Animal Waste Management Plan

Sanchez Dairy

Spring, 2006

Prepared For:

Andres Sanchez
4720 Long Prairie Road
Tillamook, Oregon 97141
(503) 801-1422

Prepared By:

Amy Krahn

MA: 147621
AWMP: 0467 - updated
Approved 11-30-06
CCH

TFO
RECEIVED
7-19-06
CCH

Animal Waste Management Plan

Sanchez Dairy
May, 2006

Operated by:
Andres Sanchez
4720 Long Prairie Road
Tillamook, Oregon 97141
(503) 815-1609

Facility Address:
4720 Long Prairie Road
Tillamook, Oregon 97141
(503) 801-1422

Operation:
Grade A Dairy
Medium Federal CAFO

As owner and operator of Sanchez Dairy, I intend to manage in accordance with the practices and operation and maintenance described in this animal waste management plan.

Signature Andres-sanchez Date 5-5-06

Sanchez Dairy
Andres Sanchez
05/06

BUSINESS NARRATIVE

The dairy is a 400-1,000 lb. animal unit operation. There are 200 lactating cows, 50 dry cows, 100 heifers, and 50 calves. The lactating cows are confined for 365 days. The dry cows are confined for 145 days and on pasture for 220 days. The heifers are confined for 110 days and on pasture for 255 days. The calves are confined for 365 days. Livestock mortality service is provided by the Tillamook County Creamery Association.

The operation consists of 53.1 acres of owned hayland, 191.9 acres of leased hayland, and 104.7 acres of pastureland that is used to apply manure from the milking operation at Tract 427. Liquid wastes are transported by pipeline and pumped with a manure gun traveler to all fields in Tract 427 and fields 1 in Tract 43. Liquid wastes are also transported by pump and pipeline and applied to fields1,2,7,8,and 9 in T-632. Solid wastes are hauled by tractor and a manure spreader and applied to field 1 in Tract 450, fields 2 and 3 in Tract 43, fields 3,4,5, and 6 in Tract 632, fields 1 and 2 in Tract 19, field 1 in Tract 665, and fields 1,2,3,4,5,6,7,8,and 9 in Tract 657. All liquid wastes generated from the operation are transported to the methane digester at the Port of Tillamook and processed. The processed liquid waste is then returned to the farm for application to the liquid waste application fields as described above.

All the hayland fields are in good condition. The pasture fields are also in fair to good condition. The target yield for all fields is 6 tons of dry matter per acre per year. All fields in Tracts 427, 43, and 450 are within the 100-year floodplain. All of field 2 and half of field 1 in Tract 19 are within the 100-year floodplain. Field 1 and parts of fields 2 and 8 in Tract 632 are also in the 100-year floodplain. Fields 5,6,7 and 9 in Tract 632 and field 1 in Tract 665 are outside the 100-year floodplain. All fields in Tract 657 are in an undetermined floodplain.

The manure management system consists of a below ground liquid waste storage tank and an above ground liquid waste storage tank. Manure is handled 90% liquid and 10% solid for the lactating cows. Manure for the dry cows, heifers, and calves are handled 100% solid. The liquid manure is transported and applied to the fields with a manure gun traveler. The solid manure is transported and applied to the fields with a tractor and 280-bushel manure spreader.

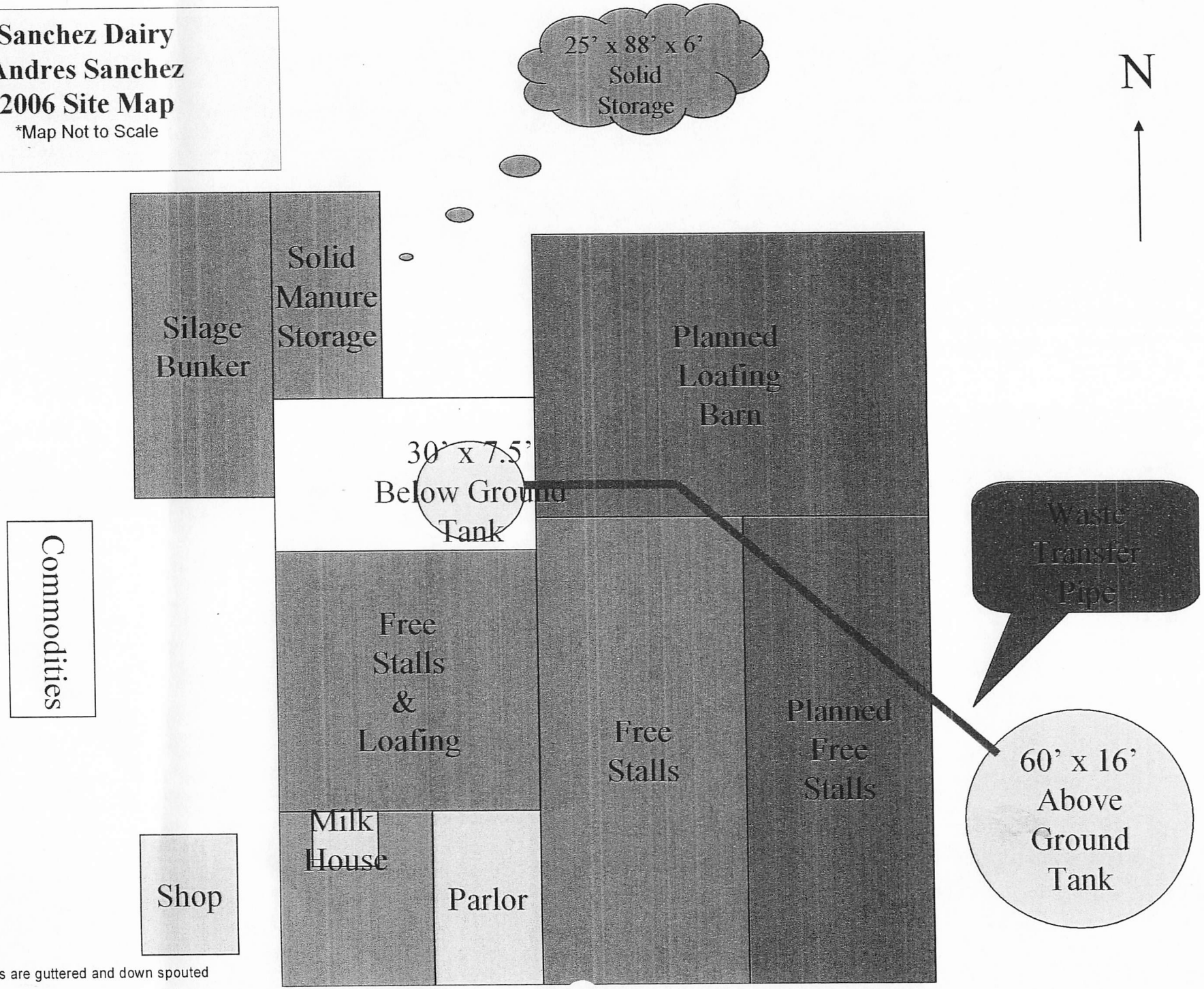
As stated above, the liquid storage system consists of a below ground liquid waste storage tank that measures 30' x 7.5' and an above ground tank that is 60' x 16'. Liquid waste from the below ground liquid waste tank is transferred by pump and waste transfer pipe to the above ground tank. The existing waste storage tanks can store the liquid waste generated by the 400-1,000 lb. animal units for 75 days.

The solid manure storage facility measures 25' x 88' x 6'. It can store the solid manure generated from the 400-1,000 lb. animal units for 90 days. There are also two solid manure storage areas on T-657, where the heifers and dry cows are housed (until the new heifer barn is complete). These manure accumulation areas are open slabs measuring 80' x 36' and 50' x 10'.

A new loafing barn will be constructed to house the dry cows and heifers at the home place (T-427). The roof will be guttered, downspouted, and outleted in an area free of manure. All conservation practices installed, or to be installed, will be managed and maintained in accordance with the enclosed "CONSERVATION PRACTICE OPERATION AND MAINTENANCE WORKSHEETS".

Soils where manure will be applied are: Brenner silt loams, Knappa silt loam, Nehalem silt loam, Gardiner fine sandy loam, Quillamook (formerly Quillayute) silt loam, Riverwash, and Made Land. The Knappa silt loam, Nehalem silt loam, Gardiner fine sandy loam, and the Quillamook silt loams are all well drained. Most of the Made Land is also well drained. The Brenner silt loam soil is poorly drained.

Sanchez Dairy
Andres Sanchez
2006 Site Map
*Map Not to Scale



* All buildings are guttered and down spouted

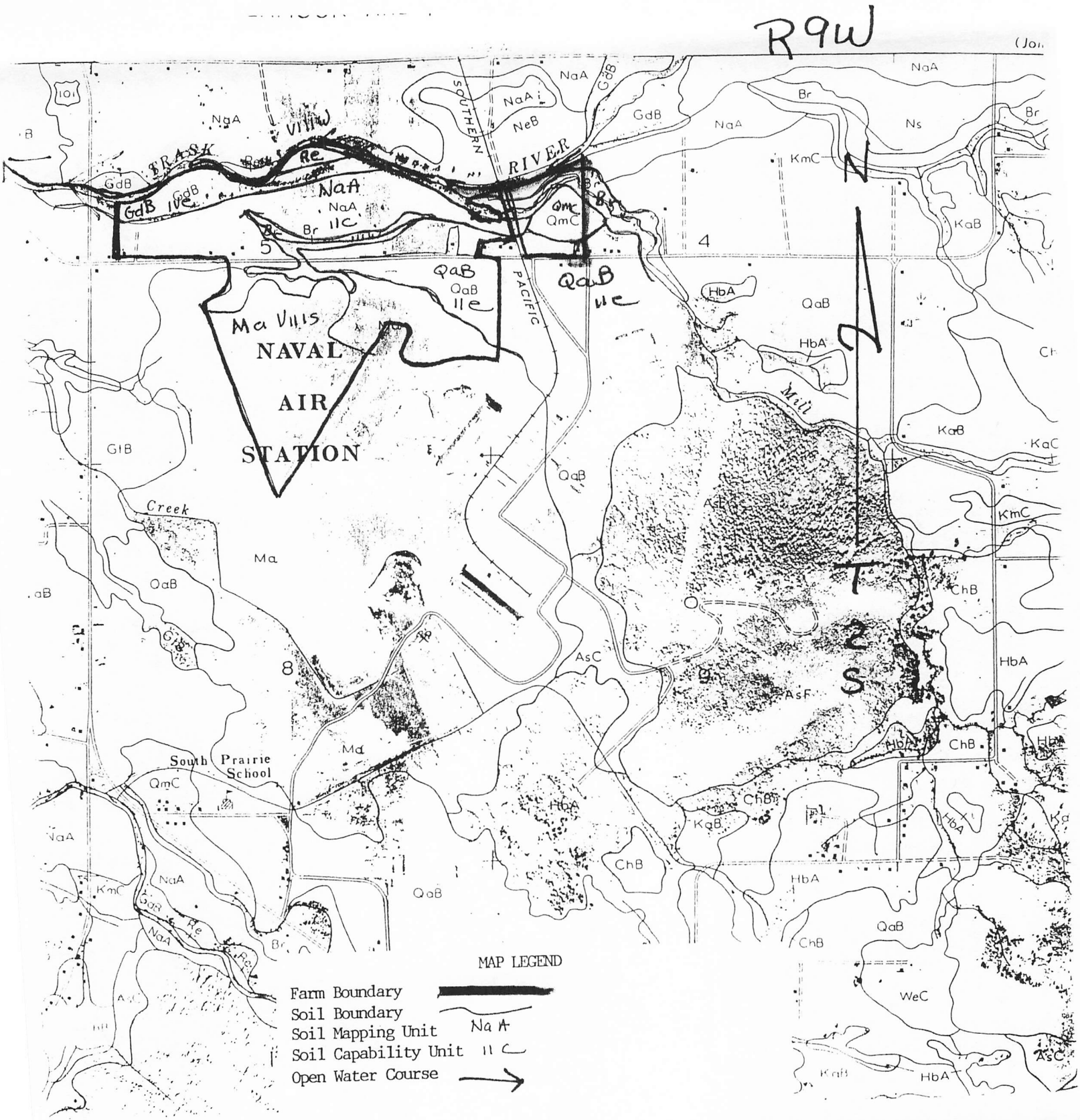
U. S. DEPARTMENT OF AGRICULTURE

SCS-CPA-15
(3-68)

SOIL MAP

Owner Sanchez and Ect. Operator Andres Sanchez
County Tillamook State Oregon
Soil survey sheet(s) or code nos. 17 Approximate scale 1:20000

Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with Tillamook County Soil and Water Conservation District



MAP LEGEND

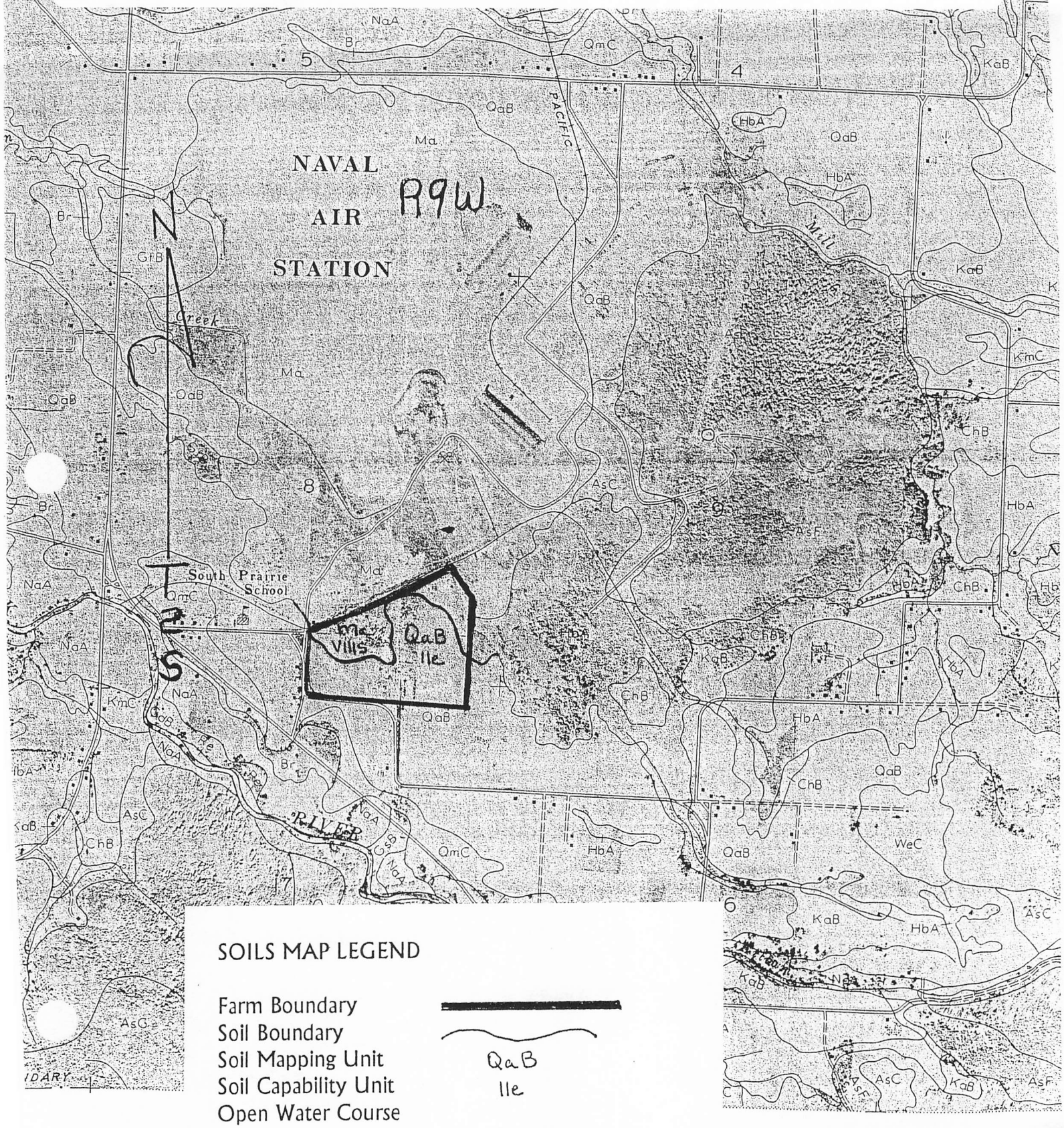
Farm Boundary
Soil Boundary
Soil Mapping Unit NaA
Soil Capability Unit IIc
Open Water Course

12-85

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Port of Tillamook Operator Andres Sanchez
County Tillamook State Oregon
Soil survey sheet(s) or code nos. 17 Approximate scale 1:20,000
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with Tillamook County Soil & Water Conservation District



SOILS MAP LEGEND

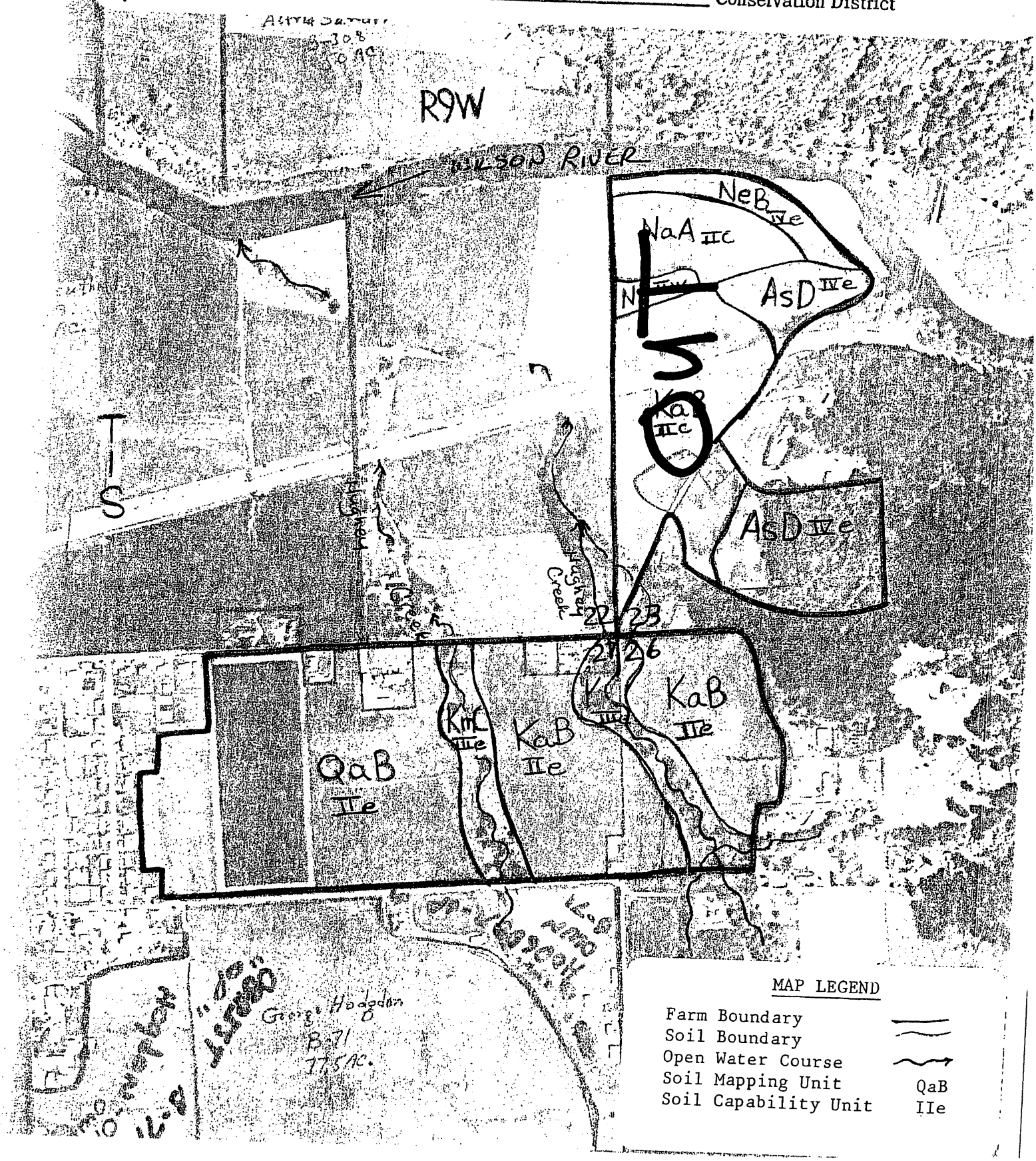
Farm Boundary
Soil Boundary
Soil Mapping Unit — QaB
Soil Capability Unit — IIe
Open Water Course

SCS-CONS-15
OCTOBER 1974

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Gene Widmer Operator Andres Sanchez
County TILLAMOOK State OREGON
Soil survey sheet(s) or code nos. P. 14 + 15 Approximate scale 1"=660'
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with TILLAMOOK Conservation District



SOILS DESCRIPTIONS

Br - Brenner silt loams are poorly drained, strongly acid soils. These soils are on bottomlands in the lowest part of the floodplains. The erosion hazard is slight. Permeability is slow. Runoff is slow to ponded. NRCS capability classification is IIIw because of poor drainage. Available water holding capacity is 8.5 to 9.5 inches. Soils are well suited for pastures.

GdB - Yachats (formerly Gardiner) very fine sandy loam. 0 to 3% slopes occur in low lying bends of major rivers. They are subject to overflow due to high water. The soil is well-drained, moderately coarse in texture. Most areas have recently deposited sand on the surface. Runoff is slow and erosion hazard is moderate. Permeability is moderately rapid. NRCS capability classification is IIIw because of the flooding. Effective rooting depth is greater than 60 inches. Water holding capacity is 6 to 8.0 inches. Soils are used primarily for pastureland and green chop.

Ma - Made Land - This unit consists of approximately 3 square miles of land leveled for a blimp base in the Second World War. Hills were cut and low areas filled to form a level surface consisting of heterogeneous material that originated from marine sediment, alluvial terraces, and recent alluvium. This is the only large tract of Made Land in the Tillamook survey area. It is now used mainly as an airport and for various industrial developments. (Capability unit VIIIs-1; woodland suitability group 18.)

KaB - Knappa silt loam, 0-7% slopes, are very deep, well drained soils. The erosion hazard is slight. Permeability is moderate. NRCS capability classification is IIc because of climate. Effective rooting depth is more than 60 inches. Available water holding capacity is 10 to 12 inches. Soils are well suited for pasturelands. Should they be used for woodland, site indexes are 170 for Douglas Fir. Logging equipment limitations are moderate.

NaA - Nehalem silt loam, 0-3% slopes, are well to moderately well drained soils. These occupy level to gently undulating river floodplains. The erosion hazard is slight. Permeability is moderate. Runoff is slow. NRCS capability classification is IIc due to climate. Effective rooting depth is greater than 60 inches. Available water holding capacity is 11 to 12.5 inches. Nehalem soils are excellent for pastures. Manure application is restricted when flood potential is high.

QaB - Quillamook (formerly Quillayute) loams, 0-7% slopes, are well drained soils. These soils are located on terraces. The erosion hazard is slight to moderate. Permeability is moderate. NRCS capability classification is IIe because of erosion potential on higher slopes. The effective rooting depth is greater than 60 inches. The total available water holding capacity is 12 to 17 inches. These soils are well suited for pasture.

QmC - Quillayute loams, 0-121% slopes, are well drained soils. These soils are located on terraces. The erosion hazard is moderate. Permeability is also moderate. NRCS Capability Unit is IIIe because of the erosion potential on the greater slopes. The effective rooting depth is greater than 60 inches. The total available water holding capacity is 12 to 17 inches. These soils are suited for pastures. Manure runoff can occur on the greater slopes.

Re - The Riverwash soil series consist of narrow, irregular strips in the bends of stream channels and along drainage ways. The strips are from 40 to 200 yards in width and consist of well-rounded sand, gravel, stones, and boulders. Riverwash slopes are from 0-5 percent.

Depth to bedrock is 20 to more than 60 inches. Permeability is rapid. Available water holding capacity and water supply capacity are variable. Effective rooting depth is 20 to 60 inches. The water erosion hazard is severe.

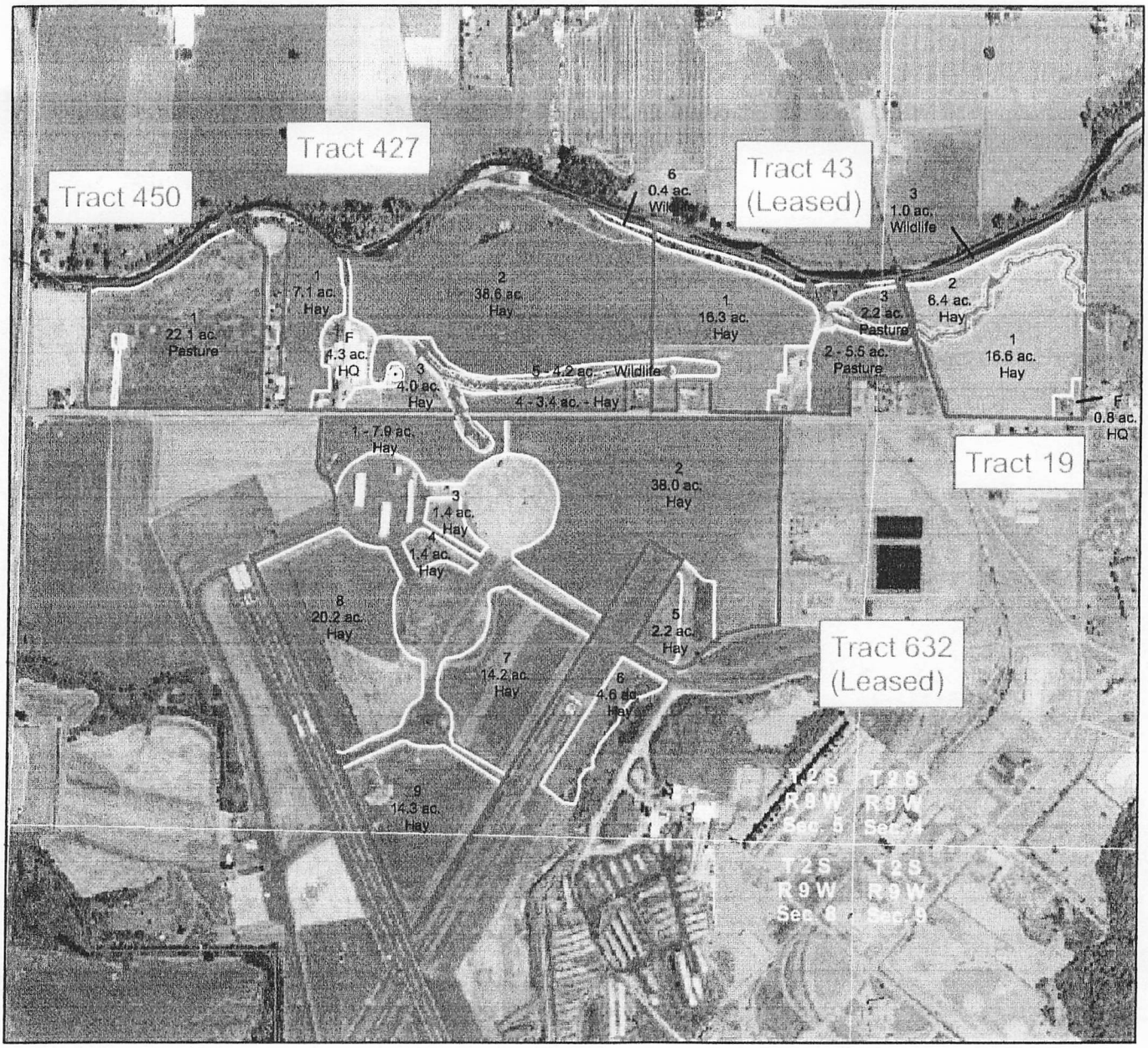
Riverwash is subject to overflow when the water is high and is extremely droughty when the water is low: during each overflow, new deposits are received or some are removed. NRCS capability classification is VIIIs because of the limited potential to produce vegetation on the aggregate.

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 236.7
Date: 5/4/2006

Conservation Plan Map 1



500 0 500 1,000 1,500 2,000 Feet

Legend

- Tract Boundary
- Planned Land Units
- Public Land Survey
- Filter Strip
- Open Water Course
- Tank

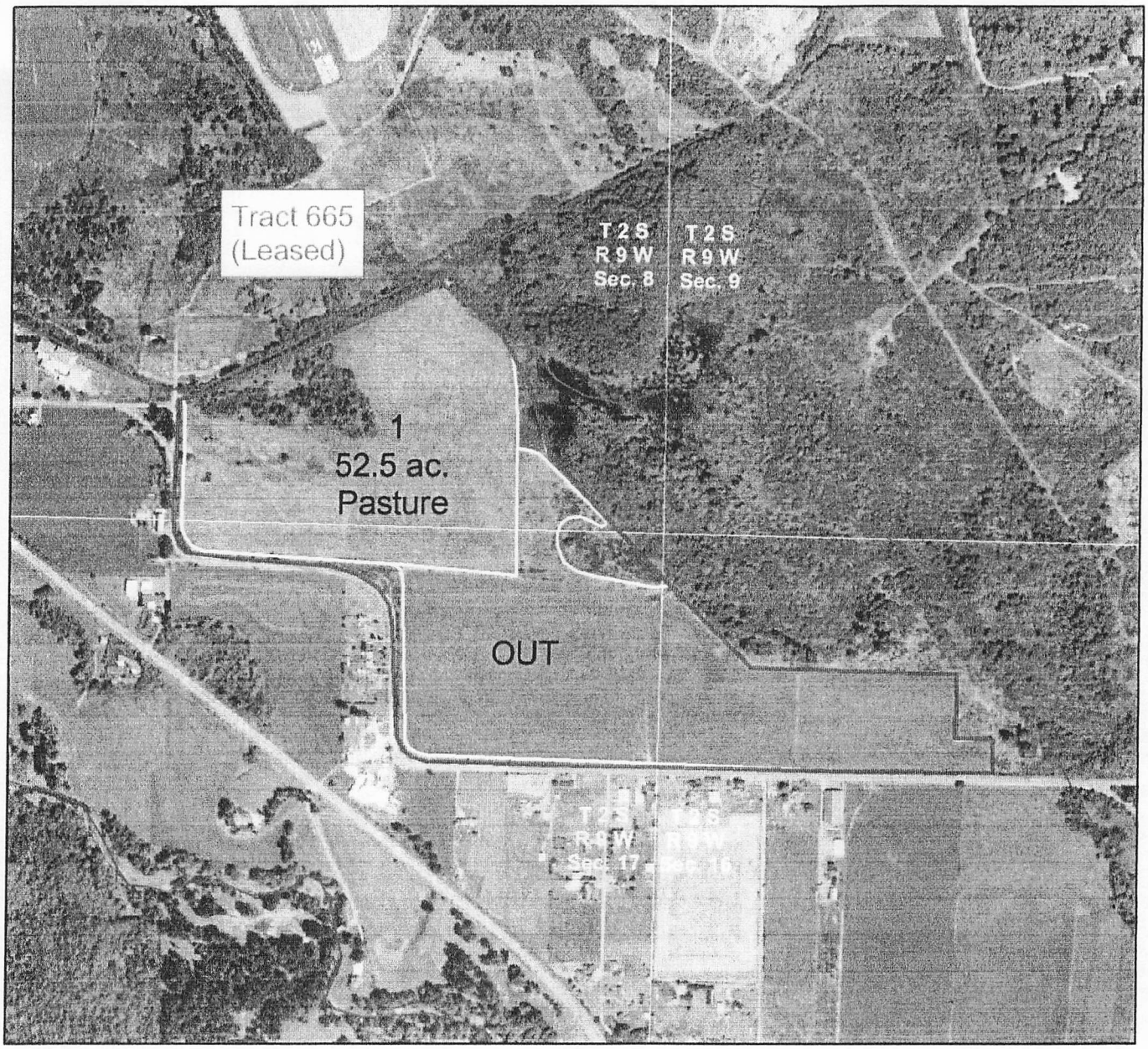
N
W E
S

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 52.5
Date: 1/24/2006

Conservation Plan Map 2



500 0 500 1,000 1,500 2,000 Feet

Legend

- Tract Boundary
- Public Land Survey
- Planned Land Units
- Open Water Course

N
W E
S

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 82.0
Date: 1/24/2006

Conservation Plan Map 3

500 0 500 1,000 1,500 2,000 Feet

Legend

- Tract Boundary
- Public Land Survey
- Planned Land Units
- Open Water Course

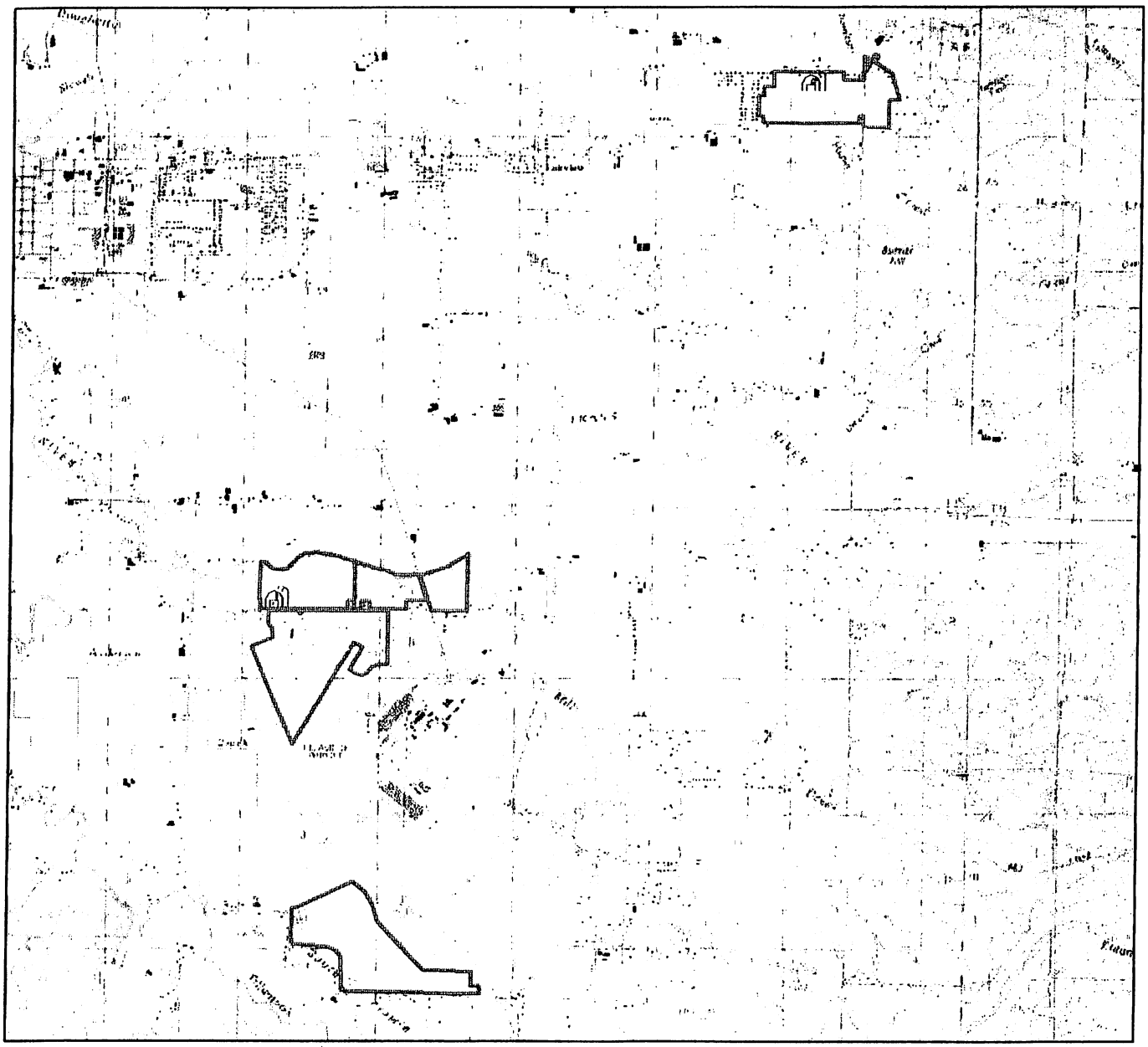
N
W E
S

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 349.5
Date: 1/24/2006

7.5 Min. Topo Map



2,000 0 2,000 4,000 6,000 8,000 Feet

Legend

Tract Boundary

Farmstead Lat/Long (NAD83)
45 25' 39.9" N; 123 48' 58.2" W

N
W E
S

Land Use Summary

Name: Andres Sanchez
Date: May, 2006
TR034

Tract	Field	Land Use	Acres
427	1	Hay	7.1
	2	Hay	38.6
	3	Hay	4.0
	4	Hay	3.4
	5	Wildlife	4.2
	6	Wildlife	0.4
	F	Farmstead	4.3
		Subtotal	**62.0**
450	1	Pasture	22.1
Leased	2	**Subtotal**	**22.1**
43	1	Hay	16.3
Leased	2	Pasture	5.5
	3	Pasture	2.2
		Subtotal	**24.0**
19	1	Hay	16.6
	2	Hay	6.4
	3	Wildlife	1.0
	F	Farmstead	0.8
		Subtotal	**24.8**
632	1	Hayland	7.9
Leased	2	Hayland	38.0
	3	Hayland	1.4
	4	Hayland	1.4
	5	Hayland	2.2
	6	Hayland	4.6
	7	Hayland	14.2

	8	Hayland	20.2
	9	Hayland	14.3
		Subtotal	**104.2**
665	1	Pasture	52.5
Leased		**Subtotal**	**52.5**

Tract	**Field**	**Land Use**	**Acres**
657	1	Hayland	21.2
	2	Hayland	1.7
	3	Hayland	11.0
	4	Pasture	2.4
	5	Pasture	5.2
	6	Pasture	1.1
	7	Hayland	14.5
	8	Pasture	3.9
	9	Pasture	9.8
	10	Wildlife	3.9
	11	Wildlife	5.6
	F	Farmstead	1.7
		Subtotal	**82.0**
		Total	**349.5**

Summary

Pasture		**104.7**
Hayland		**245.0**
Wildlife		**15.1**
Farmstead		**6.8**
	Total	**371.6**

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: Andres Sanchez
ASSISTED BY: Amy Kruhm
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

ANIMAL INVENTORY

Type of Animal	Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Milk Production in Pounds/Cow/Day= 60						Manure CF/D/AU	Annual	
				Nutrient Production (lbs./day/1000 lb. Animal Unit)			Nutrient Production (lbs./day)				Days Confined	Days Grazed
				N	P	K	N	P	K			
MILKER	200	1,200	240.0	0.53	0.09	0.30	127.49	21.60	72.04	1.47	365	0
MILKER (DRY)	50	1,300	65.0	0.36	0.05	0.23	23.40	3.25	14.95	1.10	145	220
HEIFERS (12-24 Months)	100	775	77.5	0.31	0.04	0.24	24.03	3.10	18.60	1.30	110	255
CALVES (1-12 Months)	50	350	17.5	0.31	0.04	0.24	5.43	0.70	4.20	1.30	365	0
Totals/Averages-	400	906	400.0	0.45	0.07	0.27	180.3	28.7	109.8	1.4		

GRAZING PERIOD

Type of Animal	Percent of Month and Number of Animals Grazing												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AU-YR.
MILKER	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	200	200	200	200	200	200	200	200	200	200	200	200	0
MILKER (DRY)	100%	0%	0%	0%	0%	20%	100%	100%	100%	100%	100%	100%	
	50	50	50	50	50	50	50	50	50	50	50	50	468
HEIFERS (12-24 Months)	100%	25%	25%	25%	25%	35%	100%	100%	100%	100%	100%	100%	
	100	100	100	100	100	100	100	100	100	100	100	100	647
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	0
													0
													0
													0
													0
													0
Total AUM's Available>	99						102	102	102	101	101	101	708
Total AUM's Needed>>>	143	19	19	19	19	40	143	143	143	143	143	143	1,115
Total AUM's>>>>>>>>>>	-44	-19	-19	-19	-19	-40	-41	-41	-41	-42	-42	-42	-407

ORAWMv2.4-Sanchez

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: Andres Sanchez
ASSISTED BY: Amy Krahn
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

WEATHER STATION

TILLAMOOK 1 W

	25Yr-24Hr	6.00	Lot Runoff Factors as a Percent of Monthly Precipitation	
	Monthly Average in Inches			
Month	Precipitation	Evaporation	Paved	Unpaved
October	7.48	1.42	50%	20%
November	12.80	0.75	60%	25%
December	14.25	0.60	60%	25%
January	13.46	0.48	60%	25%
February	10.45	0.78	50%	25%
March	10.35	1.26	45%	15%
April	6.03	1.90	40%	15%
May	4.24	3.22	40%	10%
June	3.16	3.40	35%	10%
July	1.44	3.91	30%	0%
August	1.73	3.52	40%	10%
September	3.69	2.54	45%	15%
Annual	89.08	23.78		

