	1.4	8.3	1.6	90			1.98	7.6	P.F.
41	C	C	7.5	5.4	8.0	1.3*	100	0.35	7.4	43.80	7.1	P.F.
42	SIC	C	7.2	6.9	7.0	1.4*		0.69	7.4			P.F.
43	C	C	7.2	1.5*	7.7	2.3*	120			42.00	7.1	P.F.
44	C	C	7.0	3.1*	7.9	2.3*	120			40.00	7.1	P.F.
45	C	C	7.1	6.3	7.7	6.3		0.89	7.4			P.F.
46	C	C	6.9	3.3	6.7	3.1		0.69	6.9			Low land
47	SIC/C	C	7.2	1.8	7.3	2.6		0.25	6.7			Low land
48	SIC	C	6.7	5.5	7.4	1.2*		1.90	7.2			P.F.
49	C	C	7.5	1.0*	8.0	1.2*		2.59	8.3			P.F.
50	C	C	7.3	6.4	7.9	6.8	110			20.40	7.4	P.F.
51	C	C	7.5	3.1	8.1	3.5	120			22.18	7.4	P.F.
52	C	C	7.6	6.4	8.1	1.5*	120			41.05	7.2	P.F.
53	C	C	7.8	2.6	8.2	2.9		1.17	7.8			P.F.
54	C	C	7.4	0.95*	8.0	1.7*	120			44.64	7.1	P.F.
55	C	C	6.4	5.1	6.8	6.3	150			26.88	7.2	P.F.
56	C	C	8.4	5.6	8.5	4.5	80			29.28	7.2	P.F.
57	C	C	7.6	4.1	8.1	4.4	120			19.81	7.5	P.F.
58	SIC	C	7.1	0.80	8.4	0.92	140	0.77	7.1	2.97	7.6	P.F.
59	C	C	7.6	2.6	7.6	2.4	120	0.58	7.6	4.50	7.6	P.F.
60	SIC/C	C	6.2	5.2	7.0	1.1*	120	0.57	7.4	38.00	7.0	P.F.
61	C	C	6.5	4.8	6.2	6.5		0.67	7.2			P.F.
62	C	C	6.4	5.5	7.5	1.1*	120			30.60	7.2	P.F.
63	SIC/C	C	7.4	3.7	7.7	3.8		0.78	6.9			Low land
64	C	C	6.2	4.0	6.3	3.7		1.02	6.7			Low land
65	SIC/C	C	6.7	4.4	8.0	5.5		0.32	7.0			P.F.
66	C	C	7.3	4.3	7.7	3.5		0.50	6.9			Low land
67	C	C	7.2	1.7	7.5	1.7		0.44	6.7			P.F.
68	C	C	6.8	5.0	6.9	5.0	140	0.55	7.0	26.50	7.1	P.F.
69	SIC/C	C	6.8	3.5	7.2	5.3	100			17.59	7.3	P.F.
70	SIC/C	C	6.2	2.4	7.5	1.3		0.74	6.9			Low land
71												
72	SIC/C	C	8.1	0.90	8.3	0.80		0.22	6.6			Low land
73	SIC/C	C	7.9	5.0	8.2	4.6		1.98	7.0			Low land
74	C	C	6.5	3.5	8.0	5.5	140			28.00	7.2	P.F.
75	C	C	6.7	5.5	8.2	6.5	120			9.69	7.2	P.F.
76	C	C	6.0	1.9*	6.6	2.2*	150			46.93	7.1	P.F.

Cont'd

Boring No.	Soil Texture 0 - 30 (cm)	30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	EC x 10^3	30 - 60 cm pH	EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	pH	Ground Water EC x 10^3	pH	Land Use
Sample Area No. 3												
1	SIC/C	C	6.7	1.7	7.5	3.3						P.F.
2	SIC/C	C	6.1	1.5	7.5	2.6						P.F.
3	SIC/C	C	7.7	6.8	6.6	3.2						P.F.
4	SIC/C	C	7.4	2.4	7.6	3.7	90			7.01	7.2	P.F.
5	SIC/C	C	6.7	2.7	7.9	4.0						P.F.
6	SIC/C	C	5.7	1.1*	7.2	1.0*						P.F. + S.P.
7	SIC/C	C	6.8	1.9	7.1	3.0						P.F. + S.P.
8	SIC/C	C	7.5	1.6*	7.9	1.6*						P.F.
9	SIC/C	C	6.4	2.8	7.6	6.5						P.F.
10	SIC/C	C	6.9	3.2	7.6	6.1						P.F.
11	SIC/C	C	6.3	5.0	7.2	7.5	120			17.85	7.6	P.F.
12	SIC/C	C	6.6	7.5	7.4	0.97*						P.F.
13	CL	C	7.4	3.6*	8.1	2.6*						P.F.
14	SIC/C	C	6.2	2.8	7.5	3.5						P.F. + S.P.
15	SIC/C	C	6.1	2.2	7.0	2.8						P.F. + S.P.
16	SIC/C	C	7.0	4.0	7.8	6.9						P.F. + S.P.
17	SIC/C	C	7.4	2.6	7.6	3.1						P.F.
18	SIC/C	C	5.5	4.3	6.7	1.2*						P.F.
19	SIC/C	C	5.8	2.8	7.3	6.3						P.F.
20	SC/FSCL	FSCL	6.4	3.8	7.7	7.2						P.F.
21	C	C	6.9	1.7	6.8	2.0	120			5.50	7.3	P.F.
22	CL/C	C	5.3	1.2*	7.2	1.8*						Village
23	C	C	6.8	2.2	7.6	3.2						P.F. + S.P.
24	SICL/C	C	6.8	6.0	7.2	1.1*						P.F. + S.P.
25	SIC/C	C	6.9	5.5	6.8	5.3						P.F. + S.P.
26	SIC/C	C/SICL	6.7	5.2	7.4	1.2*	90			9.99	7.7	P.F. + S.P.
27	SIC/C	C	6.2	3.6	7.0	3.9						P.F. + S.P.
28	SIC/C	C	6.0	3.3	7.6	5.9						P.F. + S.P.
29	C	C	5.7	1.1	7.4	7.6	120			19.89	7.1	P.F.
30	SIC/C	C	6.1	2.0	7.3	1.0						P.F. + S.P.
31	C	C	5.8	2.2	6.5	1.7						P.F. + S.P.
32	C	C	7.0	1.8*	7.4	2.2*						Village
33	C	C	6.6	2.8	6.7	4.8						P.F. + S.P.
34	C	C	6.8	1.9	7.3	4.2						P.F. + S.P.
35	C/SCL	SCL	6.2	4.4	7.4	1.1*	120			10.00	7.2	P.F. + S.P.
36	C	C	7.6	4.4	7.7	5.1						P.F. + S.P.
37	C	C	6.3	3.9	7.6	7.2	140			9.55	7.3	P.F. + S.P.
38	C	C	4.5	1.9*	4.5	1.9*		9.82	7.4			Shrub
39	C	C/FSC	7.0	2.1	6.3	2.4						P.F. + S.P.
40	C	C	7.1	1.9	7.6	3.8						P.F.
41	C	C	5.7	1.2	7.3	2.4						P.F.
42	C	C	6.4	2.5	7.8	4.5						P.F. + S.P.
43	SICL/SIC	SIC/C	6.7	3.8	7.5	1.6						P.F. + S.P.
44	C	C	7.4	3.4	7.7	5.5	140			9.90	7.8	P.F. + S.P.
45	C	C	5.6	6.0	4.8	7.3						P.F. + S.P.
46	C	C	5.8	1.7	6.5	1.9		3.40	6.8			P.F. + S.P.
47	SIC/C	C	6.2	2.8	7.3	2.0	210			9.20	7.4	P.F.
48	SIC/C	C	6.6	2.1	8.0	3.6						P.F. + S.P.
49	SIC/C	C	6.1	1.5	6.2	1.6	100	0.43	7.0	1.26	6.2	P.F. + S.P.
50	SIC/C	C	6.8	1.3	7.4	2.9						P.F. + S.P.
51	SIC/C	C	7.0	3.6	7.3	5.4	170			10.20	7.2	P.F. + S.P.
52	C	C	5.3	1.3*	4.5	2.0*						Shrub
53	SIC/C	C	6.6	7.3	7.0	3.9		2.34	7.2			P.F. + S.P.
54	SIC/C	C	6.9	0.9	7.4	1.0						P.F.
55	SIC/C	C	5.2	3.6	6.3	4.0	190			9.94	7.2	P.F.
56	SIC/C	C	6.6	2.6	7.0	2.2						P.F.
57	SIC/C	C	6.2	1.5	7.2	1.8	160			6.93	7.6	P.F. + S.P.
58	SIC/C	C	6.6	2.3	7.3	3.8						P.F.
59	SIC/C	C	6.2	1.4	7.3	0.8		0.51	7.9			P.F.
60	CL	CL/C	7.5	3.1	7.6	5.0						P.F.
61	SIC/C	C	6.8	1.0	7.5	1.1						P.F. + S.P.
62	SIC/C	C	6.3	1.3	6.8	2.5	200			9.58	7.6	P.F.
63	SIC/C	C	6.8	2.0	7.1	2.9						Waste land
64	SIC/C	C	6.7	3.1	7.2	4.9	170			9.58	7.2	P.F.
65	SIC/C	C	5.8	1.3*	7.3	1.7*						Waste land
66	C	C	5.7	1.4*	5.1	5.0						Shrub
67	SIC/C	C	7.0	2.2	7.2	3.6	200			8.16	7.5	P.F. + S.P.
68	SIC/C	C	6.7	3.2	7.2	4.2						P.F. + S.P.
69	SIC/C	C	6.8	3.0	7.5	2.9						P.F. + S.P.
70	C	C	6.6	1.5	7.0	1.7						Orchard

Cont'd

Boring No.	Soil Texture 0 - 30 (cm)	30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	EC x 10^3	30 - 60 cm pH	EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	pH	Ground Water EC x 10^3	pH	Land Use
Sample Area No. 4												
1	FSL	SICL	5.6	0.50	5.6	0.80	120			4.79	6.0	P.F.
2	SICL/C	C	5.0	3.5	5.4	2.7	90					P.F.
3	SIL	SIL	5.9	0.85	5.2	0.45	60			0.99	6.4	P.F.
4	C	C	6.2	0.40	6.2	0.58						P.F.
5	SIC/C	C	5.9	6.5	5.8	0.90*		2.65	6.8			P.F.
6	L/SICL	SICL/SIC	6.0	0.40	5.8	0.55	60			0.45	6.8	P.F.
7	SIC/C	C	5.7	1.50	5.5	2.4						P.F.
8	SIC/C	C	5.8	0.50	5.8	0.53	120			1.27	7.0	P.F.
9	SIC/C	C	5.6	1.30	5.1	0.98						P.F.
10	SICL/CL	CL/C	6.1	0.80	6.3	0.50	100	0.47	7.7	0.38	6.2	P.F.
11	SIC/SICL	SICL	7.0	0.35	6.2	0.50	60			0.42	6.8	P.F. + S.P.
12	SIC/C	C	5.4	0.60	5.4	0.45						P.F. + S.P.
13	SIC/C	C	6.2	1.2	7.7	1.8		0.20	6.9			P.F.
14	SIC	SIC	5.7	1.6	5.6	1.0						P.F.
15	CL/SIC	SIC/C	6.4	1.0	6.3	0.65	90			0.52	6.1	P.F.
16	SCL	C	6.3	0.50	6.4	0.63	30			0.42	6.3	P.F.
17	FSL	SICL	6.2	0.45	6.9	0.45	90					P.F.
18	SIC	SIC	5.7	0.35	5.3	0.24				0.36	5.5	P.F.
19	SICL/SIC	SIC/C	5.3	1.5	5.2	1.9						P.F. + S.P.
20	CL	SICL	4.9	2.7	5.1	1.6	120			3.65	4.2	P.F.
21	SIC	C	6.7	1.1	5.7	1.5						P.F.
22	SICL/CL	CL	5.3	0.75	5.1	0.80	60			0.56	5.0	P.F.
23	FSCL/FSL	FSL	6.9	0.52	6.5	0.37	90			0.11	5.8	Orchard
24	FSCL/CL	CL	5.6	0.45	6.4	0.60	90			0.34	6.8	P.F.
25	FSL/SICL	SICL	5.6	0.60	5.8	0.65	50					P.F.
26	FSCL	FSCL	6.3	0.30	6.8	0.80	60			0.35	6.8	P.F.
27	C	C	6.1	1.3	5.6	1.1						P.F.
28	L	CL	6.2	0.85	6.1	0.90	50			0.76	6.1	P.F.
29	SCL	SCL/C	6.2	2.8	7.2	1.3						P.F.
30	FSL/CL	CL/C	6.7	0.60	6.8	0.53	90			0.50	7.0	P.F.
31	FSL/CL	CL	5.4	0.95	5.7	0.65	60					P.F.
32	C	C	6.6	0.48	6.2	0.35		0.23	7.1			P.F.
33	FSL/CL	CL	6.0	2.4	6.5	1.6	60					P.F.
34	SL/CL	CL	5.9	3.5	5.2	1.5	60					P.F.
35	SIC	SIC	5.6	0.35	5.5	0.48		2.55	6.6			P.F.
36	SIC	SIC	5.7	0.48	5.6	0.40						P.F.
37	FSL/SCL	SCL	7.6	1.3*	6.9	0.92*	60			0.91	6.1	P.F.
38	FSL	SIL	7.4	5.4	8.1	0.62	60					Village
39	SIL/SICL	SICL	6.2	0.55	6.5	0.55	60					P.F.
40	SIC	SIC/C	6.2	1.2	5.2	0.65	30			4.78	5.3	P.F.
41	FSL/CL	CL	7.3	0.65	6.9	2.0	60					P.F.
42	SL/CL	C	5.7	0.30	7.9	0.58	90			5.58	7.1	P.F.
43	SIL/SIC	SIC	6.0	5.0	6.8	2.6	120					Village
44	SIC	SIC	6.3	0.62	6.1	0.72	150					P.F.
45	SIL/SICL	SICL/SIC	7.2	1.5	6.9	1.4	90					P.F.
46	SIL/SIC	SIC	6.3	0.65	6.6	0.62	90			1.48	6.2	P.F.
47	SIC	SIC	6.1	1.0	6.3	1.6						P.F.
48	FSL	CL	5.6	0.90	5.3	0.43	100					P.F.
49	SIC/C	C	5.8	1.2	6.1	0.85	120			2.97	6.6	P.F.
50	FSL/CL	CL	6.8	0.50	6.7	0.60	50			1.70	6.6	P.F.
Sample Area No. 5												
1	SIC/C	C	6.3	0.66	6.1	1.0						P.F.
2	SIC/C	C	5.8	1.2	6.1	1.7						P.F. + S.P.
3	C	C	5.9	1.4	4.3	2.4	140			5.22	3.2	P.F. + S.P.
4	C	C	5.5	2.3	5.9	4.4	140			4.11	7.0	P.F.
5	C	C	6.0	4.1	5.1	4.8						P.F.
6	C	C	6.0	1.9	5.8	1.9						P.F.
7	SIC/C	C	6.1	0.55	5.2	0.60						P.F. + S.P.
8	SIC/C	C	6.1	0.56	5.1	0.64						P.F.
9	FSCL/SC	SC	5.6	1.2	6.9	1.0		0.69	6.9			P.F. + S.P.
10	SIC/C	C	5.6	0.92	4.5	1.-	150			2.87	3.2	P.F. + S.P.
11	C	C	5.4	1.8	5.2	2.5						P.F.
12	C	C	5.3	5.0	5.7	6.0	130			6.70	6.9	P.F.
13	C	C	5.5	1.5	5.4	1.7						P.F.
14	C	C	5.7	1.7	4.8	1.6						P.F.
15	SIC/C	C	5.4	1.2	4.3	2.3						P.F.
16	SIC/C	C	6.0	1.0	4.8	5.2						P.F.
17	C	C	4.6	1.3	4.1	2.9						P.F.
18	C	C	5.1	4.7	5.5	5.7						P.F.
19	C	C	5.6	2.4	5.6	3.7						P.F.
20	C	C	5.2	5.5	5.5	7.0	150			9.69	4.0	P.F. + S.P.
21	C	C	5.2	4.1	4.8	6.8						P.F. + S.P.
22	C	C	6.0	0.9	6.0	1.4	210			2.28	5.5	P.F. + S.P.
23	SIC	C	5.9	0.95	5.8	1.2						P.F. + S.P.
24	C	C	5.7	0.95	5.1	0.45	140			2.04	3.5	P.F. + S.P.
25	C	C	5.6	0.88	5.0	1.6	>150					P.F. + S.P.

Cont'd

Boring No.	Soil Texture 0 - 30 (cm)	30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	EC x 10^3	30 - 60 cm pH	EC x 10^3	Ground Water depth (cm)	Surface Water EC x 10^3	pH	Ground Water EC x 10^3	pH	Land Use
Sample Area No. 5 (cont'd.)												
26	C	C	5.7	3.8	6.1	4.2						P.F.
27	C	C	5.7	1.6	6.3	4.2						P.F.
28	C	C	5.4	7.0	6.0	1.1x						P.F.
29	C	C	5.0	3.8	5.3	6.8	>150					P.F. + Shrub
30	C	C	5.8	3.9	5.1	5.6	150			17.85	3.3	P.F. + S.P.
31	C	C	6.6	1.4	5.6	1.7	160					P.F. + S.P.
32	SIC	C	6.2	1.6	5.8	2.7	180			5.84	3.5	P.F. + S.P.
33	C	C	5.8	0.56	5.0	0.73						P.F. + S.P.
34	SIC/C	C	6.3	0.92	5.0	0.50	180			5.71	3.2	P.F. + S.P.
35	SIC/C	C	5.2	1.2	5.4	1.1						P.F.
36	C	C	5.3	4.2	5.3	5.2						P.F.
37	SIC/C	C	5.1	4.9	5.1	7.0						P.F.
38	SIC/C	C	5.3	1.9	5.0	3.1						P.F.
39	C	C	6.5	5.4	5.6	7.3	150			10.09	3.4	P.F. + S.P.
40	SIC/C	C	6.3	1.1	5.7	1.7	>150					P.F. + S.P.
41	C	C	5.7	1.9	4.4	2.4	190			4.09	3.0	P.F. + S.P.
42	SIC/C	C	5.7	0.65	5.4	0.8						P.F. + S.P.
43	SIC/C	C	5.8	2.4	4.6	3.7	210			2.75	3.3	P.F. + S.P.
44	C	C	5.3	2.0	4.4	1.9	150					P.F. + S.P.
45	SIC/C	C	5.7	1.5	6.0	1.7						P.F.
46	SICL/C	C	6.3	7.5	7.0	7.0	90					Shrub
47	SIC/C	C	4.7	7.5	4.7	7.0						P.F.
48	SICL/C	C	5.0	1.3x	4.9	1.5x						P.F.
49	SIC/C	C	5.6	2.4	5.1	3.2	150					P.F. + S.P.
50	C	C	5.0	3.4	4.9	2.5	120			6.83	3.8	P.F. + S.P.
51	SIC	C	5.3	0.9	5.0	0.47	160					P.F. + S.P.
52	C	C	5.8	0.38	5.1	3.1	240			4.58	3.2	P.F. + S.P.
53	SIC/C	C	5.4	1.4	4.6	2.6	>150	swamp				P.F. + S.P.
54	C	C	5.7	1.9	6.8	1.3	>150	(0.36	6.7)			P.F. + Shrub
55	SICL/C	C	5.6	0.6	5.1	1.6	100			0.46	6.2	P.F.
56	SIC/C	C	5.7	1.5	5.3	1.7						P.F.
57	SICL/SCL	SCL	8.9	1.7x	8.6	1.6x	120			12.24	7.4	P.F.
58	L/CL	SICL	4.1	2.9x	4.3	3.2x						Shrub
59	CL	CL	6.0	2.1x	5.4	1.5x						Village
60	C	C	4.9	2.5	4.2	1.5	130			3.41	4.4	P.F.
61	CL	CL/C	6.5	2.1x	6.5	1.8x						Shrub
62	SICL/SIC	SIC/C	5.8	1.5	6.0	1.7	145			8.56	4.2	P.F.
63	CL	CL/C	4.8	1.5	4.5	2.4						Orchard
64	C	C	5.6	1.6	5.6	1.5	200			8.34	3.9	Orchard
65	C	C	5.7	1.6	6.0	2.6	120			6.06	6.5	P.F.
66	C	C	4.8	1.9	5.2	2.8						P.F.
67	SICL/FSCL	FSCL	5.3	1.1x	5.2	5.6	120			5.10	4.5	Shrub
68	SICL	SICL	6.7	3.2	6.6	3.3						Garden
69	SCL/FSCL	FSCL/CL	6.5	5.0x	5.3	2.7x						Shrub
70	SICL/C	C/SIC	7.5	1.3x	7.7	1.3x	130			20.40	7.5	Orchard
71	SIC/C	C	4.9	2.3x	5.5	2.0x	>150	(0.35	6.7)			P.F. + Shrub
72	C	C	5.2	3.9	4.7	5.0	>150					P.F.
73	SCL	SCL	6.3	2.5	6.6	2.8						Garden
74	SICL/CL	CL/SIC	6.3	1.8x	6.9	1.9x	>150					Orchard
75	CL/SICL	SIC	6.0	3.5	6.8	2.0	140			2.44	6.9	Orchard