AREAS CONTRIBUTING RUNOFF TO LIQUID STORAGE FACILITY

Description of Runoff Area	Area in SF
Paved Lot Area >>>>

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: Andres Sanchez
ASSISTED BY: Amy Kralm
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

BEDDING VOLUME

Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
MILKER	Free Stall	Wood Shavings	9.00	3.10	0.34	83	744
MILKER (DRY)	Loose Housing	Wood Shavings	9.00	12.40	1.38	90	806
HEIFERS (12-24 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	107	961
CALVES (1-12 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	24	217

SOLIDS SEPARATION FACTOR

Type of Animal	Type of Separator	Separation Factor %	Volume of Solids Separated CF/Day	Volume of Solids in Liquids CF/Day	Volume of Manure in Liquids CF/Day	Volume of Manure in Solids CF/Day	Accumulated Sludge in Storage CF/Day	Density of Separated Solids Lbs/CF	Weight of Separated Solids Lbs/Day
MILKER	Press Type (Screw or Roller)	40%	51	76	334	18	140	36	1,824
MILKER (DRY)	Dry Scrape System	100%	161	0	0	72	0	36	5,798
HEIFERS (12-24 Months)	Dry Scrape System	100%	208	0	0	101	0	36	7,471
CALVES (1-12 Months)	Dry Scrape System	100%	47	0	0	23	0	36	1,687
Total Solids			466	76	334	213	140		16,780

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: **Andres Sanchez**
ASSISTED BY: **Amy Krahn**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

	Runoff in Cubic Feet														
	Roof Area	Paved Slab Area	Unpaved Lot Area	Silage Pit Surface	Facility	Manure		Bedding		Solids Separated		Solids in Liquids		Total Solids	Total Liquids
	Square Feet	Square Feet	Square Feet	Area, SF	Water Use	Solids	Liquids								
Month	0	0	0	0	Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Cubic Feet
October	0	0	0	0	2,951	2,069	9,547	3,310	29,791	3,023	108,839	2,356	84,814	3,023	15,672
November	0	0	0	0	2,856	6,414	9,239	8,293	74,633	12,427	447,366	2,280	82,078	12,427	15,501
December	0	0	0	0	2,951	6,628	9,547	8,569	77,120	12,841	462,278	2,356	84,814	12,841	15,672
January	0	0	0	0	2,951	6,628	9,547	8,569	77,120	12,841	462,278	2,356	84,814	12,841	15,672
February	0	0	0	0	2,665	5,987	8,623	7,740	69,657	11,598	417,542	2,128	76,606	11,598	15,159
March	0	0	0	0	2,951	5,872	9,547	7,683	69,144	11,199	403,170	2,356	84,814	11,199	15,672
April	0	0	0	0	2,856	2,002	9,239	3,203	28,830	2,926	105,328	2,280	82,078	2,926	15,501
May	0	0	0	0	2,951	2,069	9,547	3,310	29,791	3,023	108,839	2,356	84,814	3,023	15,672
June	0	0	0	0	2,856	2,002	9,239	3,203	28,830	2,926	105,328	2,280	82,078	2,926	15,501
July	0	0	0	0	2,951	2,069	9,547	3,310	29,791	3,023	108,839	2,356	84,814	3,023	15,672
August	0	0	0	0	2,951	2,069	9,547	3,310	29,791	3,023	108,839	2,356	84,814	3,023	15,672
September	0	0	0	0	2,856	2,002	9,239	3,203	28,830	2,926	105,328	2,280	82,078	2,926	15,501
Annual	**0**	**0**	**0**	**0**	**34,743**	**45,813**	**112,411**	**63,703**	**573,328**	**81,777**	**2,943,977**	**27,739**	**998,611**	**81,777**	**186,869**

DAILY NUTRIENT PRODUCTION

	Pounds/Day of Nutrients from LIQUIDS			Pounds/Day of Nutrients from SOLIDS			Pounds/Day of Nutrients from GRAZING		
Type of Animal	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
MILKER	76.49	29.69	52.09	51.00	19.79	34.72	0.00	0.00	0.00
MILKER (DRY)	0.00	0.00	0.00	23.40	7.45	18.01	23.40	7.45	18.01
HEIFERS (12-24 Months)	0.00	0.00	0.00	24.03	7.10	22.41	24.03	7.10	22.41
CALVES (1-12 Months)	0.00	0.00	0.00	5.43	1.60	5.06	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CLIENT: **Andres Sanchez**
ASSISTED BY: **Amy Krahn**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY NUTRIENT PRODUCTION

Month	Pounds of Nutrients from LIQUIDS			Pounds of Nutrients from SOLIDS			Pounds of Nutrients from GRAZING			Pounds of Nutrients going OFF-FARM			Total Pounds of Nutrients from ALL SOURCES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
October	2,371	920	1,615	1,749	663	1,233	1,470	451	1,253	0	0	0	5,591	2,035	4,101
November	2,295	891	1,563	2,935	1,025	2,238	180	53	168	0	0	0	5,410	1,969	3,969
December	2,371	920	1,615	3,033	1,059	2,313	186	55	174	0	0	0	5,591	2,035	4,101
January	2,371	920	1,615	3,033	1,059	2,313	186	55	174	0	0	0	5,591	2,035	4,101
February	2,142	831	1,458	2,740	957	2,089	168	50	157	0	0	0	5,050	1,838	3,704
March	2,371	920	1,615	2,813	991	2,132	406	123	355	0	0	0	5,591	2,035	4,101
April	2,295	891	1,563	1,693	642	1,194	1,423	436	1,213	0	0	0	5,410	1,969	3,969
May	2,371	920	1,615	1,749	663	1,233	1,470	451	1,253	0	0	0	5,591	2,035	4,101
June	2,295	891	1,563	1,693	642	1,194	1,423	436	1,213	0	0	0	5,410	1,969	3,969
July	2,371	920	1,615	1,749	663	1,233	1,470	451	1,253	0	0	0	5,591	2,035	4,101
August	2,371	920	1,615	1,749	663	1,233	1,470	451	1,253	0	0	0	5,591	2,035	4,101
September	2,295	891	1,563	1,693	642	1,194	1,423	436	1,213	0	0	0	5,410	1,969	3,969
Annual	**27,921**	**10,837**	**19,012**	**26,628**	**9,671**	**19,599**	**11,275**	**3,450**	**9,679**	**0**	**0**	**0**	**65,824**	**23,957**	**48,290**

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: **Andres Sanchez**
ASSISTED BY: **Amy Krahn**
CHECKED BY:

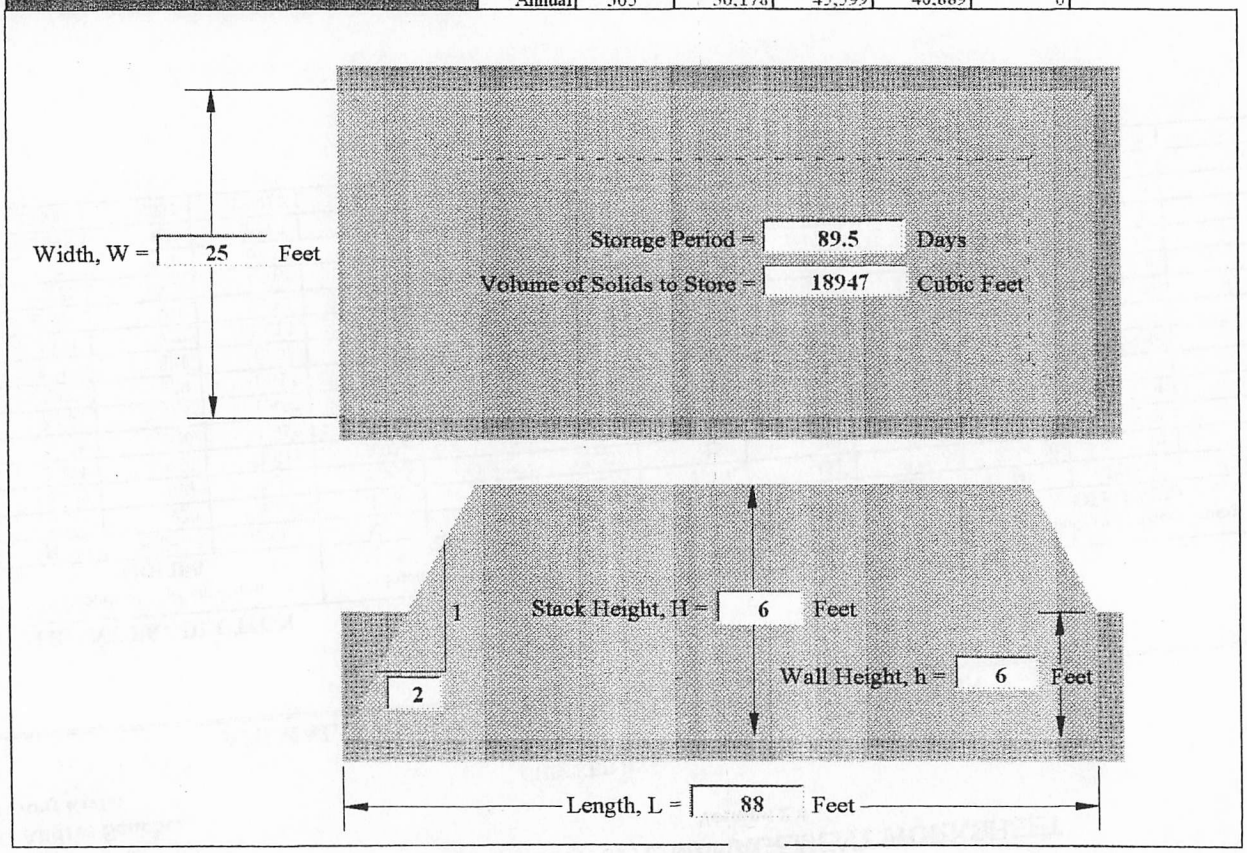
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

Solids Storage Facility Parameters	Value
Storage Period, Days=	90
Stacking Width, W in Feet=	25
Stacking Height, H in Feet=	6.00
Wall Height, h in Feet=	6.00
Stack Side Slope (X:1)=	2.00
Existing Storage, Cubic Feet=	6,694
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	18,947
Design Volume, Cubic Feet=	12,300
Is Facility Covered?	YES

MONTHLY SOLIDS VOLUME STACKED IN FACILITY

Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Normal Runoff CF
October	31	1251	1,773	1,512	0
November	30	5622	6,805	6,213	0
December	31	5810	7,031	6,421	0
January	31	5810	7,031	6,421	0
February	28	5248	6,351	5,799	0
March	31	5054	6,145	5,600	0
April	30	1210	1,715	1,463	0
May	31	1251	1,773	1,512	0
June	30	1210	1,715	1,463	0
July	31	1251	1,773	1,512	0
August	31	1251	1,773	1,512	0
September	30	1210	1,715	1,463	0
Annual	365	36,178	45,599	40,889	0



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Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: **Andres Sanchez**
ASSISTED BY: **Amy Krahn**
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

Tank Parameters	Value
Storage Period, Days=	75
Tank Diameter, Feet=	60
Existing Storage, Cubic Feet=	5,301.00
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	47,690
Design Volume, Cubic Feet=	42,361
Is Tank Covered?	NO
Tank Dimensions?	Circular

MONTHLY INFLOWS INTO TANK

Month	Number of days	Rain-Evap on Tank CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Manure CF
October	31	1,427	0	0	2,951	10,366
November	30	2,838	0	0	2,856	10,031
December	31	3,215	0	0	2,951	10,366
January	31	3,057	0	0	2,951	10,366
February	28	2,277	0	0	2,665	9,362
March	31	2,141	0	0	2,951	10,366
April	30	973	0	0	2,856	10,031
May	31	240	0	0	2,951	10,366
June	30	-57	0	0	2,856	10,031
July	31	-582	0	0	2,951	10,366
August	31	-422	0	0	2,951	10,366
September	30	271	0	0	2,856	10,031
Annual	365	15,378	0	0	34,743	122,046

1.0 Feet

Depth = 14.99 Feet

Minimum Freeboard = 1.0 Feet

25Yr-24Hr Storm Precipitation =	6	Inches
25Yr-24Hr Storm Runoff =	0	Cubic Feet
74.5 Day Precip - Evap =	31.973666666	Inches
Runoff from Normal Precipitation =	0	Cubic Feet
Washwater =	7232	Cubic Feet
Manure =	25406	Cubic Feet

Diameter = 60 Feet

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

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5/10/2006
STATE: OREGON

CLIENT: **Andres Sanchez**
ASSISTED BY: **Amy Krahn**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

MANAGEMENT CRITERIA FOR TRACTOR SPREADER APPLICATION OF SOLIDS

To apply 81,777 cubic feet of solids generated from the operation it will take approximately 235 trips annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, travel lengths, and loads per acre listed below for each crop.

Field Number	Acres	Crop	Tractor Spreader Capacity Bushels	Tractor Spreader Capacity CF	Spread Width Feet	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/100CF	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Solids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
27 1-4, T45	75.2	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-43 1,2,3	24	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-19 1,2	23	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-632 1-5	50.9	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-632 6-9	53.3	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-657 1-9	70.8	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
T-665 1	52.5	Hay/Pasture Mix 16 % Protein	280	348	15	3,914	24.42	307	1.00	0.6	490	6
0												
0												

MANAGEMENT CRITERIA FOR BIG GUN SPRINKLER APPLICATION OF LIQUIDS

To apply 1,397,780 gallons of liquids generated from the operation it will take approximately 78 hours of pumping annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, set times, and travel rates listed below for each crop.

Field Number	Acres	Crop	Sprinkler Flowrate GPM	Wetted Diameter Feet	Portion of Wetted Diameter Receiving Liquids	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/1000Gal	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Application Rate in Inches/Hour	Set Time Needed in Hours	Travel Rate Needed in Feet/Minute
27 1-4, T45	75.2	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-43 1,2,3	24	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-19 1,2	23	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-632 1-5	50.9	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-632 6-9	53.3	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-657 1-9	70.8	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
T-665 1	52.5	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	3,013	25.14	307	1.00	0.69	1.45	1.17	2.79
0													
0													

MANAGEMENT TERIA FOR TANK WAGON APPLICATION OF LIQUIDS

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: Andres Sanchez
ASSISTED BY: Amy Krahn

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation / Type of Storage Facility	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrient Retained After Stora	
		N	P2O5	K2O	N	P2O5	K2O	N	P2O5
Liquids	Dairy / Tank (Uncovered) Storing Digester Effluent	50,200	13,286	57,034	70%	85%	85%	35,140	11,293
Solids	Solids Storage Facility (Roofed)	26,628	9,671	19,599	75%	90%	90%	19,971	8,704
Grazing	NONE	11,275	3,450	9,679	100%	100%	100%	11,275	3,450

NUTRIENTS AVAILABLE AFTER APPLICATION

Nutrient Source	Type of Application System	Pounds of Nutrients Available			Percent Nutrients Retained After Application			Pounds of Nutrient Retained After Applic	
		N	P2O5	K2O	N	P2O5	K2O	N	P2O5
Liquids	Sprinkling	35,140	11,293	48,479	75%	100%	100%	26,355	11,293
Solids	Broadcast (Incorporated 7 or more days after application)	19,971	8,704	17,639	70%	100%	100%	13,980	8,704
Grazing	Grazing	11,275	3,450	9,679	90%	100%	100%	10,148	3,450

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location / Soil Drainage Class	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrient Retained After Denitrifi	
		N	P2O5	K2O	N	P2O5	K2O	N	P2O5
Liquids	Coast / Well Drained	26,355	11,293	48,479	87%	100%	100%	22,929	11,293
Solids	Well Drained	13,980	8,704	17,639	87%	100%	100%	12,163	8,704
Grazing	Well Drained	10,148	3,450	9,679	87%	100%	100%	8,829	3,450

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.4

5/10/2006
STATE: OREGON

CLIENT: **Andres Sanchez**
ASSISTED BY: Amy Krahn

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

PERCENT OF MANURE TO BE APPLIED TO FIELD AND UTILIZATION ACRES NEEDED BASED ON NITROGEN, N

Field Number	Acres	Crop	LIQUIDS Percent to be Applied	LIQUIDS Pounds of Nutrients to be Applied	LIQUIDS Acres Needed for Utilization of Nutrients	SOLIDS Percent to be Applied	SOLIDS Pounds of Nutrients to be Applied	SOLIDS Acres Needed for Utilization of Nutrients	GRAZING Percent to be Applied	GRAZING Pounds of Nutrients to be Applied	GRAZING Acres Needed for Utilization of Nutrients
T-427 1-4, T450	75.2	Hay/Pasture Mix 16 % Protein	32%	7,337	24	12%	1,460	5	21%	1,854	6
T-43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	10%	2,293	7	4%	487	2	7%	618	2
T-19 1,2	23.0	Hay/Pasture Mix 16 % Protein	0%	0	0	12%	1,460	5	0%	0	0
T-632 1-5	50.9	Hay/Pasture Mix 16 % Protein	28%	6,366	21	3%	365	1	0%	0	0
T-632 6-9	53.3	Hay/Pasture Mix 16 % Protein	30%	6,820	22	3%	365	1	0%	0	0
T-657 1-9	70.8	Hay/Pasture Mix 16 % Protein	0%	0	0	38%	4,622	15	21%	1,854	6
T-665 1	52.5	Hay/Pasture Mix 16 % Protein	0%	0	0	28%	3,406	11	51%	4,503	15
0											
0											
Off-Farm			0%	113		0%	0		0%	0	
		TOTALS-	100%	22,929	74	100%	12,163	40	100%	8,829	29

NUTRIENT BALANCE BASED ON AVAILABLE ACRES

Field Number	Acres	Crop	NUTRIENTS APPLIED Nitrogen, N Lbs/Acre	NUTRIENTS APPLIED Phosphorous, P_2O_5 Lbs/Acre	NUTRIENTS APPLIED Potassium, K_2O Lbs/Acre	- NUTRIENTS REMOVED Nitrogen, N Lbs/Acre	NUTRIENTS REMOVED Phosphorous, P_2O_5 Lbs/Acre	NUTRIENTS REMOVED Potassium, K_2O Lbs/Acre	= NUTRIENT BALANCE Nitrogen, N Lbs/Acre	NUTRIENT BALANCE Phosphorous, P_2O_5 Lbs/Acre	NUTRIENT BALANCE Potassium, K_2O Lbs/Acre
T-427 1-4, T450	75.2	Hay/Pasture Mix 16 % Protein	142	72	261	307	85	235	-166	-14	26
T-43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	142	72	260	307	85	235	-166	-14	25
T-19 1,2	23.0	Hay/Pasture Mix 16 % Protein	63	45	92	307	85	235	-244	-40	-143
T-632 1-5	50.9	Hay/Pasture Mix 16 % Protein	132	67	275	307	85	235	-175	-19	40
T-632 6-9	53.3	Hay/Pasture Mix 16 % Protein	135	68	280	307	85	235	-172	-17	45
T-657 1-9	70.8	Hay/Pasture Mix 16 % Protein	91	57	123	307	85	235	-216	-28	-112
T-665 1	52.5	Hay/Pasture Mix 16 % Protein	151	80	188	307	85	235	-157	-5	-47
0											
0											
Off-Farm											

ts
K_2O
48.479
17.639
9.679

ts
K_2O
48.479
17.639
9.679

ts
K_2O
48.479
17.639
9.679

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 427 & 450	Field(s): T-427 1-4, T450 1
Assisted by: Amy Krahn		Date: May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	11	692	5.8		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		5-6 tons		

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertilizer	165					
8. Manure / Organic Materials (Source-)	Dairy	142	0	72	0	261	0
9.	Subtotal (sum of lines 6, 7 and 8)	307	0	72	0	261	0
10.	Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.	Nutrient Status (subtract line 10 from line 9)	0	0	-13	0	26	0

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	72	K_2O	261

Method, Form, and Timing of Application

The 692 ppm of potassium in the soil is medium. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 11 ppm of phosphorus is low. Recommend 165 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 43	Field(s): T-43 1,2,3
Assisted by: Amy Krahn		Date: May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	6	299	5.6		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		5-6 tons		

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop								
2. Residual from long-term manure application								
3. Irrigation water								
4. Other (e.g., atmospheric deposition)								
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial Fertilizer	165					
8. Manure / Organic Materials (Source-)		Dairy	142	142	72	72	260	260
9.		Subtotal (sum of lines 6, 7 and 8)	307	142	72	72	260	260
10.		Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.		Nutrient Status (subtract line 10 from line 9)	0	142	-13	72	25	260

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	72	K_2O	260

Method, Form, and Timing of Application

The 299 ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 6 ppm of phosphorus is low . Recommend 165 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 19	Field(s): T-19 1,2
Assisted by: Amy Krahn		Date: May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	21	1166	5.9		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		5-6 tons		

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertilizer	244					
8. Manure / Organic Materials (Source-)	Dairy	63	63	45	45	92	92
9.	Subtotal (sum of lines 6, 7 and 8)	307	63	45	45	92	92
10.	Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.	Nutrient Status (subtract line 10 from line 9)	0	63	-40	45	-143	92

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	45	K_2O	92

Method, Form, and Timing of Application

The 1166 ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 21 ppm of phosphorus is medium. Recommend 244 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 632	Field(s): T-632 1-5
Assisted by: Amy Krahn		Date: May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	6	528	6		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		5-6 tons		

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop								
2. Residual from long-term manure application								
3. Irrigation water								
4. Other (e.g., atmospheric deposition)								
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial Fertilizer	175					
8. Manure / Organic Materials (Source-)		Dairy	132	132	67	67	275	275
9.		Subtotal (sum of lines 6, 7 and 8)	307	132	67	67	275	275
10.		Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.		Nutrient Status (subtract line 10 from line 9)	0	132	-18	67	40	275

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	67	K_2O	275

Method, Form, and Timing of Application

The 528 ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 6 ppm of phosphorus is low. Recommend 175 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 632	Field(s): T-632 6-9

Assisted by:	Amy Krahn	Date:	May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	11	3506	5.7		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B	5-6 tons		
307		85		235				

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertlizer	172					
8. Manure / Organic Materials (Source-)	Dairy	135	135	68	68	280	280
9.	Subtotal (sum of lines 6, 7 and 8)	307	135	68	68	280	280
10.	Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.	Nutrient Status (subtract line 10 from line 9)	0	135	-17	68	45	280

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS						
Amount to be Applied (lb/ac)	N	307	P_2O_5	68	K_2O	280

Method, Form, and Timing of Application

The 3506 ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 11 ppm of phosphorus is low. Recommend 172 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Andres Sanchez	Tract(s):	657	Field(s):	T-657 1-9

Assisted by:	Amy Krahn	Date:	May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x

Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	2	281	5.1		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B	5-6 tons		
307		85		235				

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertilizer	216					
8. Manure / Organic Materials (Source-) Dairy		91	91	57	57	123	123
9. Subtotal (sum of lines 6, 7 and 8)		307	91	57	57	123	123
10. Nutrients Recommended (from Table 1)		307	0	85	0	235	0
11. Nutrient Status (subtract line 10 from line 9)		0	91	-28	57	-112	123
If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.							
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.							

PLANNED NUTRIENT APPLICATIONS						
Amount to be Applied (lb/ac)	N	307	P_2O_5	57	K_2O	123

Method, Form, and Timing of Application

The 281ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 2 ppm of phosphorus is low. Recommend 216 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez	Tract(s): 665	Field(s): T-665 1
Assisted by: Amy Krahn		Date: May 10, 2006

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)

N	P	K	pH	S.O.M.%	EC
NA	22	496	5.7		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD

N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		5-6tons		

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertilizer	156					
8. Manure / Organic Materials (Source-)	Dairy	151	151	80	80	188	188
9.	Subtotal (sum of lines 6, 7 and 8)	307	151	80	80	188	188
10.	Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.	Nutrient Status (subtract line 10 from line 9)	0	151	-5	80	-47	188

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	80	K_2O	188

Method, Form, and Timing of Application

The 496 ppm of potassium in the soil is high. High potassium levels in the soil may cause livestock health problems. Recommend forage tests to evaluate the forage levels in the forage. The 22 ppm of phosphorus is medium. Recommend 156 lbs of commercial nitrogen fertilizer be applied per acre to achieve the 6 tons of dry matter per acre per year. See attached letter from the Dairy Extension Agent. Manure and fertilizer should be applied in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution Sheet Section, for manure application rates per field. Recommend applying manure evenly over all the fields during the year. Recommend soil tests in late October to evaluate how well the biosolid application rate matches the nitrogen needs of the forage.

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REPORT NUMBER
06-080-058

Client No: 00000

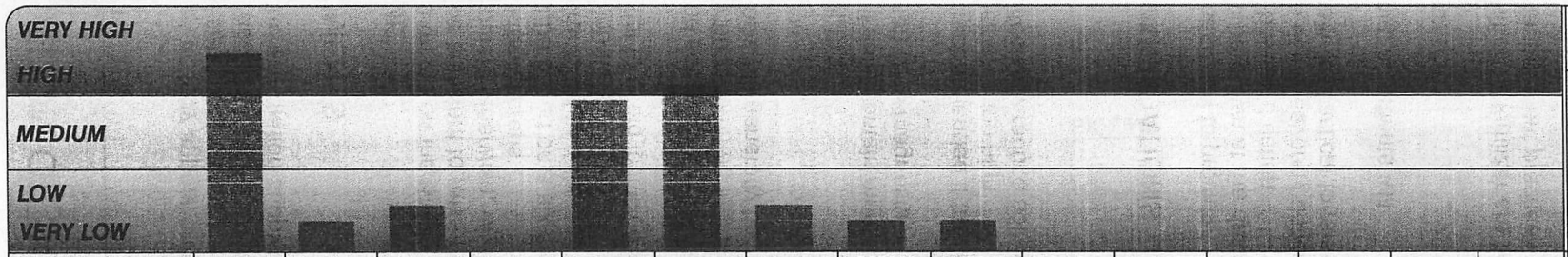
SEND TO: AMY KRAHN
1840 NW GARFIELD AVE
CORVALLIS, OR 97330-2536

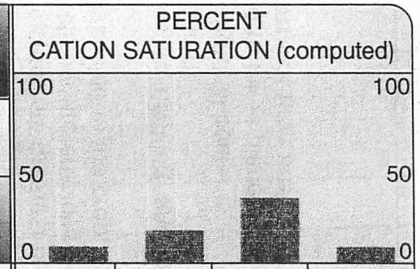
GROWER: ANRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58979 SAMPLE ID: 1 PAGE: 1





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	13.6	7	11	66	692	734	2743	82	5							6.6	22.4	50.7	1.3

ECe dS/m — LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 27.0

EX. LIME:

pH: 5.8 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.7

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

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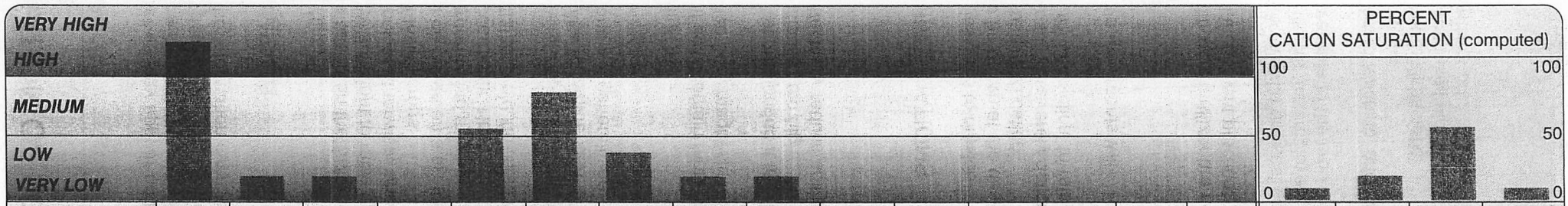
GROWER: ANRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58980 SAMPLE ID: 2 PAGE:



RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	14.1	5	6	47	299	697	3181	108	3							2.6	19.2	53.2	1.6

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.7

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

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GROWER: ANRES SANCHEZ

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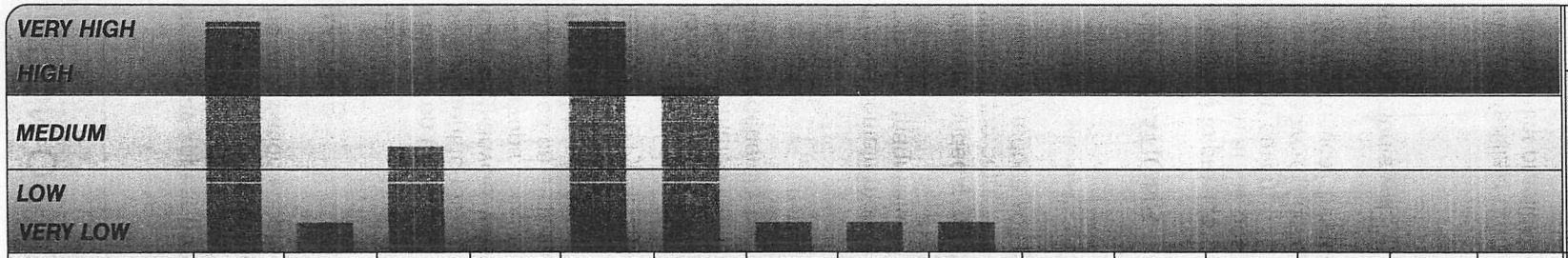
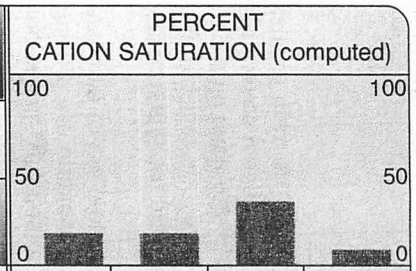
GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58981 SAMPLE ID: 3 PAGE: 3





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	25.0	6	21	50	1166	479	1537	46	3							16.7	22.1	43.0	1.1

ECe dS/m — LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 17.8

EX. LIME

pH: 5.9 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.8

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy Peebles
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GROWER: ANRES SANCHEZ

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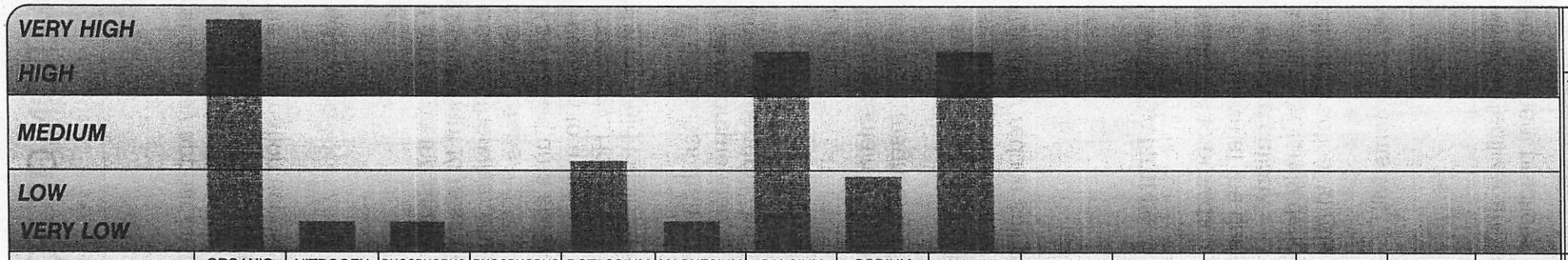
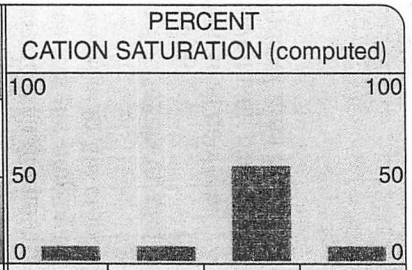
DATE OF REPORT: 03/27/2006 LAB NO: 58982 SAMPLE ID: 4 PAGE:





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	15.3	6	6	36	528	210	7811	388	39							2.6	3.4	75.7	3.3

ECe dS/m — LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 51.5

EX. LIME

pH: 6.0 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.8

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

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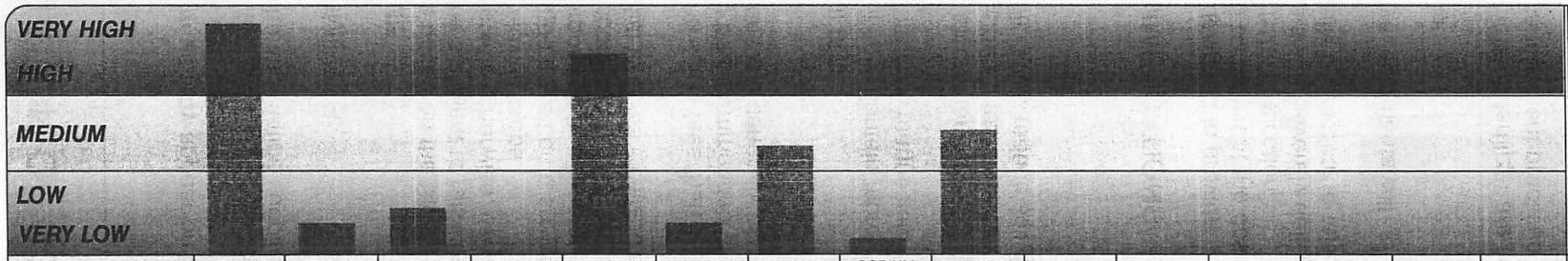
CORVALLIS, OR 97330-2536

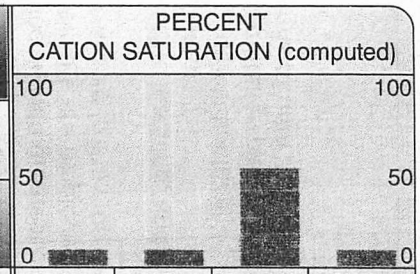
GROWER: ANRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58983 SAMPLE ID: 5 PAGE: 5





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	17.1	2	11	24	3506	241	9827	45	20							11.8	2.6	64.4	0.3

ECe dS/m — LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 76.2

EX. LIME:

pH: 5.7 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.6

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

DARCY PEEBLES, CCA

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REPORT NUMBER
06-080-058

Client No: 58999

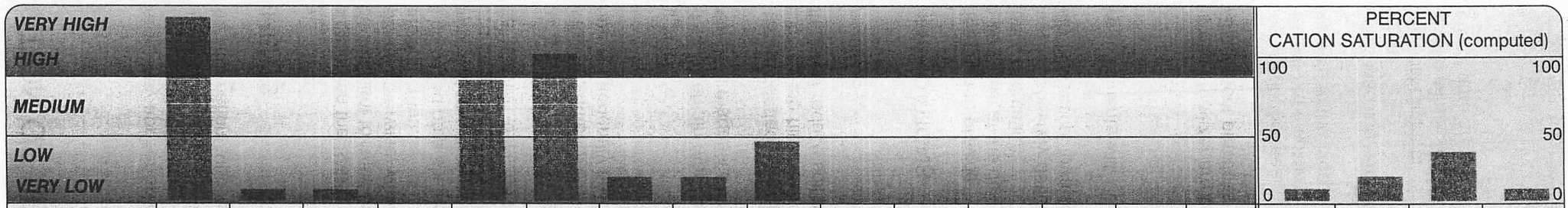
SEND TO: AMY KRAHN
1840 NW GARFIELD AVE
CORVALLIS, OR 97330-2536

GROWER: ANRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58984 SAMPLE ID: 6 PAGE:



RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	18.5	1	2	15	281	408	896	37	12							5.1	23.9	31.8	1.1

LOW AVERAGE HIGH

ECe dS/m — INCREASING SALINITY →

14.0 CEC meq/100g

EX. LIME

5.1 pH

ACIDIC BASIC

← INCREASING NEED FOR LIME

NaHCO3-F unreliable at this soil pH

BUFFER pH: 4.9

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy L. Peebles

DARCY PEEBLES, CCA

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The yield of any crop is c[illegible]lled by many factors in addition to nutrition. While these recommendations [illegible]

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REPORT NUMBER
06-080-058

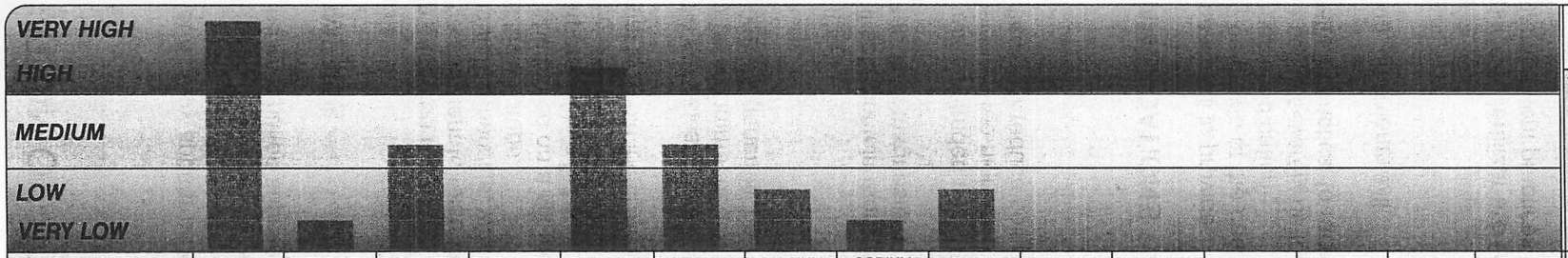
SEND TO: AMY KRAHN
1840 NW GARFIELD AVE
CORVALLIS, OR 97330-2536

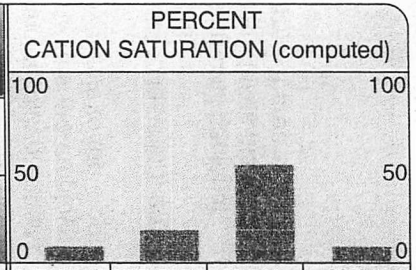
GROWER: ANRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 03/27/2006 LAB NO: 58985 SAMPLE ID: 7 PAGE: 7





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	26.4	6	22	96	496	285	1582	33	9							8.6	15.9	53.5	1.0

ECe dS/m: LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 14.7

EX. LIME:

pH: 5.7 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.3

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy L. Peebles
DARCY PEEBLES, CCA

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PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 427&450 Field No(s). 1-4 / 1 Date: 05/2006

Soil Map Unit(s): Nehalem & Gardiner silt loam Soil Test P: 11 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader, Big Gun Traveler

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.5	1.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0.75	0.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	3.25	;

Tract **427 & 450** Fields 1-4 / 1

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (11 - 40) x .10 = 0 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 69 x 0.02 = 1.38 lbs/ac P_2O_5					1.38	1.38
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	3.25	3.25
Source Factors Subtotal (SFS)	7.38	7.38
Total Rating Value (TFS + SFS)	**10.63**	**10.63**
Vulnerability Class	**LOW**	**LOW**

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 43 Field No(s). 1-3 Date: 05/2006

Soil Map Unit(s): Nehalem & Quillamook silt loam Soil Test P: 6 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader, Big Gun Traveler

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Current**	**Planned**
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.0	1.0
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0.75	0.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.75	5

Tract **43** Fields 1-3

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (6 - 40) x .10 = 0 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 69 x 0.02 = 1.38 lbs/ac P_2O_5					1.38	1.38
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	**Low**
13.0 – 25.0	**Medium**
25.1 – 50.0	**High**
> 50.0	**Very High**

	Current	Planned
Transport Factors Subtotal (TFS)	2.75	2.75
Source Factors Subtotal (SFS)	7.38	7.38
Total Rating Value (TFS + SFS)	**10.13**	**10.13**
Vulnerability Class	**LOW**	**LOW**

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 19 Field No(s). 1-2 Date: 05/2006

Soil Map Unit(s): Quillamook & Brenner silt loam Soil Test P: 21 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Current**	**Planned**
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.0	1.0
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0.75	0.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.75	5

Tract **19** Fields 1-2

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (21 - 40) x .10 = 0 Soil Test P Assign 0 points if Soil Test P < 40 ppm					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 37 x 0.02 = 0.74 lbs/ac P_2O_5					0.74	0.74
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	2.75	2.75
Source Factors Subtotal (SFS)	6.74	6.74
Total Rating Value (TFS + SFS)	**9.49**	**9.49**
Vulnerability Class	**LOW**	**LOW**

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 632 Field No(s). 1-5 Date: 05/2006

Soil Map Unit(s): Quillamook silt loam & Made Land Soil Test P: 6 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader & Big Gun Traveler

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0.5	0.5
Distance to Perennial Surface Waters / Buffer Widths	0:75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0.75	0.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.25	

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Tract **632** Fields 1-5

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (6 - 40) x .10 = 0 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 66 x 0.02 = 1.32 lbs/ac P_2O_5					1.32	1.32
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	2.25	2.25
Source Factors Subtotal (SFS)	7.32	7.32
Total Rating Value (TFS + SFS)	**9.57**	**9.57**
Vulnerability Class	**LOW**	**LOW**

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 632 Field No(s). 6-9 Date: 05/2006

Soil Map Unit(s): Made Land Soil Test P: 11 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader & Big Gun Traveler

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Current**	**Planned**
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0.5	0.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0	0
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	1.5	

Tract **632** Fields 6-9

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (11 - 40) x .10 = 0 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 68 x 0.02 = 1.36 lbs/ac P_2O_5					1.36	1.36
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	1.5	1.5
Source Factors Subtotal (SFS)	7.36	7.36
Total Rating Value (TFS + SFS)	**8.86**	**8.86**
Vulnerability Class	LOW	LOW

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 657 Field No(s). 1-9 Date: 05/2006

Soil Map Unit(s): Made Land & Quillamook silt loam Soil Test P: 2 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	**Current**	**Planned**
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0.5	0.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0	0
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	1.5	

Tract **657** Fields 1-9

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (2 - 40) x .10 = 0 Soil Test P Assign 0 points if Soil Test P < 40 ppm					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 48 x 0.02 = 0.96 lbs/ac P_2O_5					0.96	0.96
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	1.5	1.5
Source Factors Subtotal (SFS)	6.96	6.96
Total Rating Value (TFS + SFS)	**8.46**	**8.46**
Site Vulnerability Class	**LOW**	**LOW**

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 665 Field No(s). 1 Date: 05/2006

Soil Map Unit(s): Knappa & Quillamook silt loam Soil Test P: 22 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Solid Manure Spreader

Planner: Amy Krahn Notes: _____

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	0	0
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.5	1.5
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0.5	0.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0	0
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.0	

Tract **657** Fields 1-9

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P – 40) / 10 (22 - 40) x .10 = 0 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0.02 = lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 71 x 0.02 = 1.42 lbs/ac P_2O_5					1.42	1.42
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	6.0	6.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	2.0	2.0
Source Factors Subtotal (SFS)	7.42	7.42
Total Rating Value (TFS + SFS)	**9.42**	**9.42**
Site Vulnerability Class	**LOW**	**LOW**

NRCS Natural Resources Conservation Service
TILLAMOOK SERVICE CENTER
6415 SIGNAL ST
TILLAMOOK, OR 97141-9622
5038422848 ext. 107

Amy Krahn
Conservation Technician

Conservation Plan

ANDRES SANCHEZ
6430 LONG PRAIRIE RD
TILLAMOOK, OR 97141

Objective(s)

Develop and implement a comprehensive nutrient management plan, that whem implemented, the operation will be in compliance with ODA's CAFO rules, regulations, and permit conditions.