NOTES: P.F. --- Paddy field
U.P. --- Upland field
x --- EC x 10^3 of saturation extract dilution ratio 1:9
xx --- EC x 10^3 of saturation extract dilution ratio 1:19

Table B-4 Results of Soil Analyses

FIELD DESCRIPTION			PARTICLE SIZE HYDROMETER			Text. Class Lab.	pH		Sat. Extract Elec. Cond. ECx10³	Sat. % S.P.	CEC meq/100g	ESP.	EXCHANGEABLE CATIONS (meq/100 g				Base Saturation %	Org. Matter % O.M.	Total N %	Avail P. Bray II) ppm	% CaCO₃ Equivalent	Matric tension % Moisture tension bars	
Area No.	Pit No.	Depth (cm)	Sand (%)	Silt (%)	Clay <2 (%)	Hyd.	Water 1:1	KCl 1:1					Na	Ca+Mg	Ca	K						1/3	1/5
1	2	0-15	16.4	38.0	45.6	C-	7.3	6.6	1.3	55.8	43	2	0.28	19	13	0.61	46	1.9	0.10	9.4	-	30.6	16.1
		15-46	16.4	37.6	46.0	C	7.8	7.1	1.0	49.3	47	2	0.16	28	18	0.60	61	1.9	0.09	26	1	29.7	15.0
		46-55	10.4	38.0	51.6	C	7.0	6.0	0.80	51.3	47	2	0.17	16	9.4	0.55	36	1.5	0.09	16	-	30.0	16.6
		55-85	17.4	35.8	46.8	C	6.8	5.9	0.75	43.1	45	2	0.10	14	9.3	0.54	32	0.69	0.06	3.8	-	25.0	15.4
2	10	0-13	1.6	28.0	70.4	C+	6.1	5.4	1.4*	86.7	64	6.9	4.4	22	7.5	1.9	44	2.6	0.13	5.8	-	-	23.9
		13-40	9.4	27.8	62.8	C	7.1	6.5	2.0*	109.7	69	6.7	4.6	23	4.5	1.5	42	1.4	0.07	14	-	39.9	24.3
		40-100	13.4	37.8	48.8	C	7.6	7.2	2.8*	98.2	48	12	6.1	-	-	1.5	-	0.43	0.05	132	1.3	44.2	25.3
3	12	0-13	3.6	35.6	60.8	C	5.1	4.1	1.9	71.7	44	2	0.55	14	6.3	0.38	34	1.4	0.09	2.8	-	31.7	18.6
		13-44	3.6	24.0	72.4	C+	7.2	6.2	3.0	71.1	58	4.0	2.3	22	11	1.2	44	0.66	0.06	2.9	-	30.4	20.2
		44-76	3.6	24.0	72.4	C+	7.5	6.5	5.2	76.3	51	5.9	3.0	21	9.8	0.65	48	0.59	0.05	5.0	-	33.3	21.8
		76-110	8.2	29.8	62.0	C	7.5	6.7	1.0*	96.3	61	9.5	5.8	26	8.7	1.2	54	0.59	0.06	31.3	-	42.9	26.1
4	1	0-15	34.2	44.0	21.8	L	5.5	5.1	2.5*	35.7	8.8	2	0.10	4.2	2.2	0.22	51	1.4	0.06	11	-	21.9	7.2
		15-52	28.2	46.0	25.8	L+	4.5	3.9	1.7*	37.3	8.8	4.8	0.42	4.7	0.80	0.20	60	0.84	0.05	3.7	-	21.1	7.5
		52-80	28.4	47.0	24.6	L	4.6	3.8	2.2*	31.3	7.2	9.2	0.66	3.1	1.2	0.10	54	0.58	0.03	4.1	-	20.5	6.7
		80-100	27.2	38.8	34.0	CL	4.4	3.6	1.7*	43.7	15	15	2.2	5.1	1.6	0.17	50	0.32	0.03	2.9	-	21.5	11.4
5	9	0-14	9.8	36.0	54.2	C	5.9	5.1	2.0	65.1	34	2	0.30	17	12	0.43	52	2.2	0.11	73	-	35.5	19.2
		14-52	19.6	30.6	49.8	C	6.4	5.6	6.2	60.0	30	3.3	1.0	15	7.9	0.35	54	1.2	0.06	5.0	-	25.7	10.4
		52-100	5.6	24.0	70.4	C+	5.2	4.1	1.7	87.5	48	2	0.39	16	5.2	0.57	35	0.23	0.02	2.1	-	-	19.7
A	11	0-15	8.4	27.8	63.8	C	7.3	6.5	1.1*	106.4	61	5.9	3.6	29	11	1.9	57	2.5	0.22	91	-	47.9	28.4
		15-38	19.6	33.6	46.8	C	7.7	6.7	1.0*	108.8	56	9.3	5.2	32	11	2.1	70	0.98	0.09	298	1.2	48.8	27.9
		38-100	25.6	43.6	30.8	CL	7.8	7.0	1.6*	88.8	52	6.5	3.4	-	-	1.9	-	1.2	0.09	239	1.3	-	-

* EC x 10^3 of saturation extract dilution ratio 1:9

DATA SOURCE: Soil Chemistry and Physics Lab. IRD

Cont'd

Field Description			pH		Sat. % SP.	Elect Cond. EC x 10^3	Saturation Extract								Sod. Adsorp. Ratio SAR	CEC NH_4 Ext.	ESP NH_4 Ext.	Sol. Salt %	
							Soluble Cations meq/l.				Soluble Anions meq/l.								
Area No.	Pit No.	Depth (cm)	Water 1:1	KCl 1:1			Na	Ca+Mg	Ca	K	CO_3	HCO_3	SO_4	Cl					
1	2	0-15	7.3	6.6	55.8	1.3	4.0	7.4	6.0	0.57	0.18	3.0	4.5	3.3	2.1	43	<2	<0.05	
		15-46	7.8	7.1	49.3	1.0	3.2	6.0	4.6	0.39	0.99	1.7	3.9	3.6	1.8	47	< 2	<0.05	
		46-55	7.0	6.0	51.3	0.80	1.7	5.7	4.6	0.28	0	1.9	3.8	2.8	1.0	47	< 2	<0.05	
		55-85	6.8	5.9	43.1	0.75	2.1	4.3	3.7	0.24	0	0.81	3.8	3.0	1.4	45	< 2	<0.05	
2	10	0-13	6.1	5.4	86.7	1.4*	67	80	14	1.7	0	0.63	69	69	11	64	6.9	0.74	
		13-40	7.1	6.5	109.7	2.0*	111	91	20	1.8	0	1.1	99	91	16	69	6.7	1.3	
		40-100	7.6	7.2	98.2	2.8*	172	137	28	2.6	0.18	0.90	132	126	21	48	12	1.6	
3	12	0-13	5.1	4.1	71.7	1.9	9.9	7.6	3.4	0.31	0	0.32	4.8	11	5.1	44	< 2	0.14	
		13-44	7.2	6.2	71.1	3.0	21	8.0	3.4	0.25	0	0.54	11	17	10	53	4.0	0.13	
		44-76	7.5	6.5	76.3	5.2	36	14	4.3	0.44	0	0.68	18	31	14	51	5.9	0.23	
		76-110	7.5	6.7	96.3	1.0*	61	46	7.4	0.97	0	0.68	33	57	13	61	9.5	0.55	
4	1	0-15	5.5	5.1	35.7	2.5*	160	60	26	1.7	0	0.59	50	160	29	8.8	< 2	0.46	
		15-52	4.5	3.9	37.3	1.7*	117	28	14	1.2	0	0	36	108	31	8.8	4.8	0.33	
		52-80	4.6	3.8	31.3	2.2*	161	43	20	0.46	0	0	46	140	35	7.2	9.2	0.36	
		80-100	4.4	3.6	43.7	1.7*	115	28	17	0.23	0	0.14	43	103	31	15	15	0.39	
5	9	0-14	5.9	5.9	65.1	2.0	6.9	15	8.0	0.35	0	0.30	15	5.9	2.5	34	<2	0.09	
		14-52	6.4	5.6	60.0	6.2	36	32	11	0.46	0	0.23	29	35	9.0	30	3.3	0.24	
		52-100	5.2	4.1	87.5	1.7	7.9	8.5	2.6	0.36	0	0.23	13	2.9	3.8	48	<2	0.09	
A	11	0-15	7.3	6.5	100.4	1.1*	60	51	11	1.9	0.27	2.1	39	51	12	61	5.9	0.64	
		15-38	7.7	6.7	108.8	1.0*	60	46	5.7	1.7	0.27	1.4	34	48	12	56	9.3	0.60	
		38-110	7.8	7.0	88.6	1.6*	92	49	14	2.5	0.36	1.4	46	87	19	52	6.5	0.74	

* EC x 10^3 of saturation extract dilution ratio 1:9.

Table B-5 Summary of Field Survey

Boring No.	Soil Texture 0 - 30 (cm)	Soil Texture 30 - 60 (cm)	pH & EC x 10^3 0 - 30 cm pH	0 - 30 cm EC x 10^3	30 - 60 cm pH	30 - 60 cm EC x 10^3	Ground Water Depth (cm)	Surface Water EC x 10^3	Surface Water pH	Ground Water EC x 10^3	Ground Water pH	Land Use
Salinity Study Sample Plot A.												
1.	Sic/c	C	1)7.2	2.0[x]	7.8	3.1[x]	120			40.00	7 5	P.F.
			2)7.0	2.2[x]	7.1	2.6[x]	130					
2.	Sic/c	C	7.5	1.7[x]	7.9	2.2[x]						P.F.
			7.4	7.0	7 6	1.5[x]		3 21	7.8			
3.	C	C	7.7	7.5	7.9	1 4[x]	140			28 71	7 2	P F.
			7.1	6.1	7 2	1.3[x]		2 21	7 6			
4.	Sic/c	C	7.5	1.3[x]	7.8	1.7[x]						P.F.
			7.2	1.3[x]	7.2	2.8[x]						
5.	FSL	FSL	8.3	3 6	8.7	4.1						Village
			7.9	2.6	8.1	2.3						
6	Sic/c	C	7.7	1.1[x]	7.8	1.6[x]	140			29 37	7.2	Village
			6.3	6.0	7.6	8.0		2.45	7 8			
7	Sic/c	C	7.7	1 0[x]	7 9	1.8[x]						Village
			7.4	1.3[x]	7 6	1 6[x]		3 72	7.8			
8	Sic/c	C	7.4	1.4[x]	7 7	2.1[x]						Village
			6.7	1 0[x]	7.1	1 4[x]		4 24	7 6			
9	C	C	7.8	6.9	7.9	3.1[x]		2.41	8.2			U F
			7 2	2.2[x]	7.1	4.0[x]						
10.	Sic/c	C	7 6	1.9[x]	7.6	3.3[x]						P F.
			7.2	2.2[x]	7 2	3.6[x]		15 09	7 6			
11	Sic/c	C	7.6	1.7[x]	7 7	2 4[x]	130			38 00	7 2	P.F
			7.0	2.0[x]	7.0	2 8[x]	85			24.52	7.4	
12	Sic/c	C	7.2	1.0[x]	7.8	3 4[x]	90			37 25	7 2	P F.
			7.0	2.0[x]	7.5	1.7[x]						
13.	Sic/c	C	7.7	2.3[x]	7.9	4.0[x]						P.F.
			6.8	1.8[x]	7.0	3.2[x]	138			39.36	7.2	
14	Sic/c	C	7.5	1.4[x]	7.1	1.8[x]	120			29.12	7.1	P F
			6.9	1.4[x]	7.2	1.7[x]	120			26.88	7.3	
15.	Sic/c	C	7.7	7.5	7.7	1.9[x]	120			31.50	7.3	P.F.
			7.0	1.4[x]	7.1	2.0[x]		4.72	7.6			
16.	Sic/c	C	7.3	2.1[x]	7.8	2.8[x]	90	5 25	7.8	34 00	7.2	p F.
			6.7	2.4[x]	7.3	2.8[x]		5.28	7.8			
17.	Sic/c	C	7.5	1.5[x]	7.3	2.7[x]		2.80	7.5			P.F
			6.7	1.7[x]	6.7	2.4[x]	98			33.84	7 4	
18	Sic/c	C	7.3	7.5	7.3	1.3[x]		3 06	7 6			P F
			6.9	8.0	7.3	3.6[x]						
19.	Sic/c	C	7.4	2.5[x]	7 6	3.3[x]	120	6 46	8 1	37.20	7.0	P.F.
			7.0	2 1[x]	7.6	3.2[x]	120			35.28	7.2	
20.	Sic/c	C	7.7	1.4[x]	7 8	2.1[x]	90	6 10	8.0	27 00	7 2	P.F.
			6.7	1.3[x]	7.1	1.8[x]		4.24	7.8			
21.	Sic/c	C	7.4	2.1[x]	7.7	3.4[x]	60	1.80	7.4	39.25	7.2	P F
			6.7	2.1[x]	6.8	2.7[x]	150					
22.	Sic/c	C	7.1	1.5[x]	7.5	2.3[x]		3.50	7 6			P.F.
			6.1	1.5[x]	6.8	1.9[x]	105			27.60	7.4	
23	Sic/c	C	7.1	1.3[x]	7.3	1.7[x]		5.09	8.0			P.F.
			5.8	1.7[x]	6.5	2.3[x]	145			20 40	7 4	
24.	Sic/c	C	7 4	2.8[x]	7.1	1.5[x]		2.80	7.4			P.F.
			6.1	1.9[x]	7.4	2.6[x]	120					
25.	Sic/c	C	7.3	5.9	7.6	1.1[x]		2.64	7.3			P.F.
			6.2	1.2[x]	6.6	1.4[x]	150					
26.	Sic/c	C	7.1	1.2[x]	7.2	1.6[xx]		2.40	7.5			P.F.
			6.8	1.8[x]	6.6	2.7[x]	87			30.82	7.3	
27.	Sic/c	C	7.2	1.3[x]	7.5	1.9[x]		3 03	7 7			P.F.
			6.0	1.5[x]	6 1	1.9[x]	120			27 74	7.4	

Cont'd

28.	Sic/c	C	7.1	1.8[x]	7.3	2.4[x]		5.06	7.7			Waste land
			6.8	1.7[x]	6.6	3.0[x]						
29.	Sic/c	Sic	7.0	1.4[x]	7.1	2.2[x]	90	2.59	7.8	30.00	7.0	Waste land
			6.2	1.7[x]	6.6	2.1[x]	90			25.44	7.2	
30.	Sic/c	C	7.5	6.4	7.2	1.2[x]		1.40	7.2			Waste land
			6.5	1.8[x]	6.5	2.7[x]	150					
Salinity Study Sample Plot B.												
15.	C	C	7.5	2.4[x]	7.8	1.9[x]	110			25.50	7.2	P.F
			6.7	2.0[x]	6.8	1.3[x]						
16.	C	C	7.2	1.2[x]	7.8	2.0[x]	80			36.44	7.2	P.F
			5.9	1.9[x]	7.8	1.7[x]	140			8.83	7.3	
17.	SL	Sc/c	5.9	2.6[x]	7.1	3.0[x]	120			8.77	7.5	Waste land
			6.2	5.3[x]	7.3	2.5[x]						
18.	C	C	7.1	4.5[x]	7.5	4.3[x]	140			64.14	7.2	Waste land
			5.6	6.1[x]	6.7	4.1[x]						
19.	C	C	7.2	2.4	8.3	3.2	120			23.98	7.4	p.F.
			6.6	2.6	7.7	3.4	140					
20.	C	C	7.7	1.2[x]	7.9	1.4[x]	80			34.00	7.2	P.F.
			6.7	1.3[x]	7.7	0.7[xx]						
32.	C	C	7.1	1.1[x]	7.7	1.6[x]	120			41.19	7.2	P.F.
33.	C	C	7.8	3.8	8.4	6.0	90			23.46	7 5	P.F
			7.3	1.2[x]	7.6	1.6[x]						
34.	C	C	7.4	1.6[x]	7.6	2.1[x]	110			45.00	7.0	P.F.
			6.7	1.8[x]	6.8	1.8[x]	150					
35.	C	C	7.0	4.5	7.3	6.8	120			25.50	7.2	P.F
			6.1	5.6	6.8	6.0						
36.	C	C	7.4	2.6	8.2	3.4	110			39.78	7.2	P.F.
			6.7	2.8	7.6	3.6						
37.	C	C	7.0	1.0[x]	7.3	1.4[x]		6.73	8.5			Waste land
			5.8	1.7[x]	7.2	1.1[x]	140			9.50	7.6	
38.	FSC/SC	Sc/c	7.8	5.6[x]	8.2	2.4[x]	80			45.75	7.2	Waste land
			7.1	6.0[xx]	7.5	3.0[x]	140			47.52	7.4	
50.	C	C	7.3	6.4	7.9	6.8	110			20.40	7.4	P.F
			6.3	6.4	7.7	7.0	130			17.92	7.6	
51.	C	C	7.5	3.1	8.1	3.5	120			22.18	7.4	P.F.
			6.0	4.8	7.7	4.5						
52.	C	C	7.6	6.4	8.1	1.5[x]	120			41.05	7.2	P.F
			6.7	1.5[x]	7.3	1.7[x]	143			32.40	7.3	
53.	C	C	7.8	2.6	8.2	2.9		1 17	7.8			P.F.
			6.1	3.1	6.5	5.0	135			21.12	7.4	
54.	C	C	7.4	0.95[x]	8.0	1.7[x]	120			44.64	7.1	P.F.
			7.1	2.7	8.0	3.6	130			26.88	7.6	
55.	C	C	6.4	5.1	6.8	6.3	150			26.88	7.2	P.F.
			5.8	5.2	5.9	5.1	140			17.92	7.6	
56.	C	C	8.4	5.6	8.5	4.5	80			29.28	7.2	P.F
			7.2	7.4	7.4	5.0	110			35.04	7.4	
57.	C	C	7.6	4.1	8.1	4.4	120			19.81	7.5	P F.
			5.9	7.5	6.6	5.0	130			15.84	7.6	
73.	C	C	7.9	5.0	8.2	4.6		1 98	7.0			Swamp
			7.3	1.1[x]	6.9	4.8	90			23.34	7.4	
74.	C	C	6.5	3.5	8.0	5.5	140			28.00	7.2	P.F.
			6.5	5.2	7.7	6.1	120			25.92	7.5	
75.	C	C	6.7	5.5	8.2	6.5	120			9.69	7.2	P.F.
			6.8	4.6	7.2	6.5	120			25.92	7.4	
76.	C	C	6.0	1.9[x]	6.6	2.2[x]	150			46.93	7.1	P.F.
			5.6	2.6[x]	6.1	2.0[x]	140			37.44	7.3	

Cont'd

Salinity Study Sample Plot C.												
1.	SicL/CL	CL	7.2	6.0[x]	4.6	2.2	140			7.53	4.6	Orchard
			7.3	6.0[x]	7.3	2.8[x]						
2.	SicL/Sic	Sic/c	7.5	1.7[x]	4.6	1.7[x]	120			29.37	4.7	Orchard
			6.9	5.6	7.0	6.0	110			24.52	6.9	
3.	Sic/c	C	5.6	2.4	4.9	0.7	90			0.66	5 3	Orchard
			7.2	4.7	4.9	3.1	44			2.36	5.2	
4.	C	C	5.7	1.5	5.1	4.1	90			0.86	4.8	P.F.
			4.8	1.1	4.5	0.6		0.43	5.4			
5.	C	C	5.5	0.9	4.7	2.0	100			0.89	4.5	P.F.
			5.5	1.7	4.7	1.9	34			1.01	5.2	
6.	C	C	4.1	1.1[x]	4.1	5.5	80			7.50	3.5	P.F.
			4.0	6.2	4.0	4.7	30			6.53	3.8	
7.	C	C	4.9	1.5[x]	4.5	1.5[x]						P.F.
			4.2	1.7[x]	4.2	1.7[x]	76			17.52	3.9	
8.	Sic/c	C	5.0	2.1[x]	4.8	1.2[x]	120			23.00	5.0	Waste land
			4.6	1.5[x]	4.8	1.1[x]	30			7.31	5.4	
9.	Sic/c	C	5.5	1.8	6.0	1.0	110			4.69	6.5	P.F.
			4.9	5.8	4.7	6.1	38			7.01	4.6	
10.	C	C	7.6	2.8	7.9	1.6	80			5.28	7.2	P.F.
			5.6	3.0	5 7	2.8	10			1.70	6.9	
11.	C	C	5.7	1.8	5.5	2.7	100			9.00	5.0	P.F.
			5.0	2.4	5.0	1.8	17			3.79	5.0	
12	C	C	5.8	3.3	6.2	3.1	80			4.89	6.2	P.F.
			5.6	3.6	5 5	3.3						
13.	C	C	5.2	4.2	4.6	3.2	70			3.72	3.7	P.F.
			4.8	4.9	4.6	3.4	40			3.55	4.0	
14.	C	C	4.8	1.6[x]	4.4	7 5						P.F.
			5.0	1.1[x]	4.4	7.0						
15.	C	C	5.6	1.7	5.9	2 4	90	0.39	6.8			P.F.
			-	-	-	-	-	-	-		-	
16.	C	C	5.5	2.0[x]	6.9	2.5[x]	90			34.32	7.0	P.F.
			5.5	2.2[x]	5.7	2.4[x]	122			27.58	7.1	
17.	Sic/c	C	5.8	1.0	5.7	0.52	45			0.34	5.8	P.F.
			5.2	0.65	5.5	0.80	22			5.42	6.2	
18	C	C	5.7	1.7	5.3	0.58	35			0.83	5.0	P.F.
			4.4	3.7	4.4	3.00	44			3.39	4.3	
19.	C	C	5.6	1.2	5.4	0.78		0.42	7.0			P.F.
			4.6	1.0	4.5	0.90		0-76	5.6			
20.	C	C	5.2	2.2	5 2	2.0	120			3.72	4.3	P.F.
			5.2	3.4	5.2	1.6	118			2.26	5.0	
21	C	C	5.3	1.8	5.0	0.8		0 42	6.8			P.F.
			4.6	1.4	4.6	0.9		2.07	4 2			
22	L/SicL	SicL/C	5.3	2.4[x]	4.6	1.4[x]	140			34.56	4.1	Orchard
			4.9	2.3[x]	4.5	1.7[x]	140			26.00	4.4	
23.	C	C	4.9	1.0[x]	4.8	1.0[x]	60			17.28	4.5	P.F.
			4.6	7.5	4.4	5.6	62			7.60	4.6	
24.	C	C	6.2	2 2[x]	5.8	2.9		0.26	7.4			P.F.
			5.6	3.2	5.5	1.6	30			0.94	6.2	
25.	C	C	5.6	0.7	4.9	0.5		0 39	6 6			P.F.
			4.9	2.9	4.7	1.3	23			1.70	4.5	
26.	C	C	5.2	2.5	4.5	2.2	75			0.36	4.0	P.F.
			4.5	3.3	4.3	2.2	28			3.30	4.1	
27.	CL/C	C	6.0	0.93	5.5	0.9	75			2.93	4.2	P F.
			5.4	1.60	5.6	3.0	76			2.70	4.3	
Salinity Study Sample Plot D.												
1.	Sic/c	C	5.2	3.2	4.5	4.2		0.84	7.0			P.F.
			5.1	4.0	4.5	4.5	45			4.95	3.6	
2.	Sic/c	C	6.1	5.0	6.9	6.6	130			24.47	6.6	P.F.
			5.3	4.5	5.4	4.7	120			5.28	7.0	
3.	Sic/c	C	6.1	0.53	6.6	0.45	110	0.25	7.0	0.63	6.6	P.F.
			5.8	2.7	6.7	3.2	110	0.35	7.0	6.27	7.0	

Cont'd

4.	Sic/c	C	6.3	1.30	7.0	1.50	120	0.19	7.6	1.76	7.7	P.F
			4.8	2.5	5.0	5.0	110	0.98	6.8	9.59	8.0	
5.	SC	SC	7.6	1.2[x]	7.8	1.4[x]	90			21.04	6.5	P.F
			6.8	1.1[x]	7.0	1.4[x]	120	0.20	8.4	16.32	7.2	
6.	Sic/c	C	5.3	3.9	4.5	5.4		0.82	7.6			P.F
			5.0	2.4	4.5	3.9	130			16.97	3.5	
7.	Sic	C	5.4	1.2	5.4	1.7	120	0.23	7.2	8.17	6.2	P.F
			5.2	1.2	5.7	2.6	140			12.26	6.3	
8.	C	C	5.9	1.6	6.1	2.1	140	0.32	6.8	3.87	7.0	P.F
			5.7	1.4	6.7	2.2	110	0.38	7.4	3.36	7.4	
9.	C	C	6.3	2.0	7.1	2.6	130			21.50	7.0	P.F
			5.8	2.7	7.0	4.3	120			4.03	7.6	
10.	SC	SC	8.0	1.7[x]	7.3	2.5[x]						P.F
			6.8	2.0[x]	7.0	2.1[x]						
11.	Sic/c	C	5.0	1.2	4.9	1.2	130	0.63	8.0	2.34	5.2	P.F
			5.1	3.1	4.6	3.5						
12.	Sic/c	C	5.2	1.7	5.2	1.7	120	0.39	7.1	3.20	5.1	P.F
			4.5	0.8	5 1	2.4	130			6.22	4.7	
13.	Sic/c	C	5.9	1.3	6.2	2.2	120			4.80	7.1	P.F
			5.7	1.7	6.6	2.3	140			4.22	7.3	
14.	Sic	Sic	7.0	1.2	8.0	0.9	110	0.39	6.5	0.79	7.3	P.F
			5.8	1.3	6.6	1.0	120			1.06	7.2	
15.	Sc	SCl.	8.3	6.0	8.3	7.0	90			49.00	7.4	P.F
			7.7	3.0	8.2	3.2						
16.	Sic/c	C	6.2	1.4	4.9	1.0		0 46	7 8			P.F
			4.7	0.96	4.5	1.0						
17.	Sic/c	C	5.7	3.1	4.9	6.2						P.F
			5.2	2.2	4.8	3.0	130			4.80	5.7	
18	Sic/c	C	6.3	0.9	7.9	1.6						P F
			6.0	1.4	6.8	1.9	130			4.13	7.2	
19.	C	C	5.7	1.1	5.6	0.95						P.F
			5.3	1.8	5.0	1.90	120			4.85	7.0	
20.	Sic/c	C	6.7	1.1[x]	8.1	1.2[x]	120			17.50	7.2	P.F
			5.6	6.3	7.0	7.5	130			20.16	7.4	
21.	Sic/c	C	5.5	2.7	4.6	4.8		0.51	7.1			P.F
			5 3	4.0	5.4	4.6	30			8.68	5.2	
22.	Sic/c	C	5.6	2.3	5.4	4.5	120			3.08	4.3	P.F
			5.6	3.9	4.9	6.7	120			21.10	4.2	
23.	Sic/c	C	6.2	1.8	5.8	2.5	140			6.70	6.9	P.F
			5.8	2.0	7.0	3.4	110			9.12	7.2	
24.	Sic/c	C	5.2	1.2	4.8	1.3						P.F.
			5.0	1.5	4.5	1.4						
25.	Sic	C	5.2	2.6	4.7	4.0		0.37	8.0			P.F
			4.8	2.9	4.5	3.6	125			7.07	5.0	
26.	Sic/c	C	5.5	3.9	4.6	1.4[x]	120			33.50	4.0	P.F.
			4.7	6.0	4.5	1.1[x]	130			26.19	3.8	
27.	Sic/c	C	6.1	2.0	6.8	0.9	120			24.50	7.0	P.F
			5.7	2.7	6.5	4.3	120			18.72	7.1	
28.	FSC	C	6.5	1.2	5.4	1.3	120	0.80	7.2	3.21	7.5	P.F
			5.3	2.8	4.9	3.4						

Notes: 1) Field survey during the dry season (Nov. 1980 - Jan. 1981)
2) Field survey during the rainy season (Jun. - Jul. 1981)

P.F. ..... Paddy field
U.P. ..... Upland field
x ..... EC x 10^3 of saturation extract dilution ratio 1:9
xx ..... EC x 10^3 of saturation extract dilution ratio 1:19

Table B-6 Soil Analyses of Test Pits

Plot	Field Description		pH		Sat Extract Elec. Cond.[1] dS/m	Sat %	Saturation Extract: Soluble Cation meq/l				Soluble Anions meq/l				SAR	CEC meq/100g	ESP	Exchangeable Cations meq/100 g.				Org. Matter %	Total N %	Avail. P Bray 1 ppm	$CaCO_3$ %
	Pit No	Depth (cm)	H_2O 1:1	KCl 1:1			Na	Ca + Mg	Ca	K	CO_3	HCO_3	SO_4	Cl				Na	Ca + Mg	Ca	K				
A	No. 11	0-15	6.9	6.2	1.3*	93.4	70	63	20	1.9	0.23	4.3	53	61	12	37	31	7.8	32	15	2.5	2.4	0.16	75	0.15
		15-38	7.3	6.6	1.2*	102.0	73	46	17	1.8	0.45	1.8	38	58	15	39	25	9.6	33	12	2.7	1.4	0.10	213	0.07
		38-100	7.5	6.9	1.7*	86.1	113	34	14	4.0	0	1.6	50	92	22	38	23	8.7	52	0.77	2.3	1.4	0.10	234	0.05
	No. 13	0-12	5.9	5.2	1.0*	83.3	55	46	17	2.0	0	2.1	50	46	11	32	19	6.2	23	8.7	2.3	2.2	0.15	23	0.10
		12-26	6.7	6.0	1.3*	93.3	72	54	20	2.1	0	3.5	68	50	14	33	22	7.2	25	9.9	2.3	2.1	0.10	39	0.07
		26-68	7.3	6.6	2.3*	84.8	135	77	28	4.4	0	2.0	56	124	22	34	25	8.6	32	11	2.1	1.1	0.08	98	0.10
		68-95	7.6	7.2	3.7*	49.3	241	134	48	5.7	0	1.3	90	220	29	37	34	5.8	46	30	1.4	0.98	0.05	83	2.6
		95-105	7.6	7.1	4.5*	86.6	285	162	51	5.2	0	1.3	108	271	32	33	33	11	54	30	2.2	2.6	0.11	148	6.0
B	No. 3	0-14	7.5	6.8	1.5*	80	106	54	20	0.66	0	2.3	53	pp	20	31	26	8.0	32	12	1.3	1.4	0.07	52	4.5
		14-26	7.8	7.2	1.8*	90.1	126	48	14	2.6	0	3.0	53	95	26	32	31	10	57	29	1.2	0.74	0.05	110	4.2
		26-40	7.8	7.1	1.7*	102.1	121	43	8.5	2.4	0	1.7	46	93	26	30	32	9.9	58	29	1.1	0.69	0.04	126	5.7
		40-80	7.8	7.1	1.9*	97.2	135	40	8.5	2.6	0.90	1.3	41	107	30	31	35	11	49	26	1.2	0.76	0.04	113	2.4
	No. 4	0-14	5.2	4.6	5.7	71.6	34	22	5.1	0.68	0	1.4	16	34	10	28	11	3.0	15	7.1	0.77	2.5	0.11	6.7	-
		14-39	5.2	4.3	5.9	84.6	48	13	2.0	0.37	0	0.66	18	34	19	32	12	5.4	13	3.1	0.93	1.1	0.07	6.4	-
		39-69	6.0	5.0	1.0*	97.6	72	23	7.4	2.0	0	0.90	26	55	21	33	24	4.2	17	3.5	0.90	0.33	0.05	5.3	-
		69-100	6.5	5.9	1.8*	83.0	130	41	6.8	2.4	0	0.59	39	103	29	32	22	3.0	13	3.1	1.0	0.48	0.04	19	-
C	No. 5	0-20	5.4	5.0	3.0*	32.7	163	122	46	7.3	0	0.99	38	190	21	10	9.1	0.91	4.5	3.1	0.76	1.1	0.09	61	-
		20-85	4.7	4.2	1.9*	36.8	129	50	19	2.6	0	0.50	36	112	26	11	5.2	0.57	4.7	1.9	0.35	1.7	0.05	16	-
		85-110	4.9	4.3	2.5*	41.4	124	71	23	2.2	0	0.81	65	136	29	12	15	1.8	4.8	2.1	0.90	0.64	0.04	18	-
	No. 6	0-17	4.8	4.2	1.8	56.8	80	07	5.1	0.39	0	0.90	33	47	3.6	17	3.4	0.58	8.9	4.1	0.38	2.2	0.12	3.9	-
		17-40	5.5	4.9	3.2	53.8	14	10	4.0	0.37	0	0.86	13	7.2	6.6	15	4.4	0.68	9.2	3.9	0.37	0.92	0.09	6.6	-
		40-61	5.5	4.7	2.7	55.5	16	11	2.8	0.22	0	0.59	19	6.1	6.8	15	5.9	0.88	9.0	3.8	0.44	0.60	0.05	5.4	-
		61-110	6.1	5.3	3.9	69.4	26	19	3.2	0.24	0	0.77	31	7.9	6.4	19	7.9	1.5	9.9	2.7	0.42	0.27	0.05	7.4	-
D	No 7	0-10	4.6	3.8	1.1	62.6	8.3	4.0	2.3	0.16	0	1.5	5.1	5.0	5.9	27	7.4	2.0	8.4	4.6	0.21	2.6	0.11	4.5	-
		10-30	5.4	4.5	1.9	64.9	16	4.8	1.7	0.13	0	1.0	9.1	6.4	10	34	5.0	1.7	9.9	4.7	0.29	1.5	0.10	4.4	-
		30-78	4.8	4.0	3.2	76.4	28	4.8	1.7	0.38	0	0.95	17	11	18	35	14	4.8	9.2	4.0	0.36	0.93	0.08	4.2	-
		78-110	5.4	4.4	6.4	62.4	56	8.3	2.4	0.45	0	0.14	31	28	27	30	30	9.1	10	3.6	0.36	0.92	0.04	6.0	-
	No 8	0-13	5.0	4.3	3.2	59.4	20	11	4.4	0.26	0	0.99	31	15	8.5	28	8.6	2.4	11	5.2	0.22	1.2	0.12	4.6	-
		13-24	5.5	4.6	3.6	66.5	36	11	3.1	0.33	0	0.68	16	15	12	34	7.0	2.4	15	5.5	0.30	0.29	0.08	6.0	-
		24-63	6.1	5.0	5.5	77.5	42	12	4.2	0.49	0	0.72	28	24	17	34	14	4.7	16	6.2	0.43	1.4	0.04	8.4	-
		63-100	6.4	5.4	1.4*	61.8	78	60	2.6	0.40	0	0.86	83	16	14	30	2.7	2.3	18	11	0.74	0.49	0.03	12	-

NOTE: Period of Soil Sampling: June-July 1981

[1] -- Shell fragments are found in the soil sample

* -- EC of saturation extract diluted with distilled water; dilution ratio 1:9

Table B-7 Results of Water Analyses

Field Description				Salinity	EC x 10^6			RSC	Iron(Fe) ppm.		Milliequivalent per litre							
Area No.	Pit No.	Depth (cm)	pH	g/1000 g.	at 25°C	SSP	SAR	meg/l	Total	Dis-solved	Ca	Mg	Na	K	CO_3	HCO_3	Cl	SO_4
1	2	-	6.2	0.22	420	51	2.1	0	0	0	1.01	0.97	2.10	0.24	0	0.42	2.90	0.80
	10	60	7.6	28.91	*65,000	58	33	0	0.2	0	26.34	255.3	390.0	6.70	0	10.04	451.1	208.3
3	12	120	7.8	10.59	*22,500	64	23	0	0.6	0	7.69	69.80	141.0	2.68	0	17.75	165.0	46.30
5	9	150	4.5	0.08	4,800	31	3.8	0	0.4	0.1	14.38	21.68	16.00	0.61	0	0	1.27	50.17
A	11	80	7.5	-	*33,000	-	-	-	0.8	0	----------			Waste	Water	----------		
B	3	-	7.7	15.91	*24,000	73	34	0	0	0	9.64	69.01	211.2	1.95	0	7.04	248.3	45.92
	4	-	7.6	29.87	*40,000	67	39	0	0	0	23.34	163.5	380.0	4.20	0	9.46	466.1	83.96
C	5	-	7.4	34.09	*77,000	79	68	0	0.4	0.1	31.40	134.7	616.7	3.50	0	5.85	532.3	197.4
	5/1	-	7.1	0.57	1,200	54	3.9	0	0.3	0	1.87	3.35	6 25	0.16	0	2.84	8.15	0.65
	6	-	4.3	2.77	*23,500	50	15	0	15.0	12.5	14.39	101.5	118.0	1.04	0	0	42.80	192.5
D	7	-	7.2	5.81	*14,000	83	34	0	0.1	0	5.77	18.83	120.7	1.56	0	3.55	90.15	52.75
	8	-	5.8	14.61	*32,500	73	35	0	0.2	0	19.24	65.85	230.0	2.00	0	0.12	228.0	99.39
	/2	-	7.3	29.87	*54,000	78	52	0	0	0	17.22	93.20	382.5	11.80	0	2.48	466.1	50.41

/1 -- Pit No. 5, Irrigation water
/2 -- Sea water from Hard Chao Samran (Sample Plot B, included in Sample Area No.2)

pH by glass electrode
EC x 10^6 = Electircal conductivity micromhos/cm

SSP = Soluble sodium percentage.
SAR = Sodium adsorption ratio
RSC = Residual sodium carbonate

* --- Calculated from EC x 10^6 of water sample, diluted by distilled water x dilution factor = EC x 10^6 at 25°C reported

Table B-8 Distribution of Soil Salinity and pH

Name of Plot		<4 mmho		4-6 mmho		6-8 mmho		8-10 mmho		10-20 mmho		20 mmho <		Total	
		I 1/	II 2/	I	II	I	II	I	II	I	II	I	II	I	II
A	Surface soil	1	1	1	1	4	3	3	1	16	18	5	6	30	30
	Subsoil	0	1	1	0	0	1	0	0	12	11	17	17	30	30
B	Surface soil	6	4	6	5	2	3	1	0	6	9	4	4	24	25
	Subsoil	4	3	6	8	3	2	0	0	7	9	5	3	24	25
C	Surface soil	16	14	1	4	0	2	1	0	5	3	4	3	27	26
	Subsoil	17	16	2	4	1	1	1	0	4	3	2	2	27	26
D	Surface soil	23	23	1	2	1	1	0	0	3	2	0	0	28	28
	Subsoil	17	17	4	6	3	2	0	0	3	2	1	1	28	28

		<pH 5.0		pH 5.1-5.5		pH 5.6-6.0		pH 6.1-6.5		pH 6.6-7.3		pH 7.4-7.8		pH 7.9<	
		I	II	I	II	I	II	I	II	I	II	I	II	I	II
A	Surface soil	0	0	0	0	0	2	0	5	11	20	18	2	1	1
	Subsoil	0	0	0	0	0	0	1	3	8	20	15	6	6	1
B	Surface soil	0	0	0	0	2	7	2	6	8	12	11	0	2	0
	Subsoil	0	0	0	0	0	2	0	2	5	10	5	10	15	1
C	Surface soil	5	15	7	6	11	2	1	0	1	3	2	0	0	0
	Subsoil	14	17	6	4	5	2	1	0	0	3	0	0	1	0
D	Surface soil	1	7	8	8	5	10	9	0	2	2	1	1	2	0
	Subsoil	9	12	4	3	2	1	2	1	6	10	1	0	4	1

Note: 1/ First survey during the dry season (Dec. 1980 - Jan. 1981)
2/ Second survey during the rainy season (Jun. - Jul. 1981)

Table B-9 Ralation between Electrical Conductivity of Soil and Yield of Paddy
(Number of Soil Sampler)

Yield of Paddy	<1.5 t/ha			1.6-2.0 t/ha			2.1-2.5 t/ha			2.6-3.0 t/ha			>3.1 t/ha			Total		
pH of Soil		6.1			6.1			6.1			6.1			6.1			6.1	
EC of Sat. Ext.	<6.0	$\frac{1}{7.3}$	7.4<	<6.0	$\frac{1}{7.3}$	7.4<	<6.0	$\frac{1}{7.3}$	7.4<	<6.0	$\frac{1}{7.3}$	7.4<	6.0	$\frac{1}{7.3}$	7.4<	6.0	$\frac{1}{7.3}$	7.4<
0 - 4 m mhos/cm	0	0	0	1	2	2	14	4	3	5	3	0	4	2	0	24	11	5
4 - 6 m mhos/cm	0	1	0	1	2	2	0	1	1	0	0	0	0	0	0	1	4	3
6 - 8 m mhos/cm	0	2	0	0	1	2	0	0	1	0	0	0	0	0	0	0	3	3
8 - 15 m mhos/cm	3	1	1	0	5	6	0	1	1	0	0	0	0	1	2	3	8	10
15 m mhos	0	0	2	3	1	5	0	1	1	0	0	1	0	1	0	3	3	9
Total	3	4	3	5	11	17	14	7	7	5	3	1	4	4	2	31	29	30