Hay

Tract: 19

Filter Strip

A grass filter strip adjacent to the open watercourse will be established and maintained as part of the animal confinement operation water quality plan to prevent agricultural waste from entering the open watercourse. The filter strip will be 35 feet wide. It will be installed in accordance with the enclosed NRCS Filter Strip Specification Sheet Code 393.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	1.3 ac	9	2007		
2	1.3 ac	9	2007		
Total:	2.6 ac				

Forage Harvest Management

Forage will be harvested in accordance with the enclosed Forage Harvest Management Worksheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.6 ac	8	2007R		
2	6.4 ac	8	2007R		
Total:	23 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.6 ac	9	2008R		
2	6.4 ac	9	2008R		
Total:	23 ac				

Waste Utilization

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.6 ac	8	2007R		
2	6.4 ac	8	2007R		
Total:	23 ac				

Tract: 43

Forage Harvest Management

Forage will be harvested in accordance with the enclosed Forage Harvest Management Specification Sheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.3 ac	8	2007R		
Total:	16.3 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.3 ac	9	2008R		
Total:	16.3 ac				

Waste Utilization

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.3 ac	9	2007R		
Total:	16.3 ac				

Tract: 427

Filter Strip

A grass filter strip adjacent to the open watercourse will be established and maintained as part of the animal confinement operation water quality plan to prevent agricultural waste from entering the open watercourse. The filter strip will be 35 feet wide. It will be installed in accordance with the enclosed NRCS Filter Strip Specification Sheet Code 393.

Field	Planned Amount	Month	Year	Applied Amount	Date
2	1.3 ac	9	2007		
3	4 ac	9	2007		
4	4 ac	9	2007		
Total:	9.3 ac				

Forage Harvest Management

Forage will be harvested in accordance with the enclosed Forage Harvest Management Worksheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.1 ac	8	2007R		
2	38.6 ac	8	2007R		
3	4 ac	8	2007R		
4	3.4 ac	8	2007R		
Total:	53.1 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.1 ac	9	2008R		
2	38.6 ac	9	2008R		
3	4 ac	9	2008R		
4	3.4 ac	9	2008R		
Total:	53.1 ac				

Waste Utilization

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.1 ac	8	2007R		
2	38.6 ac	8	2007R		
3	4 ac	8	2007R		
4	3.4 ac	8	2007R		
Total:	53.1 ac				

Tract: 632

Forage Harvest Management

Forage will be harvested in accordance with the enclosed Forage Harvest Management Worksheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac	8	2007R		
2	38 ac	8	2007R		
3	1.4 ac	8	2007R		
4	1.4 ac	8	2007R		
5	2.2 ac	8	2007R		
6	4.6 ac	8	2007R		
7	14.2 ac	8	2007R		
8	20.2 ac	8	2007R		
9	14.3 ac	8	2007R		
Total:	104.2 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac	9	2008R		
2	38 ac	9	2008R		
3	1.4 ac	9	2008R		
4	1.4 ac	9	2008R		
5	2.2 ac	9	2008R		
6	4.6 ac	9	2008R		
7	14.2 ac	9	2008R		
8	20.2 ac	9	2008R		
9	14.3 ac	9	2008R		
Total:	104.2 ac				

Waste Utilization

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac	8	2007R		
2	38 ac	8	2007R		
3	1.4 ac	8	2007R		
4	1.4 ac	8	2007R		
5	2.2 ac	8	2007R		
6	4.6 ac	8	2007R		
7	14.2 ac	8	2007R		
8	20.2 ac	8	2007R		
9	14.3 ac	9	2007R		
Total:	104.2 ac				

Tract: 657

Forage Harvest Management

Forage will be harvested in accordance with the enclosed Forage Harvest Management Worksheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	33.9 ac	9	2007R		
5	14.5 ac	9	2007R		
Total:	48.4 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	33.9 ac	10	2008R		
5	14.5 ac	10	2008R		
Total:	48.4 ac				

Waste Utilization

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	33.9 ac	9	2008R		
5	14.5 no	8	2007R		
Total:	48.4 ac				

Headquarters

Tract: 427

Comprehensive Nutrient Management Plan

A Comprehensive Nutrient Management Plan consisting of structural and vegetative practices for the transferring, collecting, handling, storage, and application of animal waste in an environmentally safe manner will be developed and implemented.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	8	2006		
Total:	1 no				

Manure Transfer

120 feet of 4 inch Class Code 125 PVC manure transfer pipe will be installed to transfer manure from the below ground liquid waste storage tank to the above ground liquid waste storage tank.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	12	1995	1 no	1/1/0001
Total:	1 no			1 no	

Waste Storage Facility

A 25' x 88' x 6' solid manure storage facility was installed. The 13,200 cubic foot solid manure storage facility will store the solid manure produced by the 400-1000 lb. animal units for 90 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	6	2002	1 no	6/30/2002
Total:	1 no			1 no	

Waste Storage Facility

A 30' x 7.5' below ground liquid waste tank was installed. The 5,301 cubic foot liquid waste storage tank in combination with the above ground liquid waste storage tank, will store the liquid waste produced by the 400-1,000 lb. animal units for 75 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	6	1987	1 no	6/7/1987
Total:	1 no			1 no	

Waste Storage Facility

A 60 ' x 16' above ground manure tank was installed. The 45,302 cubic foot liquid waste storage tank in combination with the below ground liquid waste storage tank will store the liquid waste produced by the 400-1,000 lb. animal units for 75 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	10	1995	1 no	10/15/1995
Total:	1 no			1 no	

Waste Storage Facility

A 60' x 59.6' and a 20.8' x 58.1' roof were installed over the below ground liquid waste storage tank and the manure accumulation area to reduce the amount of rainwater entering the liquid waste storage system..

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	7	2002	1 no	7/8/2002
Total:	1 no			1 no	

Waste Storage Facility

An agitator has been installed in the above ground liquid waste storage tank to stir the manure for application and prevent solid manure buildup in the facility.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	12	1995	1 no	12/7/1995
Total:	1 no			1 no	

Pasture

Tract: 43

Filter Strip

A grass filter strip adjacent to the open watercourse will be established and maintained as part of the animal confinement operation water quality plan to prevent agricultural waste from entering the open watercourse. The filter strip will be 35 feet wide. It will be installed in accordance with the enclosed NRCS Filter Strip Specification Sheet Code 393.

Field	Planned Amount	Month	Year	Applied Amount	Date
2	0.4 ac	9	2007		
3	0.4 ac	9	2007		
Total:	0.8 ac				

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
2	5.5 ac	8	2008R		
3	2.2 ac	8	2007R		
Total:	7.7 ac				

Waste Utilization

Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
2	5.5 ac	8	2007R		
3	2.2 ac	9	2007R		
Total:	7.7 ac				

Tract: 450

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	22.1 ac	9	2008R		
Total:	22.1 ac				

Waste Utilization

Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	22.1 ac	10	2007R		
Total:	22.1 ac				

Tract: 657

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
2	2.4 ac	10	2008R		
3	5.2 ac	10	2008R		
4	1.1 ac	10	2008R		
6	3.9 ac	10	2008R		
7	9.8 ac	10	2008R		
Total:	22.4 ac				

Prescribed Grazing

Pastures will be managed in accordance with the enclosed Prescribed Grazing Specification Sheet Code 528.

Field	Planned Amount	Month	Year	Applied Amount	Date
2	2.4 ac	9	2007R		
3	5.2 ac	9	2007R		
4	1.1 ac	9	2007R		
6	3.9 ac	9	2007R		
7	9.8 ac	9	2007R		
Total:	22.4 ac				

Waste Utilization

Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
2	2.4 ac	9	2007R		
3	5.2 ac	9	2007R		
4	1.1 ac	9	2007R		
6	3.9 ac	9	2007R		
7	9.8 ac	10	2007R		
Total:	22.4 ac				

Tract: 665

Nutrient Management

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code

Field	Planned Amount	Month	Year	Applied Amount	Date
1	50.9 ac	10	2008R		
Total:	50.9 ac				

Prescribed Grazing

Pastures will be managed in accordance with the enclosed Prescribed Grazing Specification Sheet Code 528.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	52.5 ac	9	2007R		
Total:	52.5 ac				

Waste Utilization

Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	50.9 ac	9	2007R		
Total:	50.9 ac				

CERTIFICATION OF PARTICIPANTS

Andres-sanchez 5-5-06
Andres Sanchez Date

CERTIFICATION OF:

Conservation Technician
Amy Krahn 05/05/06
Amy Krahn Date

CONSERVATION DISTRICT

TILLAMOOK SOIL & WATER CO Date

NONDISCRIMINATION STATEMENT

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

R - Designates Recurring Practices

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FILTER STRIP SPECIFICATION SHEET
CODE 393

Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9 W; Sec. 5

County: Tillamook SWCD Tillamook Farm/Tract No. T-450, 427,43, 19, 632

Field No. T-450 Field 1; T-427 Fields 1,2,3,4; T-43 Fields 1,2,3; T-19 Fields 1,2; T-632 Field 1

Prepared By: Amy Krahn Date 05/06

Purpose: To reduce manure runoff into an adjacent open watercourse and the resulting fecal and organic contamination in the watercourse.

Specifications:

⇒ A 35 foot grass filter strip will be maintained adjacent to all open water courses that flow through the farm.

⇒ No manure will be applied to the filter strip area.

⇒ Noxious weeds such as Tansy Ragwort and Canada Thistle are controlled in accordance with an Integrated Pesticide Management Plan.

⇒ Excessive accumulation of sediment and/or manure will be removed. The filter strip will be harrowed at least once each year prior to May 1st to shape and maintain at least a 1 % grade sloping away from the existing open water courses. Filter strip grade will be maintained to allow the runoff to occur along the entire length of the filter strip and not occur in only certain areas of the filter strip.

⇒ Depressions will be prevented from forming in the filter strip area where manure and sediment can be trapped.

⇒ Debris will not be allowed to accumulate in the filter strip.

⇒ Filter strips will be clipped, dragged, and or grazed at least twice during the growing season.

⇒ Grass will be at least 3 inches high by October 15th.

DESIGN APPROVAL

This practice is classified as Job Class II

Design approved by: Robert A. Pedersen Date:

Job Title: Basin Team Leader

Client Acknowledgement Statement:

The client acknowledges that:

a. They have received a copy of this specification and under-stands the contents and requirements.

b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by:/s/ Andres Sanchez Date: 5-5-06

Certification:

I have completed a review and checked out the filter strip practice specifications and certify that the practice has been applied in accordance with specifications.

Certified by: /s/ Date:

Job Title:

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FORAGE HARVEST MANAGEMENT SPECIFICATION SHEET

CODE 511

Landowner/Operator: Andres Sanchez

Job Location: T 2S R 9W; Sec. 5

County: Tillamook SWCD Tillamook Farm/Tract No. T-427, 43, 19, 632, 665, 657

Field No. T-427 Fields 1-4; T-43 Field 1; T-19 Fields 1,2; T-632 Fields 1-9; T-665 Field 1; T-657 Fields 1-3, 7

Prepared By: Amy Krahn Date: 05/06

⇒ Purpose:

⇒ Improve or maintain the health and vigor of the forage stand

⇒ Maintain and improve water quality

⇒ Maintain or improve animal health and productivity.

⇒ Attain management efficiency to promote economic stability.

Specifications:

⇒ Hayland fields are managed to assure at least 6 tons of dry matter is produced per acre per year.

⇒ Hayland Fields are reestablished when forage yields fall below 4 tons of dry matter per acre per year.

⇒ Harvesting newly seeded fields are delayed until the grasses have at least 8 inches of growth and are firmly rooted.

⇒ Harvesting established stands are delayed until grasses have at least 6 inches of growth and ground is firm.

⇒ Grasses are not cut if the grass height is less than 2 inches.

⇒ Harvesting is not done when the fields are saturated or ponded.

⇒ Noxious weeds such as Tansy Ragwort and Canada Thistle are controlled in accordance with an Integrated Pesticide Management Plan.

⇒ Manure and commercial fertilizer applications are based on soil tests. Soil tests will be taken at least every 5 years. Nitrogen applications will not exceed 307 lbs. of nitrogen per acre per year unless soil tests and forage production justifies higher application rates.

⇒ Forage Tissue Tests will be taken at least twice during the growing season.

⇒ Manure is applied to hayland fields in accordance with the enclosed Waste Utilization Conservation Practice and Nutrient Management Job Sheets

⇒ Field will be grazed when the required amount of forage is harvested. Grazing will be in accordance with the enclosed Prescribed Grazing Specification Sheet Code 528A.

DESIGN APPROVAL:

This practice is classified as Job Class I.

Design approved by: /s/_____ Date: _____

Job Title: _____

CLIENTS ACKNOWLEGEMENT STATEMENT:

The client acknowledges that:

a. They have received a copy of this specification and understand the contents and requirements.

b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by:/s/ Andres - sanchez Date: 5-5-06

CERTIFICATION;

I have completed a review of the forage harvest management practice and the specification's application and certify this practice has been applied.

Certification by:/s/_____ Date: _____

Job Title: _____

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT SPECIFICATION SHEET
CODE 590

EXISTING HERD SIZE

Landowner/Operator: Andres Sanchez

Job Location: T2S; R9W; Sec 5

County: Tillamook SWCD: Tillamook County Farm/Tract No. T-427, 450, 43, 19, 632, 665, 657

Field No. T-427 Fields 1-4; T-450 Field 1; T 43 Fields 1-3; T-19 Fields 1,2; T-632 Fields 1-9; T-665 Field 1; T-657 Fields 1-9

Prepared By: Amy Krahn Date: 05/2006

Purpose:

☐ To budget and supply nutrients for plant production.

☐ To properly utilize manure and organic by-products as a plant nutrient source.

☐ To minimize agricultural non-point source pollution of surface and ground water resources.

☐ To maintain or improve the physical, chemical and biological condition of soil.

Specifications:

☐ Manure is applied to the surface of permanent pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet.

☐ A target yield of 6 tons of dry matter per acre per yield is planned to utilize the nitrogen in the manure and/or commercial applied fertilizer.

☐ Manure and commercial fertilizer is applied in accordance with soil tests.

☐ Manure and/or commercial fertilizer is applied in split applications.

☐ Soil tests are taken at least every 5 years.

☐ Manure test are taken every 5 years. Samples will be collected from the equipment that applies the manure and wastewater to the fields.

☐ No more than 384 lbs. of nitrogen is applied per acre per year in accordance with the below Nutrient Distribution, Soil and forage tests will be used to justify the rates.

Manure Application Equipment to be used:

400-1,000 lb. animal units, Big Gun Traveler, 280 Bushel Manure Spreader

Manure Nutrient Distribution

Andres Sanchez **Date: Ma 2006**

			Grazing		Solids			Liquids (Spreader)			Liquids (Pumping)			
Tract	Field #	Grazing Cycles /YR	# N supplied by grazing/ field/yr	# of N supplied by grazing ac/yr	Loads of solid/yr	# of N per field/yr solids	# of N per from solids	Loads of Liquids/yr	# of N per field/yr liquid	# of N per ac/yr from liquid	Hours of Pumping	# of N per field/yr liquid	# of N per ac/yr from liquid	Total # of N per ac/yr
427	1	0	0	0	0	0	0	0	0	0	3	993	140	140
0	2	0	0	0	0	0	0	0	0	0	18	5397	140	140
0	3	0	0	0	0	0	0	0	0	0	2	559	140	140
0	4	0	0	0	0	0	0	0	0	0	2	475	140	140
450	1	11	1884	84	28	1446	65	0	0	0	0	0	0	138
43	1	0	0	0	0	0	0	0	0	0	8	2279	140	140
	2	11	464	84	7	360	65	0	0	0	0	0	0	138
	3	11	186	84	3	144	65	0	0	0	0	0	0	138
19	1	0	0	0	22	1087	65	0	0	0	0	0	0	54
	2	0	0	0	8	419	65	0	0	0	0	0	0	54
632	1	0	0	0	0	0	0	0	0	0	4	1105	140	140
	2	0	0	0	0	0	0	0	0	0	18	5313	140	140
	3	0	0	0	2	92	65	0	0	0	0	0	0	54
	4	0	0	0	2	92	65	0	0	0	0	0	0	54
	5	0	0	0	3	144	65	0	0	0	0	0	0	54
	6	0	0	0	6	301	65	0	0	0	0	0	0	54
	7	0	0	0	0	0	0	0	0	0	6	1985	140	140
	8	0	0	0	0	0	0	0	0	0	10	2824	140	140
	9	0	0	0	0	0	0	0	0	0	7	1998	140	140
665	1	11	4427	84	66	3439	65	0	0	0	0	0	0	138
657	1,2,3	0	0	0	43	2220	65	0	0	0	0	0	0	54
	4	11	202	84	3	157	65	0	0	0	0	0	0	138
	5	11	438	84	7	341	65	0	0	0	0	0	0	138
	6	11	93	84	1	72	65	0	0	0	0	0	0	138
	7	0	0	0	18	950	65	0	0	0	0	0	0	54
	8	11	329	84	5	255	65	0	0	0	0	0	0	138
	9	11	828	84	12	642	65	0	0	0	0	0	0	138
	Totals		8829		235	12163		0	0		78	22929		

: For Farm Summary of all tracts you must highlight desired cell ranges go to Edit/Copy then click on the Summary Tab and click on Paste Special/ and under Paste select values/OK

Records are maintained of manure and or/or commmercial fertilizer applications.

Nutrient management plans are reviewed annually and adjustments are made as needed.

Manure is not applied within 35 feet of an open watercourse.

DESIGN APPROVAL:

Practice Code No.	Practice	Leand Discipline	Controlling Factor	Units	Job Class				
					I	II	III	IV	V
590	Nutrient Managem ent	CED-EE& BCSD-Agron	Area	Acres	160	320	640	All	All

This practice is classified as Job Class I

Design approved by: /s/ Date:_____

Job Title:

CLIENTS ACKNOWLEGEMENT STATEMENT:

The client acknowledges that:

a. They have received a copy of this specification and under-stands the contents and requirements.

b. The following information must be provided NRCS by the client before this practice can be certified as applied:

- ☐ Nutrient management application records including soil, water, plant and organic by-product test results.
- ☐ Documentation showing amount, rate, form and application method of nutrient applied
- ☐ Annual review of nutrient management including adjustments made.

c. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

d. Maintain records of nutrient application as required by state and local regulations.

Accepted by:/s/ Andres. Sanchez Date: 55-06

CERTIFICATION;

I have completed a review of the nutrient management and the specification's application and certify this practice has been applied.

Certification by:/s/_____ Date: _____

Job Title: _____

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Waste Utilization

Conservation Practice Jobsheet

633 OR-JS

Natural Resources Conservation Service, Oregon

February 2002

Client Andres Sanchez Date 05/2006

Definition

Waste Utilization is the beneficial use of agricultural wastes such as manure and wastewater or other organic residues.

Purpose

The ultimate purpose of waste utilization is to insure the proper use of agricultural wastes while protecting soil, water, air, plant, and animal resources. Agricultural wastes can be used to provide nutrients for crops, forage, and fiber production and forest products. Agricultural waste also can be used as an amendment to improve or maintain soil structure, provide feedstuff for livestock, or provide a source of energy. The focus of this job sheet will be the use of agricultural wastes to provide fertility for crops, forage, and fiber production and forest products; and to supply organic material to the soil.

Where used

Waste utilization is used where agricultural wastes (primarily animal manure and polluted runoff from livestock and poultry operations) are generated and collected as part of a resource management system. Wastes can be used as a source of fertility on cropland and pastureland, and occasionally on forest land or rangeland. Use of the Soil Condition Index (SCI) can be used to determine the effects of organic material on soil quality.

Conservation Management Systems

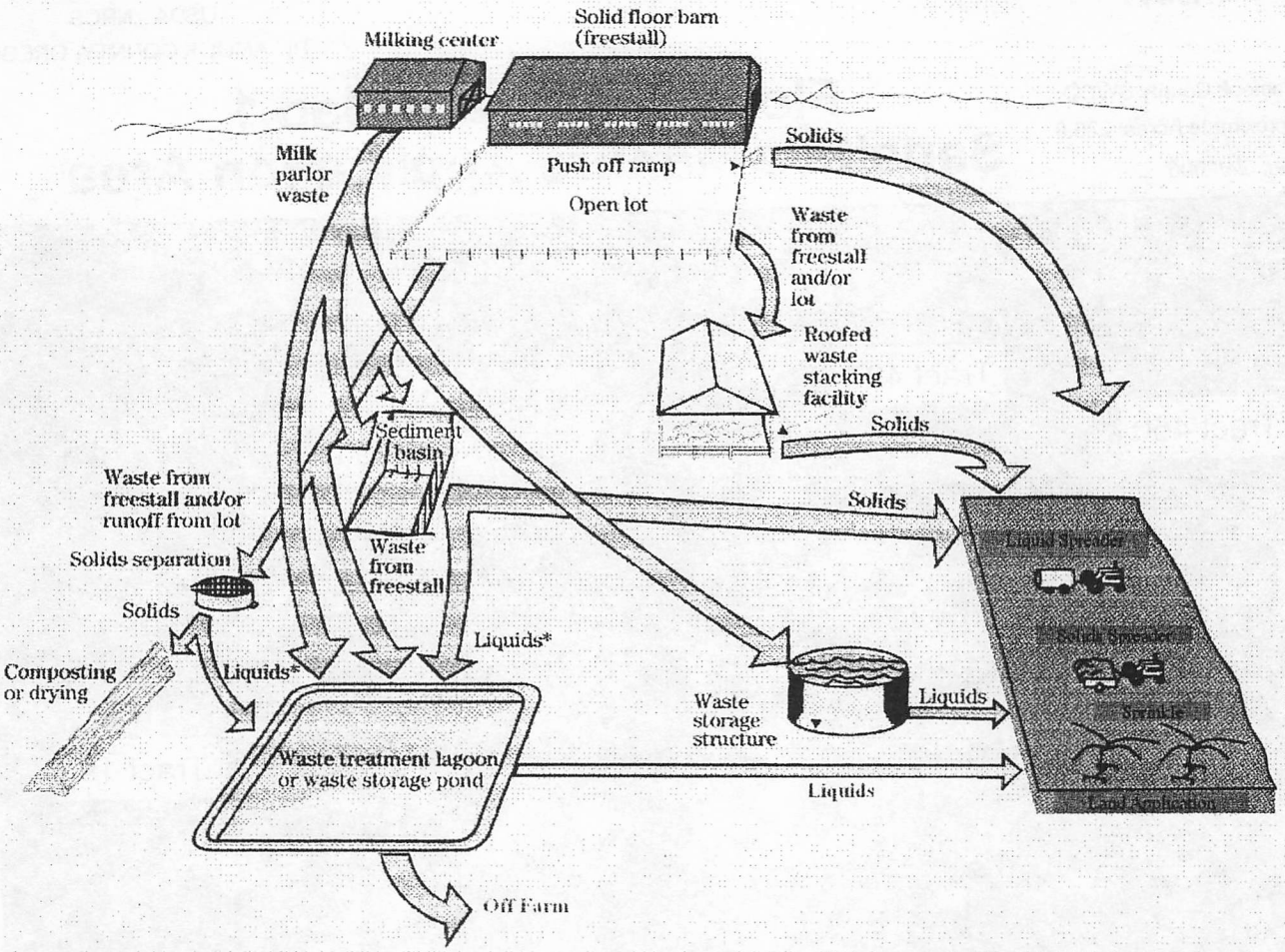
Waste utilization is generally one of several components of a resource management system used to manage manure and polluted water from livestock and poultry operations. Where the wastes are used to supply the fertility needs of crop and pasture, waste utilization is done as part of an overall resource management plan for the enterprise.

Waste Utilization Planning

Waste utilization components of the conservation plan will contain the following information:

- field map and soil map
- crop rotation or sequence
- results of soil, water, plant, and organic material samples analyses
- expected yield
- sources of nutrients to be applied
- nutrient budget, including credits of nutrients available
- recommended nutrient rates, form, timing, and method of application
- location of designated sensitive areas
- guidelines for operation and maintenance

Waste utilization is most effective when used with other conservation practices such as cover crop, residue management, conservation buffers, irrigation water management, nutrient management, pest management, and conservation crop rotation.



* Liquids from lot runoff discharged to waste storage pond only

Schematic of a Resource Management System for a Dairy

Operation and maintenance

Operation and maintenance activities shall include record keeping for 5 years or longer that includes the following:

- Quantity of manure and other agricultural wastes produced, and their nutrient content.
- Soil test results.
- Dates and rates of waste application where land applied, and the dates and amounts of waste removed from the system due to feeding, energy production, or export from the operation.
- Waste application methods.
- Crops grown and yields (both yield goals and measured yield).
- Other tests as needed, such as determining the nutrient content of the harvested product.
- Calibration of the application equipment.
- Changes in soil condition(SCI).
- Plan map showing fields where waste is applied.

Specifications

Site specific requirements for waste utilization are listed on specification sheets. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See NRCS practice standard, Waste Utilization, code 633. Use NRCS's Agricultural Waste Management Field Handbook or locally accepted references for procedures to calculate values such as residual nitrogen from past waste applications, and to estimate available nutrients in wastes where lab analyses are not available.

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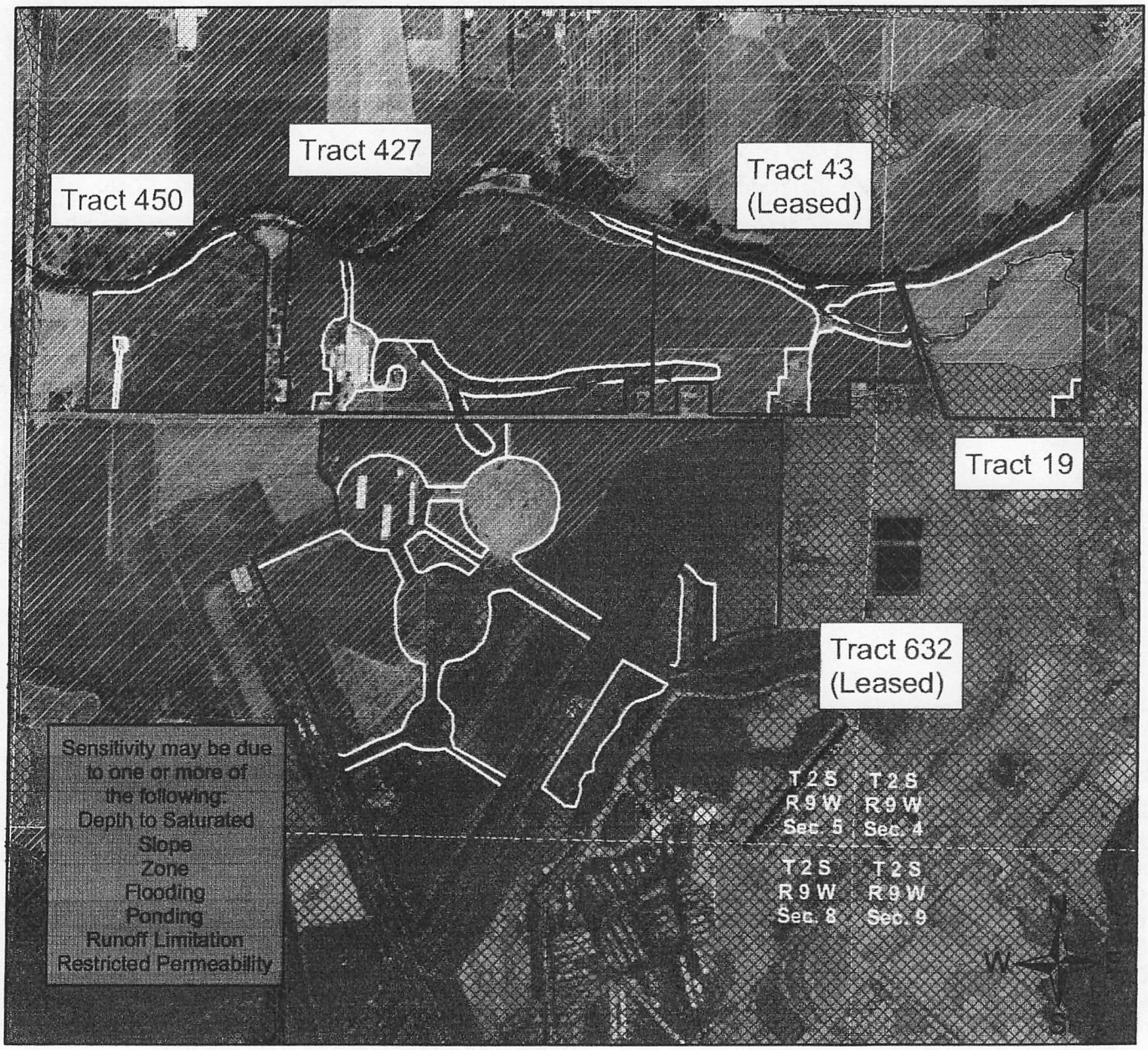
ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 236.9
Date: 5/4/2006

Flood Boundary Map 1
Sensitive Manure Application Area



Legend

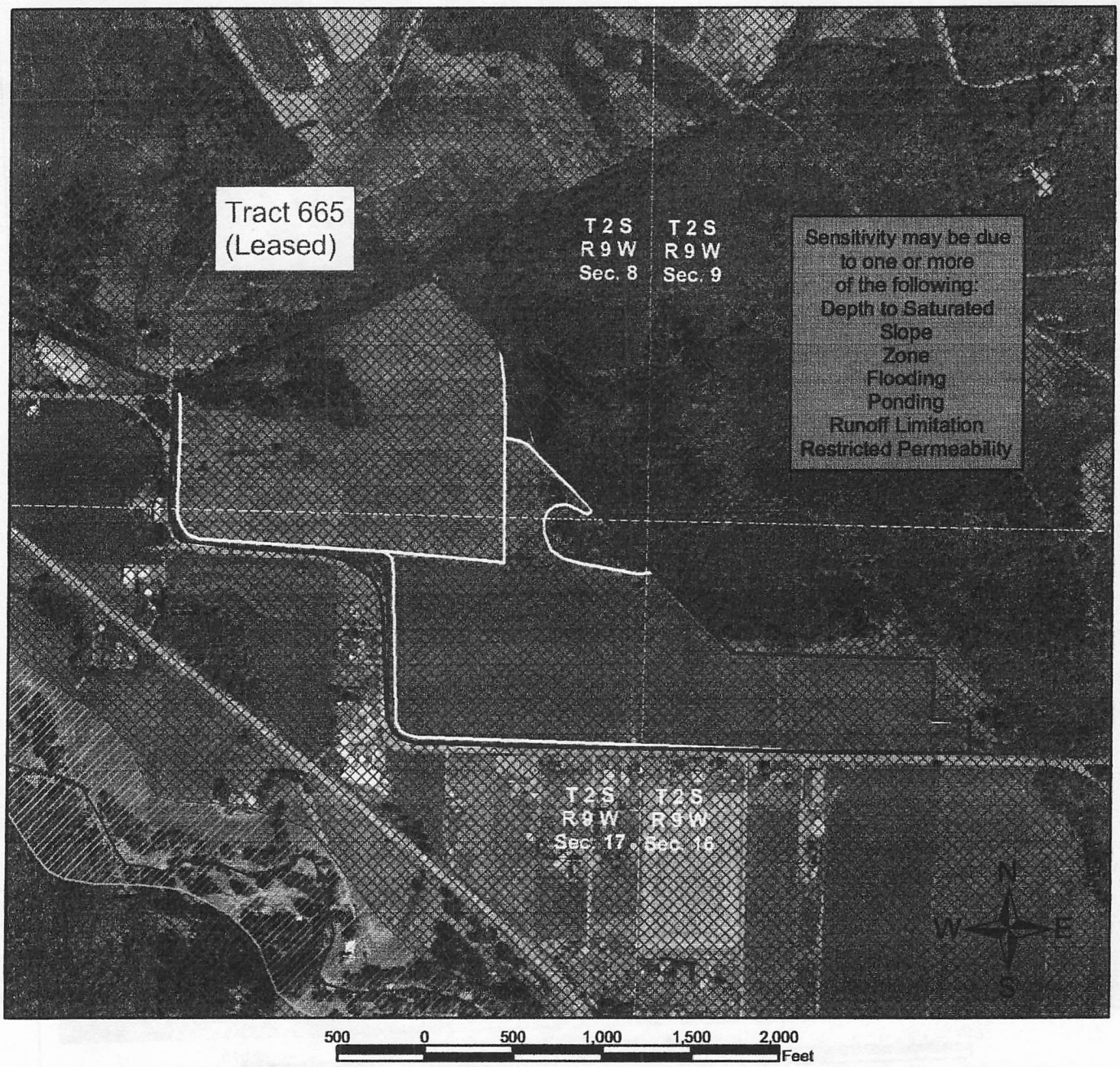
- Tract Boundary
- Planned Land Units
- Public Land Survey
- Sensitive Manure Application Area (100 Yr. Flood Plain)
- Undetermined Flood Plain
- Winter Manure Application Area (Outside 500 Yr. Flood)
- 500 Yr. Flood Plain
- Open Water Course

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 52.5
Date: 1/24/2006

Flood Boundary Map 2
Sensitive Manure Application Area



500 0 500 1,000 1,500 2,000 Feet

Legend

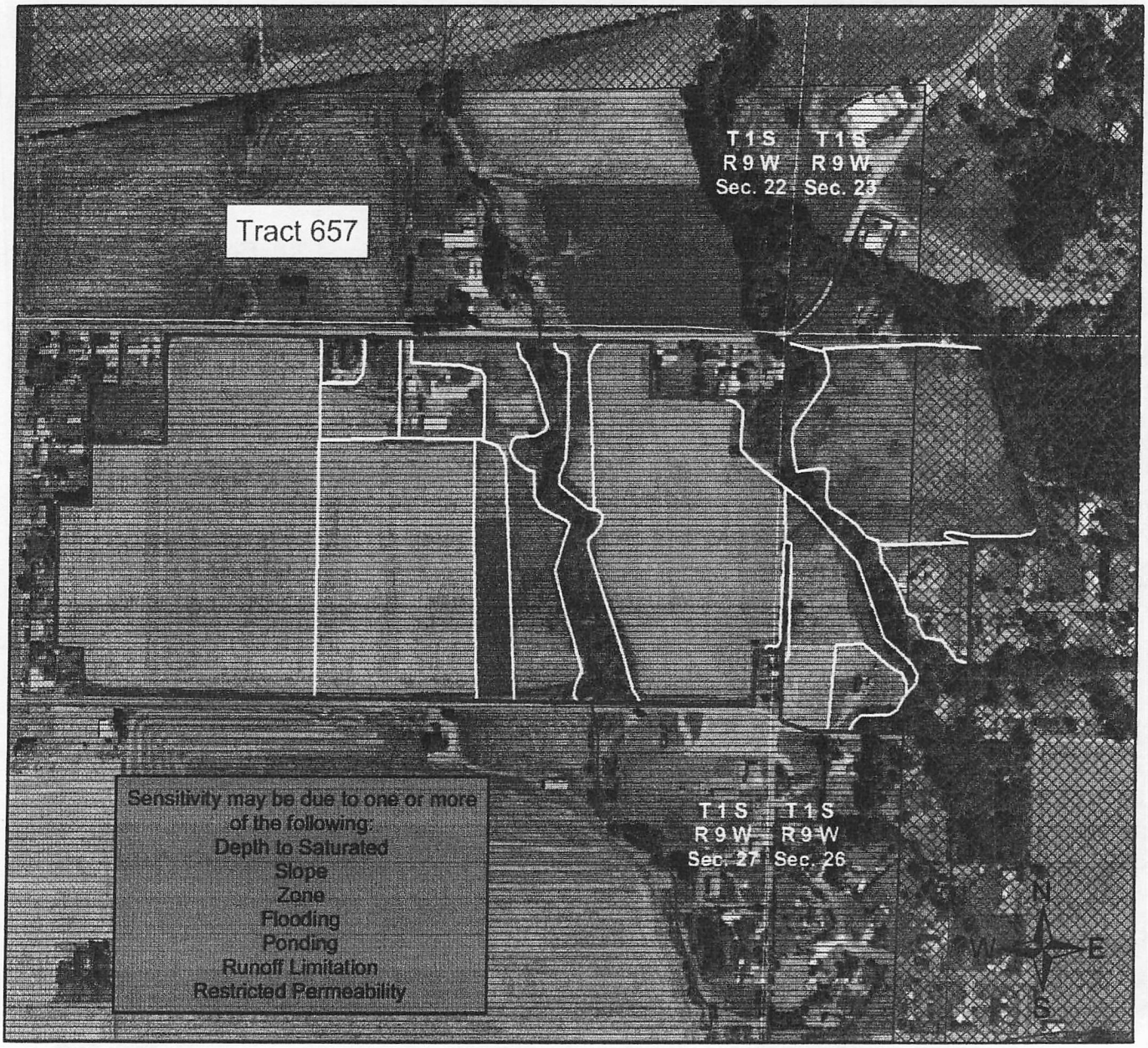
- Tract Boundary
- Planned Land Units
- Public Land Survey
- Sensitive Manure Application Area (100 Yr. Flood Plain)
- Undetermined Flood Plain
- Winter Manure Application Area (Outside 500 Yr. Flood)
- 500 Yr. Flood Plain
- Open Water Course

ANDRES SANCHEZ
TR034

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 82.0
Date: 1/24/2006

Flood Boundary Map 3
Sensitive Manure Application Area



510 0 510 1,020 1,530 2,040 Feet

Legend

- Tract Boundary
- Planned Land Units
- Public Land Survey
- Sensitive Manure Application Area (100 Yr. Flood Plain)
- Undetermined Flood Plain
- Winter Manure Application Area (Outside 500 Yr. Flood)
- 500 Yr. Flood Plain
- Open Water Course

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION SPECIFICATION SHEET

Client Andres Sanches

Location: 4720 Long Prairie Road

Tillamook SWCD Tract No. 427, 450, 43, 19, 632, 665, 657

Prepared By Amy Krahn Date 05/2006

Perform the following operations:
☐ Have your technical assistance provider review the resource management system plan for your operation at least once every 5 years.
☐ Maintain records for all waste applications.
☐ Calibrate application equipment to apply wastes in accordance with the recommended amount and timing specified on the nutrient budget specification sheet, NRCS practice code 590, for the crop being grown.
☐ Chemical analysis of soils, plant tissue and waste should be used annually to monitor and adjust amounts of waste applied. Refer to Oregon State University Extension Service publication EC1478, "Soil Test Interpretation Guide" for guidance in getting soil tested and interpreting soil test results. Refer to Oregon State University Extension publication EM8585, "Manure Application Rates for Forage Production" and EM8768, "Calculating Dairy Manure Nutrient Application Rates" for guidance in getting animal waste tested for nutrient concentrations and computing application rates.
☐ Apply waste in a manner that will cover no more than 25 percent of the leaf surface with solids unless clean water applications are planned immediately after wastes are applied. For pasture/hayland it is best to apply waste 7 days after harvesting forage by haying or grazing.
☐ To reduce odor problems, apply waste in mid morning when temperatures are warming and air is rising rather than in the afternoon or evening when air is cooling and settling. Avoid applications during periods of fog.
☐ Do not apply waste directly into an open watercourse or where waste is likely to enter an open watercourse. Observe all waste application setbacks identified in the resource management system plan.
☐ Do not apply waste to fields where there is no growing crop. If applications are needed during fall and winter periods due to unforeseen circumstances, such as the storage facilities being full, use the following guidelines for waste applications: a) Only spread waste on fields that are growing a crop, preferably grass. b) Increase all waste application setbacks identified in the resource management system plan by 50 feet. c) Don't apply waste during any rainfall event that will cause runoff. d) Use maximum travel rates for the traveling big gun sprinkler and solids spreader. e) Use soil tests, such as the Pre-sidedress Soil Nitrate test, to determine if additional applications of waste are needed on those fields receiving emergency winter applications.
☐ Do not apply waste to fields with frozen or snow covered soil conditions unless provisions are made to control runoff.
☐ Do not spread waste on fields where soils are saturated, ponded, flooded and/or during times when waste is likely to runoff into open watercourses.
☐ Be aware of the location of sensitive areas, concerns of neighbors or concerns of the public which require special application procedures
☐ Handle all waste material with caution. Wear appropriate protective clothing.
☐ Clean up residual materials from equipment and dispose of properly.
☐ Equipment used in waste utilization should be regularly inspected and maintained as needed in accordance with equipment operation and maintenance guidelines from the manufacturer or provided by NRCS.
Additional Guidance and Notes: Any manure discharge into an Open water course will be reported to Oregon Department of Agriculture (ODA) within 24 hours. Within 5 days a written statement describing the manure discharge will be submitted to ODA. Annual CAFO permit reports will be submitted on time to ODA.