Table B-10 Change of Leachate Salinity

	Leachate Sampler No.	Depth (cm)		Before the Test	During the Test																				
					July 1981																		August		
				13	14*	15	16	17	18	19	20	21	22	23*	24x	25	26x	27	28x	29	30x	31	1x	2	3x
Plot No.1	1	20	pH	0	7.43	7.07	7.07	7.09	7.05	7.13	7.07	7.14	7.16	7.08	-	7.13	-	7.10	-	7.08	-	7.04	-	7.11	-
			EC x 10^3	0	1.32	1.46	1.44	1.75	1.61	1.78	1.71	1.66	1.78	1.89	-	1.84	-	1.85	-	1.29	-	1.52	-	1.60	-
	2	20	pH	0	7.35	6.97	6.87	6.74	6.78	6.77	6.81	6.79	6.88	6.80	-	6.84	-	6.74	-	6.64	-	6.65	-	6.73	-
			EC x 10^3	0	0.79	1.32	1.69	1.93	1.99	1.95	1.80	1.73	1.61	1.41	-	1.35	-	1.43	-	1.40	-	1.47	-	1.45	-
	3	20	pH	7.74	7.59	7.52	7.46	7.50	7.54	7.62	7.53	7.51	7.51	7.52	-	7.52	-	7.40	-	7.43	-	7.50	-	7.54	-
			EC x 10^3	1.68	1.11	1.44	1.49	1.49	1.49	1.50	1.54	1.55	1.57	1.60	-	1.54	-	1.56	-	1.21	-	1.30	-	1.20	-
	4	40	pH	7.34	7.26	6.97	6.98	6.93	6.95	6.97	6.98	7.01	6.91	6.88	-	6.98	-	7.10	-	6.80	-	7.05	-	7.13	-
			EC x 10^3	5.13	3.18	3.27	3.49	3.49	3.98	3.63	3.30	3.21	2.77	2.87	-	2.71	-	2.74	-	2.99	-	3.41	-	3.57	-
	5	40	pH	7.17	7.06	6.84	6.86	6.85	6.90	6.90	6.96	6.95	6.93	6.93	-	7.11	-	7.08	-	6.88	-	7.06	-	7.03	-
			EC x 10^3	1.96	1.29	1.53	1.57	1.60	1.62	1.62	1.61	1.60	1.64	1.62	-	1.63	-	1.66	-	1.75	-	1.75	-	1.76	-
	6	40	pH	7.50	7.43	7.31	7.31	7.32	7.29	7.33	7.31	7.32	7.28	7.24	-	7.42	-	7.23	-	7.22	-	7.35	-	7.39	-
			EC x 10^3	1.75	1.40	1.49	1.51	1.53	1.53	1.53	1.63	1.64	1.66	1.68	-	1.68	-	1.70	-	1.74	-	1.75	-	1.78	-
	7	60	pH	7.43	7.33	7.06	7.04	7.08	7.04	7.07	7.18	7.19	7.20	7.15	-	7.32	-	7.33	-	7.19	-	7.27	-	7.35	-
			EC x 10^3	5.75	5.13	4.44	4.09	3.46	4.74	4.73	5.39	6.04	5.20	5.25	-	5.15	-	5.18	-	5.38	-	5.63	-	5.79	-
	8	60	pH	7.27	7.21	7.06	7.09	7.04	6.94	7.06	7.06	7.07	7.02	7.08	-	7.13	-	7.14	-	7.00	-	7.14	-	7.29	-
			EC x 10^3	3.14	3.01	2.56	2.47	2.37	2.54	2.42	2.28	2.63	2.10	2.13	-	1.99	-	2.00	-	2.26	-	2.35	-	2.25	-
	9	60	pH	7.29	7.25	7.18	7.18	7.06	7.14	7.21	7.13	7.16	7.15	7.11	-	7.25	-	7.28	-	7.04	-	7.20	-	7.25	-
			EC x 10^3	2.04	1.84	1.74	1.65	1.61	1.60	1.58	1.58	1.56	1.46	1.47	-	1.49	-	1.51	-	1.59	-	1.62	-	1.65	-
	10	100	pH	7.58	7.49	7.24	7.27	7.32	7.31	7.32	7.34	7.41	7.38	7.42	-	7.42	-	7.46	-	7.40	-	7.53	-	7.55	-
			EC x 10^3	12.57	10.57	10.31	12.13	10.29	12.46	11.33	12.58	11.52	11.81	11.53	-	10.93	-	11.38	-	11.17	-	11.83	-	11.43	-
	11	100	pH	7.20	7.35	7.22	7.26	7.19	7.23	7.25	7.22	7.23	7.22	7.27	-	7.28	-	7.24	-	7.16	-	7.24	-	7.36	-
			EC x 10^3	2.19	1.87	1.88	1.85	1.85	1.97	2.01	2.04	2.04	2.04	2.04	-	2.02	-	2.04	-	2.23	-	2.25	-	2.20	-
	12	100	pH	7.24	7.21	7.04	7.03	7.09	7.13	7.13	7.11	7.18	7.30	7.13	-	7.21	-	7.25	-	7.14	-	7.29	-	7.38	-
			EC x 10^3	3.22	3.18	3.18	3.42	3.37	3.56	3.47	3.43	3.46	3.28	3.40	-	3.26	-	3.31	-	3.65	-	3.64	-	3.62	-
Plot No.1 Surface Water	Sample 1	-	pH	-	7.02	6.98	7.20	7.15	7.27	7.32	7.65	7.44	7.44	7.51	-	7.74	-	7.47	-	7.89	-	7.93	-	7.58	-
			EC x 10^3	-	0.79	0.74	0.71	0.62	0.67	0.81	0.88	0.91	0.67	0.80	-	0.97	-	1.98	-	0.62	-	0.69	-	0.77	-
	Sample 2	-	pH	-	7.96	7.09	7.25	7.34	7.45	7.44	7.35	7.48	7.36	7.62	-	7.64	-	7.11	-	7.89	-	7.87	-	7.57	-
			EC x 10^3	-	0.61	0.67	0.63	0.67	0.67	0.76	0.82	0.88	0.64	0.76	-	0.95	-	1.64	-	0.62	-	0.67	-	0.75	-

Note: * Report on complete analyses enclosed
0 No water in the leachate sampler
x Bail out the leachate
July 14, 15, 16, 17, 20, sprinkle in the afternoon
July 21, Heavy rain in the afternoon until night

Cont'd

	Leachate Sampler No.	Depth (cm)		Before the Test	During the Test																						
					July 1981																			August			
					13	14*	15	16	17	18	19	20	21	22	23*	24	25	26x	27	28x	29	30x	31	1x	2	3x
Plot No.2	13	20	pH	0	8.49	6.81	6.58	6.58	6.55	6.59	6.62	6.53	6.67	6.83	6 63	6.67	-	6.63	-	6.55	-	6.66	-	6.72	-
			EC x 10^3	0	1.42	3.84	6.08	7.43	8.47	8.89	9.48	9.58	9.64	9.83	9.84	9.76	-	9.74	-	9.85	-	9.81	-	9.79	-
	14	20	pH	0	7.05	6.77	6.78	6.84	6.73	6.83	6.81	6.80	6.78	6.75	6.73	6.75	-	6.69	-	6.74	-	6.70	-	6.72	-
			EC x 10^3	0	1.32	1.97	2.18	2.35	2.33	2.27	2.12	2.04	1.95	1.75	1.66	1.68	-	1.78	-	1.46	-	1.58	-	1.70	-
	15	20	pH	0	7.20	6.91	6.70	6.72	6.71	6.82	6.83	7.03	6.91	6.93	6.89	7.04	-	6.92	-	6.73	-	6.73	-	6.76	-
			EC x 10^3	0	0.99	1.66	2.83	3.49	3.80	4.05	2.97	2.49	1.89	1.34	1.08	1.19	-	1.46	-	2.93	-	3.09	-	3.06	-
	16	40	pH	7.40	6.64	6.46	6.54	6.54	6.40	6.38	6.43	6.41	6.53	6.50	6.60	6.67	-	6.81	-	6.49	-	6.68	-	6.70	-
			EC x 10^3	8.32	7.41	8.03	8.18	8.08	8.32	8.34	8.43	8.55	7.91	8.26	8.13	8.01	-	8.06	-	7.91	-	7.88	-	8.09	-
	17	40	pH	0	7.22	6.94	6.77	6.73	6.60	6.74	6.65	6.62	6.58	6.71	6 82	6.83	-	6.78	-	6.66	-	6.77	-	6.83	-
			EC x 10^3	0	0.92	1.60	1.89	2.01	2.11	2.28	2.42	2.35	2.45	1.88	1.86	1.90	-	1.89	-	1.36	-	1.41	-	1.43	-
	18	40	pH	0	7.36	6.72	6.57	6.72	6.51	6.64	6.56	6.54	6.58	6.56	6.51	6.67	-	6.83	-	6.55	-	6.75	-	6.72	-
			EC x 10^3	0	0.92	2.87	3.72	3.99	4.29	4.25	4.37	4.46	4.45	4.57	4.66	4.62	-	4.70	-	4.54	-	4.66	-	4.72	-
	19	60	pH	6.97	6.60	6.42	6.32	6.34	6.30	6.52	6.38	6.40	6.47	6.44	6.45	6.66	-	6.80	-	6.63	-	6.81	-	6.77	-
			EC x 10^3	7.30	6.30	6.52	6.56	6.39	7.24	6.55	6.45	6.50	6.31	6.37	6.58	6.36	-	6.37	-	6.45	-	6.51	-	6.52	-
	20	60	pH	6.88	7.04	6.73	6.69	6.76	6.73	6.82	6.75	6.85	6.75	6.69	6.88	6.92	-	7.04	-	6.80	-	6.91	-	6.97	-
			EC x 10^3	8.47	4.18	4.84	4.45	4.48	4.03	3.92	4.17	4.37	4.25	3.67	3.72	3.81	-	3.83	-	3.49	-	3.60	-	3.70	-
	21	60	pH	0	6.79	6.71	6.66	6.68	6.64	6.65	6.67	6.76	6.72	6.63	6.81	6.85	-	7.01	-	6.63	-	6.77	-	6.81	-
			EC x 10^3	0	2.50	2.63	2.49	2.56	2.70	2.52	2.69	2.70	2.65	2.46	2.38	2.36	-	2.33	-	1.97	-	1.99	-	1.98	-
	22	100	pH	6.80	6.88	6.78	6.85	6.76	6.84	6.82	6.81	6.85	6.75	6.94	6.98	7.01	-	7.16	-	7.06	-	7.24	-	7.14	-
			EC x 10^3	16.04	11.51	10.93	11.75	12.22	13.38	13.79	13.77	13.81	13.83	14.38	13.90	13.79	-	13.66	-	14.46	-	14.23	-	14.32	-
	23	100	pH	6.69	6.99	6.81	6.70	6.77	6.71	6.78	6.71	6.73	6.79	6.58	6.81	7.05	-	7.00	-	7.13	-	7.18	-	7.14	-
			EC x 10^3	13.76	9.25	5.50	7.31	7.84	8.44	8.32	8.59	8.54	8.96	8.94	9.10	9.08	-	9.11	-	9.26	-	9.20	-	8.91	-
	24	100	pH	7.15	7.22	7.04	7.07	7.13	7.05	7.05	7.05	7.06	7.03	7.05	7.07	7.18	-	7.28	-	7.18	-	7.38	-	7.26	-
			EC x 10^3	8.30	7.92	6.64	5.40	5.25	4.90	5.36	4.87	5.06	5.00	4.93	4.76	4.78	-	4.97	-	5.00	-	5.24	-	5.45	-
Plot No.2 Surface Water	Sample 3	-	pH	-	6.52	6.48	6.49	6.41	6.84	6.76	6.94	7.03	6.71	7.21	6.99	7.11	-	7.96	-	7.19	-	7.49	-	7.84	-
			EC x 10^3	-	1.16	1.31	1.17	1.03	1.11	1.27	1.45	1.51	0.97	1.08	1.38	1.58	-	1.18	-	0.84	-	1.00	-	1.03	-
	Sample 4	-	pH	-	6.45	6.54	6.54	6.68	6.76	6.88	6.94	7.14	6.83	7.06	6.82	7.35	-	7.77	-	7.23	-	7.89	-	8.06	-
			EC x 10^3	-	1.09	1.07	0.95	0.74	0.93	1.06	1.21	1.25	0.84	0.98	1.15	1.32	-	1.12	-	0.82	-	0.81	-	0.89	-

Cont'd

	Leachate Sampler No.	Depth (cm)		Before the Test	During the Test																				
					July 1981																			August	
					13	14	15*	16	17	18	19	20	21	22	23	24*	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.3	25	20	pH	0	0	7.81	6.68	6.77	6.69	6.66	6.71	6.72	6.69	6.64	6.63	-	6.64	-	6.99	-	6.83	-	6.74	-	6.82
			EC x 10^3	0	0	1.28	1.75	1.88	1.94	1.92	1.95	1.93	1.88	1.93	1.94	-	1.76	-	1.75	-	1.76	-	1.70	-	1.67
	26	20	pH	0	0	7.08	6.88	6.81	6.70	6.73	6.63	6.59	6.57	6.56	6.62	-	6.66	-	6.63	-	6.81	-	6.56	-	6.52
			EC x 10^3	0	0	0.84	1.37	1.72	1.80	1.94	2.19	2.22	2.52	2.58	2.85	-	3.31	-	4.54	-	4.37	-	4.88	-	4.79
	27	20	pH	7.55	0	6.62	6.68	6.70	6.71	6.66	6.66	6.69	6.68	6.63	6.71	-	6.64	-	6.68	-	6.68	-	6.56	-	6.45
			EC x 10^3	1.10	0	0.76	1.14	1.28	1.37	1.44	1.40	1.49	1.47	1.49	1.52	-	1.47	-	1.56	-	1.37	-	1.36	-	1.25
	28	40	pH	0	0	7.23	6.96	6.85	6.80	6.76	6.78	6.74	6.67	6.78	6.83	-	6.75	-	6.76	-	6.99	-	6.92	-	6.99
			EC x 10^3	0	0	0.81	1.67	1.92	1.91	1.89	1.88	1.80	1.74	1.61	1 64	-	1.75	-	1.76	-	1.79	-	1.86	-	1.89
	29	40	pH	7.76	0	7.29	6.82	6.92	6.79	6.73	6.74	6.79	6.60	6.65	6.71	-	6.86	-	6.99	-	7.16	-	6.90	-	6.98
			EC x 10^3	3.12	0	0.78	2.30	2.64	2.82	3 03	2.96	3.03	3.08	3.14	3.17	-	3.26	-	3.28	-	3.35	-	3.36	-	3.33
	30	40	pH	6.78	7.39	6.78	6.64	6.67	6.64	6.59	6.60	6.57	6.65	6.67	6.62	-	6.60	-	6.77	-	6.81	-	6.66	-	6.68
			EC x 10^3	2.32	2.37	1.25	1.73	1.78	1.80	1.79	1.78	1.82	1.75	1.76	1.68	-	1.59	-	1.62	-	1.62	-	1.66	-	1.62
	31	60	pH	6.92	7.01	7.03	6.83	6.85	6.80	6.85	6.90	6.84	6.85	6.82	7.02	-	6.91	-	7.25	-	7.08	-	7.21	-	7.20
			EC x 10^3	5.27	5.53	1.57	3.33	3.87	3.97	4.02	4.15	4.20	4.07	3.99	3.97	-	4.03	-	4.16	-	3.78	-	3.61	-	3.83
	32	60	pH	6.78	6.87	7.12	6.87	6.85	6.81	6.81	6.80	6.82	6.94	6.92	7.03	-	7.01	-	7.16	-	7.12	-	7.03	-	7.13
			EC x 10^3	3.47	3.75	0.90	2.82	3.11	3.11	3.17	3.21	3.12	3.19	3 20	3.20	-	3.17	-	3.16	-	2.41	-	2.14	-	2.46
	33	60	pH	6.96	6.80	6.79	6.75	6.76	6.73	6.76	6.83	6.75	6.77	6.77	6.82	-	6.89	-	7.06	-	7.15	-	7.12	-	7.09
			EC x 10^3	3.58	3.75	2.49	2.78	2.86	2.75	2.75	2.75	2.56	2.51	2.53	2.45	-	2.30	-	2.30	-	2.44	-	2.52	-	2.58
	34	100	pH	6.89	7.02	7.02	6.98	7.03	6.95	6.93	6.94	6.87	6.88	6.83	6.94	-	6.90	-	7 19	-	7.44	-	7.06	-	7.21
			EC x 10^3	11.37	11.56	9.26	7.97	8.49	6.85	6.05	5.73	5.11	4.99	5.95	6.08	-	7.22	-	6.48	-	6.77	-	6.79	-	6.90
	35	100	pH	7.22	7.48	7.52	7.37	7.47	7.48	7.50	7.55	7.52	7.48	7.78	7.76	-	8.14	-	7.92	-	8.01	-	7.64	-	7.66
			EC x 10^3	7.55	7.98	8.06	8.27	8.25	8.20	8.34	8.39	8.39	8.39	8.60	8.54	-	8.59	-	8.30	-	8.50	-	8.47	-	8.58
	36	100	pH	7.35	7.24	7.23	7.13	7.15	7.15	7.34	7.23	7.23	7.21	7.25	7.34	-	7.51	-	7.52	-	7.65	-	7.54	-	7.47
			EC x 10^3	8.33	8.16	4.63	5.07	6.00	6.37	5.28	5.36	6.16	5.18	4.81	4.82	-	4.27	-	4.68	-	4.87	-	4.62	-	4.44
Plot No.3 Surface Water	Sample 5	-	pH	-	-	7.26	6.47	6.62	6.72	6.86	7.06	7.14	7.21	7.06	7.13	-	7.49	-	7.81	-	7.58	-	7.83	-	8.28
			EC x 10^3	-	-	0.92	0.93	0.84	0.97	1.09	1.22	1.25	0.84	1.04	1.14	-	1.45	-	1.73	-	0.59	-	0.62	-	0.69
	Sample 6	-	pH	-	-	6.10	6.41	6.55	6.77	6.90	7.05	7.12	7.12	7.19	7.14	-	7.56	-	7.64	-	7.68	-	7.78	-	8.02
			EC x 10^3	-	-	0.89	0.90	0.80	0.92	1.01	1.18	1.19	0.83	1.00	1.13	-	1.40	-	1.60	-	0.58	-	0.59	-	0.67