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION SPECIFICATION SHEET

DESIGN APPROVAL:

Practice Code NO.	PRACTICE	LEAD DISCIPLINE	CONTROLLING FACTOR	UNITS	JOB CLASS				
					I	II	III	IV	V
633	Waste Utilization	BCSD-Agron & CED-EE	Area	Acres	20	40	80	180	All

This practice is classified as Job Class IV

Design Approved by:/s/ Robert A. Pedersen Date:_____

Job title: North Coast Basin Team Leader

CLIENTS ACKNOWLEDGEMENT STATEMENT:

The Client acknowledges that:

a. They have received a copy of the specification and understand the contents and requirements.

b. The following information must be provided to NRCS by the client before this practice can be certified as applied:
   - ☐ Waste application records which include the date, crop, type of waste applied, and amount of waste applied.
   - ☐ Calibration records for waste application equipment.
   - ☐ Analysis of nutrient concentrations in solid and liquid wastes.

c. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by:/s/ Andres-sanchez Date: 5-5-06

CERTIFICATION:

I have completed a review of the information provided by the client and certify this practice has been applied.

Certification by:/s/_____ Date:_____

Job title:_____

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Spreader Equipment Calibration

(Using Bucket, Pan or Tarp)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the solids spreader equipment:

- ✓ Place buckets, pans, or tarps in the application area to collect the applied or spread waste material.
- ✓ Spread waste material over the application area using the spreading pattern normally used in the field. Make sure the spreader is traveling at the speed it typically travels over the collection area. Record engine rpm and gear settings used.
- ✓ Collect and weigh the waste material and calculate the average application rate. Use this worksheet to record the weights and calculations.

Note: Use Tarps instead of buckets or pans when using dry stack manure or separated solids as the variability in the weight will be less.

Data and Calculations:

Steps	ID of Bucket, Pan or Tarp					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading -						
3. Gear selected during spreading -						
4. Weight of empty bucket (lb) =						
5. Weight of bucket with waste (lb) =						
6. Weight of Waste (lb) - **line 5 – line 4 =**						
7. Collection Area (sq ft) - Area of the top of the bucket, pan or tarp used to collect the waste =						
8. Waste Applied (lb/sq ft) - **line 6 ÷ line 7 =**						
9. Covert to tons per acre - **line 8 x 21.78 =**						
10. Average Application Rate (tons per acre)- Sum of values in cells A9 through F9 divided by the total number of calibrations completed =						

Additional Notes:

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Spreader Equipment Calibration

(Using a Full Spreader Load)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the solids spreader equipment:

- ✓ Determine the weight of the waste material loaded in the spreader by using truck scales to weigh the spreader equipment when it is empty and full.
- ✓ Spread the loaded spreader on the field using consistent speed and spreader settings to cover the field uniformly. Spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.
- ✓ Measure the length and width covered by the full load and compute the application rate in tons per acre using this worksheet.

Data and Calculations:

Steps	ID of Calibration Test					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading -						
3. Gear selected during spreading -						
4. Weight of empty spreader (lb) =						
5. Weight of loaded spreader (lb) =						
6. Weight of Waste in spreader (lb) - **line 5 – line 4 =**						
7. Length of spreading area (ft) =						
8. Width of spreading area (ft) =						
9. Area spread (sq ft) - **line 7 x line 8 =**						
10. Waste applied (lb/sq ft) – **line 6 ÷ line 9=**						
11. Convert to tons per acre - **Line 10 x 21.78=**						
12. Average Application Rate (tons per acre) – Sum of values in cells A11 through F11 divided by the total number of calibrations completed =						

Additional Notes:

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Tank Equipment Calibration

(Using a Full Tank Load)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the tank equipment:

- ✓ Determine the maximum capacity of the tank equipment from the manufacturer's maintenance manual or the owners manual for the equipment.
- ✓ Fill the tank and reduce the volume of the tank by the appropriate amount if the tank is not filled to its maximum capacity. Normally a tank spreader is only filled to about 80 percent of its maximum capacity and therefore the maximum rated capacity of the tank should be multiplied by 0.8 to reflect the volume of the loaded tank during the calibration exercise.
- ✓ Spread the loaded tank on the field using consistent speed and settings to cover the field uniformly. Try to spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.

Data and Calculations:

Steps	ID of Calibration Test					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading-						
3. Gear selected during spreading-						
4. Maximum rated capacity of tank (gallons) =						
5. Volume of filled tank (gallons)- Line 4 x ____ % of tank filled ÷ 100% =						
6. Length of spreading area (ft) =						
7. Width of spreading area (ft) =						
8. Area spread (sq ft)- line 6 x line 7 =						
9. Waste applied (gal/sq ft)- line 5 ÷ line 8 =						
10. Convert to gallons per acre - Line 9 x 43,560 =						
11. Average Application Rate (gallons per acre) – Sum of values in cells A10 through F10 divided by the total number of calibrations completed =						

Additional Notes:

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Traveling Big Gun Sprinkler Calibration

(Using Catch Cans)

Name:_____ Date:_____

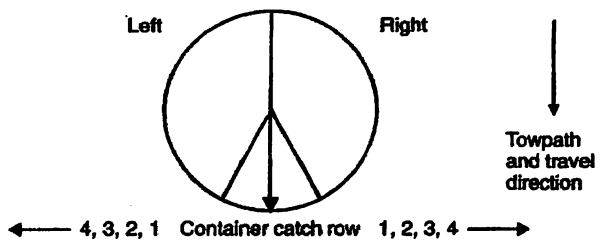
Perform the following operations to calibrate the traveling big gun sprinkler:

- ✓ **Use 5 to 10 catch cans to collect the sprinkler-irrigated waste. Use straight-sided buckets for catch cans. Two pound coffee cans work well. Make sure all of the catch cans have the same diameter.**
- ✓ Place one of the catch cans on a level surface and fill it with water to a known depth (1-3 inches). Pour the water from the catch can into a large measuring cup. Determine how many measuring cups of water are equal to an inch of water in the catch can.
- ✓ Place at least five catch cans across the towpath of the big gun sprinkler. Try to space the catch cans uniformly from the center of the towpath to the outer edge of the wetted area of the sprinkler. Stake the catch can in place or put a rock in the bottom of the catch can to keep it upright. Allow the traveling big gun sprinkler to completely pass over the catch cans. Use the measuring cup previously used to calibrate the catch cans to measure the amount of liquid collected in each can and convert the volume to inches. Be sure to add together the amount measured from the catch cans that would receive overlap from the adjacent towpath. For example, if catch can #4 will receive liquids from the adjacent towpaths, add the amount from container #4 on the left to container #4 on the right side to compute the total amount applied at the location of container #4 on the right and left sides of the towpath.

Catch Can Calibration:

Example: 1 inch = 5 Cups
1 cup = 0.2 Inches

Your Catch Cans: 1 inch = _____ Cups
1 cup = _____ Inches



Travel Rate Setting During Test:

Data and Calculations:

Catch Can ID	Volume of Liquid							
	Cups	Inches	Cups	Inches	Cups	Inches	Cups	Inches
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
Average =								

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Nitrogen Based Waste Application

Name:_____ Date:_____

Example:

Corn silage is being grown and the recommended nutrient application from the nutrient budget worksheet is 200 pounds of nitrogen(N) per acre. A traveling big gun sprinkler will be used to make 1 application of liquids from a non-agitated waste storage pond and a tractor spreader will be used to make 1 application of solids from a dry stacking facility that will not be incorporated into the field.

Waste application rates and amounts:

Steps	Example		Your Calculations			
	Liquid	Solids	Liquid	Solids	Liquid	Solids
1. Type of waste-	Dairy	Dairy				
2. Crop receiving waste-	Corn Silage	Corn Silage				
3. Desired nitrogen application rate, lb/acre-	100	100				
4. Nutrient concentrations in storage from laboratory analysis or from Table 1-1: **Nitrogen (N)-**	lb/1000 gal 4	lb/ton 9	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
Phosphorus (P_2O_5)-	1	4				
Potassium (K_2O)-	6	19				
5. Plant availability of nitrogen from Table 1-1 in percent-	100 %	100 %	%	%	%	%
6. Nitrogen retained, in percent, after application from Table 1-2-	75 %	70 %	%	%	%	%
7. Calculate nitrogen availability- line 4 N x line 5 x line 6 ÷ 10,000=	lb/1000 gal 3	lb/ton 6.3	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
8. Determine nitrogen application rate from the nutrient application charts: **Nitrogen (N)-**	inches/acre 1.75	tons/acre 17	inches/acre	tons/acre	inches/acre	tons/acre
9. Determine the amount of phosphorus and potassium applied from nutrient concentration data on line 4 and nutrient application charts: **Phosphorus (P_2O_5)-**	lb/acre 50	lb/acre 70	lb/acre	lb/acre	lb/acre	lb/acre
Potassium (K_2O)-	250	300				
10. Total Nutrients Applied, lb/acre: **Nitrogen (N)-** (Sum of liquids and solids from line 3)	200 lb/acre		lb/acre		lb/acre	
Phosphorus (P_2O_5)- (Sum of liquids and solids from line 9)	120 lb/acre		lb/acre		lb/acre	
Potassium (K_2O)- (Sum of liquids and solids from line 9)	550 lb/acre		lb/acre		lb/acre	

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Phosphorus Based Waste Application

Name:_____ Date:_____

Example:

Corn silage is being grown and the recommended nutrient application from the nutrient budget worksheet is 100 pounds of phosphorus(P_2O_5) per acre. A traveling big gun sprinkler will be used to make 1 application of liquids from a non-agitated waste storage pond and a tractor spreader will be used to make 1 application of solids from a dry stacking facility that will not be incorporated into the field.

Waste application rates and amounts:

Steps	Example		Your Calculations			
	Liquid	Solids	Liquid	Solids	Liquid	Solids
1. Type of waste-	Dairy	Dairy				
2. Crop receiving waste-	Corn	Corn				
3. Desired phosphorus application rate, lb/acre-	50	50				
4. Nutrient concentrations in storage from laboratory analysis or from Table 1-1: **Nitrogen (N)-**	lb/1000 gal 4	lb/ton 9	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
Phosphorus (P_2O_5)-	1	4				
Potassium (K_2O)-	6	19				
5. Determine phosphorus application rate from the nutrient application charts: **Phosphorus (P_2O_5)-**	inches/acre 1.0	tons/acre 14	inches/acre	tons/acre	inches/acre	tons/acre
6. Plant availability of nitrogen from Table 1-1 in percent-	100 %	100 %	%	%	%	%
7. **Nitrogen retained, in percent, after application from Table 1-2-**	75 %	70 %	%	%	%	%
8. Calculate nitrogen availability- line 4 N x line 6 x line 7 ÷ 10,000=	lb/1000 gal 3	lb/ton 6.3	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
9. Determine the amount of nitrogen and potassium applied from nutrient concentration data on line 8, line 4 and the nutrient application charts: **Nitrogen (N)-**	lb/acre 75	lb/acre 75	lb/acre	lb/acre	lb/acre	lb/acre
Potassium (K_2O)-	150	250				
10. Total Nutrients Applied, lb/acre: **Nitrogen (N)-** (Sum of liquids and solids from line 9)	150 lb/acre		lb/acre		lb/acre	
Phosphorus (P_2O_5)- (Sum of liquids and solids from line 3)	100 lb/acre		lb/acre		lb/acre	
Potassium (K_2O)- (Sum of liquids and solids from line 9)	400 lb/acre		lb/acre		lb/acre	

Table 1-1
Typical Manure Nutrient Concentrations for Different Handling Systems

The table below shows typical values of the nutrient content of manure from different animal waste handling systems. You can use them as a rough estimate of the nutrient content of your manure. Because manure nutrient content varies widely among farms and even over time on the same farm, it is recommended to test your manure to get realistic nutrient content numbers for your farm. Refer to Oregon State University Extension Publication PNW 505, "Which test is best?" for more information on manure testing.

Typical nutrient content, solids content, density, and nitrogen availability of animal manure at the time of application:

Solids from:	Nitrogen N (lb/Ton)[2]	Phosphorus P_2O_5 (lb/Ton)[2]	Potassium K_2O (lb/Ton)[2]	Solids (Percent)	Bulk Density (lb/cubic yard)	Nitrogen Availability (Percent)[1]
Broiler with litter	73	64	66	70	900	40-70
Laying Hen	37	57	47	40	1400	40-70
Sheep	18	9	35	28	1400	25-50
Horse	9	6	16	37	1400	0-20
Beef	12	6	17	23	1400	20-40
Dairy:						
Dry Stack	9	4	19	35	1400	20-40
Separated Solids	5	2	3	19	1100	0-20
Liquids from:	**Nitrogen N (lb/1,000gal)**	**Phosphorus P_2O_5 (lb/1,000gal)**	**Potassium K_2O (lb/1,000gal)**	**Solids (Percent)**	**Density (lb/gal)**	**Nitrogen Availability (Percent)[1]**
Dairy:						
Holding Tank	21	14	24	8	9.2	75-85
Pond, no agitation	4	1	6	<1	8.4	85-95
Pond, agitated	12	7	18	4	9.0	80-90

1 Nitrogen available in the first growing season after application. For a field that has received manure annually for 4 years or more, consider 100% of the nitrogen available.

2 Manure is at the moisture content typically found in storage.

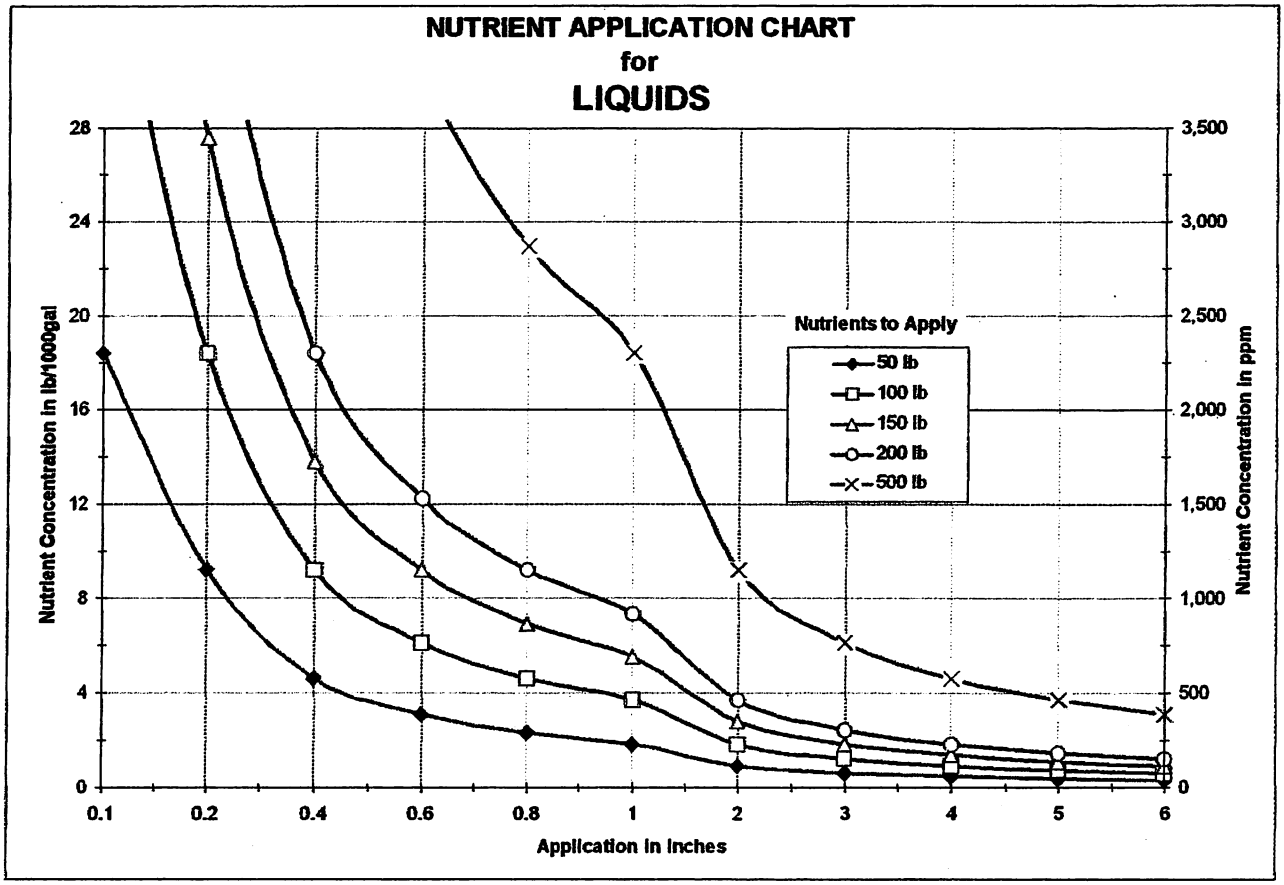
Table 1-2
Typical Nutrient Availability After Application

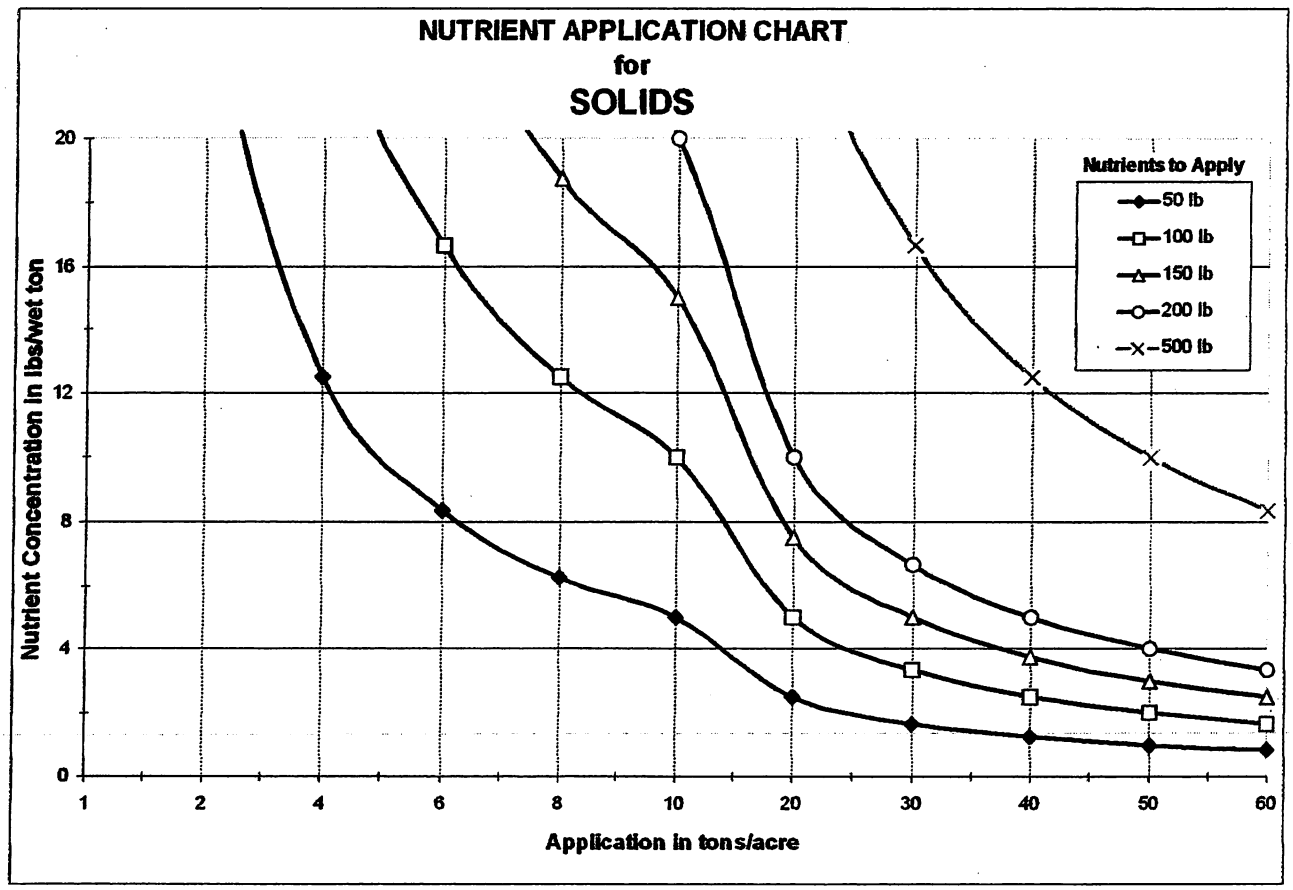
Typical nutrient content of animal manure retained after application:

Application Method	Percent of original nutrient content of manure retained after application		
	N	P_2O_5	K_2O
Injection	95%	100%	100%
Sprinkling	75%	100%	100%
Broadcast (Incorporated 1 day after application)	90%	100%	100%
Broadcast (Incorporated 4 days after application)	80%	100%	100%
Broadcast (Incorporated 7 or more days after application)	70%	100%	100%

WASTE UTILIZATION WORKSHEET

WASTE UTILIZATION WORKSHEET





WASTE UTILIZATION WORKSHEET

Waste Application Record

Name:_____ Field ID:_____

Crop:_____ Acres:_____ Seeding Date:_____

Date	Crop Stage	**Waste Type** Liquids (L), Solids (S), Separated Solids (SS), Etc.	**Amount Applied** (Loads, Inches, Tons, Hours of Operation, Etc.)	Notes

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY
CODE 313

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec 5;

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

- ***30' x 7.5'circular below ground liquid waste storage tank***
- ***60' x 16' above ground liquid waste storage tank***

Operation and Maintenance Items

A properly operated and maintained waste storage structure is an asset to your farm. This waste storage structure was designed and installed for temporary storage of animal wastes. The estimated life span of this installation is at least 10 years. If at any time this structure is taken out of service, the Natural Resources Division of the Oregon Department of Agriculture should be contacted for guidance in decommissioning the structure to avoid environmental concerns. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Do not allow equipment that exceeds the design loading to operate within 20 feet of the structure.

⇒ **WARNING: ENTERING AN UNVENTILATED TANK IS EXTEREMELY "HAZARDOUS"** ! Do not allow human entry into the enclosed structure without safety equipment that includes ladders and breathing apparatus.

⇒ Continually maintain all pumps, agitators, piping, valves and all other electrical and mechanical equipment in good operating condition by following the manufacturer's recommendations.

⇒ Continually maintain grounding rods and wiring for all electrical equipment in good condition.

⇒ Facilities will be empty by October 1st to begin winter storage.

⇒ A one foot free board will be maintained to prevent spillage.

⇒ The waste storage facility will be inspected weekly to ensure structural integrity.

⇒ Perform daily inspections of waterlines, including drinking water or cooling water lines. Repair leaking lines immediately to prevent excess water from entering the waste storage system.

⇒ Depth markers are installed in the facility and maintained to assure the maximum volume will be maintained under normal operating conditions allowing for the volume necessary to contain the 25-year, 24-hour rainfall event.

⇒ The depth of all liquid manure will be recorded during each week's inspection.

⇒ Immediately repair any vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

⇒ Pump out the facility within the first two years following construction to check for structural damage. If damage is noted, immediately seek a qualified engineer to assess the situation. Thereafter, it should be pumped out at least every four years to check for damages, remove gravel, rocks, sand, wire and other debris to maintain the designed storage capacity capacity.

⇒ Immediately remove all foreign debris within the structure that may cause damage to pumps and agitator.

⇒ During de-watering of the structure, ensure that waste is spread at minimum rates in areas where crops are grown, spread waste no closer than 50 feet from open watercourses during the winter months and apply no manure within 35 feet of an open watercourse during the summer months. Avoid applying waste during heavy rainfall events.

⇒ Dead animals will not be disposed of in the liquid waste storage facility.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY (SOLID MANURE STORAGE FACILITY) CODE 313

For: Landowner/Operator Andres Sanches

Job Location: T 2S; R 9W;Sec 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

- ***25' x 88' x 6' solid manure storage facility***

Operation and Maintenance Items

A properly operated and maintained waste storage structure is an asset to your farm. This waste storage structure was designed and installed for temporary storage of animal wastes. The estimated life span of this installation is at least 10 years. If at any time a structure is taken out of service, the Natural Resources Division of the Oregon Department of Agriculture should be contacted for guidance in decommissioning the structure to avoid environmental concerns. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Do not allow equipment that exceeds the design loading to operate within 20 feet of the structure

⇒ Immediately repair any vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

⇒ Storage facility will be empty by October 1st to begin winter storage.

⇒ During de-watering of the structure, ensure that waste is spread at minimum rates in areas where crops are grown, spread waste no closer than 50 feet from open watercourses during the winter months and apply no manure within 35 feet of an open watercourse during the summer months. Avoid applying waste during heavy rainfall events.

⇒ Roofs of the solid manure storage facilities will be inspected annually.

⇒ All roof sections that are rusted and leaking will be repaired and/or replaced.

⇒ Loose roof sections on the solid manure storage facilities will be secured.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Operation and Maintenance Worksheet

FENCING

Code 382

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

A properly operated and maintained fence is an asset to the farm. This practice was designed and installed to provide so livestock do not need access to open watercourse for drinking water Practice will prevent pollution and prevent streambank erosion and riparian habitat damage due to livestock access. The estimated life span of this installation is at least 5 years. The life of the practice can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Regular inspections of fences should be part of the on-going management program.

⇒ Inspection of fences after storm event is needed to facilitate the intended use of the fence

⇒ Broken or damaged posts will be replaced

⇒ Sagging wire will be tightened.

⇒ Broken or missing insulators will be replaced.

⇒ Any broken wires will be spliced or replaced.

⇒ Vegetation will be controlled under the fences.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

FILTER STRIP

CODE 393

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-450, 427, 43, 19, 632

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

A properly operated and maintained vegetated filter strip is an asset to your farm. This vegetative filter strip was designed and installed to remove sediment and pollutants from runoff. The estimated life span of this practice is at least 10 years. The life of this practice can be assured and usually increased by developing and carrying out a good operation and maintenance program

This practice will require you to perform periodic maintenance and may also require operation items to maintain satisfactory performance. Some recommendations to assist you develop a good operation and maintenance program:

⇒ Maintain vigorous growth of vegetative covering. This includes reseeding, commercial fertilization and application of herbicides when necessary. Periodic mowing or grazing may also be needed to control height.

⇒ Where the filter strip is used to trap nutrients, periodic grazing or mechanical harvesting and removal of vegetation is needed.

⇒ Remove all foreign debris that hinders system operation.

⇒ Limit the traffic and do not use as a roadway.

⇒ Limit livestock usage to vegetative growth periods when they will not damage vegetative root system or compact the soil.

⇒ Immediately repair any vandalism, vehicular, or livestock damage.

⇒ Eradicate or remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

USE EXCLUSION WORKSHEET

CODE 472

Landowner/Operator: Andres Sanches

Job Location: T 2S; R 9W; Sec.5

County: Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

A properly operated and maintained livestock exclusion practice will keep livestock out of the sloughs and open ditches and improve water quality. The estimated life span of the practices is 5 years. The life span can be assured and usually increased by developing and carrying out a good operation and maintenance program.

⇒ The fence barrier along the stream will be periodically inspected and remedial repairs will be performed as needed.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

FORAGE HARVEST MANAGEMENT

CODE 511

For: Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9W; Sec 4, 5,8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-427, 43, 19, 632, 665, 657

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

Forage Harvest Management can provide economic and resource benefits. If applied properly, is an assets to the dairy operation. Forage Harvest Management requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, lead to sickness (for example, hardware disease) or death.

⇒ Monitor weather conditions and take action accordingly before and after cutting to optimize forage wilting or cutting time to preserve feed quality and prevent forage swaths or windrows from smothering underlying plants.

⇒ Inspect and repair harvesting equipment following manufacturer's preventive maintenance procedures.

⇒ All shields shall be in place during machine operation to prevent injury or death. Shut off machinery before working or unplugging moving parts.

⇒ Select equipment sizes and capabilities that will in a timely and economically feasible manner handle the acreage normally harvested.

⇒ Operate all forage harvesting equipment at the optimum setting and speeds to minimize loss of leaves.

⇒ Set shear-plate on forage chopper to the proper theoretical cut for the crop being harvested. Keep knives well sharpened. Do not use re-cutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.

⇒ Regardless of silage/haylage storage method, ensure good compaction and an air-tight seal to exclude oxygen and mold formation.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET
ROOF RUNOFF MANAGEMENT

CODE 558

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

- ***Gutters and Downspouts***

Operation and Maintenance Items

Properly operated and maintained roof runoff facilities are an asset to the farm. Roof runoff facilities were designed and installed to control roof runoff. Estimated life span of this installation is at least 10 years. Facility life can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Perform weekly inspections of gutters, downspouts and above ground pipelines, and appurtenances for proper operation. Repair or replace if needed.

⇒ Periodically remove debris from gutters, downspouts and outlet facilities.

⇒ Protect downspouts from damage by livestock and equipment. Repair or replace damaged components as needed.

⇒ Keep gutters, downspouts, conveyance pipelines and ditches and appurtenances in good operating condition.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY (ROOF)
CODE 313

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec. 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

A properly operated and maintained roof is an asset to your farm. These roofs were designed and installed for preventing manure runoff from manure accumulation areas. The estimated life span of this installation is at least 10 years. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Roof will be inspected weekly.

⇒ All roof sections that are rusted and leaking will be replaced or repaired to prevent rainwater from entering the liquid waste storage system.

⇒ Loose roof sections will be secured.

⇒ Broken trusses, beams, poles, gutters and downspouts will be repaired or replaced.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

NUTRIENT MANAGEMENT
CODE 590

For: Landowner/Operator Andres Sanchez

Job Location: T2S; R 9W; Sec 4, 5, 8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-427, 450, 43, 19, 632, 665, 657

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

Waste Utilization can provide economic and resource benefits if applied properly which are assets to the dairy operation. Proper waste utilization requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Manure application equipment is calibrated at least once per year to ensure uniform distribution and accurate application rates.

⇒ Records are maintained of manure applications.

⇒ Manure application equipment is cleaned up and residual material from the equipment is disposed of properly and in a place where surface runoff does not occur.

⇒ Nutrient management plans are reviewed annually and adjustments are made as needed.

⇒ Unnecessary exposure to manure is avoided. Protective clothing is worn when necessary.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENCE WORKSHEET

UNDERGROUND OUTLETS
Code 620

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec. 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Amy Krahn Date 05/06

- ***Gutter Outlet***

Operation and Maintenance Items

Properly operated and maintained underground outlet for the guttering system is an asset to the farm. This outlet was designed and installed to convey roof runoff in an underground pipeline to where it can be released without causing erosion. The estimated life span of this installation is at least 10 years. The life of the practice can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Check all above ground connections, rodent guards, inlets and outlets to make sure they are functioning properly.

⇒ Maintain design depth of cover on all pipelines.

⇒ Avoid operation of tillage and sub-soiling equipment that could damage any component of the gutter outlet system.

⇒ Remove all foreign debris that hinders the gutter system operation.

⇒ Limit traffic over pipeline to designated sections that were designated for traffic loads.

⇒ Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control growth.

⇒ Eradicate of otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

⇒ Immediately repair any vandalism, vehicular livestock damage.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE UTILIZATION
CODE 633

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec. 4, 5, 8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-427, 450, 43, 19, 632, 665, 657

Prepared By Amy Krahn Date 05/06

Operation and Maintenance Items

Waste Utilization can provide economic and resource benefits if applied properly which are assets to the dairy operation. Proper waste utilization requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Manure application equipment is calibrated at least once per year to ensure uniform distribution and accurate application rates.

⇒ Records are maintained of manure applications.

⇒ Manure application equipment is cleaned up and residual material from the equipment is disposed of properly and in a place where surface runoff does not occur.

⇒ Nutrient management plans are reviewed annually and adjustments are made as needed.

⇒ Unnecessary exposure to manure is avoided. Protective clothing is worn when necessary.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

MANURE TANK AGITATOR
CODE 634

Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9W; Sec. 5

County Tillamook SWCD Tillamook Tract No. T-427

Prepared By: Amy Krahn Date 05/06

Operation and Maintenance Items

A properly operated and maintained manure tank agitator is an asset to your farm. The manure agitator was designed and installed to stir the liquid waste and keep the solids in suspension so solid manure will not buildup in the bottom of the tank and reduce the designed storage capacity. The estimated life span of this installation is at least 10 years. The life of the manure agitator can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Preventive maintenance will be in accordance with the manufacturer's recommendations.

⇒ Periodically examine the agitator for proper operation. Clean debris from the propeller, and promply replace any defective or damaged parts.

⇒ Remove the agitator from the manure tank and periodically clean and oil as needed to increase the life expectancy of the agitator.

⇒ Immediately repair any vandalism or livestock damage. Do not allow livestock near equipment during operation.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET
IRRIGATION WATER CONVEYANCE

HIGH-PRESSURE UNDERGROUND, PLASTIC PIPELINE
CODE 430-DD

Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec.5

County Tillamook SWCD Tillamook Tract No. T-427

Prepared By Amy Krahn Date 05/06

- ***Waste Transfer Pipe***

Operation and Maintenance Items

A properly operated and maintained waste transfer system is an asset to your farm. This waste transfer system was designed and installed for transferring liquid wastes from a below ground liquid storage facility to an above ground liquid waste storage facility. The estimated life span of this installation is at least 20 years. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Check to make sure all values and air vents are set at the proper operating condition so they may provide protection to the pipeline. Remove foreign materials and vegetation that can interfere with proper valve operation.

⇒ Pipeline will be flushed regularly to prevent clogging.

⇒ Leaks or broken sections will be replaced and/or repaired.

⇒ Maintain the designed depth of cover over the pipeline.

⇒ Limit traffic over the pipeline to designated sections that were designed for traffic loads.

⇒ Avoid travel over pipelines by tillage equipment when the soil is saturated.

⇒ Avoid any sub-soiling operation that may disturb the pipeline.

⇒ Maintain a vigorous growth of vegetative covering. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control height of vegetation.

⇒ Non-buried pipelines will be inspected weekly to assure there is no leaks that is causing waste spillage. Leaks will be repaired immediately.

⇒ Eradicate or otherwise remove all rodents or burrowing animals that can potentially damage or displace the pipe. Immediately repair any damages caused by their activity.

EXTENSION SERVICE
Tillamook County Office

May 28, 2002

Bob Pedersen
Tillamook NRCS Field Office
6415 Signal St.
Tillamook, OR 97141

OREGON
STATE
UNIVERSITY

2204 Fourth Street
Tillamook, Oregon
97141

Dear Bob,

Over the past five years, I have had the opportunity to study nutrient cycling dynamics on dairies in the Tillamook area. It has been observed that pastures will very in productivity based on environment, grazing management and soil fertility. Nitrogen utilization has been a major focus of my work looking specifically at nitrogen up takes by the pasture plant. I have seen pastures remove as little as 200 lbs of N per acre a year to as high as 750. Average pastures on dairies will use between 300 and 400lbs of nitrogen per acre each year.

With this understanding, it makes logical sense to me to use nitrogen utilization numbers in our animal waste management planning of 300 pounds nitrogen per year as a reasonable starting point. I think this is a conservative guess and would not hesitate adjusting this number if the landowner has other data indicating they are using N at higher levels. For example, yield data, grazing rotation records with removal data, and/or soil test data.

Sincerely,

Troy Downing

Troy Downing
Area Dairy Extension Agent

Telephone
503·842·3433

OREGON STATE UNIVERSITY EXTENSION SERVICE

Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, Energy, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Tillamook County cooperating. The Extension Service offers its programs and materials equally to all people.

10/29/20 - Mailed
Scanned to server
emailed Armando.
Copy to Stephanie

OREGON DEPARTMENT OF AGRICULTURE

Protect. Promote. Prosper.

Confined Animal Feeding Operations Program
635 Capitol St, NE, Salem, OR 97301-2532
503.986.4699 | Oregon.gov/ODA

October 29, 2020

Andres Sanchez
Sanchez Dairy
4720 Long Prairie Rd.
Tillamook, OR 97141

Re: Animal Waste Management Plan (AWMP) review; MA#147621.

Dear Mr. Sanchez:
On October 18, 2017, the Oregon Department of Agriculture (department) received a new Animal Waste Management plan that included and animal increase from 430 animals to 480 at your dairy located at 4720 Long Prairie Rd in Tillamook, Oregon. After receiving your request, Livestock Water Quality Specialist Armando Macias worked with you to identify additional information and infrastructure needed before we could approve your AWMP. On December 11, 2017, Armando spoke with you about not having sufficient storage for liquid and solid manure on your Waste Management Plan and you stated that you would try to secure sufficient storage. On March 12, 2018, Armando spoke with you again about sufficient manure storage for your facility and you stated that you were not able to secure any more storage. During that conversation, Armando again informed you that without more storage your plan was not approvable. We are sending this letter to memorialize the conversation that the AWMP #17026 is not approvable.

We have completed our review of the AWMP you provided and our conclusions follow.

AWMP Status: Not approvable as submitted
The AWMP that you submitted on October 18, 2017, was logged into our files as #17026. This AWMP has been reviewed and is not approvable as submitted due to inadequate manure storage capacity. Please find enclosed a Minimum Required Elements (MRE) Memo that details the missing or additional information needed to complete your AWMP.

Tillamook

Construction Status: None at this time

All construction of substantial manure system structures requires department approval prior to construction. Please apply to the department for construction approval if you plan to build manure storage facilities.

Permit Status: Active

Your medium concentrated dairy facility remains permitted for a total of 430 dairy cattle with a herd composition of 250 mature cows and 180 heifers/calves. The department will consider an animal increase if you can obtain additional manure storage and an approvable AWMP including that storage has been submitted and reviewed by the department.

The department appreciates your efforts to complete an AWMP that reflects the changes you wish to make for your dairy operation. If you have any questions, please contact Armando Macias, your Livestock Water Quality Specialist (LWQS) at (503) 842-6278.

Sincerely,

Wym Matthews, Manager
CAFO & Fertilizer Programs
Ph: (503) 986-4792
wmatthews@oda.state.or.us

Enc: MRE Memo

Cc: Armando Macias, Area I, LWQS

MEMORANDUM

To: Stephanie Page, Director, Natural Resources & Pesticides Programs

From: Armando Macias, Area 1, LWQS

Subject: AWMP (New, amended)
MA **#147621.**

Date: October 7, 2020

Sanchez Dairy is owned and operated by Andres Sanchez. This medium dairy facility is located at 4720 Long Prairie Rd. in Tillamook, Oregon and is currently permitted for 430 dairy cattle based on a herd composition of 250 mature cows and 180 heifers/calves.