Cont'd

	Leachate Sampler No.	Depth (cm)		Before the Test		During the Test																				
						July 1981																	August		
				13	14	15*	16	17	18	19	20	21	22	23	24*	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.4	37	20	pH	0	0	7.03	6.70	6.56	6.56	6.58	6.61	6.58	6.58	6.38	6.48	-	6.62	-	6.58	-	6.80	-	6.75	-	6.66
			EC x 10^3	0	0	1.44	2.91	5.76	6.97	7.58	7.85	8.09	10.02	8.30	8.15	-	8.20	-	8.28	-	4.76	-	6.24	-	6.89
	38	20	pH	7.62	0	7.72	6.82	6.75	6.77	6.71	6.73	6.71	6.61	6.62	6.76	-	6.92	-	6.88	-	6.94	-	6.78	-	6.71
			EC x 10^3	2.16	0	1.30	2.89	3.56	3.87	4.05	4.17	4.32	4.40	4.55	4.62	-	4.61	-	3.96	-	3.38	-	4.02	-	4.26
	39	20	pH	7.81	0	7.04	6.85	6.62	6.41	6.39	6.43	6.49	6.52	6.30	6.32	-	6.51	-	6.67	-	6.72	-	6.56	-	6.65
			EC x 10^3	2.63	0	1.70	2.59	3.88	7.64	9.26	9.87	10.56	10.82	11.58	11.56	-	11.27	-	11.61	-	8.21	-	9.23	-	9.71
	40	40	pH	6.85	0	7.25	6.73	6.49	6.48	6.48	6.59	6.49	6.71	6.65	6.73	-	6.84	-	6.88	-	7.17	-	6.82	-	6.76
			EC x 10^3	6.49	0	1.72	5.01	6.69	7.23	7.77	7.45	8.00	7.80	7.94	7.95	-	8.26	-	8.24	-	4.41	-	6.47	-	7.01
	41	40	pH	6.57	7.46	7.25	6.46	6.43	6.48	6.53	6.49	6.42	6.53	6.62	7.01	-	7.02	-	7.09	-	7.17	-	6.96	-	7.05
			EC x 10^3	7.62	7.49	1.96	6.98	8.06	7.85	7.87	8.22	8.69	7.82	6.31	3.47	-	3.36	-	4.86	-	2.47	-	3.95	-	4.62
	42	40	pH	6.51	6.33	7.84	6.56	6.43	6.37	6.42	6.46	6.81	6.53	6.61	6.59	-	6.82	-	6.82	-	7.08	-	6.72	-	6.77
			EC x 10^3	11.48	11.57	1.73	7.30	9.62	10.23	10.56	10.61	10.69	10.64	10.94	10.90	-	10.82	-	10.92	-	4.15	-	6.45	-	7.53
	43	60	pH	6.58	6.55	6.89	6.65	6.56	6.59	6.62	6.62	6.57	6.68	6.63	6.85	-	6.90	-	6.89	-	7.05	-	6.95	-	6.92
			EC x 10^3	9.49	9.58	3.16	7.41	7.95	8.12	8.08	8.86	8.94	8.38	8.92	8.73	-	8.79	-	8.37	-	2.74	-	5.31	-	5.64
	44	60	pH	6.64	6.59	6.52	6.56	6.62	6.54	7.56	6.65	6.62	6.65	6.75	6.80	-	7.03	-	6.98	-	7.06	-	6.89	-	6.81
			EC x 10^3	14.61	14.51	13.78	14.32	14.07	13.83	14.10	13.53	13.76	13.12	13.24	13.04	-	13.19	-	13.32	-	4.36	-	7.61	-	9.65
	45	60	pH	6.72	6.53	6.49	6.48	6.41	6.39	6.42	6.46	6.42	6.47	6.46	6.68	-	6.92	-	6.79	-	7.08	-	6.86	-	6.93
			EC x 10^3	12.88	13.08	12.47	12.25	12.33	12.17	12.17	12.00	12.36	11.92	11.44	11.53	-	11.55	-	11.31	-	3.01	-	6.10	-	7.22
	46	100	pH	6.04	6.64	6.45	6.55	6.56	6.53	6.50	6.58	6.49	6.51	6.50	6.63	-	6.84	-	6.98	-	7.16	-	7.01	-	7.00
			EC x 10^3	11.11	11.64	11.10	10.93	10.46	10.14	10.16	10.28	10.04	8.13	9.98	9.94	-	9.94	-	9.77	-	10.08	-	10.01	-	10.04
	47	100	pH	6.76	6.64	6.55	6.56	6.55	6.52	6.61	6.71	6.65	6.66	6.63	6.75	-	6.90	-	6.95	-	7.24	-	6.93	-	6.90
			EC x 10^3	14.79	15.32	13.37	14.18	14.37	14.39	13.94	13.82	14.28	14.67	12.00	11.56	-	12.16	-	12.79	-	10.52	-	11.89	-	10.67
	48	100	pH	6.87	6.87	6.61	6.71	6.76	6.68	6.76	6.81	6.86	6.83	6.80	6.86	-	7.01	-	7.04	-	7.10	-	7.07	-	7.10
			EC x 10^3	15.56	15.01	12.94	12.76	12.63	12.66	13.01	13.26	13.64	12.97	12.66	12.76	-	12.96	-	13.55	-	11.62	-	12.28	-	10.20
Plot No.4 Surface Water	Sample 7	-	pH	-	-	6.06	6.14	6.23	6.30	6.52	6.52	6.78	6.74	6.72	6.92	-	7.00	-	7.22	-	7.37	-	7.84	-	8.22
			EC x 10^3	-	-	1.48	1.40	1.29	1.47	1.71	1.89	2.00	1.37	1.67	1.92	-	2.33	-	2.63	-	0.98	-	1.27	-	1.62
	Sample 8	-	pH	-	-	6.22	6.33	6.32	6.52	6.53	6.80	7.02	6.94	6.70	6.84	-	7.09	-	7.11	-	7.56	-	7.70	-	7.71
			EC x 10^3	-	-	1.45	1.46	1.22	1.47	1.66	1.94	1.96	1.41	1.63	1.73	-	2.14	-	2.50	-	0.99	-	1.16	-	1.45

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	Leachate Sampler No.	Depth (cm)		Before the Test		During the Test																				
				July 1981																			August		
				13	14	15*	16	17	18	19	20	21	22	23	24*	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.5	49	20	pH	0	0	7.09	6.44	6.39	6.40	6.47	6.43	6.52	6.50	6.34	6.34	-	6.16	-	7.08	-	6.70	-	6.82	-	6.89
			EC x 10^3	0	0	1.95	6.56	9.07	10.82	10.86	11.55	11.71	11.82	12.08	11.92	-	12.41	-	5.27	-	7.93	-	10.18	-	10.80
	50	20	pH	0	0	7.39	6.97	6.83	6.78	6.82	6.94	6.86	6.94	6.90	7.00	-	7.07	-	6.98	-	7.11	-	7.13	-	7.05
			EC x 10^3	0	0	1.16	1.44	1.62	1.62	1.55	1.61	1.63	1.63	1.53	1.58	-	1.66	-	1.73	-	1.44	-	1.57	-	1.67
	51	20	pH	0	0	7.48	6.86	6.85	6.74	6.76	6.67	6.62	6.61	6.75	6.74	-	6.63	-	6.90	-	6.78	-	6.93	-	6.88
			EC x 10^3	0	0	1.13	1.77	2.39	2.56	2.69	3.12	3.38	3.42	3.07	3.74	-	4.42	-	2.63	-	2.33	-	2.84	-	3.03
	52	40	pH	6.81	6.40	8.21	6.33	6.38	6.28	6.27	6.23	6.26	6.31	6.22	6.42	-	6.29	-	6.38	-	6.82	-	6.79	-	6.81
			EC x 10^3	11.18	11.32	2.50	7.12	8.55	10.20	10.31	10.30	10.43	10.62	10.58	10.55	-	11.14	-	9.44	-	8.67	-	9.05	-	9.46
	53	40	pH	0	0	7.26	6.54	6.53	6.58	6.41	6.31	6.53	6.41	6.40	6.66	-	6.81	-	6.65	-	6.77	-	6.97	-	7.22
			EC x 10^3	0	0	3.26	7.08	8.04	8.94	10.16	10.55	10.01	10.68	10.97	10.16	-	10.29	-	10.13	-	9.21	-	9.76	-	9.91
	54	40	pH	0	0	7.04	6.97	6.85	6.71	6.63	6.81	6.82	6.82	6.87	6.93	-	6.81	-	6.87	-	6.88	-	7.12	-	7.04
			EC x 10^3	0	0	1.50	2.36	2.65	3.32	3.49	3.03	2.85	2.35	2.38	2.46	-	2.14	-	2.04	-	2.01	-	2.19	-	2.25
	55	60	pH	6.21	6.20	7.06	6.67	6.61	6.65	6.63	6.51	6.64	6.81	6.56	6.72	-	6.62	-	6.71	-	7.04	-	6.99	-	7.11
			EC x 10^3	16.21	16.75	5.32	3.53	3.61	3.66	4.97	7.06	6.39	4.00	7.00	5.55	-	10.08	-	7.15	-	5.69	-	6.71	-	7.02
	56	60	pH	6 83	7.55	7.33	6.68	6.64	6.59	6.52	6.51	6.63	6.67	6.61	6.86	-	6.86	-	6.72	-	6.86	-	7.11	-	7.05
			EC x 10^3	17.91	18.44	4.89	7.14	9.61	10.52	10.54	10.62	10.32	10.23	10.59	9.11	-	10.65	-	11.00	-	10.18	-	10.34	-	10.54
	57	60	pH	6.70	6.81	6.89	6.60	6.57	6.53	6.62	6.63	6.61	6.69	6.74	6.88	-	6.75	-	6.72	-	6.92	-	7.01	-	7.06
			EC x 10^3	9.38	8.44	2.31	4.95	5.64	5.76	6.19	6.34	5.83	5.24	5.10	4.79	-	5.18	-	5.04	-	4.26	-	4.95	-	4.73
	58	100	pH	7.35	7.30	7.35	7.25	7.17	7.14	7.23	7.14	7.07	7.15	7.16	7.18	-	7.12	-	7.10	-	7.55	-	7.58	-	7.75
			EC x 10^3	19.20	19.43	14.43	7.01	6.02	6.35	7.30	6.96	6.14	6.17	5.44	5.42	-	5.07	-	6.98	-	5.37	-	5.77	-	6.32
	59	100	pH	6.99	7.05	7.26	6.75	6.92	6.92	7.01	6.97	6.98	6.93	6.89	7.03	-	7.10	-	6.98	-	7.12	-	7.39	-	7.32
			EC x 10^3	18.29	17.05	2.92	10.33	9.12	7.78	11.13	11.63	11.83	13.42	10.92	10.81	-	13.31	-	13.81	-	12.66	-	12.47	-	12.69
	60	100	pH	7.05	7.14	7.12	7.06	7.07	7.16	7.52	7.02	7.31	7.19	7.24	7.23	-	7.21	-	7.18	-	7.29	-	7.57	-	7.46
			EC x 10^3	18.16	18.36	12.38	13.21	12.97	16.16	16.24	13.30	15.72	16.58	12.86	12.61	-	13.82	-	14.67	-	14.66	-	14.64	-	15.66
Plot No.5 Surface Water	Sample 9	-	pH	-	-	6.64	6.86	6.91	7.05	7.34	7.33	7.37	7.12	7.20	7.52	-	7.66	-	7.72	-	7.98	-	7.62	-	8.11
			EC x 10^3	-	-	1.18	1.09	0.96	1.25	1.54	1.84	1.99	0.94	1.38	1.65	-	2.18	-	0.57	-	0.94	-	1.27	-	1.22
	Sample 10	-	pH	-	-	6.54	6.74	6.73	6.96	7.06	7.02	7.32	6.98	7.18	7.21	-	7.34	-	7.50	-	7.67	-	7.91	-	7.66
			EC x 10^3	-	-	1.25	1.38	1.12	1.06	1.31	1.51	1.65	0.89	1.38	1.42	-	1.77	-	0.62	-	0.89	-	1.23	-	1.14

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	Leachate Sampler No.	Depth (cm)		Before the Test	During the Test																				
					July 1981																		August		
					13	14	15*	16	17	18	19	20	21	22	23	24	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.6	61	20	pH	0	0	7.63	7.44	7.43	7.44	7.38	7.43	7.45	7.36	7.41	7.48	-	7.41	-	7.40	-	7.45	-	7.32	-	7.53
			EC x 10^3	0	0	0.69	0.83	0.99	1.05	1.03	1.08	1.08	1.05	1.00	1.03	-	1.05	-	1.06	-	1.01	-	1.05	-	1.11
	62	20	pH	7.25	7.25	7.23	7.16	7.38	7.30	7.33	7.27	7.31	7.41	7.27	7.37	-	7.37	-	7.39	-	7.33	-	7.65	-	7.60
			EC x 10^3	1.02	0.89	0.72	0.58	0.57	0.60	0.63	0.70	0.75	0.82	0.88	0.88	-	0.91	-	0.91	-	0.80	-	0.74	-	0.73
	63	20	pH	0	0	7.33	7.22	7.18	7.22	7.26	7.28	7.22	7.34	7.33	7.38	-	7.52	-	7.42	-	7.30	-	6.91	-	7.27
			EC x 10^3	0	0	0.55	0.58	0.57	0.50	0.49	0.54	0.58	0.54	0.51	0.54	-	0.67	-	0.67	-	0.62	-	0.61	-	0.73
	64	40	pH	7.63	7.61	7.58	7.43	7.43	7.40	7.46	7.41	7.46	7.50	7.42	7.51	-	7.42	-	7.55	-	7.55	-	7.80	-	7.71
			EC x 10^3	1.75	1.87	1.44	1.24	1.26	1.28	1.27	1.30	1.32	1.39	1.26	1.28	-	1.31	-	1.34	-	1.31	-	1.30	-	1.31
	65	40	pH	7.60	7.49	7.45	7.35	7.43	7.43	7.42	7.41	7.52	7.45	7.38	7.44	-	7.42	-	7.39	-	7.44	-	7.52	-	7.58
			EC x 10^3	1.22	1.33	1.19	1.16	1.17	1.14	1.14	1.17	1.20	1.24	1.21	1.19	-	1.18	-	1.06	-	1.05	-	0.97	-	0.94
	66	40	pH	7.22	7.03	7.09	7.04	7.03	7.01	7.04	7.01	7.00	7.06	6.96	7.13	-	7.16	-	7.13	-	7.28	-	7.42	-	7.27
			EC x 10^3	1.86	1.99	1.15	1.25	1.24	1.23	1.18	1.18	1.20	1.20	1.17	1.24	-	1.20	-	1.19	-	1.18	-	1.21	-	1.24
	67	60	pH	7.48	7.35	7.49	7.31	7.28	7.37	7.45	7.46	7.46	7.61	7.52	7.52	-	7.60	-	7.56	-	7.57	-	7.75	-	7.72
			EC x 10^3	1.80	1.84	1.70	1.13	0.65	0.56	0.60	0.72	0.94	0.87	1.00	0.95	-	1.28	-	1.30	-	1.40	-	1.43	-	1.51
	68	60	pH	7.29	7.25	7.25	7.30	7.27	7.27	7.30	7.26	7.26	7.31	7.32	7.42	-	7.42	-	7.50	-	7.56	-	7.00	-	7.52
			EC x 10^3	2.35	2.41	1.94	1.66	1.65	1.66	1.97	1.97	2.10	1.86	1.73	1.81	-	1.73	-	1.86	-	1.82	-	1.85	-	1.88
	69	60	pH	7.08	7.04	6.95	6.99	6.97	7.01	6.97	7.03	7.04	7.01	7.03	7.11	-	7.21	-	7.16	-	7.22	-	7.33	-	7.34
			EC x 10^3	1.64	1.73	1.61	1.42	1.36	1.37	1.40	1.40	1.39	1.39	1.39	1.43	-	1.44	-	1.44	-	1.44	-	1.44	-	1.44
	70	100	pH	7.37	7.41	7.37	7.33	7.33	7.45	7.52	7.37	7.42	7.42	7.38	7.51	-	7.48	-	7.54	-	7.60	-	7.95	-	7.75
			EC x 10^3	1.68	1.86	1.65	1.62	1.62	1.54	1.49	1.65	1.57	1.61	1.54	1.57	-	1.66	-	1.57	-	1.58	-	1.60	-	1.62
	71	100	pH	7.39	7.40	7.41	7.49	7.51	7.51	7.43	7.46	7.50	7.62	7.55	7.53	-	7.65	-	7.70	-	7.74	-	7.71	-	7.64
			EC x 10^3	7.72	7.52	4.08	2.85	3.22	2.90	2.99	3.04	2.85	2.45	2.49	2.67	-	2.62	-	2.62	-	2.74	-	3.02	-	3.95
	72	100	pH	7.10	6.92	6.91	6.94	6.94	6.90	6.90	6.94	7.01	7.09	7.06	7.02	-	7.15	-	7.08	-	7.19	-	7.36	-	7.25
			EC x 10^3	1.92	2.12	1.71	1.69	2.33	2.13	2.42	2.27	2.41	2.57	2.48	2.06	-	2.09	-	2.22	-	2.15	-	2.13	-	2.20
Plot No.6 Surface Water	Sample 11	-	pH	-	-	7.22	7.33	7.38	7.61	7.17	7.71	7.61	7.66	7.53	7.75	-	7.81	-	7.89	-	8.32	-	9.03	-	8.25
			EC x 10^3	-	-	0.44	0.47	0.43	0.52	0.57	0.69	0.63	0.49	0.56	0.65	-	0.73	-	0.30	-	0.44	-	0.44	-	0.49
	Sample 12	-	pH	-	-	7.01	7.16	7.31	7.43	7.44	7.42	7.52	7.43	7.50	7.57	-	7.75	-	7.79	-	8.16	-	8.65	-	8.16
			EC x 10^3	-	-	0.41	0.42	0.40	0.46	0.51	0.61	0.61	0.45	0.55	0.61	-	0.72	-	0.29	-	0.44	-	0.42	-	0.49

Cont'd

	Leachate Sample No.	Depth (cm)		Before the Test		During the Test																				
						July 1981																		August		
				13	14	15*	16	17	18	19	20	21	22	23	24*	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.7	73	20	pH	0	0	6.91	6.77	6.68	6.82	6.68	6.75	6.85	6.86	6.80	6.78	-	6.87	-	6.91	-	6.92	-	6 96	-	6.93
			EC x 10^3	0	0	1.20	1.90	2.36	2.51	2.57	2.39	2.27	2.20	2.72	2.69	-	2.72	-	3.59	-	3.24	-	3.38	-	3.55
	74	20	pH	0	0	6.97	6.93	6.91	6.91	7.01	6.95	6.93	6.85	6.93	7.03	-	6.91	-	6.91	-	7.04	-	6.82	-	6.88
			EC x 10^3	0	0	1.04	1.24	1.32	1.26	1.73	2.16	2.44	2.29	2.22	3.35	-	2.46	-	2.74	-	1.63	-	2.00	-	2.22
	75	20	pH	0	0	7.03	6.75	6.75	6.81	6.85	6.77	6.77	6.71	6.86	6.91	-	6.77	-	6.60	-	6.88	-	6.87	-	6.89
			EC x 10^3	0	0	1.23	2.14	2.69	2.72	3.43	4.47	4.86	4.21	3.17	3.42	-	4.57	-	5.17	-	3.16	-	3.63	-	3.96
	76	40	pH	7.26	0	7.39	7.22	6.98	6.92	6.96	7.09	7.08	7.08	7.12	7.23	-	7.14	-	7.10	-	7.15	-	7.10	-	7.26
			EC x 10^3	4.39	0	1.05	1.99	2.84	3.44	3.46	3.45	3.41	3.65	3.39	3.43	-	3.34	-	2.55	-	2.35	-	2.53	-	2.75
	77	40	pH	6.85	0	7.43	7.02	6.90	6.87	6.83	6,84	6.84	6.92	6.83	6.95	-	7.12	-	7.06	-	7.04	-	6.93	-	7.14
			EC x 10^3	3.45	0	0.87	2.06	2.72	2.95	3.07	3.24	3.31	3.29	3.31	2.32	-	3.28	-	3.31	-	3.21	-	3.20	-	3.25
	78	40	pH	6.72	6.89	6.81	6.76	6.77	6.68	6.77	6.70	6.73	6.69	6.78	7.02	-	7.06	-	7.02	-	7.15	-	7.03	-	7.24
			EC x 10^3	5.27	5.20	4.32	4.99	5.26	5.23	5.35	5.59	5.59	5.49	5.59	5.68	-	5.69	-	5.72	-	5.76	-	5.68	-	5.78
	79	60	pH	7.50	7.38	7.35	6.93	7.02	7.01	7.04	7.03	7.02	7.02	7.04	7.16	-	7.31	-	7.09	-	7.20	-	7.26	-	7.36
			EC x 10^3	3.74	4.21	1.36	1.27	1.29	2.32	2.23	2.28	2.13	2.25	2.07	2.14	-	2.17	-	2.67	-	2.78	-	2.97	-	3.20
	80	60	pH	6.67	6.60	6.94	6.62	6.84	6.82	6.73	6.84	6.84	6.91	6.86	6.91	-	7.04	-	6.92	-	7.10	-	7.04	-	7.02
			EC x 10^3	4.75	4.78	1.84	1.67	3.00	3.00	2.92	1.99	1.97	2.02	1.83	1.80	-	1.78	-	2.45	-	2.34	-	2.35	-	2.47
	81	60	pH	6.57	6.58	6.62	6.64	6.70	6.73	6.71	6.69	6.67	6.72	6.65	6.90	-	7.01	-	7.00	-	7.01	-	6.90	-	7.14
			EC x 10^3	6.43	6.50	5.41	6.15	6.23	6.18	6.29	6.44	6.29	6.24	6.26	6.34	-	6.26	-	6.27	-	6.44	-	6.32	-	6.40
	82	100	pH	7.20	7.46	7.27	7.12	7.06	6.97	7.07	7.04	7.05	6.93	6.92	6.92	-	7.07	-	7.25	-	7.35	-	7.20	-	7.43
			EC x 10^3	5.80	6.69	5.60	5.20	5.05	5.07	5.13	5.14	5.17	5.05	5.10	4.95	-	4.94	-	5.42	-	5.81	-	5.85	-	5.99
	83	100	pH	6.82	7.00	6.86	6.95	6.96	7.03	7.06	7.03	7.05	7.11	7.07	7.25	-	7.30	-	7.24	-	7.46	-	7.38	-	7.39
			EC x 10^3	7.36	7.63	6.60	6.43	6.48	6.36	6.37	6.52	6.49	6.18	6.32	6.43	-	6.40	-	6.55	-	6.72	-	6.57	-	6.70
	84	100	pH	7.68	7.70	7.36	7.51	7.49	7.45	7.44	7.52	7.43	7.41	7.34	7.46	-	7.42	-	7.81	-	7.72	-	7.60	-	7.78
			EC x 10^3	6.65	6.97	1.61	3.92	3.91	4.38	4.64	5.04	4.68	4.67	4.27	4.30	-	4.25	-	4.56	-	4.90	-	4.72	-	5.30
Plot No.7 Surface Water	Sample 13	-	pH	-	-	6.49	6.71	6.77	7.03	7.11	7.42	7.43	7.13	7.32	7.33	-	7.64	-	7.92	-	8.02	-	8.35	-	8.13
			EC x 10^3	-	-	0.83	0.94	0.89	0.97	1.23	1.43	1.51	0.95	1.20	1.35	-	1.69	-	1.92	-	0.90	-	1.11	-	1.18
	Sample 14	-	pH	-	-	6.56	6.74	6.91	6.96	7.25	7.46	7.62	7.36	7.46	7.64	-	7.78	-	7.98	-	8.08	-	8.69	-	8.00
			EC x 10^3	-	-	1.06	1.21	1.03	1.20	1.44	1.63	1.69	1.00	1.26	1.50	-	1.86	-	1.98	-	0.91	-	1.15	-	1.24