On October 18, 2017, Tom Thomson submitted an AWMP on behalf of Sanchez Dairy. The new AWMP includes an animal increase for a total of 480 dairy cattle with a herd composition of 300 milking/dry cows and 180 heifers and calves. This facility would remain a medium concentrated CAFO.

The AWMP was logged into our files under AWMP **#17026**.

The AWMP was reviewed according to OAR Chapter 340 Division 51 and department policy documents.

AWMP Minimum Required Elements	Notes
1. Summary of CAFO Operation	
a) Contact name, address, phone number	Complete
b) Facility address	Complete
c) Type of operation	Complete
(i) Number and size of animals by species, expansion?	Complete
d) Manure, litter and process waste system – provide a general narrative description of each	
(i) Collection – How is manure, litter and process waste removed from housing, confinement lots? How is clean water diverted from storage?	Complete
(ii) Storage – Types and size of manure, litter and process waste storage tanks, ponds.	Not Complete
(iii) Transfer – How is manure, litter and process waste moved to storage, application areas?	Complete

(iv) Use – How is manure, litter and process waste treated (composted, separated, anaerobic digestion or storage, aeration)? How is manure, litter and process waste water used on crops? If export is utilized, describe that process.	Not Complete
2. Specific descriptions and calculations	
a) A description of production area and land application locations	
(i) Aerial photo or topographical map showing numbered field locations, production area facilities, clean water diversions, and surface water features.	Complete
(ii) Soil maps of all application fields, including those not owned, and map unit descriptions. Indicate areas with application limitations.	Complete
b) Manure, litter and process waste volumes	
(i) Manure (feces and urine), litter and process waste output that is collected and stored in this system.	Not Complete
(ii) Bedding added and collected.	Complete
(iii) Process and wash water collected, include footbath use when appropriate.	Complete
(iv) Silage and feed processing leachate.	Complete
c) Contaminated storm water	
(i) Direct rainfall into storage.	Complete
(ii) Slab or lot runoff collected.	Complete
(iii) Overflow from gutters or other diversions.	Complete
d) Nutrient content of manure, litter and process waste water	
(i) Content and volume of nutrients in manure, litter and process waste generated – can come from NRCS Animal Waste Field Handbook (chapter 4)), land grant university publications, or analyses of manure, litter and process waste. Actual test values are required of large CAFOs.	Complete
e) Farm nutrient balance	
(i) Show amount of nutrients (N, P, K) generated, lost in storage, lost during application, used by crops, and/or exported off the farm on an annual basis.	Complete
(ii) Nutrient application must balance to most limiting nutrient as determined by NRCS Agronomy Technical Note #26 and the NRCS Phosphorus Index.	Complete
(iii) Include all acres required to balance nutrients owned or leased by the operator.	Complete
f) Application schedule and limitations	
(i) Show scheduled applications of solids and liquids. Include date, amount and method	Complete

AWMP Minimum Required Elements	Notes
of application to identified fields. Describe calibration of equipment used to apply manure, litter and process waste water.	
(ii) Describe limitations to manure, litter and process waste applications. Indicate buffer areas and management to avoid saturated soils. Justify buffer width and management. If application to frozen soil is planned, include field descriptions, specific management/structural practices, monitoring and record keeping.	Complete
(iii) Using agronomic rates, application limitations, and scheduled applications, calculate the minimum storage required for liquids and solids.	Complete
(iv) How is irrigation water managed relative to manure, litter and process waste water application? Include general timing and application rates of irrigation water. Irrigation water management must not allow leaching of soluble nutrients or runoff.	Complete
g) Animal mortality management	
(i) Describe how the farm handles mortalities.	Complete
h) Operation and maintenance	
(i) Include operation and maintenance narrative for structural and mechanical components included in this plan.	Complete
3. Record keeping and reporting requirements	
a) Testing – Monitoring	
(i) Include the protocol for testing manure, litter and process waste.	Complete
(ii) Include the protocol for testing and measuring crop nutrient removals.	Complete
(iii) Include the protocol for soil testing to evaluate nutrient application and crop uptake.	Complete
b) Record keeping. Include the following:	
(i) Date and amount of manure, litter and process waste applied by field. Calculate N and P applied.	Complete
(ii) Manure, litter and process waste volume exported.	Complete
c) Reporting to Oregon Department of Agriculture	
(i) Any discharge within 24 hours.	Complete
(ii) Amount of manure, litter and process waste applied annually.	Complete
(iii) Amount of manure, litter and process waste exported annually.	Complete
4. Additional requirements for Large CAFOs	**N/A**
a) Inspections	

AWMP Minimum Required Elements	Notes
(i) Check storm water diversions, runoff diversions, waste transport, storage structures, storage structure volume weekly.	
(ii) Check water lines daily.	
(iii) Check for application equipment leaks periodically.	
b) Record keeping	
(i) Results of daily inspections.	
(ii) Results of weekly inspections.	
(iii) Results of periodic inspections.	
(iv) Corrective actions taken, explain those not corrected.	
(v) Expected crop yields if not in the plan.	

Recommendations

The AWMP provided is considered incomplete. Based on my working knowledge of Sanchez Dairy and the information provided, I recommend not granting approval of this AWMP.

Tilla

MEMO

To: Debbie Gorham
From: Kathryn Higgs
Subject: Animal increase for Mr. Andres Sanchez
Date: July 2, 2004

Mr. Andres Sanchez is the owner and operator of Sanchez dairy in Tillamook. Mr. Sanchez submitted an AWMP to the department requesting an animal increase/change in herd composition. Mr. Sanchez is currently permitted for 330 animals based on a herd composition of 310 mature animals and 20 calves and heifers. Heifers are currently housed at a permitted facility off-site and with the approval of the AWMP, Mr. Sanchez will construct an additional barn so heifers can be raised on-site. The AWMP was reviewed and approved June 30. Mr. Sanchez also submitted an Application to Register on June 30. I recommend that Mr. Sanchez be issued a new CAFO permit for a total of 430 animals based on the herd composition of 250 mature and 180 heifers and calves.

Oregon
Theodore R. Kulongoski, Governor

Department of Agriculture
635 Capitol Street NE
Salem, OR 97301-2532

July 6, 2004

Andres Sanchez
Sanchez Dairy
4720 Long Prairie Rd
Tillamook, Oregon 97141

Re: Animal Waste Management Plan (AWMP) review and Confined Animal Feeding Operation (CAFO) General Permit increase status

Dear Mr. Sanchez:

We have completed our review of the AWMP and General Permit application you provided to support your request for an increase of the permitted number of animals at your dairy CAFO. Our conclusions follow.

AWMP Status: Approved
The AWMP you provided was logged into our files as #0467 and is hereby approved.

Permit Status: Increase Approved
A new permit will be issued for a total of 430 animals based upon a herd composition of 200 lactating cows, 50 dry cows, 150 heifers and 30 calves.

With the animal increase, I encourage you to ensure that the maximum liquid manure storage is available at your facility. For example, the above ground liquid manure tank should not have a crust and any accumulation within the below ground liquid manure tank should be removed. Please review carefully the conditions described in your permit. It is your responsibility to operate your dairy in a manner that complies with the permit conditions and protects water quality.

If you have any questions, please contact the area Livestock Water Quality Specialist, Kathryn Higgs, at 503-842-6278.

Sincerely,

Debbie Gorham, Administrator
Natural Resources Division
PH (503) 986-4700
FX (503) 986-4730

Enclosures: AWMP review memo
Permit summary

DG/kh/cw

AN MENT PLAN
LEMENT

AWMP inserts for AWMP # 0468

AMENDMEN E MANAGEMENT PLAN

SANCHEZ D ANDRES SANCHEZ

CONFINED ANIMAL FEEDING OPERATION — CAFO OPERATOR'S NAME

4720 LONG PRAIRIE RD, TILLAMOOK, OR 97141 — 503-815-1609

STREET ADDRESS, CITY, STATE, ZIP — PHONE NUMBER

On June 30, 2004, KATHRYN HIGGS

INSPECTOR'S NAME

of the Oregon Department of Agriculture discussed modifications to Animal Waste Management Plan (AWMP) # 0467 / 0468.

The following modification were made to this AWMP:

1) Animal Mortalities Document

2) Record Keeping + Repoting

3)

CONCLUSION:

X The above amendments will are accepted.

INSPECTOR'S SIGNATURE

Andres Sanchez

OPERATOR'S SIGNATURE

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

ANIMAL MORTALITY

Management of Animal Mortalities for: Sanchez Dairy
NAME OF OPERATION

Animal mortalities will be disposed of in a manner that will comply with local, state and federal regulations. Please mark and describe the method(s) of animal mortality management used on this operation:

☒ REMOVAL SERVICE: Call Harvey Strong to remove all dead animals

☐ COMPOSTED: _____

☐ INCINERATED: _____

☐ BURIED: _____

☐ OTHER: _____

Signature of Legally Authorized Representative: Andres Sanchez

Print Name: A-S Date: 6-30-04

ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT

RECORD KEEPING AND REPORTING TO OREGON DEPARMENT OF AGRICULTURE

RECORD KEEPING:

a) Applications of manure, litter and process waste will be kept, including the date and the amount of N and P applied during each application.
b) Records of exporting manure, litter and process waste will also be kept.

REPORTING TO OREGON DEPARTMENT OF AGRICULTURE (ODA):

a) Any discharge will be reported orally to ODA within 24 hours. Within 5 days, a written statement describing this discharge will also be submitted to ODA.
b) The amount of manure, litter and process waste applied will be reported annually.
c) The amount of manure, litter and process waste exported will be reported annually.

Signature of Legally Authorized Representative: Andres Sanchez

Print Name: A - S - Date: 6-30-04

Andres Sanchez
02/04

Business Narrative

AWMP MA#'s
0468 → 154087 +
0467 → 147621

This dairy operation is planned to be a 410-1,000 lb. animal unit Holstein-Jersey Operation. There will be approximately 10-1,000 lb. animal units on leased Tracts 450 and 43 that do not belong to the operation. There will be 200 lactating cows, 50 dry cows, 150 heifers, and 30 calves. This is a confined operation. All cows are confined for 365 days.

The operation consists of 53.8 acres of owned hayland, 167.1 acres of leased hayland, and 29.8 acres of pastureland that is used to apply manure from the milking operation at Tract 427. Liquid wastes are transported by pipeline and pump to all fields in Tract 427 and field 1 in Tract 43 and applied with a manure gun traveler. Liquid wastes are also transported by pump and pipe line and applied to fields 1,2,7,8 and 9 in Tract 632. A commercial hauler uses a 4,000 gallon truck tanker to haul and apply liquid waste on field 1 in Tract 665. Solid wastes hare hauled by tractor and a manure spreader and applied to field 1 in Tract 450, fields 2 and 3 in Tract 43 and fields 3, 4, 5 and 6 in Tract 632. All liquid wastes generated from the operation is transported to the methane digester at the Port of Tillamook and processed. The processed liquid waste is then returned to the farm for application to the liquid waste application fields as defined above. There will be 3,427 lbs. of nitrogen exported per year to the Port of Tillamook that will be in the solids that are produced by the digestion process that will not be returned to the operation.

The all hayland fields in Tract 427 are in good condition. Hayland field 1 in Tract 43 and field 1 and 2 in Tract 632 are also in good condition. Hayland field 3, 4, 5, 6, 7, 8 and 9 in Tract 632 are in fair to good condition. The hayland field in Tract 665 is in fair condition. The pasture fields in Tracts 450 and 43 are in fair condition. The target yield for all fields in Tracts 427, 450, 43, and 632 is 6 tons of dry matter per acre per year. A 5 ton dry matter per acre per yield for field 1 in Tract 665 is expected. All fields in Tracts 427, 43, and 450 are within the 100-year floodplain. Field 1 and parts of fields 2 and 8 in Tract 632 are also in the 100-year floodplain. Fields 5, 6, 7, and 9 in Tract 632 and field 1 in Tract 665 are outside the 100-year floodplain.

The manure management system consists of a below ground liquid waste storage tank and an above ground liquid waste storage tank. The manure and wastes will be managed 90% liquids from the lactating cows, dry cows, and heifers. The manure from the calves will be handled 100% solids. The below ground liquid waste storage tank is 30' x 7.5'. The above ground liquid waste storage tank is 60' x 16'. Liquid waste from the below ground liquid waste tank is transfer by pump and waste transfer pipe to the above ground liquid waste tank. The existing waste storage tanks can store the liquid waste generated by the planned 410-1,000 lb. animal units for 48 days. There is an existing solid waste storage facility. This solid waste storage facility is 25' x 88' x 6'. The facility can store the solid waste produced by the planned 410-1,000 lb. animal units for 98 days.

A new loafing barn will be constructed to house the addition dry cows and heifers. The roof will be guttered downspouted and outleted in an area free of manure. The existing below ground liquid waste storage tank will be used to scrape the waste produced into with transfer to the above ground liquid waste tank. The existing silage bunker will be covered and the leachate will be directed towards the below ground liquid waste storage tank. All the conservation practices installed will be maintained in accordance with the enclosed "CONSERVATION PRACTICE OPERATION AND MAINTENANCE PLAN".

Soils, where manure is applied are: Nehalem silt loam, Gardiner fine sandy loam, Quillayute silt loam, and Made Land. The Nehalem silt loam, Gardiner fine sandy loam, and the Quillayute silt loams are well drained. Most of the Made Land is also well drained.

The Trask River stream corridor in Tract 427 is managed for wildlife. The existing tree/shrubs planted in the area will be managed and protected to reduce potential streambank erosion.

NRCS Natural Resources Conservation Service

Robert A. Pedersen
Basin Team Leader

Conservation Plan

Mr. Andres Sanchez
4720 Long Prairie Road
Tillamook, OR 97141

Objective(s) To develop and implement a comprehensive nutrient management plan, that when implemented, the operation will be in compliance with ODA's CAFO rules, regulations, and permit conditions.

Farmstead

The major land use is the farmstead. The animal confinement buildings, milkhouse and parlor, silage bunker, and the waste storage facilities are located within this land use. The landscape is the lower agricultural lands in the Trask River Watershed. The farmstead is within the 100-year floodplain. The soils are well drained and subject to flooding. The annual precipition is 90 inches. This Resource Management System will prevent surface and/or groundwater degradation associated with the waste runoff at the animal confinement area.

Tract: 427

WASTE MANAGEMENT SYSTEM

A waste management system consisting of structural and vegetative practices for the collection, transfer, storage and land application of waste generated from the confined animal feeding operation will be installed, maintained, and managed. The identified practices will allow the management of the wastes during periods when direct application may contribute to surface and/or groundwater degradation. Conservation practices installed will be operated and maintained in accordance with the enclosed "OPERATION AND MAINTENANCE WORKSHEETS". Practices planned will be installed in accordance with the Practice Specifications provided.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	9	2008		
Total:	1.0 no.				

WASTE STORAGE FACILITY

A 60' x 16' above ground liquid waste tank was installed in accordance with an approved NRCS design and specifications. This 45,302 cubic foot liquid waste storage tank in combination with the existing below ground liquid waste storage tank will store the liquid wastes produced by the 410-1,000 lb. animal units for 48 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	10	1995	1.0 no.	Oct-16-1995
Total:	1.0 no.			1.0 no.	

WASTE STORAGE FACILITY

A 30' x 7.5' below ground liquid manure tank has been installed. This 5,301 cubic foot liquid waste storage tank in comination with an existing above ground liquid waste storage tank will store the liquid waste produced by the 410-1,000 lb. animal units for 48 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	6	1987	1.0 no.	Jun-8-1987
Total:	1.0 no.			1.0 no.	

WASTE STORAGE FACILITY

A 1,500 gallon below gro[illegible]uid waste collection tank will be installe[illegible]ollect the silage seepage..

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	8	2006		
Total:	1.0 no.				

WASTE STORAGE FACILITY

A 25' x 88' x 6' solid manure storage facility was installed in accordance with an approved NRCS design and specification. This 13,200 cubic foot solid manure storage facility will store the solid manure produced by the 410-1,000 lb. animal units for 98 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	8	2002	1.0 no.	Jul-1-2002
Total:	1.0 no.			1.0 no.	

WASTE STORAGE FACILITY

A roof will be installed over the manure accumulation area. A 5,904 square foot roof will be installed over the silage bunker to prevent excessive silage leachate runoff. A 48_ x 123_ roof is planned.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	8	2008		
Total:	1.0 no.				

WASTE STORAGE FACILITY

An agitator has been installed in the below ground liquid waste storage tank to stir the manure for application and prevent solid manure buildup in the facility.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	11	1995	1.0 no.	Dec-8-1995
Total:	1.0 no.			1.0 no.	

WASTE STORAGE FACILITY

A 4,785 square feet of oof was installed over the manure accumulation slab and the below ground liquid waste storage tank. ti reduce the amount of rainfall entering the existing below ground liquid waste storage tank.The areas were 60' x 59.6' and 20.8' x 58.1'.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	7	2002	1.0 no.	Jul-9-2002
Total:	1.0 no.			1.0 no.	

MANURE TRANSFER

A pump will be professionally installed so liquid waste collection tank to transfer the silage leached to the existing below ground liquid waste storage tank..

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	8	2006		
Total:	1.0 no.				

MANURE TRANSFER

120 feet of 3 inch Class [illegible]125 PVC waste transfer pipe will be ins[illegible]to transfer silage leachate from the planned waste collection tank to the existing below ground liquid waste storage tank

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	12	1995	1.0 no.	Dec-8-1995
F	1.0 no.	8	2006		
Total:	2.0 no.			1.0 no.	

MANURE TRANSFER

330 feet of 4 inch Class Code 125 PVC perforate pipe will be installed in a 2.5 deep trench along the base of the silage bunker to collect the leachate and transfer the leachate to the waste collection tank. 2,330 square feet of plastic lining will be installed in the 2.5 foot wide trech prior to pipe placement. The trench will back filled with pea gravel.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1.0 no.	8	2006		
Total:	1.0 no.				

Hayland

The major land use is hayland. The hayland produces forage for the dairy operation. The fields are used for manure application. Tract 427 is owned, Tract 43 hayland field and those hayland fields in Tracts 632 and 665 are leased. Tract 427, 43, and parts of Tract 632 field are within the 100-year floodplain.The soils are well drained. The annual precipitation is 90 inches. The target yield for fields in Tracts 427, 43, and 632 is 6 tons of dry matter per acre per year. The target yield for the hayland field in Tract 665 is at least 5 tons of dry matter per acre per year. This Resource Management System will maintain forage production and prevent manure runoff associated with manure application to the hayland fields.

Tract: 43

FORAGE HARVEST MANAGEMENT

Forage will be harvested in accordance with the enclosed Forage Harvest Management Specification Sheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.3 ac.	9	2004-2013		
Total:	16.3 ac.				

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	16.3 ac.	9	2005-2014		
Total:	16.3 ac.				

WASTE UTILIZATION

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	5.5 ac.	9	2004-2013		
Total:	5.5 ac.				

FILTER STRIP

Grass filter strip adjacent to the open watercourse will be established and maintained as part of the animal confinement operation water quality plan to prevent agricultural waste from entering the open watercourse. Filter strip will be 35 feet wide. The filter strip will be established in accordance with the enclosed NRCS Filter Strip Specification Sheet Code 393

Field	Planned Amount	Month	Year	Applied Amount	Date
1	0.3 ac.	9	2004		
2	2.9 ac.	9	2004		
3	0.4 ac.	9	2004		
Total:	3.6 ac.				

FORAGE HARVEST MANAGEMENT

Forage will be harvested in accordance with the enclosed Forage Harvest Management Specification Sheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.2 ac.	9	2004-2013		
2	39.0 ac.	9	2004-2013		
3	7.6 ac.	9	2004-2013		
Total:	53.8 ac.				

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.2 ac.	9	2005-2014		
2	39.0 ac.	9	2005-2014		
3	7.6 ac.	9	2005-2014		
Total:	53.8 ac.				

WASTE UTILIZATION

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.2 ac.	9	2004-2013		
2	39.0 ac.	8	2004-2013		
3	7.6 ac.	9	2004-2013		
Total:	53.8 ac.				

FORAGE HARVEST MANAGEMENT

Forage will be harvested in accordance with the enclosed Forage Harvest Management Specification Sheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac.	9	2004-2013		
2	38.0 ac.	9	2004-2013		
3	1.4 ac.	9	2004-2013		
4	1.4 ac.	9	2004-2013		
5	2.0 ac.	9	2004-2013		
6	2.4 ac.	9	2004-2013		
7	14.0 ac.	9	2004-2013		
8	19.8 ac.	9	2004-2013		
9	13.3 ac.	9	2004-2013		
Total:	100.2 ac.				

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac.	9	2005-2014		
2	38.0 ac.	9	2005-2014		
3	1.4 ac.	9	2005-2014		
4	1.4 ac.	9	2005-2014		
5	2.0 ac.	9	2005-2014		
6	2.4 ac.	9	2005-2014		
7	2.4 ac.	9	2005-2014		
8	19.8 ac.	9	2005-2014		
9	13.3 ac.	9	2005-2014		
Total:	88.6 ac.				

WASTE UTILIZATION

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	7.9 ac.	9	2004-2013		
2	38.0 ac.	9	2004-2013		
3	1.4 ac.	9	2004-2013		
4	1.4 ac.	9	2004-2013		
5	2.0 ac.	9	2004-2013		
6	2.4 ac.	9	2004-2013		
7	14.0 ac.	9	2004-2013		
8	19.8 ac.	9	2004-2013		
9	13.3 ac.	9	2004-2013		
Total:	100.2 ac.				

Tract: 665

FORAGE HARVEST MANAGEMENT

Forage will be harvested in accordance with the enclosed Forage Harvest Management Specification Sheet Code 511.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	50.9 ac.	9	2004-2013		
Total:	50.9 ac.				

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	50.9 ac.	9	2005-2014		
Total:	50.9 ac.				

WASTE UTILIZATION

Manure will be applied to hayland in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	50.9 ac.	9	2004-2013		
Total:	50.9 ac.				

Pasture

The major land use is pasture. The pastures are leased for waste applications from the waste produced at the dairy operation. Forage from the pastures are not used for the dairy operation. The owners' livestock use the pastures for forage. The landscape is the lower Trask River Watershed. The pastures are within the 100-year floodplain. The soils are well drained. The annual precipitation is 90 inches. The forage production is at least 6 tons of dry matter per acre per year. This Resource Management System will prevent surface and/or groundwater associated with manure application to the pastures.

Tract: 43

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
2	5.5 ac.	9	2005-2014		
3	2.2 ac.	9	2005-2014		
Total:	7.7 ac.				

WASTE UTILIZATION

Manure will be applied to pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
2	5.5 ac.	9	2004-2013		
3	2.2 ac.	9	2004-2013		
Total:	7.7 ac.				

Tract: 450

FILTER STRIP

Grass filter strip adjacent to the open watercourse will be established and maintained as part of the animal confinement operation water quality plan to prevent agricultural waste from entering the open watercourse. Filter strip will be 35 feet wide. The filter strip will be established in accordance with the enclosed NRCS Filter Strip Specification Sheet Code 393

Field	Planned Amount	Month	Year	Applied Amount	Date
1	0.8 ac.	9	2004		
Total:	0.8 ac.				

NUTRIENT MANAGEMENT

Manure will be used for forage production. Soil tests will be used to determine rates of application. Nutrient management will be implemented in accordance with the enclosed Nutrient Management Specification Sheet Code 590.

Field	Planned Amount	Month	Year	Applied Amount	Date
1	22.1 ac.	9	2005-2014		
Total:	22.1 ac.				

WASTE UTILIZATION

Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet(633 OR-JS).

Field	Planned Amount	Month	Year	Applied Amount	Date
1	22.1 ac.	9	2004-2013		
Total:	22.1 ac.				

Wildlife

The major land use is wildlife. The land [illegible]ciated with pasture and hayland. The landscape [illegible]00-year floodplain within the lower aricultural reach of the Trask River Watershed. The annual precipitation is 90 inches. The soils are well drained. Woody vegetation has been planted within Tract 427 along the Trask River to improve the riparian zone. Fences have been installed. This Resource Management System will improve the fish and wildlife habitat along the stream reach. Water quality is expected to improve by lower stream temperates during the summer months and reduced sedimentation from the streambanks.

Tract: 427

CHANNEL VEGETATION

Woody vegetation has been planted within the stream corridor to reduce erosion, sedimentation, stream temperatures, and provide stream cover for the fishery resources. 1,500 native willows were planted on the streambank.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	4.4 ac.	4	2001	4.4 ac.	Apr-26-2001
Total:	4.4 ac.			4.4 ac.	

FENCE

The water course has been fenced to exclude the livestock from the water course and the riparian area.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	2,450.0 ft.	4	2001	2,450.0 ft.	Apr-26-2001
Total:	2,450.0 ft.			2,450.0 ft.	

USE EXCLUSION

Livestock have been excluded from the stream corridor.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	4.4 ac.	4	2001	4.4 ac.	Apr-26-2001
Total:	4.4 ac.			4.4 ac.	

Tree/Shrub Establishment

Conifers and/or hardwoods were planted to improve and/or create a diversified riparian zone. 80 Big leave Maple and 150 Spruce were planted. along the top of the bank along the Trask River.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	4.4 ac.	4	2001	4.4 ac.	Apr-26-2001
Total:	4.4 ac.			4.4 ac.	

UPLAND WILDLIFE HABITAT MANAGEMENT

The riparian areas will be maintained to provide wildlife cover, food, and protect the streambanks from erosion.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	4.4 ac.	4	2002	4.4 ac.	Jun-26-2002
Total:	4.4 ac.			4.4 ac.	

CERTIFICATION OF PARTICIPAN

Andres-sanchez 4-5-04
Mr. Andres Sanchez Date

CERTIFICATION OF:

Basin Team Leader
Robert A Pedersen 4/5/04
Robert A. Pedersen Date

CONSERVATION DISTRICT
Randy Stenk 4-6-04
Tillamook County SWCD Date

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U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY
CODE 313

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec 5;

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

30' x 7.5'circular below ground liquid waste storage tank

60' x 16' above ground liquid waste storage tank

Operation and Maintenance Items

A properly operated and maintained waste storage structure is an asset to your farm. This waste storage structure was designed and installed for temporary storage of animal wastes. The estimated life span of this installation is at least 10 years. If at any time this structure is taken out of service, the Natural Resources Division of the Oregon Department of Agriculture should be contacted for guidance in decommissioning the structure to avoid environmental concerns. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Do not allow equipment that exceeds the design loading to operate within 20 feet of the structure.

⇒ **WARNING: ENTERING AN UNVENTILATED TANK IS EXTEREMELY "HAZARDOUS" !** Do not allow human entry into the enclosed structure without safety equipment that includes ladders and breathing apparatus.

⇒ Continually maintain all pumps, agitators, piping, valves and all other electrical and mechanical equipment in good operating condition by following the manufacturer's recommendations.

⇒ Continually maintain grounding rods and wiring for all electrical equipment in good condition.

⇒ Facilities will be empty by October 1st to begin winter storage.

⇒ A one foot free board will be maintained to prevent spillage.

⇒ The waste storage facility will be inspected weekly to ensure structural integrity.

⇒ Perform daily inspections of waterlines, including drinking water or cooling water lines. Repair leaking lines immediately to prevent excess water from entering the waste storage system.

⇒ Depth markers are installed in the facility and maintained to assure the maximum volume will be maintained under normal operating conditions allowing for the volume necessary to contain the 25-year, 24-hour rainfall event.

⇒ The depth of all liquid manure will be recorded during each week's inspection.

⇒ Immediately repair any vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

⇒ Pump out the facility within the first two years following construction to check for structural damage. If damage is noted, immediately seek a qualified engineer to assess the situation. Thereafter, it should be pumped out at least every four years to check for damages, remove gravel, rocks, sand, wire and other debris to maintain the designed storage capacity capacity.

⇒ Immediately remove all foreign debris within the structure that may cause damage to pumps and agitator.

⇒ During de-watering of the structure, ensure that waste is spread at minimum rates in areas where crops are grown, spread waste no closer than 50 feet from open watercourses during the winter months and apply no manure within 35 feet of an open watercourse during the summer months. Avoid applying waste during heavy rainfall events.

⇒ Dead animals will not be disposed of in the liquid waste storage facility.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

MANURE TANK AGITATOR
CODE 634

Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9W; Sec. 5

County Tillamook SWCD Tillamook Tract No. T-427

Prepared By: Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained manure tank agitator is an asset to your farm. The manure agitator was designed and installed to stir the liquid waste and keep the solids in suspension so solid manure will not buildup in the bottom of the tank and reduce the designed storage capacity. The estimated life span of this installation is at least 10 years. The life of the manure agitator can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Preventive maintenance will be in accordance with the manufacturer's recommendations.

⇒ Periodically examine the agitator for proper operation. Clean debris from the propeller, and promply replace any defective or damaged parts.

⇒ Remove the agitator from the manure tank and periodically clean and oil as needed to increase the life expectancy of the agitator.

⇒ Immediately repair any vandalism or livestock damage. Do not allow livestock near equipment during operation.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET
IRRIGATION WATER CONVEYANCE

HIGH-PRESSURE UNDERGROUND, PLASTIC PIPELINE
CODE 430-DD

Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec.5

County Tillamook SWCD Tillamook Tract No. T-427

Prepared By Pedersen Date 01/04

Waste Transfer Pipe

Operation and Maintenance Items

A properly operated and maintained waste transfer system is an asset to your farm. This waste transfer system was designed and installed for transferring liquid wastes from a below ground liquid storage facility to an above ground liquid waste storage facility. The estimated life span of this installation is at least 20 years. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Check to make sure all values and air vents are set at the proper operating condition so they may provide protection to the pipeline. Remove foreign materials and vegetation that can interfere with proper valve operation.

⇒ Pipeline will be flushed regularly to prevent clogging.

⇒ Leaks or broken sections will be replaced and/or repaired.

⇒ Maintain the designed depth of cover over the pipeline.

⇒ Limit traffic over the pipeline to designated sections that were designed for traffic loads.

⇒ Avoid travel over pipelines by tillage equipment when the soil is saturated.

⇒ Avoid any sub-soiling operation that may disturb the pipeline.

⇒ Maintain a vigorous growth of vegetative covering. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control height of vegetation.

⇒ Non-buried pipelines will be inspected weekly to assure there is no leaks that is causing waste spillage. Leaks will be repaired immediately.

⇒ Eradicate or otherwise remove all rodents or burrowing animals that can potentially damage or displace the pipe. Immediately repair any damages caused by their activity.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY (SOLID MANURE STORAGE FACILITY) CODE 313

For: Landowner/Operator Andres Sanches

Job Location: T 2S; R 9W;Sec 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

25' x 88' x 6'

Operation and Maintenance Items

A properly operated and maintained waste storage structure is an asset to your farm. This waste storage structure was designed and installed for temporary storage of animal wastes. The estimated life span of this installation is at least 10 years. If at any time a structure is taken out of service, the Natural Resources Division of the Oregon Department of Agriculture should be contacted for guidance in decommissioning the structure to avoid environmental concerns. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Do not allow equipment that exceeds the design loading to operate within 20 feet of the structure

⇒ Immediately repair any vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

⇒ Storage facility will be empty by October 1st to begin winter storage.

⇒ During de-watering of the structure, ensure that waste is spread at minimum rates in areas where crops are grown, spread waste no closer than 50 feet from open watercourses during the winter months and apply no manure within 35 feet of an open watercourse during the summer months. Avoid applying waste during heavy rainfall events.

⇒ Roofs of the solid manure storage facilities will be inspected annually.

⇒ All roof sections that are rusted and leaking will be repaired and/or replaced.

⇒ Loose roof sections on the solid manure storage facilities will be secured.

⇒ Broken trusses, beams, poles, gutters and downspouts will be repaired or replaced on the solid waste storage facilities.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET
ROOF RUNOFF MANAGEMENT

CODE 558

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Gutters and Downspouts

Operation and Maintenance Items

Properly operated and maintained roof runoff facilities are an asset to the farm. Roof runoff facilities were designed and installed to control roof runoff. Estimated life span of this installation is at least 10 years. Facility life can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Perform weekly inspections of gutters, downspouts and above ground pipelines, and appurtenances for proper operation. Repair or replace if needed.

⇒ Periodically remove debris from gutters, downspouts and outlet facilities.

⇒ Protect downspouts from damage by livestock and equipment. Repair or replace damaged components as needed.

⇒ Keep gutters, downspouts, conveyance pipelines and ditches and appurtenances in good operating condition.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENCE WORKSHEET

UNDERGROUND OUTLETS
Code 620

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec. 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Gutter Outlet

Operation and Maintenance Items

Properly operated and maintained underground outlet for the guttering system is an asset to the farm. This outlet was designed and installed to convey roof runoff in an underground pipeline to where it can be released without causing erosion. The estimated life span of this installation is at least 10 years. The life of the practice can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Check all above ground connections, rodent guards, inlets and outlets to make sure they are functioning properly.

⇒ Maintain design depth of cover on all pipelines.

⇒ Avoid operation of tillage and sub-soiling equipment that could damage any component of the gutter outlet system.

⇒ Remove all foreign debris that hinders the gutter system operation.

⇒ Limit traffic over pipeline to designated sections that were designated for traffic loads.

⇒ Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control growth.

⇒ Eradicate of otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

⇒ Immediately repair any vandalism, vehicular livestock damage.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY (ROOF)
CODE 313

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec. 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained roof is an asset to your farm. These roofs were designed and installed for preventing manure runoff from manure accumulation areas. The estimated life span of this installation is at least 10 years. The life of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Roof will be inspected weekly.

⇒ All roof sections that are rusted and leaking will be replaced or repaired to prevent rainwater from entering the liquid waste storage system.

⇒ Loose roof sections will be secured.

⇒ Broken trusses, beams, poles, gutters and downspouts will be repaired or replaced.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

USE EXCLUSION WORKSHEET

CODE 472

Landowner/Operator: Andres Sanches

Job Location: T 2S; R 9W; Sec.5

County: Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained livestock exclusion practice will keep livestock out of the sloughs and open ditches and improve water quality. The estimated life span of the practices is 5 years. The life span can be assured and usually increased by developing and carrying out a good operation and maintenance program.

⇒ The fence barrier along the stream will be periodically inspected and remedial repairs will be performed as needed.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

NUTRIENT MANAGEMENT
CODE 590

For: Landowner/Operator Andres Sanchez

Job Location: T2S; R 9W; Sec 5, 8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-450, 427, 43, 632, 665

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

Waste Utilization can provide economic and resource benefits if applied properly which are assets to the dairy operation. Proper waste utilization requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Manure application equipment is calibrated at least once per year to ensure uniform distribution and accurate application rates.

⇒ Records are maintained of manure applications.

⇒ Manure application equipment is cleaned up and residual material from the equipment is disposed of properly and in a place where surface runoff does not occur.

⇒ Nutrient management plans are reviewed annually and adjustments are made as needed.

⇒ Unnecessary exposure to manure is avoided. Protective clothing is worn when necessary.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE UTILIZATION
CODE 633

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W; Sec. 5, 8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-450,427,43,632, 665

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

Waste Utilization can provide economic and resource benefits if applied properly which are assets to the dairy operation. Proper waste utilization requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Manure application equipment is calibrated at least once per year to ensure uniform distribution and accurate application rates.

⇒ Records are maintained of manure applications.

⇒ Manure application equipment is cleaned up and residual material from the equipment is disposed of properly and in a place where surface runoff does not occur.

⇒ Nutrient management plans are reviewed annually and adjustments are made as needed.

⇒ Unnecessary exposure to manure is avoided. Protective clothing is worn when necessary.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

FORAGE HARVEST MANAGEMENT

CODE 511

For: Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9W; Sec 5,8 & 17

County Tillamook SWCD Tillamook Farm/Tract No. T-427, 43, 632, 665

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

Forage Harvest Management can provide economic and resource benefits. If applied properly, is an assets to the dairy operation. Forage Harvest Management requires certain operational procedures to be followed and evaluated on an annual basis.

⇒ Before forage harvest, clear fields of debris that could damage machinery, or if ingested by livestock, lead to sickness (for example, hardware disease) or death.

⇒ Monitor weather conditions and take action accordingly before and after cutting to optimize forage wilting or cutting time to preserve feed quality and prevent forage swaths or windrows from smothering underlying plants.

⇒ Inspect and repair harvesting equipment following manufacturer's preventive maintenance procedures.

⇒ All shields shall be in place during machine operation to prevent injury or death. Shut off machinery before working or unplugging moving parts.

⇒ Select equipment sizes and capabilities that will in a timely and economically feasible manner handle the acreage normally harvested.

⇒ Operate all forage harvesting equipment at the optimum setting and speeds to minimize loss of leaves.

⇒ Set shear-plate on forage chopper to the proper theoretical cut for the crop being harvested. Keep knives well sharpened. Do not use re-cutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.

⇒ Regardless of silage/haylage storage method, ensure good compaction and an air-tight seal to exclude oxygen and mold formation.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Operation and Maintenance Worksheet

FENCING

Code 382

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained fence is an asset to the farm. This practice was designed and installed to provide so livestock do not need access to open watercourse for drinking water Practice will prevent pollution and prevent streambank erosion and riparian habitat damage due to livestock access. The estimated life span of this installation is at least 5 years. The life of the practice can be assured and usually increased by developing and carrying out a good operation and maintenance program.

This practice will require periodic maintenance and may require operational items to maintain satisfactory performance. A good operation and maintenance plan includes:

⇒ Regular inspections of fences should be part of the on-going management program.

⇒ Inspection of fences after storm event is needed to facilitate the intended use of the fence

⇒ Broken or damaged posts will be replaced

⇒ Sagging wire will be tightened.

⇒ Broken or missing insulators will be replaced.

⇒ Any broken wires will be spliced or replaced.

⇒ Vegetation will be controlled under the fences.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

FILTER STRIP

CODE 393

For: Landowner/Operator Andres Sanchez

Job Location: T 2S; R 9W;Sec.5

County Tillamook SWCD Tillamook Farm/Tract No. T-450, 427, 43, 632

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained vegetated filter strip is an asset to your farm. This vegetative filter strip was designed and installed to remove sediment and pollutants from runoff. The estimated life span of this practice is at least 10 years. The life of this practice can be assured and usually increased by developing and carrying out a good operation and maintenance program

This practice will require you to perform periodic maintenance and may also require operation items to maintain satisfactory performance. Some recommendations to assist you develop a good operation and maintenance program:

⇒ Maintain vigorous growth of vegetative covering. This includes reseeding, commercial fertilization and application of herbicides when necessary. Periodic mowing or grazing may also be needed to control height.

⇒ Where the filter strip is used to trap nutrients, periodic grazing or mechanical harvesting and removal of vegetation is needed.

⇒ Remove all foreign debris that hinders system operation.

⇒ Limit the traffic and do not use as a roadway.

⇒ Limit livestock usage to vegetative growth periods when they will not damage vegetative root system or compact the soil.

⇒ Immediately repair any vandalism, vehicular, or livestock damage.

⇒ Eradicate or remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

Andres Sanchez
02/04

LAND USE SUMMARY

Tract No.	Field No	Land Use	Acres
427	1	Hayland	7.2
	2	Hayland	39.0
	3	Hayland	7.6
	4	Wildlife	3.8
	5	Wildlife	4.4
	F	Farmstead	3.5
		Subtotal	**65.5**
450 (Leased)	1	Pasture	22.1
		Subtotal	**22.1**
43 (Leased)	1	Hayland	16.3
	2	Pasture	5.5
	3	Pasture	2.2
		Subtotal	**24.0**
632	1	Hayland	7.6
	2	Hayland	38.0
	3	Hayland	1.4
	4	Hayland	1.4
	5	Hayland	2.0
	6	Hayland	2.4

Tract No	Field No.	Land Use	Acres
632	7	Hayland	14.0
	8	Hayland	19.8
	9	Hayland	13.3
		Subtotal	**99.9**
Tract 665	1	Hayland	50.9
		Subtotal	**50.9**

LAND USE SUMMARY

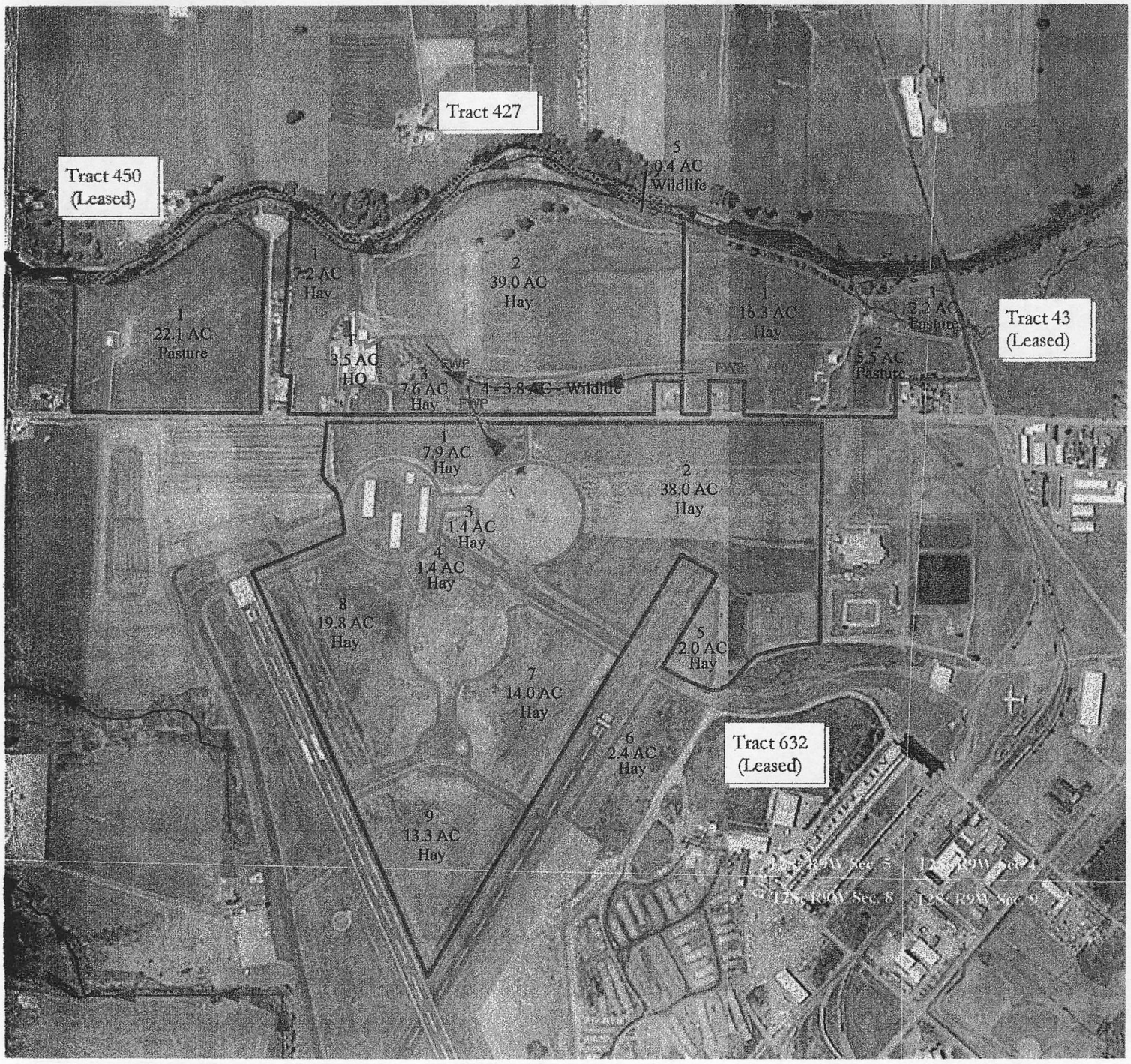
Pasture		29.8
Hayland		220.9
Wildlife		8.2
Farmstead		3.5
	TOTAL	**262.4**

Mr. Andres Sanchez

Tillamook County SWCD
Approx. Acres: 207.8
Date: 02/04/04

Conservation Plan Map

Tillamook, Oregon
USDA - NRCS



1000 0 1000 2000 3000 Feet

Legend

- Tract Boundary
- Planned Land Units
- Filter Strip
- Public Land Survey
- Open Water Course
- FWP = Farmed Wetland Pasture
- W = Wetland
- OW = Other Wetland

N W E S

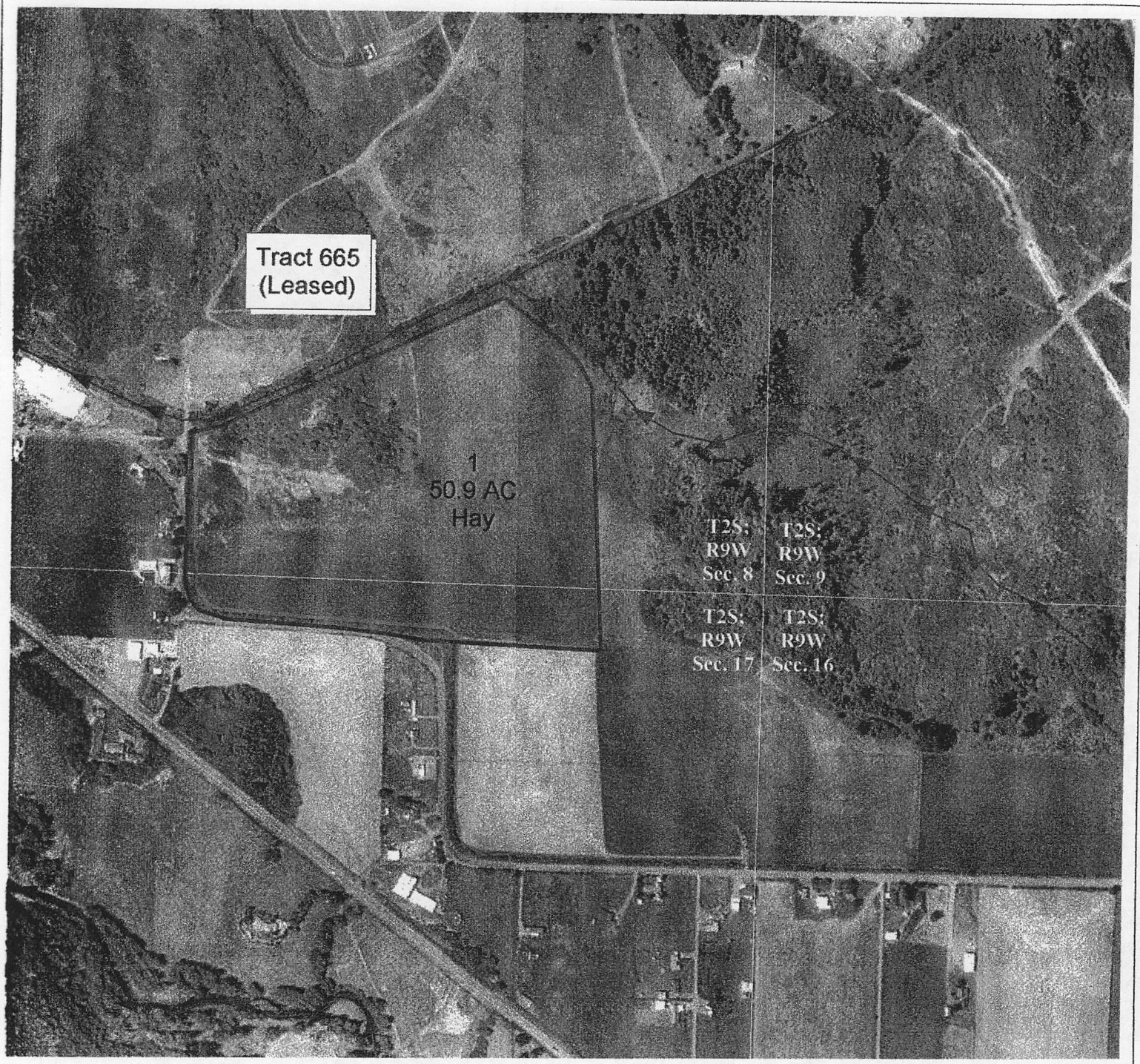
USDA

Mr. Andres Sanchez

Tillamook County SWCD
Approx. Acres: 50.9
Date: 02/02/2004

Conservation Plan Map 2
Tract 665

Tillamook, Oregon
USDA - NRCS



1000 0 1000 2000 Feet

Legend

- Tract Boundary
- Public Land Survey
- Planned Land Units
- Open Water Course

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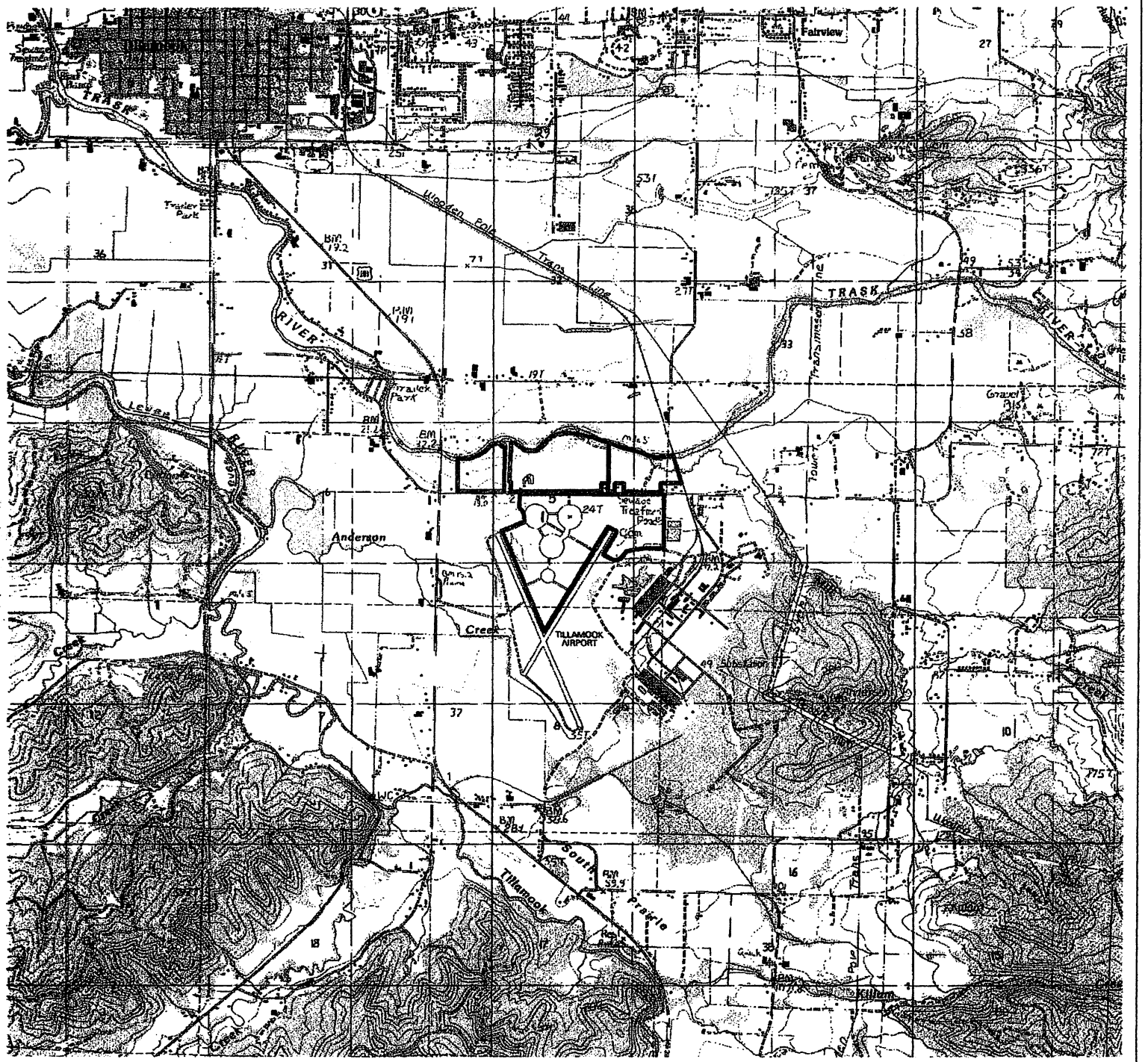
USDA

Mr. Andres Sanchez

Tillamook County SWCD
Approx. Acres: 221.1
Date: 10/15/2003

7.5 Min. Topo Quad Map

Tillamook, Oregon
USDA - NRCS



5000 0 5000 10000 Feet

Tract Boundary

Farmstead Lat/Long (NAD83)
45 25 39.9" N 123 49 58.2" W

N
W E
S

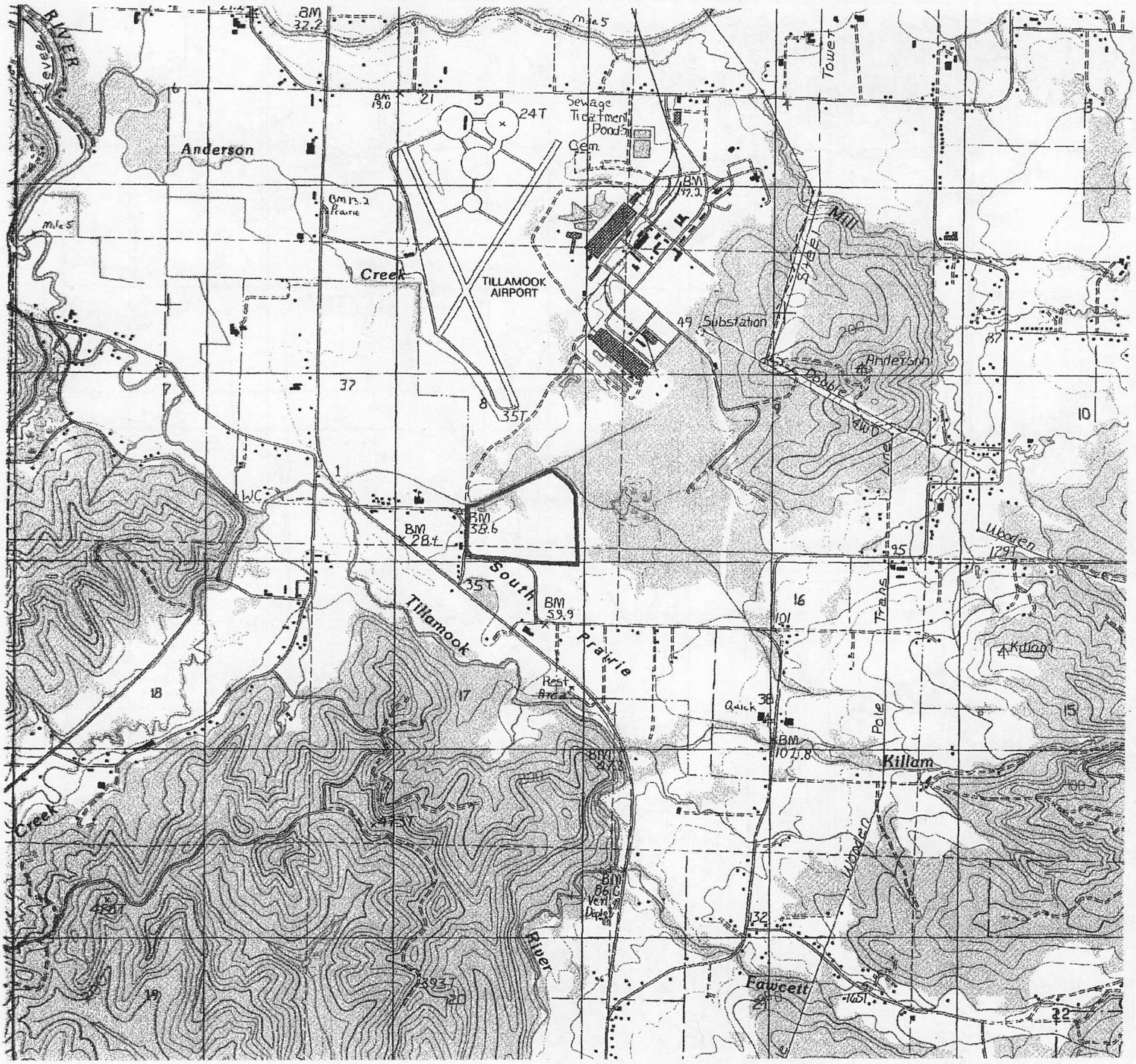
USDA

Mr. Andres Sanchez

Tillamook County SWCD
Approx. Acres: 50.9
Date: 02/04/2004

7.5 Min. Topo Quad Map 2
Tract 665

Tillamook, Oregon
USDA - NRCS



4000 0 4000 8000 Feet

Tract Boundary

N
W E
S

USDA

U. S. DEPARTMENT OF AGRIC

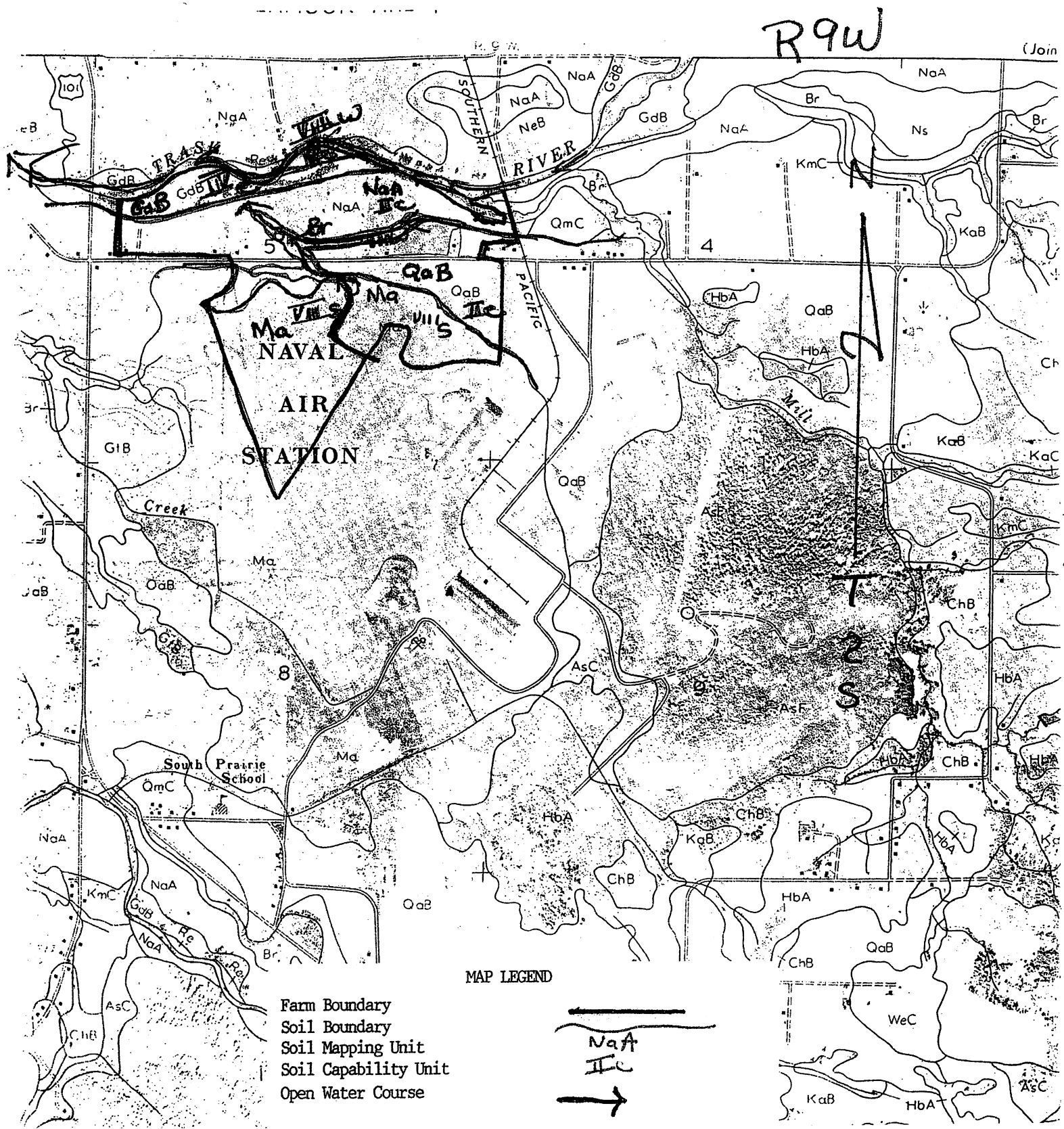
SCS-CPA-15
(3-88)

SOIL MAP

Owner Sanchez and Ect. Operator Andres Sanchez
County Tillamook State Oregon
Soil survey sheet(s) or code nos. 17 Approximate scale 1:20000

N

Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with Tillamook County Soil and Water Conservation District



MAP LEGEND

Farm Boundary
Soil Boundary
Soil Mapping Unit
Soil Capability Unit
Open Water Course

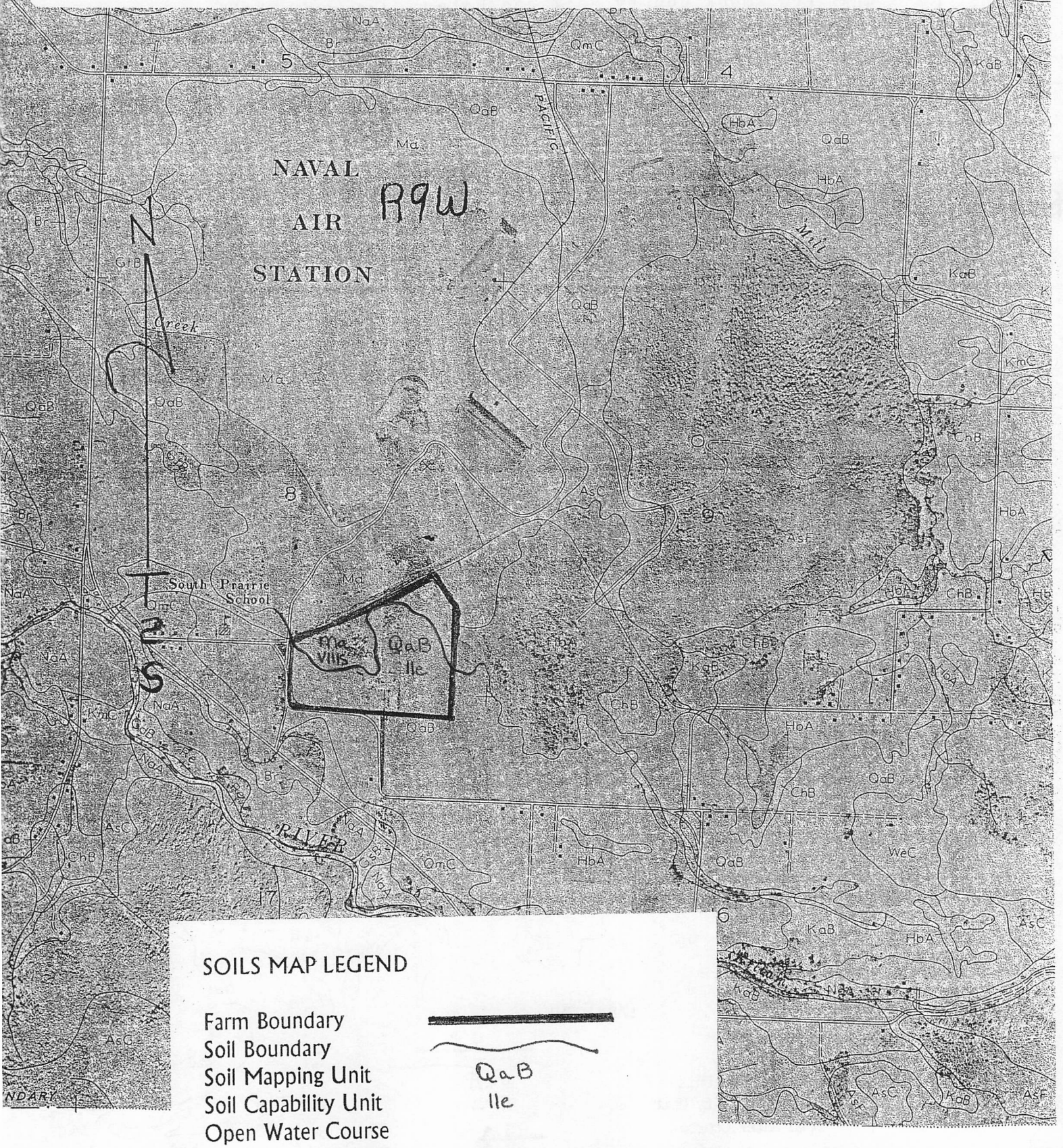
NaA
IIc

SCS-CPA-015
12-85

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Port of Tillamook Operator Andres Sanchez
County Tillamook State Oregon
Soil survey sheet(s) or code nos. 17 Approximate scale 1:20,000
N
Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with Tillamook County Soil & Water Conservation District



SOILS MAP LEGEND

Farm Boundary	
Soil Boundary	
Soil Mapping Unit	QaB
Soil Capability Unit	IIe
Open Water Course	

Andres Sanchez
02/04

SOILS DESCRIPTION

Br - Brenner silt loams are poorly drained, strongly acid soils. These soils are on bottomlands in the lowest part of the floodplains. The erosion hazard is slight. Permeability is slow. Runoff is slow to ponded. NRCS capability classification is IIIw because of poor drainage. Available water holding capacity is 8.5 to 9.5 inches. Soils are well suited for pastures.

GdB - Gardiner fine sand loam, over washed soils, 3 to 7% slopes occur in low lying bends of major rivers. They are subject to overflow due to high water. The soil is well-drained, coarse and textured. Most areas have recently deposited sand on the surface. Runoff is slow and erosion hazard is moderate. Permeability is rapid. NRCS capability classification is IVe because of the erosion hazard. Effective rooting depth is greater than 60 inches. Water holding capacity is 5 to 6.5 inches. Soils are used primarily for pastureland and green chop.

Ma - Made Land - This unit consists of approximately 3 square miles of land leveled for a blimp base in the Second World War. Hills were cut and low areas filled to form a level surface consisting of heterogeneous material that originated from marine sediment, alluvial terraces, and recent alluvium. This is the only large tract of Made Land in the Tillamook survey area. It is now used mainly as an airport and for various industrial developments. (Capability unit VIIIs-1; woodland suitability group 18.)

NaA - Nehalem silt loam, 0-3% slopes, are well to moderately well drained soils. These occupy level to gently undulating river floodplains. The erosion hazard is slight. Permeability is moderate. Runoff is slow. NRCS capability classification is IIc due to climate. Effective rooting depth is greater than 60 inches. Available water holding capacity is 11 to 12.5 inches. Nehalem soils are excellent for pastures. Manure application is restricted when flood potential is high.

QaB - Quillayute loams, 0-7% slopes, are well drained soils. These soils are located on terraces. The erosion hazard is slight to moderate. Permeability is moderate. NRCS capability classification is IIe because of erosion potential on higher slopes. The effective rooting depth is greater than 60 inches. The total available water holding capacity is 12 to 17 inches. These soils are well suited for pasture.

Re - The Riverwash soil series consist of narrow, irregular strips in the bends of stream channels and along drainage ways. The strips are from 40 to 200 yards in width and consist of well-rounded sand, gravel, stones, and boulders. Riverwash slopes are from 0-5 percent. Depth to bedrock is 20 to more than 60 inches. Permeability is rapid. Available water holding capacity and water supply capacity are variable. Effective rooting depth is 20 to 60 inches. The water erosion hazard is severe. NRCS capability classification is VIIIs because of the limited potential to produce vegetation on the aggregate.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

TREE/SHRUB ESTABLISHMENT

CODE 612

For: Landowner/Operator Andres Sanchez

Job Location: T2S; R 10W; Sec. 5

County Tillamook SWCD Tillamook Farm/Tract No. T-427

Prepared By Pedersen Date 01/04

Operation and Maintenance Items

A properly operated and maintained riparian zone is an asset to your farm. This riparian was designed and installed to remove sediment and pollutants from runoff and improve the wildlife habitat benefits. The estimated life span of this practice is at least 20 years. The life of this practice can be assured and usually increased by developing and carrying out a good operation and maintenance program

This practice will require you to perform periodic maintenance and may also require operation items to maintain satisfactory performance. Some recommendations to assist you develop a good operation and maintenance program:

⇒ Replace all dead trees or shrubs the following planting season.

⇒ Determine cause of planting failure and take appropriate actions to prevent further loss of seedlings or cuttings.

⇒ Perform regular inspections to check for animal, insect or disease damage. Seek professional assistance to implement damage control measures.

⇒ Inspect at least annually, tree tubes and stakes making repairs as needed. Adjust any tubes to protect new leader growth.

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

4/6/2004
STATE: OREGON

CLIENT: Andres Sanchez (All Livestock Planned)
ASSISTED BY: Pedersen
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

ANIMAL INVENTORY

Type of Animal	Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Milk Production in Pounds/Cow/Day= 60						Manure CF/D/AU	Annual	
				Nutrient Production (lbs./day/1000 lb. Animal Unit)			Nutrient Production (lbs./day)				Days Confined	Days Grazed
				N	P	K	N	P	K			
MILKER	150	1,300	195.0	0.53	0.09	0.30	103.59	17.55	58.53	1.47	365	0
MILKER	50	900	45.0	0.53	0.09	0.30	23.90	4.05	13.51	1.47	365	0
MILKER (DRY)	40	1,300	52.0	0.36	0.05	0.23	18.72	2.60	11.96	1.10	365	0
MILKER (DRY)	10	900	9.0	0.36	0.05	0.23	3.24	0.45	2.07	1.10	365	0
HEIFERS (12-24 Months)	100	800	80.0	0.31	0.04	0.24	24.8	3.20	19.20	1.30	365	0
HEIFERS (12-24 Months)	50	400	20.0	0.31	0.04	0.24	6.20	0.80	4.80	1.30	365	0
CALVES (1-12 Months)	15	400	6.0	0.31	0.04	0.24	1.86	0.24	1.44	1.30	365	0
CALVES (1-12 Months)	15	200	3.0	0.31	0.04	0.24	0.93	0.12	0.72	1.30	365	0
BEEF COW	10	1,000	10.0	0.33	0.12	0.26	3.30	1.20	2.60	1.00	0	365
Totals-	**440**	**800**	**420.0**	**0.44**	**0.07**	**0.27**	**58.17**	**9.59**	**34.12**	**1.4**		

GRAZING PERIOD

Type of Animal	Percent of Month and Number of Animals Grazing												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AU-YR.
MILKER	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	150	150	150	150	150	150	150	150	150	150	150	150	0
MILKER	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	0
MILKER (DRY)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	40	40	40	40	40	40	40	40	40	40	40	40	0
MILKER (DRY)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	10	10	10	10	10	10	10	10	10	10	10	10	0
HEIFERS (12-24 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	100	100	100	100	100	100	100	100	100	100	100	100	0
HEIFERS (12-24 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	0
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	15	15	15	15	15	15	15	15	15	15	15	15	0
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	15	15	15	15	15	15	15	15	15	15	15	15	0
BEEF COW	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
	10	10	10	10	10	10	10	10	10	10	10	10	120
													0
Total AUM's Available>	259						259	259	259	258	258	258	1,810
Total AUM's Needed>>>	10	10	10	10	10	10	10	10	10	10	10	10	120
Total AUM's>>>>>>>>>>	249	-10	-10	-10	-10	-10	249	249	249	248	248	248	1,690

CLIENT: Andres Sanchez (All Livestock Planned)
ASSISTED BY: Pedersen CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

WEATHER STATION

TILLAMOOK 1 W

Month	25Yr-24Hr Monthly Average in Inches: Precipitation	25Yr-24Hr Monthly Average in Inches: Evaporation	Lot Runoff Factors as a Percent of Monthly Precipitation: Paved	Lot Runoff Factors as a Percent of Monthly Precipitation: Unpaved
	25Yr-24Hr	6.00		
October	7.48	1.42	50%	20%
November	12.80	0.75	60%	25%
December	14.25	0.60	60%	25%
January	13.46	0.48	60%	25%
February	10.45	0.78	50%	25%
March	10.35	1.26	45%	15%
April	6.03	1.90	40%	15%
May	4.24	3.22	40%	10%
June	3.16	3.40	35%	10%
July	1.44	3.91	30%	0%
August	1.73	3.52	40%	10%
September	3.69	2.54	45%	15%
Annual	89.08	23.78		

AREAS CONTRIBUTING RUNOFF TO LIQUID STORAGE FACILITY

Description of Runoff Area	Area in SF
Paved Lot Area >>>>

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: Andres Sanchez (All Livestock Planned)
ASSISTED BY: Pedersen CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

BEDDING VOLUME

Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
MILKER	Free Stall	Wood Shavings	9.00	3.10	0.34	67	605
MILKER	Free Stall	Wood Shavings	9.00	3.10	0.34	16	140
MILKER (DRY)	Free Stall	Wood Shavings	9.00	3.10	0.34	18	161
MILKER (DRY)	Loose Housing	Wood Shavings	9.00	12.40	1.38	12	112
HEIFERS (12-24 Months)	Free Stall	Wood Shavings	9.00	3.10	0.34	28	248
HEIFERS (12-24 Months)	Free Stall	Wood Shavings	9.00	3.10	0.34	7	62
CALVES (1-12 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	8	74
CALVES (1-12 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	4	37
BEEF COW	Nonconfined						

SOLIDS SEPARATION FACTOR

Type of Animal	Type of Separator	Separation Factor %	Volume of Solids Separated CF/Day	Volume of Solids in Liquids CF/Day	Volume of Manure in Liquids CF/Day	Volume of Manure in Solids CF/Day	Accumulated Sludge in Storage CF/Day	Density of Separated Solids Lbs/CF	Weight of Separated Solids Lbs/Day
MILKER	Press Type (Screw or Roller)	30%	31	72	275	11	133	36	1,111
MILKER	Press Type (Screw or Roller)	30%	7	17	64	2	31	36	256
MILKER (DRY)	Press Type (Screw or Roller)	30%	7	17	55	2	18	36	265
MILKER (DRY)	Press Type (Screw or Roller)	30%	4	9	10	0	3	36	146
HEIFERS (12-24 Months)	Dry Scrape System	75%	99	33	26	78	9	36	3,552
HEIFERS (12-24 Months)	Dry Scrape System	75%	25	8	7	20	2	36	888
CALVES (1-12 Months)	Dry Scrape System	100%	16	0	0	8	0	36	578
CALVES (1-12 Months)	Dry Scrape System	100%	8	0	0	4	0	36	289
BEEF COW			0	1	10	0	3		0
Total Solids >>>>

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

4/6/2004
STATE: OREGON

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen**
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

Month	Runoff in Cubic Feet: Roof Area Square Feet 0	Paved Slab Area Square Feet 0	Unpaved Lot Area Square Feet 0	Silage Pit Surface Area, SF 0	Facility Water Use Cubic Feet	Manure: Solids Cubic Feet	Manure: Liquids Cubic Feet	Bedding Cubic Feet	Bedding Pounds	Solids Separated Cubic Feet	Solids Separated Pounds	Solids in Liquids Cubic Feet	Solids in Liquids Pounds	Total Solids Cubic Feet	Total Liquids Cubic Feet
October	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
November	0	0	0	0	3,377	2,356	14,767	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
December	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
January	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
February	0	0	0	0	3,152	2,199	13,782	4,475	40,275	5,512	198,436	4,380	157,693	5,512	21,049
March	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
April	0	0	0	0	3,377	2,356	14,767	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
May	0	0	0	0	3,490	2,435	15,259	4,954	4,954	6,103	219,696	4,850	174,589	6,103	21,856
June	0	0	0	0	3,377	2,356	14,767	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
July	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
August	0	0	0	0	3,490	2,435	15,259	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
September	0	0	0	0	3,377	2,356	14,767	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
Annual	**0**	**0**	**0**	**0**	**41,087**	**28,671**	**179,661**	**58,335**	**485,380**	**71,854**	**2,586,749**	**57,101**	**2,055,642**	**71,854**	**260,394**

DAILY NUTRIENT PRODUCTION

Type of Animal	Pounds/Day of Nutrients from LIQUIDS: N	P2O5	K2O	Pounds/Day of Nutrients from SOLIDS: N	P2O5	K2O	Pounds/Day of Nutrients from GRAZING: N	P2O5	K2O
MILKER	72.51	28.14	49.37	31.08	12.06	21.16	103.59	40.21	70.53
MILKER	16.73	6.49	11.39	7.17	2.78	4.88	23.90	9.28	16.28
MILKER (DRY)	13.10	4.17	10.09	5.62	1.79	4.32	18.72	5.96	14.41
MILKER (DRY)	2.27	0.72	1.75	0.97	0.31	0.75	3.24	1.03	2.49
HEIFERS (12-24 Months)	6.20	1.83	5.78	18.60	5.50	17.35	24.80	7.33	23.14
HEIFERS (12-24 Months)	1.55	0.46	1.45	4.65	1.37	4.34	6.20	1.83	5.78
CALVES (1-12 Months)	0.00	0.00	0.00	1.86	0.55	1.74	1.86	0.55	1.74
CALVES (1-12 Months)	0.00	0.00	0.00	0.93	0.27	0.87	0.93	0.27	0.87
BEEF COW	3.30	2.75	3.13	0.00	0.00	0.00	3.30	2.75	3.13
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen**
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY NUTRIENT PRODUCTION

Month	Pounds of Nutrients from LIQUIDS			Pounds of Nutrients from SOLIDS			Pounds of Nutrients from GRAZING			Pounds of Nutrients going OFF-FARM			Total Pounds of Nutrients from ALL SOURCES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
October	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
November	3,371	1,255	2,395	2,126	739	1,662	99	82	94	0	0	0	5,596	2,076	4,151
December	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
January	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
February	3,146	1,171	2,235	1,985	690	1,551	92	77	88	0	0	0	5,223	1,938	3,874
March	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
April	3,371	1,255	2,395	2,126	739	1,662	99	82	94	0	0	0	5,596	2,076	4,151
May	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
June	3,371	1,255	2,395	2,126	739	1,662	99	82	94	0	0	0	5,596	2,076	4,151
July	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
August	3,483	1,296	2,475	2,197	764	1,718	102	85	97	0	0	0	5,783	2,146	4,290
September	3,371	1,255	2,395	2,126	739	1,662	99	82	94	0	0	0	5,596	2,076	4,151
Annual	**41,013**	**15,265**	**29,139**	**25,869**	**8,993**	**20,224**	**1,205**	**1,003**	**1,144**	**0**	**0**	**0**	**68,087**	**25,262**	**50,506**

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

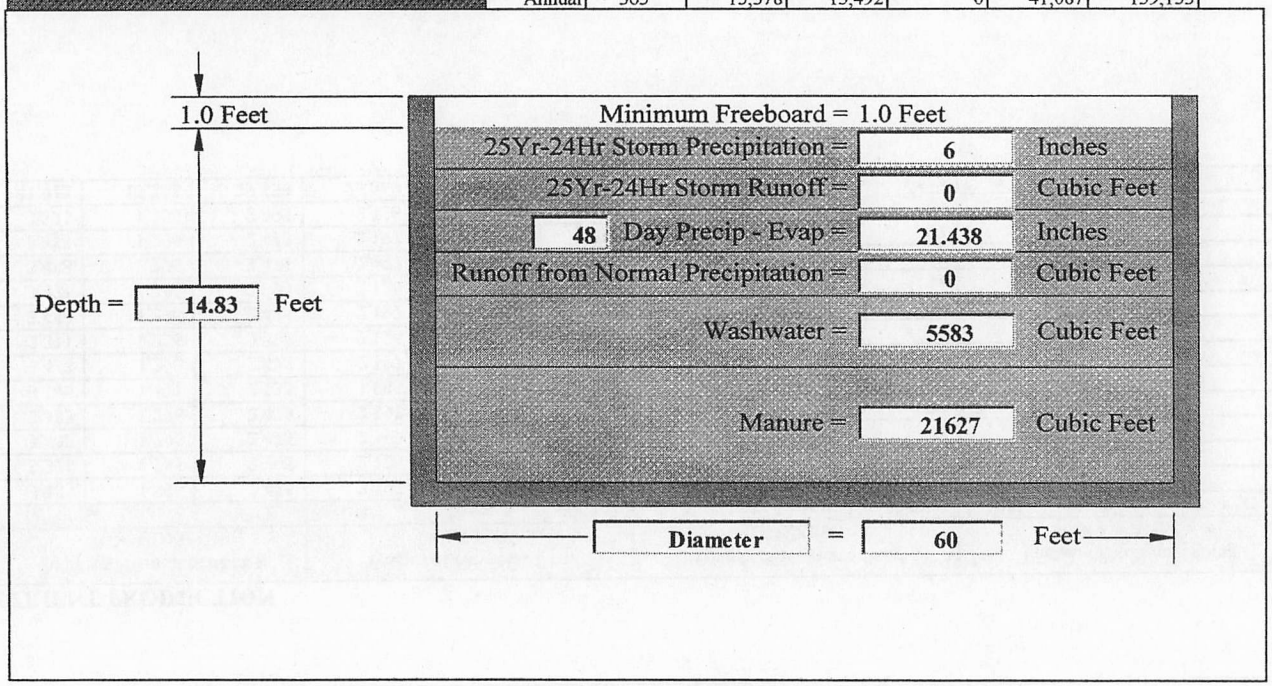
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

Tank Parameters	Value
Storage Period, Days=	48
Tank Diameter, Feet=	60
Existing Storage, Cubic Feet=	4,604.00
Surface Area of Existing Storage, SF=	2,847
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	46,517
Design Volume, Cubic Feet=	41,909
Is Tank Covered?	NO
Tank Dimensions?	Circular

MONTHLY INFLOWS INTO TANK

Month	Number of days	Rain-Evap on Tank CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Manure CF
October	31	1,427	1,438	0	3,490	13,517
November	30	2,838	2,859	0	3,377	13,081
December	31	3,215	3,238	0	3,490	13,517
January	31	3,057	3,080	0	3,490	13,517
February	28	2,277	2,294	0	3,152	12,209
March	31	2,141	2,157	0	3,490	13,517
April	30	973	980	0	3,377	13,081
May	31	240	242	0	3,490	13,517
June	30	-57	-57	0	3,377	13,081
July	31	-582	-586	0	3,490	13,517
August	31	-422	-425	0	3,490	13,517
September	30	271	273	0	3,377	13,081
Annual	365	15,378	15,492	0	41,087	159,153



ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

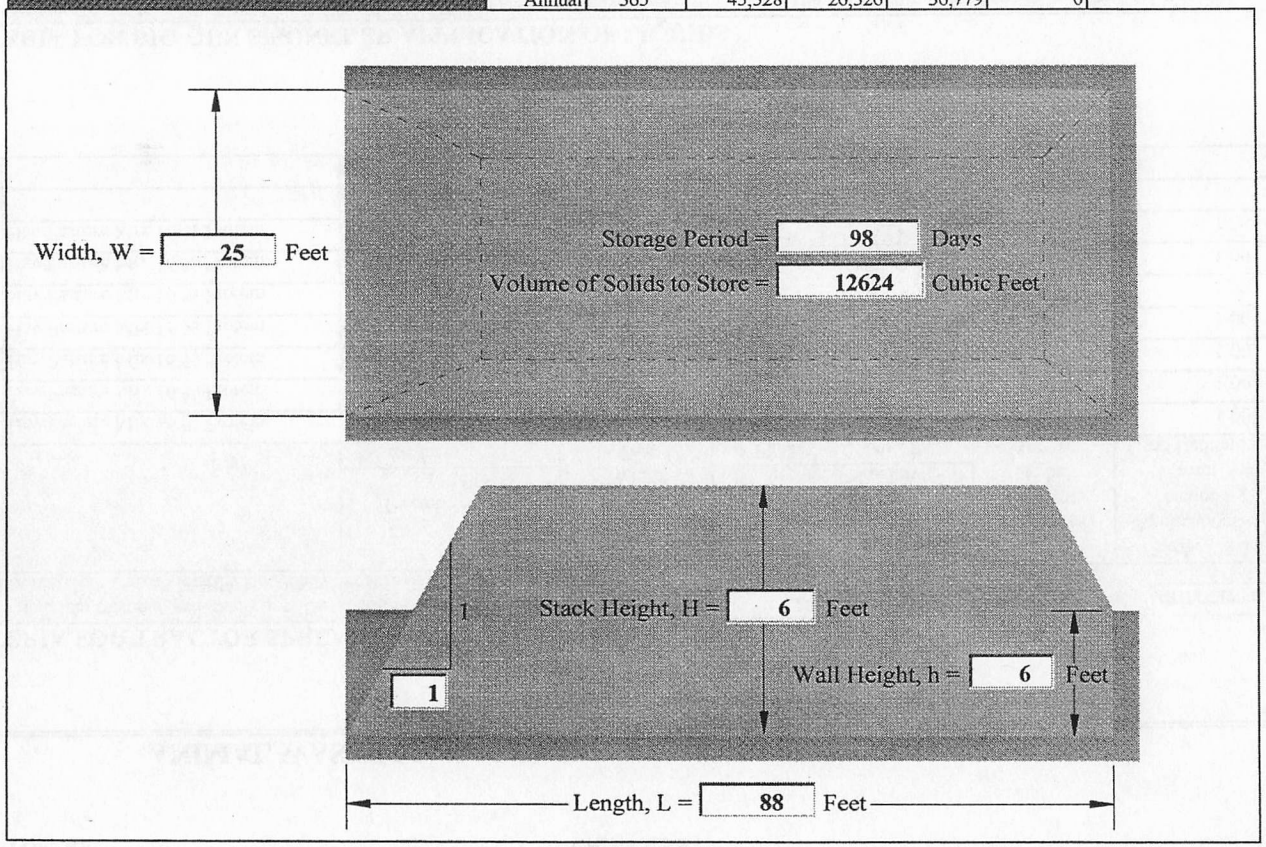
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

Solids Storage Facility Parameters	Value
Storage Period, Days=	98
Stacking Width, W in Feet=	25
Stacking Height, H in Feet=	6.00
Wall Height, h in Feet=	6.00
Stack Side Slope (X:1)=	1.00
Existing Storage, Cubic Feet=	0
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	**12,624**
Design Volume, Cubic Feet=	**12,750**
Is Facility Covered?	YES

MONTHLY SOLIDS VOLUME STACKED IN FACILITY

Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Normal Runoff CF
October	31	3867	2,236	3,903	0
November	30	3742	2,164	2,953	0
December	31	3867	2,236	3,051	0
January	31	3867	2,236	3,051	0
February	28	3493	2,020	2,756	0
March	31	3867	2,236	3,051	0
April	30	3742	2,164	2,953	0
May	31	3867	2,236	3,051	0
June	30	3742	2,164	2,953	0
July	31	3867	2,236	3,051	0
August	31	3867	2,236	3,051	0
September	30	3742	2,164	2,953	0
Annual	365	45,528	26,326	36,779	0



CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

MANAGEMENT CRITERIA FOR TRACTOR SPREADER APPLICATION OF SOLIDS

To apply **71,854** cubic feet of solids generated from the operation it will take approximately **206** trips annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, travel lengths, and loads per acre listed below for each crop.