Cont'd

	Leachate Sample No.	Depth (cm)		Before the Test		During the Test																				
						July 1981																		August		
				13	14	15*	16	17	18	19	20	21	22	23	24*	25x	26	27x	28	29x	30	31x	1	2x	3
Plot No.8	85	20	pH	0	0	6.87	6.55	6.57	6.57	6.60	6.64	6.71	6.65	6.68	6.77	-	6.85	-	6.92	-	6.84	-	6.93	-	6.90
			EC x 10^3	0	0	1.03	1.60	1.93	1.99	2.05	2.06	2.10	2.08	2.15	2.19	-	2.15	-	1.92	-	1.28	-	1.66	-	1.80
	86	20	pH	0	0	7.12	6.95	6.85	6.81	6.91	6.91	7.02	6.90	6.92	6.95	-	6.94	-	6.99	-	7.13	-	7.08	-	7.07
			EC x 10^3	0	0	1.10	1.39	1.50	1.47	1.38	1.42	1.47	1.49	1.33	1.39	-	1.49	-	2.20	-	0.94	-	1.20	-	1.27
	87	20	pH	0	0	7.13	6.89	6.84	6.76	6.71	6.76	6.89	6.73	6.79	6.81	-	6.78	-	6.82	-	6.86	-	7.07	-	6.85
			EC x 10^3	0	0	1.25	2.02	2.25	2.39	2.46	2.56	2.42	2.81	2.24	2.34	-	2.32	-	2.65	-	1.82	-	2.03	-	2.20
	88	40	pH	6.51	6.72	7.07	6.83	6.75	6.73	6.66	6.67	6.67	6.67	6.83	6.92	-	6.88	-	6.73	-	6.92	-	7.77	-	7.16
			EC x 10^3	3.87	4.07	0.94	2.06	2.57	2.66	2.65	2.69	2.89	2.90	1.80	1.92	-	2.21	-	2.80	-	1.04	-	1.30	-	1.41
	89	40	pH	6.62	6.86	6.98	6.75	6.16	6.82	6.90	6.68	6.67	6.72	6.71	6.93	-	6.81	-	6.87	-	7.10	-	7.05	-	7.08
			EC x 10^3	9.62	9.66	1.92	1.05	3.03	2.98	2.17	5.38	6.59	6.82	6.87	6.98	-	7.32	-	8.18	-	4.61	-	4.84	-	4.56
	90	40	pH	6.56	6.33	6.86	6.71	6.74	6.76	6.52	6.55	6.56	6.73	6.66	6.79	-	6.67	-	6.75	-	7.03	-	7.12	-	7.04
			EC x 10^3	10.56	10.61	2.71	2.80	3.13	3.49	6.15	7.99	8.92	6.80	6.03	6.37	-	7.98	-	8.36	-	3.31	-	3.45	-	3.46
	91	60	pH	7.21	7.06	7.02	6.93	6.91	6.87	6.87	6.89	6.91	6.87	6.95	7.03	-	7.15	-	7.04	-	7.15	-	7.30	-	7.45
			EC x 10^3	5.12	5.17	4.00	3.51	3.42	3.41	3.53	3.37	3.51	3.34	3.28	3.30	-	3.37	-	4.19	-	2.80	-	2.76	-	2.75
	92	60	pH	6.82	6.78	6.87	6.83	6.73	6.80	6.73	6.85	6.81	6.87	6.83	7.02	-	6.87	-	6.98	-	7.01	-	7.24	-	7.21
			EC x 10^3	9.56	10.11	6.75	5.00	3.68	2.82	2.74	3.60	4.75	4.55	4.84	4.67	-	4.25	-	4.57	-	1.99	-	2.96	-	3.38
	93	60	pH	6.70	6.56	6.66	6.55	6.56	6.64	6.60	6.57	6.66	6.63	6.82	6.87	-	6.83	-	6.74	-	7.11	-	7.22	-	7.12
			EC x 10^3	13.52	13.37	8.17	11.57	13.46	10.94	13.56	13.68	13.75	11.57	7.44	9.05	-	11.45	-	12.85	-	4.64	-	5.12	-	4.99
	94	100	pH	7.02	7.08	7.06	7.08	7.19	7.14	7.14	7.22	7.32	7.18	7.26	7.38	-	7.38	-	7.28	-	7.42	-	7.45	-	7.44
			EC x 10^3	9.24	9.67	9.21	9.33	8.68	9.02	8.78	8.84	8.51	8.27	8.17	8.21	-	8.16	-	8.20	-	7.69	-	7.20	-	7.39
	95	100	pH	7.18	7.19	7.21	7.23	7.28	7.28	7.32	7.41	7.42	7.26	7.36	7.52	-	7.61	-	7.47	-	7.77	-	7.70	-	7.81
			EC x 10^3	6.97	7.22	6.30	6.52	6.46	6.28	6.29	6.36	6.36	6.39	5.87	6.11	-	6.15	-	6.12	-	5.71	-	5.24	-	5.33
	96	100	pH	6.93	6.89	6.86	6.91	6.90	6.92	6.96	6.91	6.99	7.02	6.95	7.02	-	7.05	-	7.06	-	7.23	-	7.42	-	7.23
			EC x 10^3	12.22	16.63	11.70	14.22	14.97	12.30	14.06	17.11	18.20	17.01	14.77	14.41	-	14.44	-	18.10	-	15.81	-	15.76	-	17.36
Plot No.8 Surface Water	Sample 15	-	pH	-	-	6.62	6.65	6.83	6.91	7.06	7.07	7.55	7.26	7.12	7.18	-	7.79	-	7.92	-	7.42	-	6.68	-	8.12
			EC x 10^3	-	-	1.08	1.01	0.79	0.87	1.00	1.19	1.22	0.95	0.89	1.12	-	1.54	-	1.72	-	0.68	-	0.73	-	0.85
	Sample 16	-	pH	-	-	6.58	6.85	7.02	6.96	7.19	7.31	7.41	7.32	7.20	7.34	-	7.64	-	8.08	-	7.42	-	8.57	-	8.18
			EC x 10^3	-	-	0.89	1.04	0.84	0.91	1.03	1.33	1.45	0.77	0.96	1.14	-	1.69	-	1.74	-	0.69	-	0.83	-	0.88

Table B-11 Report on Soil Analyses

Plot No.	Field Description: Symbol of Sample	Depth cm.	Particle Size Hydrometer: Sand %	Silt %	Clay %	Text. Class Lab. Hyd.	pH: H_2O 1:1	KCl 1:1	Sat. Extract Elec. Cond. EC×10	Sat % S.P.	Saturation Extract: Soluble Cations meq/l: Na	Ca+Mg	Ca	K	Soluble Anions meq/l: CO_3	HCO_3	SO_4	Cl	SAR	CEC meq/100g.	ESP	Depth (cm.)	Bulk Density g/cm³ (B.D.)	Moisture of Soil g/100ml. /1
1	P-10-1	0-20	16.4	37.4	46.2	C	5.7	4.9	2.2	42.4	17	3.4	1.5	0 05	0	0.79	6.0	9.9	13	21	6.4	-	-	-
	-2	20-40	13.6	35.6	50.8	C	6.3	5.6	2.9	44.3	25	4.3	1.2	0 03	0	1.1	12	14	17	24	12	-	-	-
	-3	40-60	20.4	28.4	51.2	C	7.0	6.0	3.6	52.3	32	2.3	0.80	0.21	0	2.2	12	17	30	31	18	-	-	-
	-4	60-80	17.6	29.4	53.0	C	7.2	6.3	3.6	60.0	33	1.7	0.74	0.21	0	1.6	12	18	36	29	22	-	-	-
	-5	80-100	17.6	31.0	52.0	C	7.6	6.5	3.2	76.9	33	1.4	1 1	0.18	0.45	1.6	13	15	39	30	24	-	-	-
	P-11-1	0-20	17 8	31.6	50.6	C	7.0	6.7	1.7	52.6	9 2	8.3	6.1	0.44	0.90	3.2	6.2	6.9	4.5	27	< 2	20	1.51	40.01
	-2	20-40	17 2	32 0	50.8	C	7.1	6.5	2.2	56.7	9.7	11	6.8	0.29	0.27	2.2	6.8	11	4.1	32	2.1	40	1.48	41.80
	-3	40-60	15.0	31.8	53.2	C	7.1	6.6	1.9	52.0	8.5	9.4	5.6	0.40	0.27	2.0	4.5	10	3.9	31	< 2	60	1.47	41.0
	-4	60-80	15.4	31.8	52.8	C	7.1	6.1	1.4	51.8	5.7	7.4	3.9	0.41	0.27	2.1	5.0	6.4	3.0	30	< 2	-	-	-
	-5	80-100	18.4	30.8	50.8	C	7.4	6.1	1.2	54.0	7.1	6.1	2.0	0.59	0.45	1.6	7.4	5.5	4.4	29	< 2	-	-	-
2	P-22-1	0-20	10.6	37.8	51.6	C	5.8	4.7	2.5	47.3	32	6.3	3.4	0.63	0	2.3	3.9	14	9.6	15	6.7	-	-	-
	-2	20-40	27 4	23.6	49 0	C	4 6	3 8	2.6	52.4	21	3.7	1.6	0.23	0	0.16	8.2	18	10	17	3 5	-	-	-
	-3	40-60	10 8	30 2	59.6	C	4.7	3.7	3.1	57.5	30	2.6	0.85	0 20	0	0.77	5.1	21	26	23	8 6	-	-	-
	-4	60-80	10.2	28.0	61 8	C	5.7	4.8	5.2	57 3	45	4.0	0.86	0	0	0.45	3.9	38	32	18	22	-	-	-
	-5	80-100	27.4	36.6	56.0	C	6.6	5.7	4 7	63.7	49	2.0	0.68	0 19	0	0 68	4.8	38	49	30	33	-	-	-
	P-23-1	0-20	29.4	29.0	41.6	C	5.3	4 5	3.0	44 2	21	6.8	4 0	0.15	0	0.68	5 0	19	11	15	5 6	20	1.38	32.15
	-2	20-40	31.2	23.6	45.2	C	4.7	3.7	3.7	54.6	30	4.8	1.7	0.24	0	0.41	5.8	27	19	16	10	40	1.45	36.05
	-3	40-60	10.6	31.8	57.6	C	4.8	3.8	4.0	61.5	33	3.7	1.7	0.03	0	0.27	2.7	28	24	19	13	60	1.51	37.22
	-4	60-80	29.6	15.0	55 4	C	5.7	4.9	3.9	73.1	34	1.8	0.68	0 18	0	0.27	4.5	28	36	23	24	-	-	-
	-5	80-100	22.6	24.6	52.8	C	6 6	5.9	4.8	61.8	44	3.3	0.67	0.18	0	0.54	4.1	34	41	32	31	-	-	-
3	P-34-1	0-20	45.0	15.6	39 4	SC	5.1	4 6	4.1	45.5	24	6.3	3.2	0 41	0	0.95	4.6	29	19	16	7.0	-	-	-
	-2	20-40	37 2	22 6	40.2	C	4.8	3.9	3.8	47 4	30	3.4	2.0	0.66	0	0.45	5.1	27	21	13	9.1	-	-	-
	-3	40-60	39.4	19.4	41.2	C	5.1	4.2	3.4	55.1	29	1.7	0.37	0 21	0	0.18	4.1	25	31	16	14	-	-	-
	-4	60-80	20.2	28.6	51.8	C	6.2	5.3	3.6	60.8	33	1.4	0.80	0.19	0	0.45	4.5	24	39	21	25	-	-	-
	-5	80-100	20.4	29.0	50.6	C	6.8	5 9	3 1	59.5	26	1.4	0.40	0.19	0	0.68	3.8	22	31	21	30	-	-	-
4	P-35-1	0-20	14.6	37.8	47 6	C	5 4	4 6	1 5	45.9	8 7	5.2	1.4	0.09	0	1.1	4.1	8.0	5.1	16	3.6	20	1.57	16.34
	-2	20-40	14.2	35 8	50.0	C	5 2	4.4	1.4	44.3	7.7	7.8	2.3	0.04	0	0	1.4	8.6	6.5	13	3.4	40	1.54	38.86
	-3	40-60	10.0	40.6	49.4	SiC	5.1	4.0	1.3	50.5	10	2.0	1 4	0.02	0	0.36	2.4	7 9	10	15	7.1	60	1.54	38.44
	-4	60-80	16.4	30.0	53.6	C	6.4	5.3	1.7	56.4	15	1.3	0.57	0 21	0	1 3	2 6	10	19	21	21	-	-	-
	-5	80-100	24.2	22.8	53.0	C	7 2	6.0	2.2	56 9	21	1 4	0 57	0 18	0	1.6	5.8	13	25	21	37	-	-	-
4	P-46-1	0-20	13.0	37.4	49 6	C	5.3	4.5	3.0	44.4	23	4.8	2.6	0 11	0	0 90	5 6	19	15	15	5 0	-	-	-
	-2	20-40	12.2	33 6	54.2	C	4.5	3.7	2.8	50 2	26	2.6	1 4	0.24	0	0 22	3.3	20	22	14	5.1	-	-	-
	-3	40-60	21.6	28.6	49.6	C	4.6	3.8	4.0	54.6	35	4.2	1.4	0.25	0	0 27	4.8	28	24	15	4.7	-	-	-
	-4	60-80	12.0	31.2	56.8	C	4.9	3.9	4.0	61.6	35	1.7	1 1	0 03	0	0	2.7	29	38	17	9.2	-	-	-
	-5	80-100	27.2	22.6	50.2	C	5.8	5.0	3.8	63.7	33	1.4	0.68	0.18	0	0.22	4.1	28	39	18	20	-	-	-
	P-47-1	0-20	16.6	33 8	49 6	C	5 6	4.8	5.2	46.8	40	9.4	6.7	0.20	0	1.1	3.8	37	38	15	4.2	20	1.49	16.74
	-2	20-40	20.0	28.2	51.8	C	4.6	3.8	5.5	51.3	46	6 5	3.1	0.09	0	0	1.7	43	26	13	7.4	40	1.49	40.19
	-3	40-60	11.4	33.6	55.0	C	4.9	4.0	4.5	64.1	39	3 7	2 3	0 04	0	0	3.4	35	39	15	8.7	60	1.32	38 65
	-4	60-80	12.4	29.6	58.0	C	5.9	5.2	5.5	63.1	48	3 4	1.1	0.01	0	0.05	2.9	40	37	16	19	-	-	-
	-5	80-100	12.4	30.4	57.2	C	6.1	5.5	5.5	69.6	49	3.1	2.3	0	0	0.23	4.8	40	39	20	18	-	-	-

/1 --- Moisture of Soil = Percent moisture/Bulk volume of soil
Volume of soil core = 100 ml.

Cont'd

Plot No.	Field Description: Symbol of Samples	Depth cm	Particle Size Hydrometer: Sand %	Silt %	Clay %	Text Class Lab. Hyd.	pH: H_2O 1:1	pH: KCl 1:1	Sat Extract Elec Cond ECxlO	Sat % S.P.	Saturation Extract: Soluble Cations meq/l: Na	Ca + Mg	Ca	K	Soluble Anions meq/l: CO_3	HCO_3	SO_4	Cl	SAR	CEC meq/100g	ESP	Depth (cm)	Bulk Density g/cm³ (B.D.)	Moisture of Soil g/100ml /1
5	P-58-1	0-20	26 2	26 2	47 6	C	5 6	4 9	2 0	49 3	15	4.2	2 8	0 30	0	1 4	5 1	12	10	18	2.2	-	-	-
	-2	20-40	29 6	31 0	39 4	CL	5 8	4 9	3 2	43 2	26	4 3	2 4	0 30	0	1.1	8.4	17	18	18	4.9	-	-	-
	-3	40-60	16 0	27 6	56 4	C	6 1	5 4	4.5	46 4	39	6 0	3.4	0 05	0	0 90	12	25	23	20	18	-	-	-
	-4	60-80	8 2	31 2	60 6	C	7 3	6 6	5 3	52.3	47	5 7	3 4	0 04	0 45	3 6	11	30	28	28	15	-	-	-
	-5	80-100	11.8	28 4	59.8	C	7 1	6 6	5 5	57 3	54	2 8	1 7	0 19	0	1.0	11	36	46	27	22	-	-	-
	P-59-1	0-20	13 8	35 8	50.4	C	5 3	4 7	5.0	51 6	33	14	9.1	0.27	0	0.90	5.1	34	13	21	2 5	20	1.52	34.50
	-2	20-40	11.8	31.2	55 0	C	6.8	5.9	5 0	48.3	41	7.1	4.3	0.11	0	0.85	2.6	37	22	22	3 7	40	1 53	38 68
	-3	40-60	31 4	16.4	52.2	C	4 6	3 8	4.3	62.1	44	3 1	1 6	0.22	0	0 77	13	32	15	24	6.4	60	1.54	36.26
	-4	60-80	6.8	28.6	64 6	C	5 6	4 7	5 9	57 9	48	2 8	0.85	0.18	0	0 86	4.6	41	41	22	18	-	-	-
	-5	80-100	7.6	29 8	62.6	C	6 5	5.7	5 9	54 8	55	3 1	2 0	0 01	0	0 77	3.9	47	44	24	22	-	-	-
6	P-70-1	0-20	14 6	36 6	48 8	C	7.1	6 5	1.1	55 2	3.3	10	1 7	0 46	0 45	7.1	2 9	2 0	1 5	27	7	-	-	-
	-2	20-40	14 6	32 8	52 6	C	7 3	6 6	1 4	54 1	5 5	8 0	5 1	0 45	0 45	2 5	3 4	5.6	2 7	27	< 2	-	-	-
	-3	40-60	15 4	32 7	52 4	C	7 3	6 8	1 5	55 4	6 2	6 5	4 3	0 49	0 27	2 3	5 5	6 5	3 0	27	< 2	-	-	-
	-4	60-80	24 8	36 4	48 8	C	7 3	6 5	1 2	51 2	5 5	5 7	4 0	0 43	0 45	2 3	4 5	3 6	3 3	27	< 2	-	-	-
	-5	80-100	16 6	31 6	51 8		7 5	6 8	0 90	54.7	4.6	4 6	3 1	0 45	0 90	1 8	2.1	4.4	3 0	28	< 2	-	-	-
	P-71-1	0-20	16 6	33 8	49.6	C	6 6	5.9	1 2	50 4	6 8	4 3	3 1	0 32	0 18	2 7	2 2	4 1	4 6	25	< 2	20	1 59	38 04
	-2	20-40	15 0	31 4	53 6	C	7 3	6 5	1 9	55 6	13	6 0	4 0	0 57	0 18	3.0	6 7	7 5	7 5	30	2 3	40	1 57	39 05
	-3	40-60	17 2	29 2	53 6	C	7 3	6.6	2 2	54 8	16	6 0	2 8	0 72	0 63	2 2	9 6	7 8	9 2	28	3 9	60	1.65	36.16
	-4	60-80	15 8	28 6	55 6	C	7 4	6 6	2.2	60 6	19	4 9	3 7	0 66	0	3 2	8 7	8 3	12	30	5 0	-	-	-
	-5	80-100	17 2	27 6	55 2	C	7 5	6 6	2 2	63 3	18	3 7	2 0	0 39	0 45	2.5	9 3	7.3	13	31	7 7	-	-	-
7	P-82-1	0-20	27.6	29.8	42 6	C	5 6	4.7	2.4	51.7	17	5.1	3.3	0.17	0	2.0	5.8	12	11	20	3.0	-	-	-
	-2	20-40	33 2	22 6	44 2	C	5 3	4 2	2 3	44.7	1 9	2 0	1 1	0 21	0	2.95	5 3	13	19	18	7 8	-	-	-
	-3	40-60	32 0	20 4	47 6	C	6 2	5 3	2 9	44 8	24	2 0	1 1	0	0	3.1	6.1	16	24	23	16	-	-	-
	-4	60-80	12 8	30 8	56 4	C	7 2	5.8	2.9	50.9	26	1 1	0.51	0.18	0	1 3	4 8	18	35	24	19	-	-	-
	-5	80-100	40.8	12 0	47 2	C	7.4	5 9	2 6	53.1	25	0.74	0 34	0 20	0	0.72	4 6	16	41	25	20	-	-	-
	P-83-1	0-20	41 0	19 6	39 4	CL	5.6	4 8	2 4	44.7	18	1.7	2.0	0.38	0	0 90	9.6	14	13	20	3.2	20	1.58	38.48
	-2	20-40	42 8	14 8	42.4	C	4.9	4.0	2.5	49.3	22	2.7	1 7	0 25	0	0 68	3 4	17	19	17	3.7	40	1.45	42.17
	-3	40-60	19 2	29.6	53 2	C	5.4	4.5	2 5	65 2	22	1.1	0 51	0 19	0	0 37	2 7	13	30	20	2 3	60	1 55	40 59
	-4	60-80	21.2	26 4	52 4	C	4 8	3.8	2.5	53 9	19	2.6	0 83	0 04	0	0 09	1.4	17	17	17	4 8	-	-	-
	-5	80-100	17 0	32 0	51 0	C	6.1	5.2	3.1	49 8	27	2.3	1.1	0.01	0	0 59	2.9	22	25	20	11	-	-	-
8	P-94-1	0-20	16.0	37 4	46 6	C	5.2	4 4	2 6	42 3	20	3.4	1 4	0 15	0	0 72	6 9	16	15	17	7.0	-	-	-
	-2	20-40	15.6	33 4	51 0	C	5 1	3.9	2 2	61 6	18	1.1	0 46	0 21	0	0.13	6 9	14	24	17	6.5	-	-	-
	-3	40-60	20.4	28 2	51 4	C	6 2	5 1	2 8	58 0	24	1.4	0 68	0 30	0	0 27	6.9	18	29	21	10	-	-	-
	-4	60-80	14.0	31 4	54 6	C	6.7	5 8	3 0	52 8	25	1.4	0 40	0 21	0	0 27	3 6	21	30	26	12	-	-	-
	-5	80-100	28 2	24.0	47.8	C	6 9	5.7	3 4	59 9	30	1.6	0.74	0 21	0	0 45	3 8	23	34	26	16	-	-	-
	P-95-1	0-20	12.8	40.8	46.4	SIC	5 9	4 9	1.8	41.8	13	4 0	2.6	0 19	0	2 1	5 7	9 7	9 2	20	3.7	20	1 53	38 86
	-2	20-40	42.6	16.4	41 0	C	4 9	3 9	1 8	49 8	16	1 5	1.1	0 24	0	0 45	6 9	11	18	18	4.1	40	1.55	39 16
	-3	40-60	31.8	11.8	56 4	C	5 4	4.2	2 2	56.8	18	1 7	0 85	0.21	0	0.45	3 8	12	20	21	12	60	1.53	38.53
	-4	60-80	12.4	31.4	56.2	C	7 0	6 0	2 5	49 0	22	1 7	0 85	0	0	0 68	5 7	14	24	27	18	-	-	-
	-5	80-100	14.0	29.6	56 4	C	7.3	6 4	2 1	56 8	19	1 1	0.26	0 01	0	0 77	4.3	14	26	26	25	-	-	-