Field Number	Acres	Crop	Tractor Spreader Capacity Bushels	Tractor Spreader Capacity CF	Spread Width Feet	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/100CF	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Solids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
T450 1	22.1	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T632 2	38	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T665 1	50.9	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	256	1.00	0.4	650	4
0												
0												

MANAGEMENT CRITERIA FOR BIG GUN SPRINKLER APPLICATION OF LIQUIDS

To apply **1,947,746** gallons of liquids generated from the operation it will take approximately **108** hours of pumping annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, set times, and travel rates listed below for each crop.

Field Number	Acres	Crop	Sprinkler Flowrate GPM	Wetted Diameter Feet	Portion of Wetted Diameter Receiving Liquids	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/1000Gal	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Application Rate in Inches/Hour	Set Time Needed in Hours	Travel Needed in Feet/Minute
T450 1	22.1	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T632 2	38	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T665 1	50.9	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	256	1.00	0.80	1.45	1.36	2.40
0													
0													

MANAGEMENT CRITERIA FOR TANK WAGON APPLICATION OF LIQUIDS

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

To apply **1,947,746** gallons of liquids generated from the operation it will take approximately **487** trips annually. Based on applying NITROGEN, N
at agronomic rates use the application depths, travel lengths, and loads per acre listed below for each crop.

Field Number	Acres	Crop	Tank Wagon Capacity Gallons	Spread Width Feet	NITROGEN, N Concentration in Storage Facility		Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
					PPM	Lbs/1000Gal					
T450 1	22.1	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T632 2	38	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T665 1	50.9	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	256	1.00	0.34	1,254	2.3
0											
0											

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation: Dairy	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrients Retained After Storage		
	Type of Storage Facility	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Tank (Uncovered) Storing Digester Effluent	50,200	13,286	57,034	70%	85%	85%	35,140	11,293	48,479
Solids	Solids Storage Facility (Roofed)	25,869	8,993	20,224	75%	90%	90%	19,402	8,094	18,202
Grazing	NONE	1,205	1,003	1,144	100%	100%	100%	1,205	1,003	1,144

NUTRIENTS AVAILABLE AFTER APPLICATION

Nutrient Source	Type of Application System	Pounds of Nutrients Available			Percent Nutrients Retained After Application			Pounds of Nutrients Retained After Application		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Sprinkling	35,140	11,293	48,479	75%	100%	100%	26,355	11,293	48,479
Solids	Broadcast (Incorporated 7 or more days after application)	19,402	8,094	18,202	70%	100%	100%	13,581	8,094	18,202
Grazing	Grazing	1,205	1,003	1,144	90%	100%	100%	1,084	1,003	1,144

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location: Coast	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrients Retained After Denitrification		
	Soil Drainage Class	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Well Drained	26,355	11,293	48,479	87%	100%	100%	22,929	11,293	48,479
Solids	Well Drained	13,581	8,094	18,202	87%	100%	100%	11,816	8,094	18,202
Grazing	Well Drained	1,084	1,003	1,144	87%	100%	100%	943	1,003	1,14

CLIENT: **Andres Sanchez (All Livestock Planned)**
ASSISTED BY: **Pedersen**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

PERCENT OF MANURE TO BE APPLIED TO FIELD AND UTILIZATION ACRES NEEDED BASED ON NITROGEN, N

Field Number	Acres	Crop	LIQUIDS			SOLIDS			GRAZING		
			Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients
T450 1	22.1	Hay/Pasture Mix 16 % Protein	0%	0	0	42%	4,963	16	50%	472	2
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	35%	8,025	26	0%	0	0	0%	0	0
T43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	10%	2,293	7	15%	1,772	6	50%	472	2
T632 2	38.0	Hay/Pasture Mix 16 % Protein	20%	4,586	15	0%	0	0	0%	0	0
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	30%	6,879	22	0%	0	0	0%	0	0
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	0%	0	0	14%	1,654	5	0%	0	0
T665 1	50.9	Hay/Pasture Mix 16 % Protein	5%	1,146	4	0%	0	0	0%	0	0
0											
0											
Off-Farm			0%	0		29%	3,427		0%	0	
		TOTALS-	100%	22,929	75	100%	11,816	27	100%	943	3

NUTRIENT BALANCE BASED ON AVAILABLE ACRES

Field Number	Acres	Crop	NUTRIENTS APPLIED			- NUTRIENTS REMOVED			= NUTRIENT BALANCE		
			Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre
T450 1	22.1	Hay/Pasture Mix 16 % Protein	246	177	372	307	85	235	-61	91	137
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	149	73	315	307	85	235	-158	-12	80
T43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	189	119	340	307	85	235	-118	33	105
T632 2	38.0	Hay/Pasture Mix 16 % Protein	121	59	255	307	85	235	-187	-26	20
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	126	62	266	307	85	235	-181	-23	31
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	230	157	354	307	85	235	-77	72	119
T665 1	50.9	Hay/Pasture Mix 16 % Protein	23	11	48	256	71	196	-233	-60	-148
0											
0											
Off-Farm											

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: Andres Sanchez (Dairy Herd Size Planned)
ASSISTED BY: Pedersen CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

ANIMAL INVENTORY

Type of Animal	Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Milk Production in Pounds/Cow/Day= 60 — Nutrient Production (lbs./day/1000 lb. Animal Unit) N	P	K	(lbs./day) N	P	K	Manure CF/D/AU	Annual Days Confined	Annual Days Grazed
MILKER	150	1,300	195.0	0.53	0.09	0.30	103.59	17.55	58.53	1.47	365	0
MILKER	50	900	45.0	0.53	0.09	0.30	23.90	4.05	13.51	1.47	365	0
MILKER (DRY)	40	1,300	52.0	0.36	0.05	0.23	18.72	2.60	11.96	1.10	365	0
MILKER (DRY)	10	900	9.0	0.36	0.05	0.23	3.24	0.45	2.07	1.10	365	0
HEIFERS (12-24 Months)	100	800	80.0	0.31	0.04	0.24	24.8	3.20	19.20	1.30	365	0
HEIFERS (12-24 Months)	50	400	20.0	0.31	0.04	0.24	6.20	0.80	4.80	1.30	365	0
CALVES (1-12 Months)	15	400	6.0	0.31	0.04	0.24	1.86	0.24	1.44	1.30	365	0
CALVES (1-12 Months)	15	200	3.0	0.31	0.04	0.24	0.93	0.12	0.72	1.30	365	0
Totals	430	775	410.0	0.45	0.07	0.27	59.51	9.80	34.89	1.4		

GRAZING PERIOD

Type of Animal	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AU-YR.
	Percent of Month and Number of Animals Grazing												
MILKER	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	150	150	150	150	150	150	150	150	150	150	150	150	0
MILKER	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	0
MILKER (DRY)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	40	40	40	40	40	40	40	40	40	40	40	40	0
MILKER (DRY)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	10	10	10	10	10	10	10	10	10	10	10	10	0
HEIFERS (12-24 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	100	100	100	100	100	100	100	100	100	100	100	100	0
HEIFERS (12-24 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	50	50	50	50	50	50	50	50	50	50	50	50	0
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	15	15	15	15	15	15	15	15	15	15	15	15	0
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	15	15	15	15	15	15	15	15	15	15	15	15	0
													0
													0
Total AUM's Available>	259						259	259	259	258	258	258	1,810
Total AUM's Needed>>>	0	0	0	0	0	0	0	0	0	0	0	0	0
Total AUM's>>>>>>>>>>>	259	0	0	0	0	0	259	259	259	258	258	258	1,810

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: Andres Sanchez (Dairy Herd Size Planned)
ASSISTED BY: Pedersen CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

WEATHER STATION

TILLAMOOK 1 W

	25Yr-24Hr	6.00	Lot Runoff Factors as a Percent of Monthly Precipitation	
	Monthly Average in Inches			
Month	Precipitation	Evaporation	Paved	Unpaved
October	7.48	1.42	50%	20%
November	12.80	0.75	60%	25%
December	14.25	0.60	60%	25%
January	13.46	0.48	60%	25%
February	10.45	0.78	50%	25%
March	10.35	1.26	45%	15%
April	6.03	1.90	40%	15%
May	4.24	3.22	40%	10%
June	3.16	3.40	35%	10%
July	1.44	3.91	30%	0%
August	1.73	3.52	40%	10%
September	3.69	2.54	45%	15%
Annual	89.08	23.78		

AREAS CONTRIBUTING RUNOFF TO LIQUID STORAGE FACILITY

Description of Runoff Area	Area in SF
Paved Lot Area >>>>

CLIENT: Andrei Sanchez (Dairy Herd Size Planned)
ASSISTED BY: Pedersen CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

BEDDING VOLUME

Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
MILKER	Free Stall	Wood Shavings	9.00	3.10	0.34	67	605
MILKER	Free Stall	Wood Shavings	9.00	3.10	0.34	16	140
MILKER (DRY)	Free Stall	Wood Shavings	9.00	3.10	0.34	18	161
MILKER (DRY)	Loose Housing	Wood Shavings	9.00	12.40	1.38	12	112
HEIFERS (12-24 Months)	Free Stall	Wood Shavings	9.00	3.10	0.34	28	248
HEIFERS (12-24 Months)	Free Stall	Wood Shavings	9.00	3.10	0.34	7	62
CALVES (1-12 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	8	74
CALVES (1-12 Months)	Loose Housing	Wood Shavings	9.00	12.40	1.38	4	37

SOLIDS SEPARATION FACTOR

Type of Animal	Type of Separator	Separation Factor %	Volume of Solids Separated CF/Day	Volume of Solids in Liquids CF/Day	Volume of Manure in Liquids CF/Day	Volume of Manure in Solids CF/Day	Accumulated Sludge in Storage CF/Day	Density of Separated Solids Lbs/CF	Weight of Separated Solids Lbs/Day
MILKER	Press Type (Screw or Roller)	30%	31	72	275	11	133	36	1,111
MILKER	Press Type (Screw or Roller)	30%	7	17	64	2	31	36	256
MILKER (DRY)	Vibrating Screen	30%	7	17	55	2	18	36	265
MILKER (DRY)	Press Type (Screw or Roller)	30%	4	9	10	0	3	36	146
HEIFERS (12-24 Months)	Dry Scrape System	75%	99	33	26	78	9	36	3,552
HEIFERS (12-24 Months)	Dry Scrape System	75%	25	8	7	20	2	36	888
CALVES (1-12 Months)	Dry Scrape System	100%	16	0	0	8	0	36	578
CALVES (1-12 Months)	Dry Scrape System	100%	8	0	0	4	0	36	289
Total Solids >>>>

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

Month	Runoff in Cubic Feet: Roof Area Square Feet 0	Paved Slab Area Square Feet 0	Unpaved Lot Area Square Feet 0	Silage Pit Surface Area, SF 0	Facility Water Use Cubic Feet	Manure: Solids Cubic Feet	Manure: Liquids Cubic Feet	Bedding Cubic Feet	Bedding Pounds	Solids Separated Cubic Feet	Solids Separated Pounds	Solids in Liquids Cubic Feet	Solids in Liquids Pounds	Total Solids Cubic Feet	Total Liquids Cubic Feet
October	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
November	0	0	0	0	3,377	2,322	14,501	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
December	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
January	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
February	0	0	0	0	3,152	2,167	13,535	4,475	40,275	5,512	198,436	4,380	157,693	5,512	21,049
March	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
April	0	0	0	0	3,377	2,322	14,501	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
May	0	0	0	0	3,490	2,399	14,985	4,954	4,954	6,103	219,696	4,850	174,589	6,103	21,856
June	0	0	0	0	3,377	2,322	14,501	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
July	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
August	0	0	0	0	3,490	2,399	14,985	4,954	44,590	6,103	219,696	4,850	174,589	6,103	21,856
September	0	0	0	0	3,377	2,322	14,501	4,795	43,152	5,906	212,610	4,693	168,957	5,906	21,587
Annual	**0**	**0**	**0**	**0**	**41,087**	**28,247**	**176,434**	**58,335**	**485,380**	**71,854**	**2,586,749**	**57,101**	**2,055,642**	**71,854**	**260,394**

DAILY NUTRIENT PRODUCTION

Type of Animal	Pounds/Day of Nutrients from LIQUIDS: N	P_2O_5	K_2O	Pounds/Day of Nutrients from SOLIDS: N	P_2O_5	K_2O	Pounds/Day of Nutrients from GRAZING: N	P_2O_5	K_2O
MILKER	72.51	28.14	49.37	31.08	12.06	21.16	103.59	40.21	70.53
MILKER	16.73	6.49	11.39	7.17	2.78	4.88	23.90	9.28	16.28
MILKER (DRY)	13.10	4.17	10.09	5.62	1.79	4.32	18.72	5.96	14.41
MILKER (DRY)	2.27	0.72	1.75	0.97	0.31	0.75	3.24	1.03	2.49
HEIFERS (12-24 Months)	6.20	1.83	5.78	18.60	5.50	17.35	24.80	7.33	23.14
HEIFERS (12-24 Months)	1.55	0.46	1.45	4.65	1.37	4.34	6.20	1.83	5.78
CALVES (1-12 Months)	0.00	0.00	0.00	1.86	0.55	1.74	1.86	0.55	1.74
CALVES (1-12 Months)	0.00	0.00	0.00	0.93	0.27	0.87	0.93	0.27	0.87
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY NUTRIENT PRODUCTION

Month	Pounds of Nutrients from LIQUIDS			Pounds of Nutrients from SOLIDS			Pounds of Nutrients from GRAZING			Pounds of Nutrients going OFF-FARM			Total Pounds of Nutrients from ALL SOURCES		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
October	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
November	3,371	1,255	2,395	2,126	739	1,662	0	0	0	0	0	0	5,497	1,994	4,057
December	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
January	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
February	3,146	1,171	2,235	1,985	690	1,551	0	0	0	0	0	0	5,131	1,861	3,787
March	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
April	3,371	1,255	2,395	2,126	739	1,662	0	0	0	0	0	0	5,497	1,994	4,057
May	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
June	3,371	1,255	2,395	2,126	739	1,662	0	0	0	0	0	0	5,497	1,994	4,057
July	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
August	3,483	1,296	2,475	2,197	764	1,718	0	0	0	0	0	0	5,680	2,060	4,192
September	3,371	1,255	2,395	2,126	739	1,662	0	0	0	0	0	0	5,497	1,994	4,057
Annual	**41,013**	**15,265**	**29,139**	**25,869**	**8,993**	**20,224**	**0**	**0**	**0**	**0**	**0**	**0**	**66,883**	**24,259**	**49,363**

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

Tank Parameters	Value
Storage Period, Days=	48
Tank Diameter, Feet=	60
Existing Storage, Cubic Feet=	4,604.00
Surface Area of Existing Storage, SF=	2,847
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	46,517
Design Volume, Cubic Feet=	41,909
Is Tank Covered?	NO
Tank Dimensions?	Circular

MONTHLY INFLOWS INTO TANK

Month	Number of days	Rain-Evap on Tank CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Manure CF
October	31	1,427	1,438	0	3,490	13,517
November	30	2,838	2,859	0	3,377	13,081
December	31	3,215	3,238	0	3,490	13,517
January	31	3,057	3,080	0	3,490	13,517
February	28	2,277	2,294	0	3,152	12,209
March	31	2,141	2,157	0	3,490	13,517
April	30	973	980	0	3,377	13,081
May	31	240	242	0	3,490	13,517
June	30	-57	-57	0	3,377	13,081
July	31	-582	-586	0	3,490	13,517
August	31	-422	-425	0	3,490	13,517
September	30	271	273	0	3,377	13,081
Annual	365	15,378	15,492	0	41,087	159,153

1.0 Feet

Depth = 14.83 Feet

Minimum Freeboard = 1.0 Feet

25Yr-24Hr Storm Precipitation =	6	Inches
25Yr-24Hr Storm Runoff =	0	Cubic Feet
48 Day Precip - Evap =	21.438	Inches
Runoff from Normal Precipitation =	0	Cubic Feet
Washwater =	5583	Cubic Feet
Manure =	21627	Cubic Feet

Diameter = 60 Feet

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

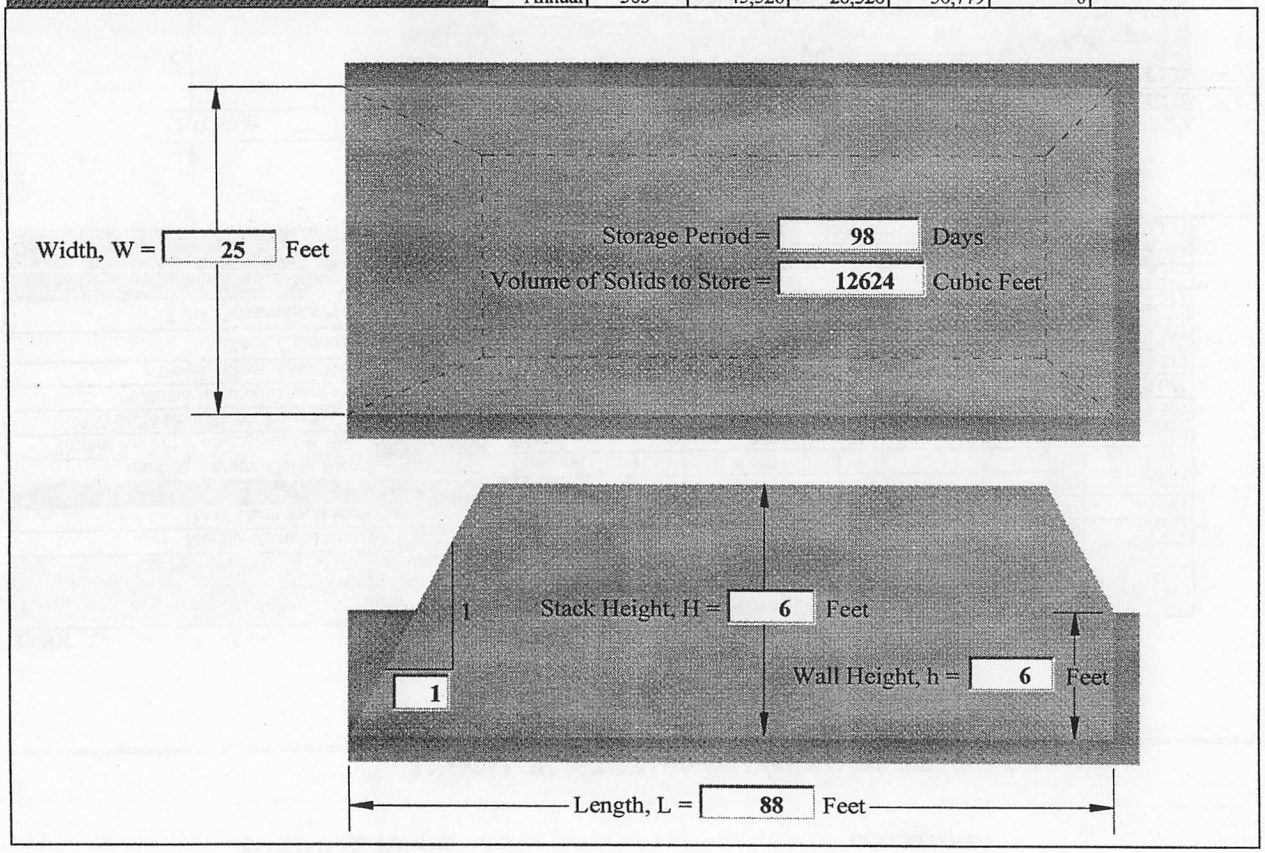
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

Solids Storage Facility Parameters	Value
Storage Period, Days=	98
Stacking Width, W in Feet=	25
Stacking Height, H in Feet=	6.00
Wall Height, h in Feet=	6.00
Stack Side Slope (X:1)=	1.00
Existing Storage, Cubic Feet=	0
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	12,624
Design Volume, Cubic Feet=	12,750
Is Facility Covered?	YES

MONTHLY SOLIDS VOLUME STACKED IN FACILITY

Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Normal Runoff CF
October	31	3867	2,236	3,903	0
November	30	3742	2,164	2,953	0
December	31	3867	2,236	3,051	0
January	31	3867	2,236	3,051	0
February	28	3493	2,020	2,756	0
March	31	3867	2,236	3,051	0
April	30	3742	2,164	2,953	0
May	31	3867	2,236	3,051	0
June	30	3742	2,164	2,953	0
July	31	3867	2,236	3,051	0
August	31	3867	2,236	3,051	0
September	30	3742	2,164	2,953	0
Annual	365	45,528	26,326	36,779	0



CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation: Dairy / Type of Storage Facility	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrients Retained After Storage		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Tank (Uncovered) Storing Digester Effluent	50,200	13,286	57,034	70%	85%	85%	35,140	11,293	48,479
Solids	Solids Storage Facility (Roofed)	25,869	8,993	20,224	75%	90%	90%	19,402	8,094	18,202
Grazing	NONE	0	0	0	100%	100%	100%	0	0	0

NUTRIENTS AVAILABLE AFTER APPLICATION

Nutrient Source	Type of Application System	Pounds of Nutrients Available			Percent Nutrients Retained After Application			Pounds of Nutrients Retained After Application		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Sprinkling	35,140	11,293	48,479	75%	100%	100%	26,355	11,293	48,479
Solids	Broadcast (Incorporated 7 or more days after application)	19,402	8,094	18,202	70%	100%	100%	13,581	8,094	18,202
Grazing	Grazing	0	0	0	90%	100%	100%	0	0	0

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location: Coast / Soil Drainage Class	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrients Retained After Denitrification		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Liquids	Well Drained	26,355	11,293	48,479	87%	100%	100%	22,929	11,293	48,479
Solids	Well Drained	13,581	8,094	18,202	87%	100%	100%	11,816	8,094	18,202
Grazing	Well Drained	0	0	0	87%	100%	100%	0	0	0

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

PERCENT OF MANURE TO BE APPLIED TO FIELD AND UTILIZATION ACRES NEEDED BASED ON NITROGEN, N

Field Number	Acres	Crop	LIQUIDS			SOLIDS			GRAZING		
			Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients
T450 1	22.1	Hay/Pasture Mix 16 % Protein	0%	0	0	42%	4,963	16	50%	0	0
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	35%	8,025	26	0%	0	0	0%	0	0
T43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	10%	2,293	7	15%	1,772	6	50%	0	0
T632 2	38.0	Hay/Pasture Mix 16 % Protein	20%	4,586	15	0%	0	0	0%	0	0
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	30%	6,879	22	0%	0	0	0%	0	0
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	0%	0	0	14%	1,654	5	0%	0	0
T665 1	50.9	Hay/Pasture Mix 16 % Protein	5%	1,146	4	0%	0	0	0%	0	0
0											
0											
Off-Farm			0%	0		29%	3,427		0%	0	
		TOTALS-	100%	22,929	75	100%	11,816	27	100%	0	0

NUTRIENT BALANCE BASED ON AVAILABLE ACRES

Field Number	Acres	Crop	NUTRIENTS APPLIED			- NUTRIENTS REMOVED			= NUTRIENT BALANCE		
			Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre	Nitrogen, N Lbs/Acre	Phosphorous, P_2O_5 Lbs/Acre	Potassium, K_2O Lbs/Acre
T450 1	22.1	Hay/Pasture Mix 16 % Protein	225	154	346	307	85	235	-83	69	111
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	149	73	315	307	85	235	-158	-12	80
T43 1,2,3	24.0	Hay/Pasture Mix 16 % Protein	169	98	316	307	85	235	-138	12	81
T632 2	38.0	Hay/Pasture Mix 16 % Protein	121	59	255	307	85	235	-187	-26	20
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	126	62	266	307	85	235	-181	-23	31
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	230	157	354	307	85	235	-77	72	119
T665 1	50.9	Hay/Pasture Mix 16 % Protein	23	11	48	256	71	196	-233	-60	-148
0											
0											
Off-Farm											

U.S. Department of Agriculture
Natural Resources Conservation Service

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 1.8

4/6/2004
STATE: OREGON

CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen**
CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

MANAGEMENT CRITERIA FOR TRACTOR SPREADER APPLICATION OF SOLIDS

To apply **71,854** cubic feet of solids generated from the operation it will take approximately **206** trips annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, travel lengths, and loads per acre listed below for each crop.

Field Number	Acres	Crop	Tractor Spreader Capacity Bushels	Tractor Spreader Capacity CF	Spread Width Feet	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/100CF	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Solids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
T450 1	22.1	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T632 2	38	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	307	1.00	0.5	542	5
T665 1	50.9	Hay/Pasture Mix 16 % Protein	280	348	15	4,327	27.00	256	1.00	0.4	650	4
0												
0												

MANAGEMENT CRITERIA FOR BIG GUN SPRINKLER APPLICATION OF LIQUIDS

To apply **1,947,746** gallons of liquids generated from the operation it will take approximately **108** hours of pumping annually. Based on applying NITROGEN, N
at agronomic rate use the application depths, set times, and travel rates listed below for each crop.

Field Number	Acres	Crop	Sprinkler Flowrate GPM	Wetted Diameter Feet	Portion of Wetted Diameter Receiving Liquids	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/1000Gal	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Application Rate in Inches/Hour	Set Time Needed in Hours	Travel Needed Feet/Minute
T450 1	22.1	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T632 2	38	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	307	1.00	0.96	1.45	1.63	2.00
T665 1	50.9	Hay/Pasture Mix 16 % Protein	300	250	1/2 Circle	2,162	18.04	256	1.00	0.80	1.45	1.36	2.40
0													
0													

MANAGEMENT CRITERIA FOR TANK WAGON APPLICATION OF LIQUIDS

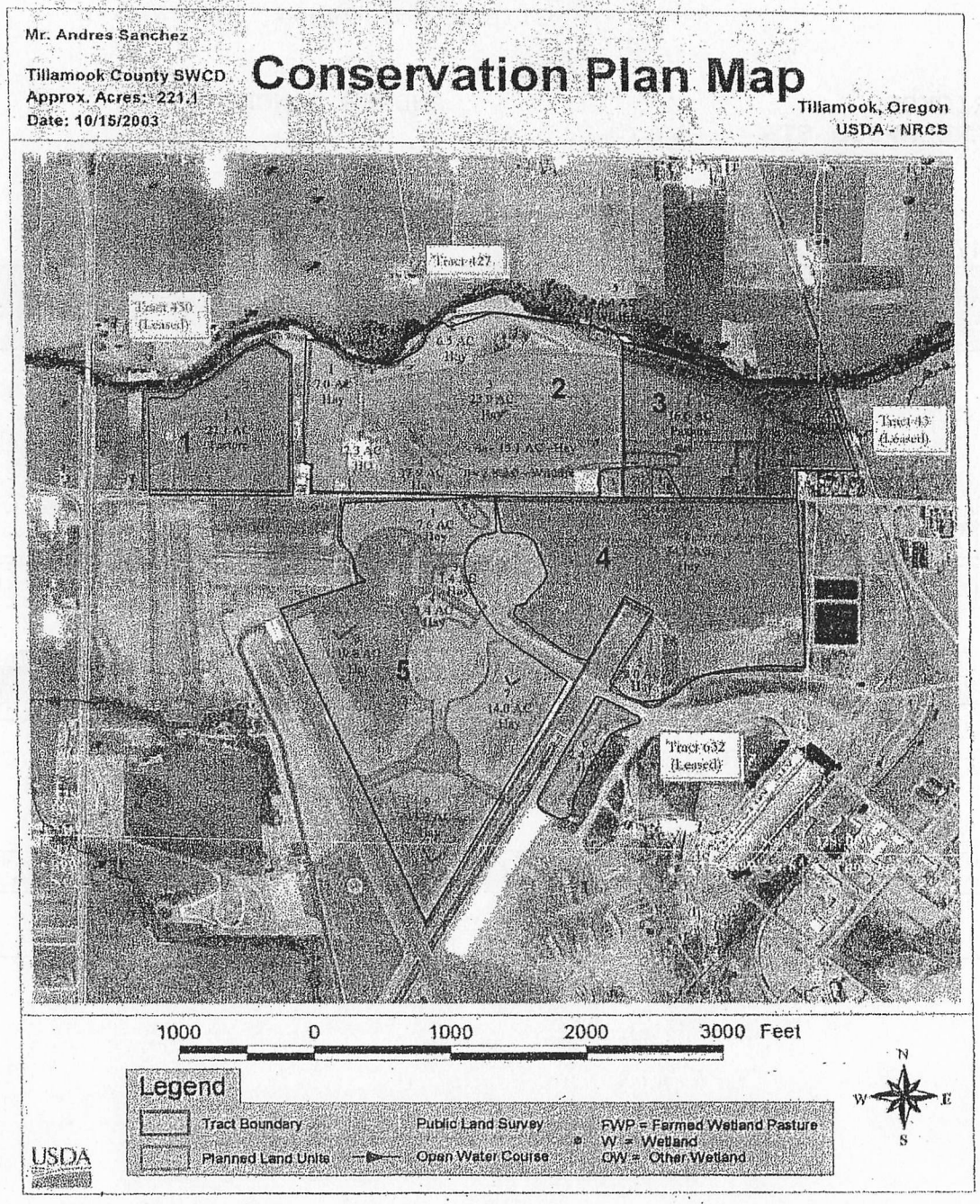
CLIENT: **Andres Sanchez (Dairy Herd Size Planned)**
ASSISTED BY: **Pedersen** CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

To apply **1,947,746** gallons of liquids generated from the operation it will take approximately **487** trips annually. Based on applying NITROGEN, N
at agronomic rates use the application depths, travel lengths, and loads per acre listed below for each crop.