Cont'd

Salinity Study Sample Plot A Field Leaching test During the test

Plot No	Field Description: Symbol of Samples	Depth cm	pH: H_2O 1:1	pH: KCl 1 1	Sat Extract Elec Cond ECx10^3	Sat. % S P	Saturation Extract: Soluble Cation meq/l: Na	Ca^{++} Mg^{++}	Ca	K	Soluble Anions meq/l: CO_3	HCO_3	SO_4	Cl	SAR	Depth (cm)	Moisture of Soil g/100 ml Z^1
	P-10-D-1	0-20	5 8	4 8	2 1	41 9	16	6.0	2 6	0 01	0	2 0	11	8 5	9 2	-	- -
	-2	20-40	6 1	4 9	2 6	47.2	25	3 4	1,1	0 10	0	1 6	14	13	19	-	-
	-3	40-60	6.7	5.4	3.6	51 9	35	3 1	1 7	0 11	0	2 3	12	21	28	-	-
	-4	60-80	7.1	5.9	3.9	59 5	36	1,7	1 1	0 03	0 54	1 6	10	24	37	-	-
	-5	80-100	7.3	6 0	3 2	75 1	32	3 1	0.57	0 02	0 90	4 7	11	17	26	-	-
1																	
	P-11-D-1	0-20	6.5	5.5	1 1	50 3	5 0	5 7	4 8	0 19	0	3 5	4 8	4 6	3.0	20	41 63
	-2	20-40	6 8	5.9	1 4	58 1	6 4	7.4	6 3	0 24	0	3 8	3 3	6 0	3 3	40	39 30
	-3	40-60	6 7	5 6	1 5	55 1	7 0	8 0	6 5	0 43	0	3 4	6 7	6 8	3 5	60	39 43
	-4	60-80	7 1	6 0	1 3	58 3	6 5	4 7	4 3	0 36	0 54	2 4	4 3	5 8	4 2	-	-
	-5	80-100	7 2	6.1	1.2	57 8	6 1	4 8	3 7	0 33	0 54	2 2	7 5	4 7	3 9	-	-
	P-22-D-1	0-20	5 5	4 5	2 9	46 0	19	5.7	4 0	0 20	0	1 3	8 4	17	11	-	-
	-2	20-40	4 7	3 9	3,4	52 4	24	5 4	3 7	0 12	0	0 81	6 8	23	15	-	-
	-3	40-60	4.6	3 8	3 3	58 7	29	6 3	1 4	0 08	0	0 22	4 5	25	16	-	-
	-4	60-80	5 2	4 3	3 6	73.5	30	2 6	0 85	0 04	0	0 54	5 0	27	26	-	-
	-5	80-100	6 1	5.2	4 2	70 8	35	2 6	0 85	0 03	0	0 54	2 4	31	31	-	-
2																	
	P-23-D-1	0-20	5 4	4 5	2 2	44 6	18	5 4	2 3	0	0	1 6	3 8	14	11	20	39.45
	-2	20-40	4 7	4 0	2 6	53 0	27	4 8	2 0	0 08	0	0 27	7 7	26	17	40	38 09
	-3	40-60	5 0	4 0	3.7	61 1	31	3 1	1 4	0 05	0	0 54	5 8	28	25	60	34 18
	-4	60-80	5 8	4,7	3.9	67 5	32	2 8	1 1	0 02	0	0 27	2,4	29	27	-	-
	-5	80-100	6.4	5 3	4.0	66 1	34	2 3	0 57	0 03	0	0 27	4.1	31	32	-	-
	P-34-D-1	0-20	5,3	4,5	3,2	44 2	26	6 3	4,3	0 08	0	1,3	6 8	22	15	-	-
	-2	20-40	5 1	4 2	3 8	42 9	32	5 7	3 7	0	0	0 45	2 1	28	19	-	-
	-3	40-60	5 2	4 0	3 6	46 3	34	3 4	1 7	0 07	0	0 45	6 0	28	26	-	-
	-4	60-80	5 7	4 7	3.4	59 5	29	2.3	1 1	0 03	0	0 54	6 2	25	27	-	-
	-5	80-100	6 4	5 4	3.4	59 6	29	2 6	0 57	0 02	0	0 27	5 8	23	25	-	-
3																	
	P-35-D-1	0-20	5 3	4 6	1.2	43 3	6 8	4 8	3 7	0 10	0	1 3	6 3	6 5	4 4	20	39 44
	-2	20-40	5 1	4 3	1 5	46 0	8 6	4 0	3 1	0 07	0	0 22	2 6	10	6 1	40	39 21
	-3	40-60	5 3	4 2	1 6	44 9	11	2.3	0 85	0 04	0	0 54	5 1	10	10	60	41 03
	-4	60-80	6 3	5 2	1.5	60 1	13	1 4	0 28	0 02	0	0 27	5 8	10	16	-	-
	-5	80-100	6 7	5 8	1.9	59.0	16	1 4	0 28	0 12	0	0 45	7 7	13	19	-	-
	P-46-D-1	0-20	5 4	4 4	2 2	44 5	18	4 0	2 6	0 01	0	1 3	3 2	15	13	-	-
	-2	20-40	4,9	3,9	2 3	51 7	16	4 0	2 6	0 09	0	0 81	2 6	16	11	-	-
	-3	40-60	4,7	3 8	2 5	57 4	19	3 7	1 7	0 07	0	0 27	3 2	19	14	-	-
	-4	60-80	7 1	6 1	5 6	60 3	47	4 0	1 7	0 04	0	1 6	12	36	33	-	-
	-5	80-100	5.8	4 8	3.4	72 2	28	1 7	0 57	0 02	0	0.27	2.6	24	30	-	-
4																	
	P-47-D-1	0-20	5 6	4.6	2 9	44 7	21	4 6	2 6	0 17	0	1 1	7 0	19	14	20	41.12
	-2	20-40	4 8	3 8	3 1	52 7	25	4,6	2 3	0.03	0	0.27	5,5	22	16	40	41.18
	-3	40-60	4 7	3 9	3 0	52 1	25	3 4	1 4	0 08	0	0.22	2,9	22	19	60	41.04
	-4	60-80	5.2	4.3	4 3	61 1	37	3,3	1 3	0 08	0	0,54	9,8	31	30	-	-
	-5	80-100	6.1	5 1	4 9	67.4	44	2.8	1 4	0 09	0	0 27	5 3	36	37	-	-

Cont'd

Salinity Study Sample Plot A Field Leaching test During the test

Plot No.	Field Description: Symbol of Samples	Depth cm	pH: H_2O 1:1	pH: KCl 1:1	Sat Extract Elec. Cond ECx10^3	Sat % S P	Saturation Extract: Soluble Cation meq/l: Na	Ca + Mg	Ca	K	Soluble Anions meq/l: CO_3	HCO_3	SO_4	Cl	SAR	Depth (cm)	Moisture of Soil g/100 ml l^1
5	F-58-D-1	0-20	5 8	4 8	1 8	48 0	12	4.3	2 6	0 07	0	3 0	3 6	8 5	8 2	-	-
	-2	20-40	5.7	4.8	3 1	45.3	25	5 4	3 4	0 12	0	1 3	12	16	15	-	-
	-3	40-60	6.3	5 2	5 1	50 8	47	5.1	2.3	0.07	0	1 3	13	31	29	-	-
	-4	60-80	6.9	5 9	5.8	52.6	51	4.0	2 3	0 10	0	1 6	11	33	36	-	-
	-5	80-100	5.0	4 0	3 1	65 9	28	3 1	1.1	0 08	0	0 27	1.5	24	22	-	-
	F-59-D-1	0-20	5 2	4 5	3 4	47 4	29	8 0	4.8	0 12	0	0 90	8 4	26	15	20	33.26
	-2	20-40	4 8	4 1	5 0	50 7	41	9.1	4 0	0	0	0 45	4.6	37	19	40	39.40
	-3	40-60	4.9	3 9	5.0	56.9	45	5 1	2 3	0 06	0	0 22	5 1	39	28	60	38.33
	-4	60-80	5.3	4.2	5.3	61.8	48	3.7	1 7	0 07	0	0 68	5 3	40	35	-	-
	-5	80-100	7.2	6 0	6.0	59.5	56	4 3	1 7	0 10	0 54	3 2	5 0	41	38	-	-
6	F-70-D-1	0-20	7.2	6 0	1.0	51 6	3 6	6.5	4 6	0 24	0 54	5 7	4 1	2 8	2.0	-	-
	-2	20-40	7.3	6 0	1.0	52.1	3.9	5 1	3 7	0 34	0 54	3 8	3 6	3.5	2.4	-	-
	-3	40-60	7.2	6.0	1.0	52.0	4.4	6.0	4.3	0 34	0 54	2.7	5 8	4 2	2.5	-	-
	-4	60-80	7.2	6 0	1.1	55 6	5.1	5 7	3 4	0.39	0 54	2 4	3 9	4 5	3.0	-	-
	-5	80-100	7.4	6 2	1 1	52 4	6 2	5 4	2 3	0 43	0 54	2 4	6 2	4 7	3.8	-	-
7	F-71-D-1	0-20	6 4	5 3	1.0	45 8	5 2	4 6	2.3	0 16	0	3 0	4 6	3.4	3 4	20	40.95
	-2	20-40	7.0	5 9	1 4	48 5	9 1	4.8	2 8	0 38	0 45	2 7	6 9	5.6	5.9	40	39 48
	-3	40-60	7 1	5 9	1 8	54 2	13	5 7	3 4	0 39	0	4 9	5 7	6.4	7.7	60	38.49
	-4	60-80	7.1	5.8	2.2	62.8	17	6 0	2 8	0.22	0.54	4.3	8.7	7.8	9.8	-	-
	-5	80-100	7.2	6 1	2.4	66 3	20	5 4	2 8	0.16	0.54	4 6	11	8 1	12	-	-
	F-82-D-1	0-20	5.5	4 6	1 9	43 0	14	4 3	2.3	0 10	0	2 0	6.3	9 1	9 5	-	-
	-2	20-40	5.3	4.3	2.1	43.4	18	2.0	0.85	0.06	0	0 81	7.2	12	18	-	-
	-3	40-60	6.5	5 1	2.7	39.1	25	1 7	0.57	0 10	0	1 6	4 3	16	27	-	-
	-4	60-80	7 2	5 9	2.6	43.6	22	4 0	0.28	0 11	0	0 27	4 5	18	16	-	-
	-5	80-100	7.2	5 7	2.4	48 7	22	2.0	0 28	0 10	0	1 6	3 8	15	22	-	-
8	F-83-D-1	0-20	5.6	4 8	2 2	42.9	15	5.1	3 4	0 18	0	1 9	4 1	12	9.4	20	36.19
	-2	20-40	5.0	3.9	2.2	47.5	18	3 7	1.7	0.02	0	0 54	3.9	15	13	40	41.87
	-3	40-60	4 8	3 8	2 4	53.3	20	2.3	1 1	0.05	0	0 27	3 9	16	19	60	40.54
	-4	60-80	5.2	4.2	2 6	63.6	24	2.6	0 85	0.09	0	1 3	3.4	17	20	-	-
	-5	80-100	5.9	4.9	2.6	60.4	24	2.0	0.85	0 11	0	0 68	4.3	18	24	-	-
	F-94-D-1	0-20	5.9	4.7	1.9	41 0	17	3 7	2.6	0 02	0	2 4	9.1	11	12	-	-
	-2	20-40	5 1	4.1	2.4	43.2	27	2.8	1.7	0 08	0	0.27	6.0	16	19	-	-
	-3	40-60	5.2	4.2	2 0	51.8	20	2.8	0 85	0 10	0	0.22	4.5	14	17	-	-
	-4	60-80	6.2	5.1	2.3	53.1	24	2.3	1.4	0 11	0	0.81	2.6	16	22	-	-
	-5	80-100	6.6	5.5	3.0	56 3	30	2.8	1 4	0 17	0	0 54	4 3	22	25	-	-
	F-95-D-1	0-20	6.0	4.9	1.8	42 4	16	5.3	2 8	0 03	0	4.6	5.0	8.5	10	20	40.76
	-2	20-40	4.8	3.8	1 8	43.5	17	3 4	1.4	0.04	0	0 81	5.3	11	13	40	40.06
	-3	40-60	5.2	4 0	1.7	56 3	17	1.4	0 57	0 13	0	0 22	4.8	11	20	60	41.92
	-4	60-80	6.7	5.4	2.4	47.7	24	1.7	0.57	0 13	0	2.4	5 3	11	26	-	-
	-5	80-100	6.6	5.5	2.2	51.6	22	1 4	0.85	0.14	0	0.81	4.3	14	26	-	-

Table B-12 Leachate Analyses

Date Sampled	Leachate collected from samplers installed at 20, 40, 60 and 100 cm depths in the plots During the test.																
	Field Description								Milliequivalent per litre meq/l								
	Plot No.	Leachate Sample No.	Depth cm.	pH	EC$\times 10^3$ at 25°C	TDS ppm.	SSP	SAR	RSC meq/l	Na	Ca+Mg	Ca	K	CO_3	HCO_3	SO_4	Cl
Jul.14/1981	1	1	20	7.43	1 32	860	58	4.7	0	7 8	5.6	2 1	0 14	0	2 0	4 6	5.5
		2	20	7.35	0 79	510	64	3 3	0	5 3	2.8	1 9	0.15	0	2 0	3.3	2 7
		3	20	7.59	1 11	690	45	2 9	0	4 7	5 4	2 6	0 23	0	4 3	1 9	4 4
		4	40	7.26	3 18	2080	72	11	0	22	8 3	3.4	0 08	0	3 4	10	13
		5	40	7.06	1 29	900	52	3 9	0	6 8	6 1	2.6	0.07	0	3 4	2.9	5.7
		6	40	7.43	1.40	960	48	3.4	0	6 3	6 7	3.1	0 23	0	5 4	2.6	5.3
		7	60	7.33	5.13	3150	81	18	0	40	9 6	4.0	0 04	0	5 6	13	26
		8	60	7.21	1 91	1830	56	6.0	0	14	11	3.2	0 21	0	8 3	4.6	14
		9	60	7.25	1 84	1160	58	5.5	0	11	7 9	2.6	0 17	0	6 1	2 4	8.0
		10	100	7.49	10.57	6410	92	25	0	94	8 3	1 7	0.01	0	21	20	57
		11	100	7 35	1.87	990	48	3 9	0	7 6	7 7	3 3	0 55	0	7.4	1 7	7.8
		12	100	7.21	3.18	1900	77	13	1 3	25	7 6	3 1	0.02	0	8 9	2.6	16
	2	13	20	8.49	1.42	1030	70	7.1	0	10	4.0	2.0	0,24	0	1.3	2.2	8.1
		14	20	7.05	1 32	1140	73	6.5	0	9 2	2 9	2.2	0.40	0	1 3	2.2	7.6
		15	20	7.20	0.99	600	62	4 8	0	6 7	3.9	2 0	0 17	0	1 1	1 9	5.6
		16	40	6.64	7.41	4570	84	25	0	59	11	5.8	0 09	0	2 0	4.3	53
		17	40	7.22	0 92	600	69	5 4	0	6 4	2 8	2 0	0 12	0	1 3	2 2	4.7
		18	40	7 36	0.92	550	70	5 7	0	6 6	2 7	2 2	0 15	0	1 6	1 7	4 6
		19	60	6 60	6 30	3930	81	21	0	48	11	4.3	0 02	0	1 8	1 7	45
		20	60	7.04	4.18	2650	85	20	0	33	5 7	2 8	0.08	0	1 9	1.7	32
		21	60	6.79	2 50	1950	83	14	0	19	3 7	2 6	0.10	0	1 6	2 6	15
		22	100	6.88	11 51	6960	89	27	0	99	13	8 5	0 04	0	5 9	1.9	86
		23	100	6 99	9 25	5840	87	24	0	7 5	11	8 5	0 04	0	3 4	2 1	69
		24	100	7 22	7 92	4460	87	30	0	67	9 7	4 6	0 01	0	7 7	2 2	53
Jul.15/1981	3	25	20	7.81	1 26	770	60	6 4	0	9 1	4 0	2.0	0.32	0	1 22	2 4	8.4
		26	20	7.08	0 84	410	65	4 9	0	5 8	2 8	2.0	0 33	0	1 35	0.69	3 9
		27	20	6.62	0 76	490	54	3.3	0	4 2	3 4	2.6	0,23	0	1 35	0 86	3.8
		28	40	7.23	0.81	550	64	5.0	0	6.2	3 1	1.7	0 42	0	1 26	2 4	3.2
		29	40	7.29	0 78	460	63	4 7	0	5 6	2 8	1 7	0.41	0	1.26	0.86	3.4
		30	40	6.78	1.25	780	69	6 9	0	8 2	3.4	2 3	0 22	0	1 58	1 5	6.9
		31	60	7 03	1.57	900	77	9 3	0	12 2	3.4	2.6	0 26	0	2 62	1 5	7.5
		32	60	7.12	0,90	630	67	5.2	0	6.2	2 8	1 7	0.27	0	1.67	0.86	4.6
		33	60	6.79	2 49	1420	79	12	0	18 5	4 6	2 6	0.21	0	2 03	1 2	15
		34	100	7.02	9.36	5130	86	34	0	82	11 4	2 8	1 6	0	7 51	11.6	62
		35	100	7 57	8.06	4530	85	33	0	76	11.4	2 8	1 6	0	15.56	3 8	52
		36	100	7 23	4.63	2500	87	23	0	36 3	5 1	2 0	0 20	0	2 71	0 80	30
	4	37	20	7 03	1 44	760	75	8 6	0	11 2	3 4	2 3	0 32	0	1 13	2 9	8.2
		38	20	7 72	1 30	810	67	6 1	0	8 7	4 0	2 3	0 27	0	1 22	5 5	7.6
		39	20	7.04	1.70	950	79	11	0	13 3	3 3	1 7	0 34	0	1.13	1.9	10
		40	40	7.25	1.72	1070	71	8.4	0	11 1	4 8	3 4	0.43	0	1 44	5.7	9.8
		41	40	7.25	1 98	1130	80	11	0	15.0	3.7	2.0	0.14	0	1.49	0 69	12
		42	40	7 84	1.73	980	79	11	0	14 3	3 4	2 3	0.34	0	1 58	1.0	10
		43	60	6 89	3.14	1820	81	15	0	24 5	5 4	3 4	0 35	0	2 16	0 69	21
		44	60	6.52	13.78	8460	85	38	0	121	19.9	8 5	1 7	0	2.12	0.80	103
		45	60	6.49	12.57	7710	75	26	0	110	14 2	11.4	1.6	0	1 80	24	96
		46	100	6.45	11.10	6700	89	43	0	103	11 4	5 7	1 7	0	1 26	26	84
		47	100	6.55	13 37	8430	87	42	0	124	17.1	11.4	1 6	0	3.38	34	97
		48	100	6.61	12.94	8360	94	72	0	122	5 7	2 8	1 6	0	3.07	1.5	99

Cont'd

Date Sampled	Field Description: Plot No.	Leachate Sample No.	Depth cm	pH	EC x10³ at 25°C	TDS ppm	SSP	SAR	RSC meq/l	Leachate collected from samplers installed at 20, 40, 60 and 100 cm depths in the plots During the test — Milliequivalent per litre meq/l: Na	Ca+Mg	Ca	K	CO_3	HCO_3	SO_4	Cl
		49	20	7 09	1 95	1070	58	7 8	0	12 4	5 1	2 8	0 75	0	0.22	8 0	10
		50	20	7 39	1.16	630	66	5.5	0	7 2	3.4	2.3	0.31	0	1 35	6.3	5.5
		51	20	7 48	1 13	530	64	5 1	0	6.9	3 7	2.3	0.24	0	1.13	3 1	6 0
		52	40	8.21	2 50	1300	76	11	0	17.5	5.4	3.7	0.20	0	1.58	4.0	15
		53	40	7.26	3.26	1890	79	14	0	21.1	5.7	4.3	0.27	0	1 35	10	20
	5	54	40	7 04	1 50	760	74	7 7	0	10.1	3 4	2.8	0.16	0	1.13	4 6	8 5
		55	60	7 06	5.32	2920	83	20	0	40.2	8.3	5 1	0.12	0	2.26	8.0	35
		56	60	7.33	4.89	2520	83	19	0	36 8	7.1	4 0	0.14	0	1.58	6.5	32
		57	60	6 09	2 31	1250	84	14	0	17.8	3 4	1 1	0.03	0	1 58	3 4	14
		58	100	7 35	14.43	8710	81	33	0	123	28 5	5 7	0.6	0	16.69	57	91
		59	100	7.26	2.92	1490	83	15	0	22 1	4.3	2 8	0.08	0	1 80	6.6	18
		60	100	7 12	12 31	7010	84	34	0	106	19 9	8.5	0.60	0	101.8	4.5	86
		61	20	7.63	0 69	320	50	2 8	0	3 6	3 4	2.6	0 15	0	1.80	2 5	1.9
		62	20	7 23	0 72	420	28	1 3	0	2 1	5.4	4.0	0.10	0	4 29	0 69	2 0
		63	20	7 33	0 55	260	59	3 1	0	3.3	2 3	1 7	0.03	0	1.80	1 9	2 0
		64	40	7.58	1.44	930	50	4 0	0	7.2	6.5	4 6	0.56	0	5.86	0.51	4.5
Jul.15/ 1981		65	40	7.45	1.19	690	44	2 8	0 09	4.9	6.0	4 8	0.32	0	6.09	1 0	3 6
	6	66	40	7 09	1.19	690	58	4.3	0	6.6	4 6	3.4	0.10	0	2.71	2.9	4.6
		67	60	7 49	1.70	1040	43	3 5	0	7.4	9.1	4.6	0 70	0	7 90	0 17	5.7
		68	60	7 25	1 94	1060	42	3 5	0	7 9	10 0	4 6	0 91	0	7.76	2 2	7 2
		69	60	6.95	1.61	830	54	4 4	0	8.2	6.8	5 7	0 24	0	5.41	2 7	6.6
		70	100	7.37	1 65	950	45	3 4	0 50	6 6	7 4	3.7	0 75	0	7 90	4 1	5 2
		71	100	7 41	4 08	2520	67	11	0	28.7	13 4	4 6	0.77	0	10 06	11	15
		72	100	6 91	1.71	950	58	5 0	0	9 3	6 8	4 6	0 04	0	4.96	3 8	7.2
		73	20	6 91	1.20	590	72	7 4	0	9.2	3.1	2 0	0 43	0	1 35	3.8	5.8
		74	20	6.97	1 04	490	70	6 2	0	7.4	2 8	2 3	0 37	0	0 90	3 2	5.4
		75	20	7 03	1.23	790	65	5 5	0	7 5	3 7	2.6	0 37	0	1.49	4 1	6 7
		76	40	7 39	1.05	580	70	6,6	0	8 6	3 4	2 6	0 32	0	1.80	8.2	4.8
	7	77	40	7.43	0.81	460	71	6 7	0	7 2	2 3	2 0	0 38	0	1.35	5.6	3 8
		78	40	6.81	4 32	2450	77	16	0	31.2	7.4	4 8	1 67	0	4.15	3.9	26
		79	60	7.35	1.36	800	83	11	1.31	12 2	2.3	1.7	0 25	0	3.61	5 8	6.3
		80	60	6.94	1.84	900	81	12	0	14 8	2.8	2 0	0 25	0	1.80	7.5	10
		81	60	6.62	5.41	2800	87	25	0	44 0	6 0	4 3	0 23	0	2.48	6.0	36
		82	100	7.27	5.60	2960	93	36	3.07	48 6	3.7	2.6	0 21	0	6 72	17	33
		83	100	6.86	6.60	3410	93	39	0	56 9	4.3	2 3	0 19	0	2 93	7.2	44
		84	100	7.63	1.61	840	83	12	1.69	13 3	2.6	1.4	0.09	0	4.29	1.2	8.2
		85	20	6.87	1 01	480	66	5.1	0	6.3	3 1	2 0	0 13	0	1.13	2.1	5.3
		86	20	7.12	1 10	560	78	8.4	0	9 6	2.6	2.1	0.06	0	1 71	2.2	5.8
		87	20	7,13	1.25	560	72	6,6	0	8 2	3.1	2.1	0.13	0	1.35	2.7	6.7
		88	40	7.07	0.96	500	68	5 4	0	6 7	3.1	1 7	0 09	0	1.35	2.4	4 4
		89	40	6.98	1 94	1000	78	10	0	13 3	3.4	2 3	0 24	0	1 44	2.4	11
	8	90	40	6.86	2.71	1390	78	12	0	18.7	4.6	2 3	0 53	0	1.80	3 8	16
		91	60	7.02	4.00	1990	88	22	0	32 3	4.3	2 6	0 01	0	3.61	6.0	24
		92	60	6.87	6.75	3670	90	32	0	51 4	5 7	2.8	0.04	0	4 29	5 8	45
		93	60	6.66	8.17	-	80	21	0	52.0	14.2	5.7	0.20	0	2.93	2.7	58
		94	100	7.00	9.21	5010	87	33	0	78	11.6	2.8	0.06	0	10.15	5.0	60
		95	100	7.21	6.30	3220	94	43	9.23	56.5	3 4	3.4	0	0	12.63	16	36
		96	100	6.80	11.70	-	79	26	0	80	22.8	5 7	0.20	0	4.51	3 2	86

Cont'd

Date Sampled	Leachate collected from samplers installed at 20, 40, 60 and 100 cm depths in the plots During the test																
	Field Description								Milliequivalent per litre meq/l								
	Plot No.	Leachate Sample No.	Depth cm	pH	EC$\times 10^3$ at 25°C	TDS ppm.	SSP	SAR	RSC meq/l	Na	Ca+Mg	Ca	K	CO_3	HCO_3	SO_4	Cl
Jul.23/ 1981	1	1	20	7 08	1.89	9.00	51	4 3	0	8 7	8.3	6.0	0 09	0	5 86	7 0	7.9
		2	20	6.80	1.41	6 80	59	4 7	0	7 6	5.1	4.6	0 08	0	3.15	4.1	6.3
		3	20	7.52	1.60	9.90	36	2.5	0	5 6	9 7	7 7	0.32	0	7 09	6.0	5.9
		4	40	6 68	2.87	1550	65	8 3	0	18	9.4	6 3	0 05	0	5 10	11	12
		5	40	6.93	1.62	820	48	3 7	0	7 3	7 7	6 5	0.10	0	5.41	5 8	6 7
		6	40	7.24	1.68	840	46	3 4	0 04	16 6	7 4	6.8	0.27	0	7.44	5.5	6 2
		7	60	7.15	5 25	3170	75	15	0	37	12	7 4	0 03	0	6 76	16	25
		8	60	7.08	2.13	1050	49	4 2	0	9 0	9.1	5.1	0 16	0	6.99	7.0	8.8
		9	60	7.11	1.47	690	52	4 1	0	7 6	6 8	4.0	0 18	0	5.64	4.3	6.0
		10	100	7.42	11.53	1990	55	34	4 78	99	17	5.7	0.20	0	21 88	24	60
		11	100	7.27	2.04	1020	47	3 9	0	8 1	8.8	4.8	0 67	0	7 67	3.1	8.5
		12	100	7 13	3.40	1670	78	13	2 97	23	6 5	5 1	0.01	0	9.47	6.2	17
	2	13	20	6.83	9.83	6220	78	22	0	69	20	11.4	0	0	1 66	4 4	74
		14	20	6.75	1.75	940	69	7 1	0	11	4 8	3 7	0.14	0	2 61	1.5	9 6
		15	20	6.93	1.34	790	73	7.1	0	8 8	3.1	2 0	0 09	0	2.03	4.8	7 3
		16	40	6.50	8.26	4950	88	30	0	62	0.5	5.7	0.1	0	1.71	5 9	60
		17	40	6.71	1.88	1130	72	7 9	0	12	4 6	3 4	0 13	0	3 24	1 5	10.8
		18	40	6.56	4 57	2360	87	22	0	36	5 1	4 0	0.04	0	1 80	3 1	31
		19	60	6.44	6.37	3840	87	25	0	48	7.1	4 8	0.02	0	1 57	1 9	46
		20	60	6.69	3 67	1980	78	14	0	26	7 1	5 4	0 05	0	3 15	3.6	23
		21	60	6.63	2 46	1170	79	11	0	16	4 3	3.4	0 02	0	3 15	3 9	15
		22	100	6.94	14 38	8520	85	36	0	113	20	5 7	0 1	0	6 99	1 7	106
		23	100	6.58	8.94	5550	82	25	0	67	14	5.7	0.2	0	3 15	4.9	66
		24	100	7 05	4 93	2620	89	25	0 38	39	4 8	3 4	0	0	5 38	5 6	32
Jul.24/ 1981	3	25	20	6.63	1 94	1100	61	6.0	0	11	6 8	5.1	0 08	0	3.60	6 5	10
		26	20	6.62	2.85	1580	77	11	0	19	5 4	4 3	0.09	0	3.24	3 1	18
		27	20	6.71	1 52	950	47	3 7	0	7 0	7 1	4 6	0.06	0	2 70	4.1	7 8
		28	40	6.83	1 64	980	70	6 8	0	10	4 3	3 1	0 09	0	3.83	3 2	7.9
		29	40	6 71	3 17	1550	83	14	0	22	4 6	3 3	0 10	0	2 84	7 9	19
		30	40	6.62	1.68	760	64	6.0	0	9 8	5.4	3 7	0.04	0	2 48	2 6	9.3
		31	60	7 02	3 97	2160	83	19	0	30	4 8	4 0	1 1	0	3.83	15	21
		32	60	7.03	3.20	1680	78	13	0	22	6 0	4.6	0 11	0	2.70	5 0	20
		33	60	6 82	2.45	1270	77	10	0	16	4 8	3 7	0 04	0	2 93	4 8	14
		34	100	6.94	6 00	3320	85	25	0	47	7.1	4 6	1 1	0	5.41	6 0	41
		35	100	7.76	8.54	4940	86	30	7 55	71	11	5.7	0 20	0	18 95	8.7	53
		36	100	7 34	4.82	2390	90	26	0 28	37	4.0	2 1	0	0	4 28	3 2	32
	4	37	20	6.48	8 15	5160	63	16	0	48	17	8 5	11	0	2 03	8 1	60
		38	20	6.78	4.62	2800	73	13	0	29	9 7	8.0	1.2	0	2.70	8 4	30
		39	20	6.12	11 58	7360	73	26	0	81	30	8 5	11	0	1 57	17	86
		40	40	6.73	7.95	4910	79	21	0	55	13	8 8	1 1	0	2.48	18	57
		41	40	7 01	3 47	2010	78	15	0	26	6.3	4 8	1 2	0	2 48	17	22
		42	40	6.59	10 90	6660	71	24	0	77	20	5.7	11	0	3 25	12	80
		43	60	6 85	8.73	5060	78	22	0	70	20	5.7	0 10	0	2 25	15	65
		44	60	6 80	13.04	8000	73	27	0	96	26	5 7	11	0	2 25	19	101
		45	60	6.66	11 51	7110	75	28	0	83	17	11.4	11	0	2 25	8.4	87
		46	100	6.61	9 94	5970	86	32	0	86	14	2.8	0.10	0	1 57	18	75
		47	100	6 75	11 56	6850	75	28	0	83	17	5 7	11	0	3.18	3 1	88
		48	100	6.86	12.76	7810	78	34	0	98	17	5.7	11	0	2 70	15	96

Cont'd

	Leachate collected from samplers installed at 20, 40, 60 and 100 cm depths in the plots. During the test.																
	Field Description									Milliequivalent per litre meq/l							
Date Sampled	Plot No.	Leachate Sample No.	Depth cm.	pH	EC x 10^3 at 25°C	TDS ppm.	SSP	SAR	RSC meq/l	Na	Ca+Mg	Ca	K	CO_3	HCO_3	SO_4	Cl
		49	20	6.34	11.92	8100	75	23	0	88	28	14.2	0	0	1.71	5.5	88
		50	20	7 00	1.58	950	69	6.8	0	10	4 3	2.3	0.18	0	4.19	3.4	7.8
		51	20	6 74	3 74	2440	73	11	0	23	8.5	4.6	0.19	0	2.39	5.8	23
		52	40	6.42	10.55	6950	80	25	0	79	20	8.5	0.10	0	1 80	2.2	76
		53	40	6.66	10 16	6770	78	23	0	80	23	8.5	0	0	2.34	6.7	75
		54	40	6.93	2.46	1430	74	9.7	0	16	5.4	3.7	0.10	0	3 47	1.7	14
	5	55	60	6 72	5.55	1200	81	18	0	19	9 1	3.7	0 11	0	4.96	2.9	35
		56	60	6.86	9.11	-	78	22	0	71	20	8 5	0.10	0	3 15	16.3	66
		57	60	6.88	4 79	2870	82	18	0	34	7.4	3.7	0 06	0	3 51	1.0	31
		58	100	7.16	5.42	3110	85	22	0	41	7.1	3.4	0.05	0	6.76	9.1	29
		59	100	7 03	10 81	6470	84	31	0	90	1 7	8 5	0 20	0	5.95	11.9	78
		60	100	7 23	12.61	7280	82	31	0	105	23	8.5	0.30	0	9.70	14.6	88
		61	20	7 48	1.01	600	46	3.0	0	5 1	5.7	3.1	0 29	0	5.64	1.9	2.6
		62	20	7.37	0.88	570	26	1.3	11	2 5	7 1	3.1	0.12	0	7.21	1.5	1.4
		63	20	7.38	0.54	400	42	1.9	0	2 4	3.1	1 7	0.10	0	3.02	1.6	1.4
Jul.24, 1981		64	40	7 51	1.28	700	40	2.8	2.22	5 5	7.7	3.1	0.48	0	9.92	0.6	2.5
		65	40	7.44	1.19	460	41	2.4	3 99	4 1	5 7	2.0	0 26	0	8.79	2.6	2.3
	6	66	40	7.13	1 24	700	58	4.5	0	7.0	4.8	2.8	0.15	0	4.42	3.9	4 2
		67	60	7.52	0.95	580	36	2.1	0	3.6	6.0	3.4	0.43	0	5.73	2.9	3.4
		68	60	7.42	1.81	910	39	3.1	0	7 0	10	4.3	0.89	0	8.57	2.6	6.0
		69	60	7,11	1.41	780	50	3.8	0	7.0	6 8	4.0	0.24	0	6.40	5.5	4.8
		70	100	7,51	1 57	350	42	3.2	0	6.4	8 0	3.7	0.80	0	7.67	4.9	4 9
		71	100	7.57	2 67	1640	66	8.5	0 03	17	8.0	3.1	0.80	0	8.03	12	8 8
		72	100	7.02	2.06	1110	59	5 7	0	11	7.4	3.4	0.06	0	6 31	1.5	8.9
		73	20	6.78	2 69	1260	79	11	0	18	5.1	4 8	0.18	0	3.60	9.4	16
		74	20	7.03	3.35	1100	72	8.9	0	15	5.7	4.3	0.11	0	2.48	5.1	13
		75	20	6.15	3 47	1710	74	11	0	26	7 1	5.4	0.45	0	6.16	5.3	20
		76	40	7.21	3.41	1770	84	17	0	26	4.8	4.0	0.08	0	4 06	11	19
		77	40	6.95	2.32	1770	83	16	0	25	5 1	4.0	0.08	0	3.29	4.3	19
	7	78	40	7.01	5.68	2760	81	21	0	42	8.3	7.1	0.09	0	4.06	10	17
		79	60	7.16	2.14	900	85	13	1.26	16	2.8	2.0	0.06	0	4.06	8.2	11
		80	60	6.91	1.80	810	78	10	0.66	13	3 4	2.8	0.16	0	4.06	7.4	9.1
		81	60	6.90	6 3	1520	88	27	0	49	6.5	4.8	0.02	0	2 25	1.4	44
		82	100	6.97	4.95	2410	86	22	0	37	5,7	4.8	0.04	0	4.38	9.9	30
		83	100	7.25	6.41	3310	92	34	0	53	4.8	2.1	0.01	0	2.93	12.6	43
		84	100	7.46	4.30	2040	92	30	6.01	37	3 1	1 4	0	0	9.11	9.4	22
		85	20	6.71	2.19	870	75	9.9	0	15	4.6	3.7	0.13	0	2.79	8.2	12
		86	20	6.95	1.35	360	73	7.3	1.33	9.5	3.4	2 0	0.08	0	4.71	2.7	6.2
		87	20	6.81	2.37	1150	77	11	0.36	16	4.6	2.6	0.18	0	4.96	7.0	12
		88	40	6.92	1.92	850	79	10	0.57	13	3 4	2 0	0.13	0	3.97	1.9	10
		89	40	6.91	6.96	3630	85	24	0	51	9.1	5.4	0.10	0	4.06	9.3	47
	8	90	40	6.79	6.37	3390	84	23	0	47	8.5	4.6	0.13	0	3.60	7.0	43
		91	60	7.03	3.30	1560	88	20	2.14	26	3.4	2 0	0.04	0	5.54	8.4	19
		92	60	7.02	4.61	2220	87	22	0	35	5 1	2.8	0.04	0	4 96	7.3	28
		93	60	6.87	8.05	-	80	24	0	70	17	11.4	0.20	0	4 28	5.5	63
		94	100	7.36	8.21	3830	83	27	0	71	14	2.8	0.30	0	8.43	19.2	54
		95	100	7.52	6.11	3300	93	37	0.48	51	3.7	0.85	0.01	0	12.18	9.8	24
		96	100	7.02	14.41	9400	83	36	0	116	23	8.5	0.30	0	5.18	3.6	107