Field Number	Acres	Crop	Tank Wagon Capacity Gallons	Spread Width Feet	NITROGEN, N Concentration in Storage Facility PPM	NITROGEN, N Concentration in Storage Facility Lbs/1000Gal	Pounds of Nutrients to be Applied	Number of Applications Needed to meet Crop Demand	Inches of Liquids to Apply	Travel Length per Load Needed in Feet	Loads per Acre
T450 1	22.1	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T427 1,2,3	53.8	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T43 1,2,3	24	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T632 2	38	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
1,7,8,9	54.7	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
3,4,5,6	7.2	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	307	1.00	0.41	1,045	2.8
T665 1	50.9	Hay/Pasture Mix 16 % Protein	4,000	15	2,162	18.04	256	1.00	0.34	1,254	2.3
0											
0											

Soil Sample Collection Locations



A & L WESTERN AGRICULTURAL LABORATORIES

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REPORT NUMBER
03-330-066

Client No: 99999

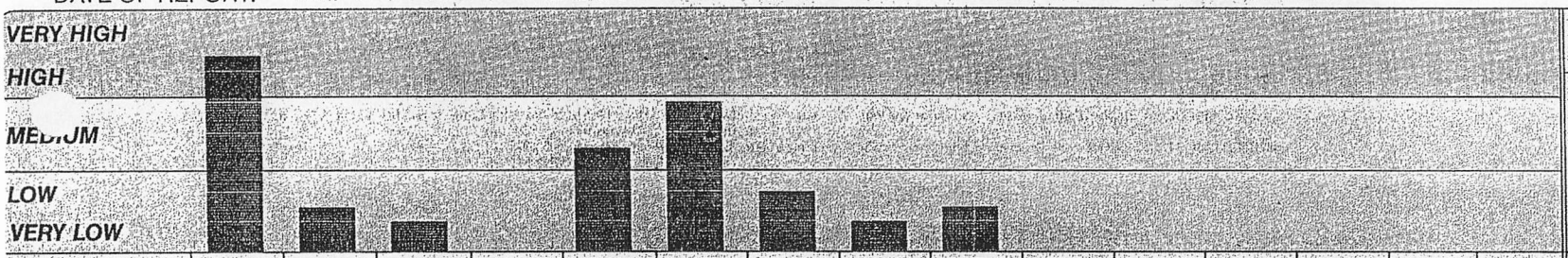
SEND TO: JIM HENDRICKSON
9665 SW ARDENWOOD ST
PORTLAND, OR 97225-

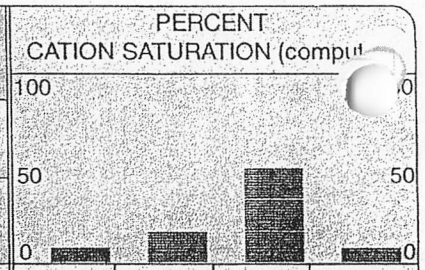
GROWER: ANDRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 12/04/2003 LAB NO: 59982 SAMPLE ID: 1 PAGE: 1





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	8.5	7	10	23	352	699	3210	55	7							3.3	20.8	58.0	0.9

ECe dS/m	LOW	AVERAGE	HIGH	CEC meq/100g	EX. LIME	pH	ACIDIC	BASIC
				27.6		5.9		

INCREASING SALINITY → ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.8

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy J. Peebles

DARCY PEEBLES, CCA

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PHOSPHORUS INDEX WORKSHEET – WESTERN OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 450 Field No(s). 1 Date: Dec 10, 2003

Soil Map Unit(s): Nehalem A Soil Test P: 10 Lab. Method: Weak Bray Sample Depth: 1'

Crop Rotation: Perm Pasture Nutrient Application Method(s) Solid Spreading & Sprinkling

Planner: Jim Hendrickson - ODFA Notes: Sample #1

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	1.5	.75
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.5	1.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	1.5	.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	5.5	4

PHOSPHORUS INDEX WORKSHEET – WESTERN OREGON

Tract 450 Fields 1

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P 10 – 40) / 10 (7 - 40) x .10 =-3.3 Soil Test P Assign 0 points if Soil Test P < 40 ppm					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0 .02 = _____ lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 130 x 0.02 = 2.6 lbs/ac P_2O_5					2.6	2.6
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	8	2.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	5.5	4
Source Factors Subtotal (SFS)	10.6	4.6
Total Rating Value (TFS + SFS)	16.1	8.6
Site Vulnerability Class	**Medium**	**Low**

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10220 S.W. Nimbus Ave., Bldg. K-9 • Portland, OR 97223

Client No: 99999

REPORT NUMBER
03-330-066

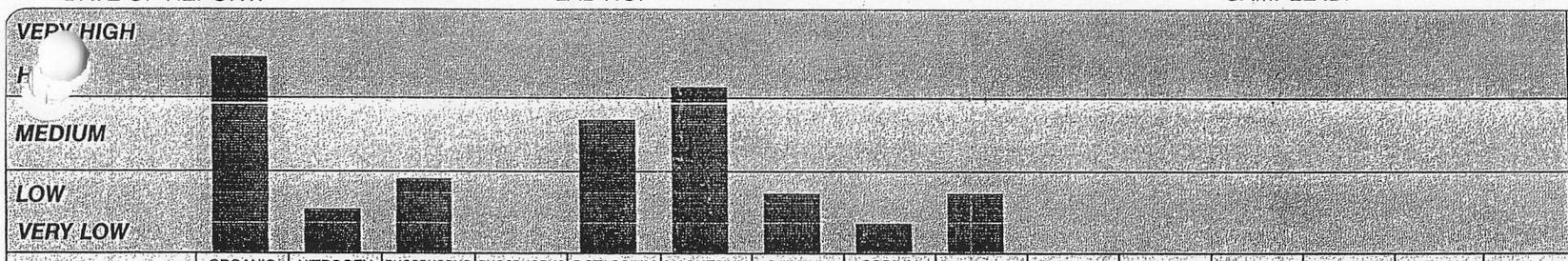
SEND TO: JIM HENDRICKSON
9665 SW ARDENWOOD ST
PORTLAND, OR 97225-

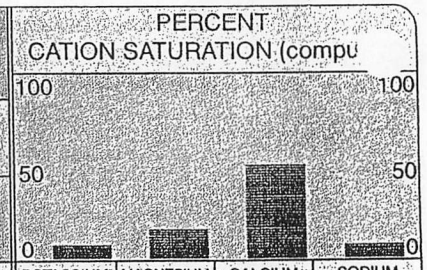
GROWER: ANDRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 12/04/2003 LAB NO: 59983 SAMPLE ID: 2 PAGE: 2





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	7.6	7	17	30	499	808	3223	72	9							4.4	22.7	54.9	1.1

ECe dS/m	LOW	AVERAGE	HIGH

INCREASING SALINITY →

CEC meq/100g: 29.3

EX. LIME:

pH	ACIDIC	BASIC
5.9		

← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.9

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy I. Peebles
DARCY PEEBLES, CCA

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PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No: 427 Field No(s). 1,2,3,4,4a Date: Dec 10, 2003

Soil Map Unit(s): Nehalem A Soil Test P: 17ppm Lab. Method: Weak Bray Sample Depth: 1'

Crop Rotation: Perm Pasture Nutrient Application Method(s) Solid Spreading & Sprinkling

Planner: Jim Hendrickson - ODFA Notes: Sample #2

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	1.5	.75
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.5	1.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	1.5	.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	5.5	4

Tract 427 Fields 1,2,3,4,4a

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P 10 – 40) / 10 (17 - 40) x .10 =-2.3 Assign 0 points if Soil Test P < 40 ppm Soil Test P					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0 .02 = _____ lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 127 x 0.02 = 2.54 lbs/ac P_2O_5					2.54	2.54
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	8.0	2.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	5.5	4
Source Factors Subtotal (SFS)	10.54	4.54
Total Rating Value (TFS + SFS)	**16.04**	**8.54**
Site Vulnerability Class	**Medium**	**Low**

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REPORT NUMBER
03-330-066

Client No: 99999

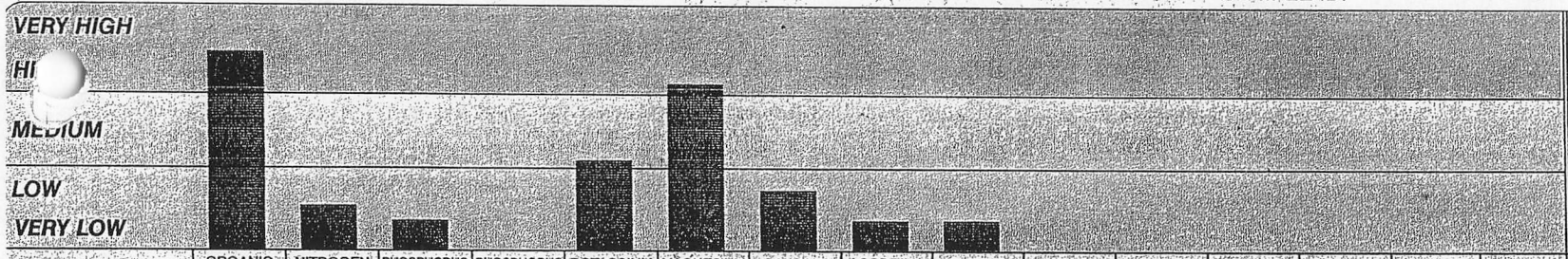
SEND TO: JIM HENDRICKSON
9665 SW ARDENWOOD ST
PORTLAND, OR 97225-

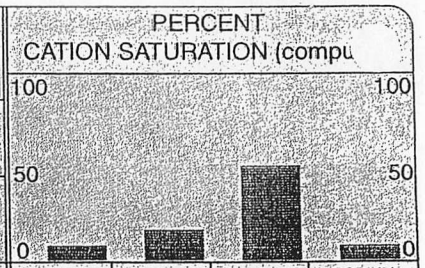
GROWER: ANDRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 12/04/2003 LAB NO: 59984 SAMPLE ID: 3 PAGE: 3





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	13.4	8	10	21	299	709	2832	43	5							3.0	22.6	54.7	0.7

LOW AVERAGE HIGH

ECe dS/m — INCREASING SALINITY →

CEC meq/100g: 25.8

EX. LIME

pH: 5.8

ACIDIC BASIC

← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.6

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy J. Peebles
DARCY PEEBLES, CCA

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PHOSPHORUS INDEX WORKSHEET – WESTERN OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 43 Field No(s). 1,2,3 Date: Dec 10, 2003

Soil Map Unit(s): Nehalem A Soil Test P: 10ppm Lab. Method: Weak Bray Sample Depth: 1'

Crop Rotation: Perm Pasture Nutrient Application Method(s) Solid Spreading & Sprinkling

Planner: Jim Hendrickson - ODFA Notes: Sample #3

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	1.5	.75
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	1.5	1.5
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	1.5	.75
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	5.5	4

Tract 43 Fields 1,2,3

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P 10 – 40) / 10 (10 - 40) x .10 = -3 Soil Test P; Assign 0 points if Soil Test P < 40 ppm					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0 .02 = _____ lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 130 x 0.02 = lbs/ac P_2O_5					2.6	2.6
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	8.0	2.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	5.5	4
Source Factors Subtotal (SFS)	10.6	4.6
Total Rating Value (TFS + SFS)	**16.1**	**8.6**
Site Vulnerability Class	**Medium**	**Low**

A & L WESTERN AGRICULTURAL LABORATORIES

REPORT NUMBER
03-330-066

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10220 S.W. Nimbus Ave., Bldg. K-9 • Portland, OR 97223
Client No: 99999

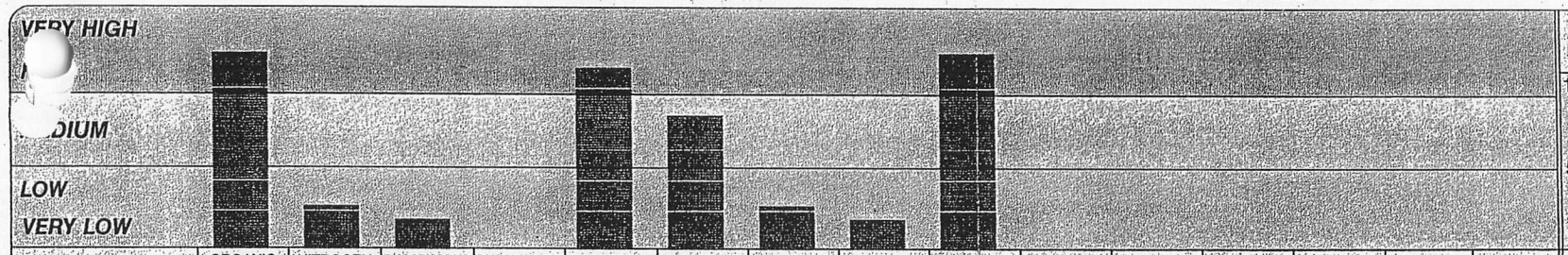
SEND TO: JIM HENDRICKSON
9665 SW ARDENWOOD ST
PORTLAND, OR 97225-

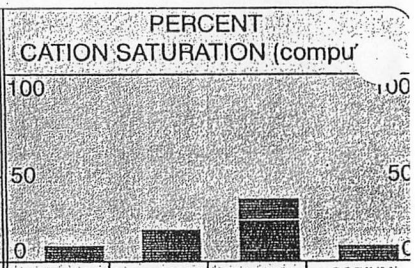
GROWER: ANDRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 12/04/2003 LAB NO: 59985 SAMPLE ID: 4 PAGE:





RATING	ORGANIC MATTER %	NITROGEN NO_3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS $NaHCO_3$-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO_4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	14.3	7	5	21	383	271	1085	41	60							8.5	19.4	47.1	1.6

ECe dS/m	LOW	AVERAGE	HIGH	CEC meq/100g	EX. LIME	pH	ACIDIC	BASIC
				11.5		5.6		

INCREASING SALINITY → ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.4

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P_2O_5	POTASH K_2O	MAGNESIUM Mg	SULFUR SO_4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy L. Peebles
DARCY PEEBLES, CCA

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PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 632 Field No(s). 2 Date: Dec 10, 2003

Soil Map Unit(s): Quillayute B Soil Test P: 5 ppm Lab. Method: Weak Bray Sample Depth: 1'

Crop Rotation: Perm Pasture Nutrient Application Method(s) Solid Spreading & Sprinkling

Planner: Jim Hendrickson - ODFA Notes: Sample #4

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	1.5	.75
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0	0
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0	0
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.5	1.75

Tract 632 Fields 2

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P 10 – 40) / 10 Soil Test P		(5 - 40) x .10 =-3.5	Assign 0 points if Soil Test P < 40 ppm		0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02		_____ x 0 .02 = _____ lbs/ac P_2O_5			0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02		129 x 0.02 = 2.58 lbs/ac P_2O_5			2.58	2.58
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	8.0	2.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	2.5	1.75
Source Factors Subtotal (SFS)	10.58	4.58
Total Rating Value (TFS + SFS)	**13.08**	**6.33**
Site Vulnerability Class	**Medium**	**Low**

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REPORT NUMBER
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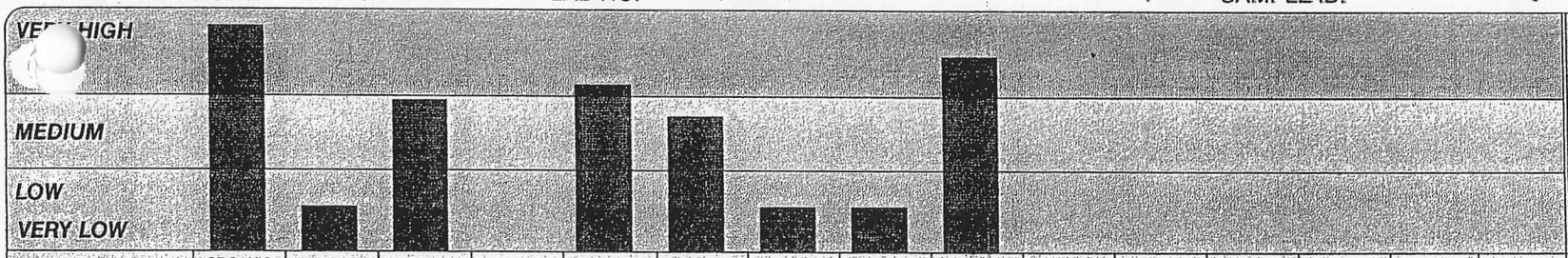
9665 SW ARDENWOOD ST
PORTLAND, OR 97225-

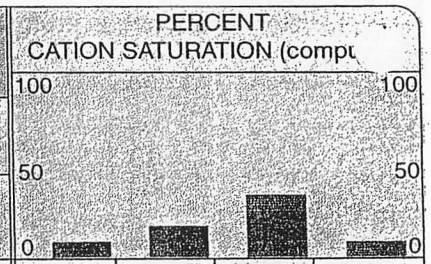
GROWER: ANDRES SANCHEZ

SUBMITTED BY:

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 12/04/2003 LAB NO: 59986 SAMPLE ID: 5 PAGE: 5





RATING	ORGANIC MATTER %	NITROGEN NO3-N ppm	PHOSPHORUS WEAK BRAY ppm	PHOSPHORUS NaHCO3-P ppm	POTASSIUM K ppm	MAGNESIUM Mg ppm	CALCIUM Ca ppm	SODIUM Na ppm	SULFUR SO4-S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm		POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
TEST RESULTS	23.8	9	28	11	198	144	569	27	37							7.8	18.2	43.7	1.8

ECe dS/m — LOW / AVERAGE / HIGH — INCREASING SALINITY →

CEC meq/100g: 6.5

EX. LIME:

pH: 5.4 — ACIDIC / BASIC — ← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 5.2

SOIL FERTILITY GUIDELINES

CROP: RATE:

DOLOMITE (100 score)	LIME (100 score)	GYPSUM	ELEMENTAL SULFUR	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	MAGNESIUM Mg	SULFUR SO4-S	ZINC Zn	MANGANESE Mn	IRON Fe	COPPER Cu	BORON B	REFER TO BACK

COMMENTS

Darcy L. Peebles
DARCY PEEBLES, CCA

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The yield of any crop is controlled by many factors in addition to nutrition. While these recommendations are based on agronomic research and experience, they DO NOT GUARANTEE the achievement of satisfactory performance. Copyright 1994 A & L WESTERN LABORATORIES, INC.

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PHOSPHORUS INDEX WORKSHEET – WESTERN OREGON

Producer: Andres Sanchez County: Tillamook Tract No. 632 Field No(s). 1,3,4,5,6,7,8,9 Date: Dec 10, 2003

Soil Map Unit(s): Quillayute B Soil Test P: 28 ppm Lab. Method: Weak Bray Sample Depth: 1'

Crop Rotation: Perm Pasture Nutrient Application Method(s) Solid Spreading & Sprinkling

Planner: Jim Hendrickson - ODFA Notes: Sample #5

		PHOSPHORUS LOSS RATING					Weighted Rating Value	
TRANSPORT FACTORS	Factor Weight	None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Current	Planned
Soil Erosion – tons/ac/yr (RUSLE)	1.50	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)	0	0
Soil Erosion from Sprinkler Irrigation	0.75	No sprinkler irrigation (0)	Application rate < infiltration rate OR No visible runoff at field borders (0.75)	Application rate = infiltration rate OR Little to no visible runoff at field borders (1.5)	Application rate > infiltration rate OR Visible runoff at field borders (3.0)	Application rate > infiltration rate OR Excessive runoff visible at field borders. Rills and gullies present. (6.0)	1.5	.75
Runoff Class	1.00	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	Very High (8.0)	1.0	1.0
Flooding Frequency Class	0.75	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)	0	0
Distance to Perennial Surface Waters / Buffer Widths	0.75	> 500 feet OR buffer > 30 ft. wide (or meets NRCS standards) next to surface waters (0)	300 – 500 feet OR buffer 20 - 30 ft. wide next to surface waters (0.75)	200 – 299 feet OR buffer 10 -19 ft. wide next to surface waters (1.5)	100 – 199 feet AND buffer < 10 ft. wide next to surface waters (3.0)	< 100 feet AND No buffer next to surface waters (6.0)	0	0
Subsurface Drainage	0.50	No Tile Drains (0)	Tile drains present Soil Test P (Bray P1) < 60 ppm (0.5)	Tile drains present Soil Test P (Bray P1) 61 - 140 ppm (1.0)	Tile drains present Soil Test P (Bray P1) 141- 190 ppm (2.0)	Tile drains present Soil Test P (Bray P1) > 190 ppm (4.0)	0	0
						Transport Factors Subtotal (TFS)	2.5	1.75

Tract 632 Fields 1,3,4,5,6,7,8,9

SOURCE FACTORS	Factor Weight	PHOSPHORUS LOSS RATING: None (0)	Low (1)	Medium (2)	High (4)	Very High (8)	Weighted Rating Value: Current	Planned
Soil Test P – ppm (Bray P1)	1.00	(Soil Test P ~~10~~ 28 – 40) / 10 (~~0~~ 28 - 40) x .10 =-3.1 Soil Test P Assign 0 points if Soil Test P < 40 ppm					0	0
Commercial P Fertilizer Application Rate	1.00	lbs/ac P_2O_5 x 0.02 _____ x 0 .02 = _____ lbs/ac P_2O_5					0	0
Commercial P Fertilizer Application Method	1.00	None Applied (0)	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	0	0
Organic P Source Application Rate	1.00	lbs/ac P_2O_5 x 0.02 69 x 0.02 = 1.38 lbs/ac P_2O_5					1.38	1.38
Organic P Source Application Method	1.00	None Applied (0)	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September (1.0)	Incorporated within 5 days of application from October through February OR Surface applied March through August (2.0)	Incorporated more than 5 days after application OR Surface applied September through October (4.0)	Surface applied November through February (8.0)	8.0	2.0

Total Rating Value TFS + SFS	Site Vulnerability Class
< 13.0	Low
13.0 – 25.0	Medium
25.1 – 50.0	High
> 50.0	Very High

	Current	Planned
Transport Factors Subtotal (TFS)	2.5	1.75
Source Factors Subtotal (SFS)	9.38	3.38
Total Rating Value (TFS + SFS)	11.88	5.13
Site Vulnerability Class	**Low**	**Low**

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez (All Livestock Planned)	Tract(s): 450 (Sample 1)	Field(s): T450 1
Assisted by: Pedersen		Date: April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	10	352	5.9		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		3.7 tons		

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop			0					
2. Residual from long-term manure application			0					
3. Irrigation water			0		0		0	
4. Other (e.g., atmospheric deposition)			0		0		0	
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial Fertilizer	61		0			0
8. Manure / Organic Materials (Source-)		Dairy	246	0	177	0	372	0
9.		Subtotal (sum of lines 6, 7 and 8)	307	0	177	0	372	0
10.		Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.		Nutrient Status (subtract line 10 from line 9)	0	0	92	0	137	0

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	177	K_2O	372

Method, Form, and Timing of Application

The 352 ppm. Of potassium is high. An addiditional 61 lbs. of nitrogen fertilizer per acre per year is recommended to achieve the 6 tons of dry matter per acre per year. See enclosed letter from the Dairy Extension Agent. Commercial fertilizer and manure application should be in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution section, for manure application rates per field per year. Recommend aplying the manure evenly over all the fields during the year. Soil testing at least every 5 years is recommended to evaluate if the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Andres Sanchez (All Livestock Planned)	Tract(s):	427 (Sample 3)	Field(s):	T427 1,2,3
Assisted by:	Pedersen			Date:	April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	17	499	5.9		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD									
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other		Other	
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B					
307		85		235		3.3				

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop			0					
2. Residual from long-term manure application			0					
3. Irrigation water			0		0		0	
4. Other (e.g., atmospheric deposition)			0		0		0	
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial fertilizer	158		0		0	
8. Manure / Organic Materials (Source-)		Dairy	149		73		315	
9.		Subtotal (sum of lines 6, 7 and 8)	307	0	73	0	315	0
10.		Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.		Nutrient Status (subtract line 10 from line 9)	0	0	-12	0	80	0

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	85	K_2O	315

Method, Form, and Timing of Application

The 499 ppm. of potassium is high. An addiditional 158 lbs. of nitrogen fertilizer per acre per year is recommended to achieve the 6 tons of dry matter per acre per year. See enclosed letter from the Dairy Extension Agent. Commercial fertilizer and manure application should be in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution section, for manure application rates per field per year. Recommend aplying the manure evenly over all the fields during the year. Soil testing at least every 5 years is recommended to evaluate if the biosolid application rate matches the nitrogen needs of the forage.

Natural Resources Conservation Service, Oregon

WASTE UTILIZATION WORKSHEET

Tank Equipment Calibration

(Using a Full Tank Load)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the tank equipment:

- ✓ Determine the maximum capacity of the tank equipment from the manufacturer's maintenance manual or the owners manual for the equipment.
- ✓ Fill the tank and reduce the volume of the tank by the appropriate amount if the tank is not filled to its maximum capacity. Normally a tank spreader is only filled to about 80 percent of its maximum capacity and therefore the maximum rated capacity of the tank should be multiplied by 0.8 to reflect the volume of the loaded tank during the calibration exercise.
- ✓ Spread the loaded tank on the field using consistent speed and settings to cover the field uniformly. Try to spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.

Data and Calculations:

Steps	ID of Calibration Test					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading-						
3. Gear selected during spreading-						
4. Maximum rated capacity of tank (gallons) =						
5. Volume of filled tank (gallons)- Line 4 x ____ % of tank filled ÷ 100% =						
6. Length of spreading area (ft) =						
7. Width of spreading area (ft) =						
8. Area spread (sq ft)- line 6 x line 7 =						
9. Waste applied (gal/sq ft)- line 5 ÷ line 8 =						
10. Convert to gallons per acre - Line 9 x 43,560 =						
11. Average Application Rate (gallons per acre) – Sum of values in cells A10 through F10 divided by the total number of calibrations completed =						

Additional Notes:

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Spreader Equipment Calibration

(Using a Full Spreader Load)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the solids spreader equipment:

- ✓ Determine the weight of the waste material loaded in the spreader by using truck scales to weigh the spreader equipment when it is empty and full.
- ✓ Spread the loaded spreader on the field using consistent speed and spreader settings to cover the field uniformly. Spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.
- ✓ Measure the length and width covered by the full load and compute the application rate in tons per acre using this worksheet.

Data and Calculations:

Steps	ID of Calibration Test					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading -						
3. Gear selected during spreading -						
4. Weight of empty spreader (lb) =						
5. Weight of loaded spreader (lb) =						
6. Weight of Waste in spreader (lb) - line 5 – line 4 =						
7. Length of spreading area (ft) =						
8. Width of spreading area (ft) =						
9. Area spread (sq ft) - line 7 x line 8 =						
10. Waste applied (lb/sq ft) – line 6 ÷ line 9=						
11. Convert to tons per acre - Line 10 x 21.78=						
12. Average Application Rate (tons per acre) – Sum of values in cells A11 through F11 divided by the total number of calibrations completed =						

Additional Notes:

Natural Resources Conservation Service, Oregon

WASTE UTILIZATION WORKSHEET

Spreader Equipment Calibration

(Using Bucket, Pan or Tarp)

Name:_____ Date:_____

Operator:_____ Spreader ID:_____

Perform the following operations to calibrate the solids spreader equipment:

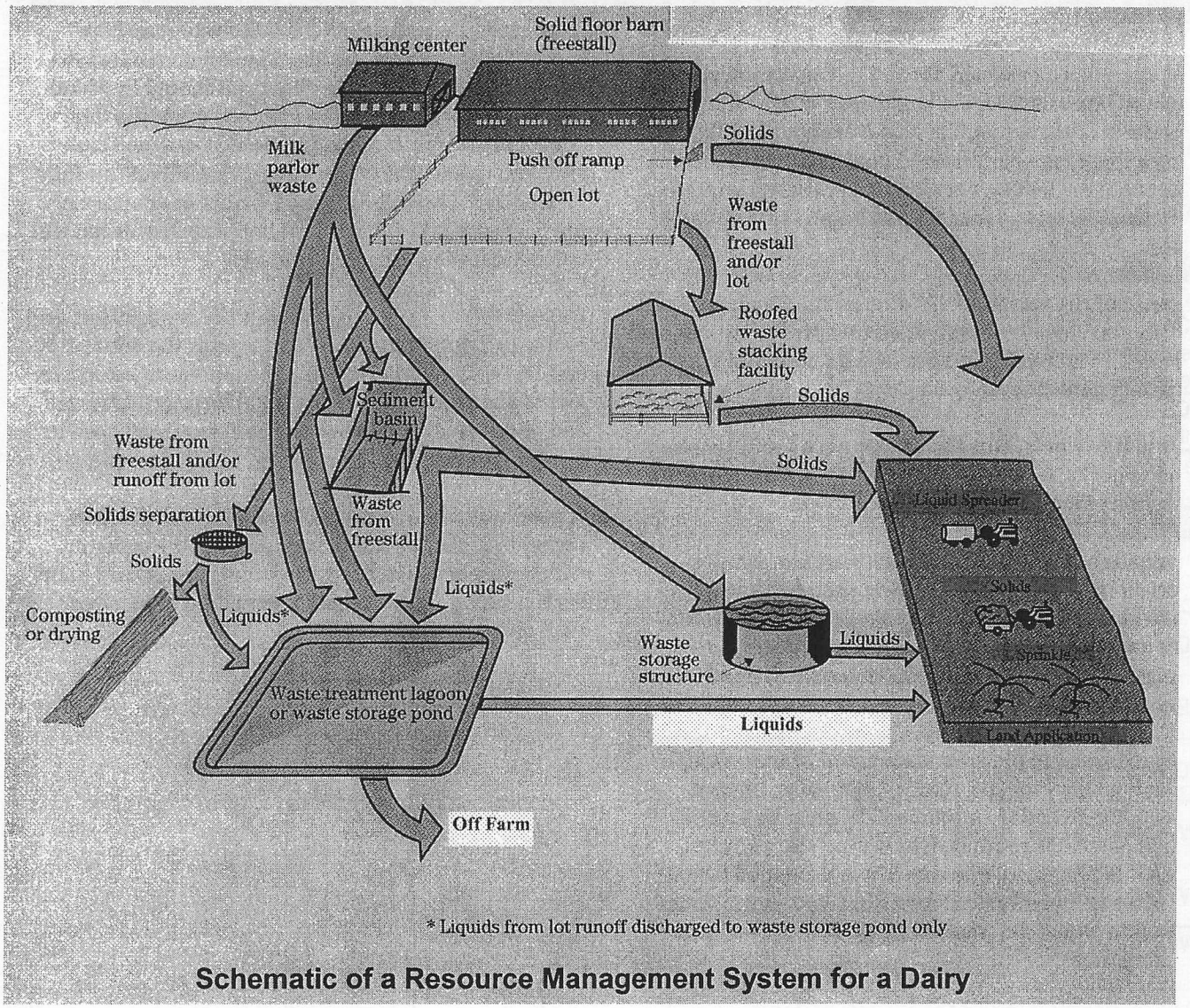
- ✓ Place buckets, pans, or tarps in the application area to collect the applied or spread waste material.
- ✓ Spread waste material over the application area using the spreading pattern normally used in the field. Make sure the spreader is traveling at the speed it typically travels over the collection area. Record engine rpm and gear settings used.
- ✓ Collect and weigh the waste material and calculate the average application rate. Use this worksheet to record the weights and calculations.

Note: Use Tarps instead of buckets or pans when using dry stack manure or separated solids as the variability in the weight will be less.

Data and Calculations:

Steps	ID of Bucket, Pan or Tarp					
	A	B	C	D	E	F
1. Date of calibration test-						
2. Engine RPM during spreading -						
3. Gear selected during spreading -						
4. Weight of empty bucket (lb) =						
5. Weight of bucket with waste (lb) =						
6. Weight of Waste (lb) - line 5 – line 4 =						
7. Collection Area (sq ft) - Area of the top of the bucket, pan or tarp used to collect the waste =						
8. Waste Applied (lb/sq ft) - line 6 ÷ line 7 =						
9. Covert to tons per acre - line 8 x 21.78 =						
10. Average Application Rate (tons per acre)- Sum of values in cells A9 through F9 divided by the total number of calibrations completed =						

Additional Notes:



Schematic of a Resource Management System for a Dairy

Operation and maintenance

Operation and maintenance activities shall include record keeping for 5 years or longer that includes the following:

- Quantity of manure and other agricultural wastes produced, and their nutrient content.
- Soil test results.
- Dates and rates of waste application where land applied, and the dates and amounts of waste removed from the system due to feeding, energy production, or export from the operation.
- Waste application methods.
- Crops grown and yields (both yield goals and measured yield).
- Other tests as needed, such as determining the nutrient content of the harvested product.
- Calibration of the application equipment.
- Changes in soil condition(SCI).
- Plan map showing fields where waste is applied.

Specifications

Site specific requirements for waste utilization are listed on specification sheets. Specifications are prepared in accordance with the NRCS Field Office Technical Guide. See NRCS practice standard, Waste Utilization, code 633. Use NRCS's Agricultural Waste Management Field Handbook or locally accepted references for procedures to calculate values such as residual nitrogen from past waste applications, and to estimate available nutrients in wastes where lab analyses are not available.

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United States Department of Agriculture

NRCS Natural Resources Conservation Service

Waste Utilization

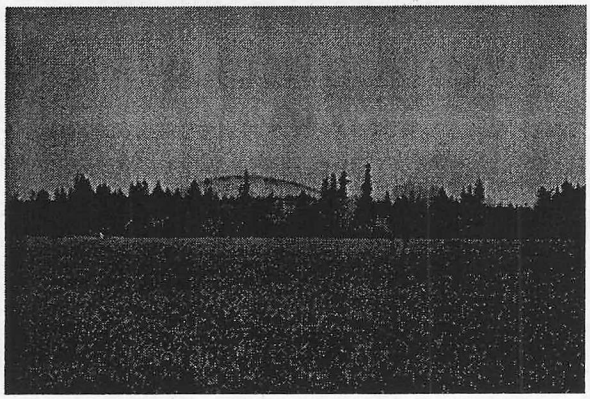
Conservation Practice Jobsheet

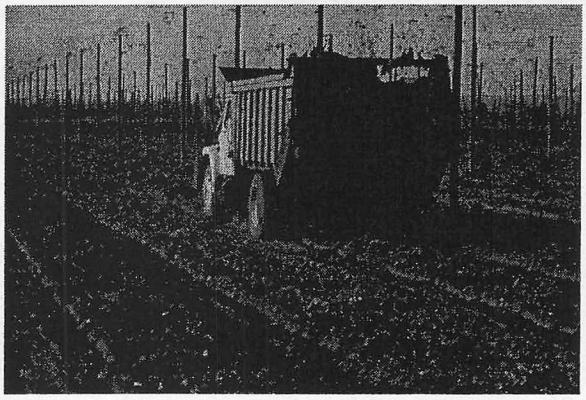
633 OR-JS

Natural Resources Conservation Service, Oregon

February 2002

Client Andres Sanchez Date 02/03/04





Definition

Waste Utilization is the beneficial use of agricultural wastes such as manure and wastewater or other organic residues.

Purpose

The ultimate purpose of waste utilization is to insure the proper use of agricultural wastes while protecting soil, water, air, plant, and animal resources. Agricultural wastes can be used to provide nutrients for crops, forage, and fiber production and forest products. Agricultural waste also can be used as an amendment to improve or maintain soil structure, provide feedstuff for livestock, or provide a source of energy. The focus of this job sheet will be the use of agricultural wastes to provide fertility for crops, forage, and fiber production and forest products; and to supply organic material to the soil.

Where used

Waste utilization is used where agricultural wastes (primarily animal manure and polluted runoff from livestock and poultry operations) are generated and collected as part of a resource management system. Wastes can be used as a source of fertility on cropland and pastureland, and occasionally on forest land or rangeland. Use of the Soil Condition Index (SCI) can be used to determine the effects of organic material on soil quality.

Conservation Management Systems

Waste utilization is generally one of several components of a resource management system used to manage manure and polluted water from livestock and poultry operations. Where the wastes are used to supply the fertility needs of crop and pasture, waste utilization is done as part of an overall resource management plan for the enterprise.

Waste Utilization Planning

Waste utilization components of the conservation plan will contain the following information:

- field map and soil map
- crop rotation or sequence
- results of soil, water, plant, and organic material samples analyses
- expected yield
- sources of nutrients to be applied
- nutrient budget, including credits of nutrients available
- recommended nutrient rates, form, timing, and method of application
- location of designated sensitive areas
- guidelines for operation and maintenance

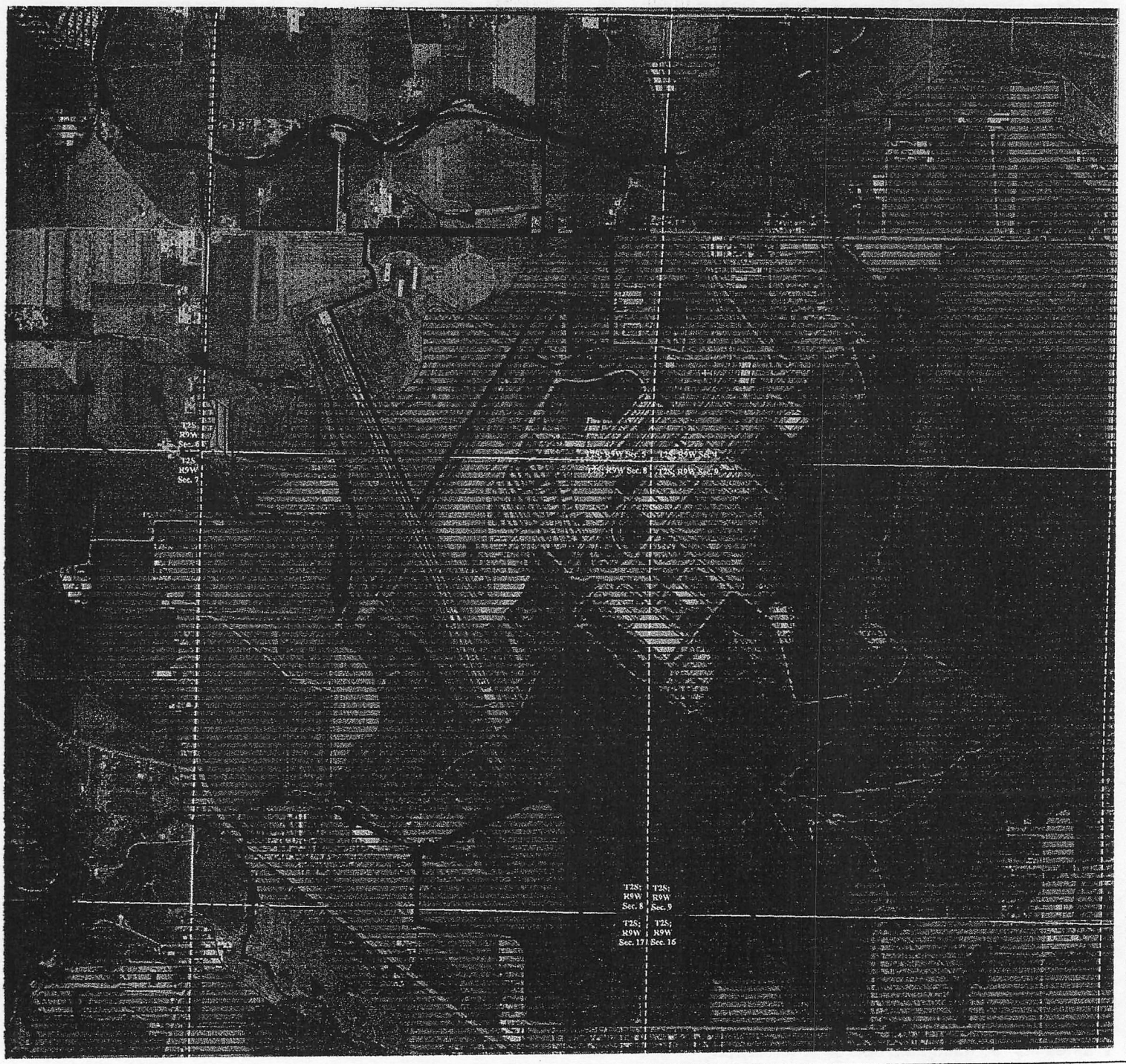
Waste utilization is most effective when used with other conservation practices such as cover crop, residue management, conservation buffers, irrigation water management, nutrient management, pest management, and conservation crop rotation.

Mr. Andres Sanchez

Tillamook County SWCD
Date: 02/04/2004

Flood Boundary
Sensitive Manure Application Area

Tillamook, Oregon
USDA - NRCS



3000 0 3000 6000 Feet

N
W E
S

Legend

- Tract Boundary
- Public Land Survey
- Open Water Course
- Sensitive Manure Application Area (100 Yr. Flood Plain)
- Undetermined Flood Plain
- Winter Manure Application Area (Outside 500 Yr. Flood)
- 500 Yr. Flood Plain

USDA

633 OR-Specification

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION SPECIFICATION SHEET

DESIGN APPROVAL:

Practice Code NO.	PRACTICE	LEAD DISCIPLINE	CONTROLLING FACTOR	UNITS	JOB CLASS I	II	III	IV	V
633	Waste Utilization	BCSD-Agron & CED-EE	Area	Acres	20	40	80	180	All

This practice is classified as Job Class IV

Design Approved by:/s/ Robert A. Pedersen Date: 4/5/04

Job title: North Coast Basin Team Leader

CLIENTS ACKNOWLEDGEMENT STATEMENT:

The Client acknowledges that:

a. They have received a copy of the specification and understand the contents and requirements.

b. The following information must be provided to NRCS by the client before this practice can be certified as applied:
   - ☐ Waste application records which include the date, crop, type of waste applied, and amount of waste applied.
   - ☐ Calibration records for waste application equipment.
   - ☐ Analysis of nutrient concentrations in solid and liquid wastes.

c. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by:/s/ Andres Sanchez Date: 4-5-04

CERTIFICATION:

I have completed a review of the information provided by the client and certify this practice has been applied.

Certification by:/s/ _____ Date: _____

Job title: _____

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION SPECIFICATION SHEET

Client Andres Sanches

Location: 4720 Long Prairie Road

Tillamook SWCD _____ Tract No.450, 427, 43, 632, 665

Prepared By Pedersen Date 02/03/04

Perform the following operations:
❑ Have your technical assistance provider review the resource management system plan for your operation at least once every 5 years.
❑ Maintain records for all waste applications.
❑ Calibrate application equipment to apply wastes in accordance with the recommended amount and timing specified on the nutrient budget specification sheet, NRCS practice code 590, for the crop being grown.
❑ Chemical analysis of soils, plant tissue and waste should be used annually to monitor and adjust amounts of waste applied. Refer to Oregon State University Extension Service publication EC1478, "Soil Test Interpretation Guide" for guidance in getting soil tested and interpreting soil test results. Refer to Oregon State University Extension publication EM8585, "Manure Application Rates for Forage Production" and EM8768, "Calculating Dairy Manure Nutrient Application Rates" for guidance in getting animal waste tested for nutrient concentrations and computing application rates.
❑ Apply waste in a manner that will cover no more than 25 percent of the leaf surface with solids unless clean water applications are planned immediately after wastes are applied. For pasture/hayland it is best to apply waste 7 days after harvesting forage by haying or grazing.
❑ To reduce odor problems, apply waste in mid morning when temperatures are warming and air is rising rather than in the afternoon or evening when air is cooling and settling. Avoid applications during periods of fog.
❑ Do not apply waste directly into an open watercourse or where waste is likely to enter an open watercourse. Observe all waste application setbacks identified in the resource management system plan.
❑ Do not apply waste to fields where there is no growing crop. If applications are needed during fall and winter periods due to unforeseen circumstances, such as the storage facilities being full, use the following guidelines for waste applications: a) Only spread waste on fields that are growing a crop, preferably grass. b) Increase all waste application setbacks identified in the resource management system plan by 50 feet. c) Don't apply waste during any rainfall event that will cause runoff. d) Use maximum travel rates for the traveling big gun sprinkler and solids spreader. e) Use soil tests, such as the Pre-sidedress Soil Nitrate test, to determine if additional applications of waste are needed on those fields receiving emergency winter applications.
❑ Do not apply waste to fields with frozen or snow covered soil conditions unless provisions are made to control runoff.
❑ Do not spread waste on fields where soils are saturated, ponded, flooded and/or during times when waste is likely to runoff into open watercourses.
❑ Be aware of the location of sensitive areas, concerns of neighbors or concerns of the public which require special application procedures
❑ Handle all waste material with caution. Wear appropriate protective clothing.
❑ Clean up residual materials from equipment and dispose of properly.
❑ Equipment used in waste utilization should be regularly inspected and maintained as needed in accordance with equipment operation and maintenance guidelines from the manufacturer or provided by NRCS.
Additional Guidance and Notes:

DESIGN APPROVAL:

This practice is classified as Job Class I

Design approved by: /s/ Robert A. Pedersen Date: 4/5/04

Job Title: Basin Team Leader

CLIENTS ACKNOWLEGEMENT STATEMENT:

The client acknowledges that:

a. They have received a copy of this specification and under-stands the contents and requirements.

b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

c. Maintain records of nutrient application as required by state and local regulations.

Accepted by:/s/ Andres Sanchez Date: 4-5-04

CERTIFICATION;

I have completed a review of the nutrient management and the specification's application and certify this practice has been applied.

Certification by:/s/_____ Date: _____

Job Title: _____

3.	Cont.	337	**61**	23	1,265	**230**							**291**
T-632													
1							4.5	956	**126**				**148**
2							21.6	4,586	**121**				**121**
3				5	321	**229**							**229**
4				5	321	**229**							**229**
5				8	460	**230**							**230**
6				10	552	**230**							**230**
7							8.3	1,761	**126**				**126**
8							11.7	2,490	**126**				**126**
9							7.9	1,672	**126**				**126**
T-665													
1										24	1,146	23	**23**
Totals		**944**		**146**	**8,389**		**115.9**	**21,783**		**24**	**1,146**		

The manure Distribution is based on 1,000 lb. animal units and the following Application Equipment;

420-1,000 lb. animal units

280 bushel manure spreader

Manure Gun Traveler 300 gpm. (wetted diameter 250 feet

4,000 gallon tank wagon (Commercial)

Manure Nutrient Distribution

Field #	5 grazing cycles/yr	# of N supplied by herd	# of N supplied by grazing/ year/ac	Loads of solid/year	#of N per field/year solids	#of N per acre from solids	Hours of pumping /year	#of N per field/year liquid	#of N per acre from liquid	Loads of Liquid/year	# of N per field/year liquids	# of N per acre/year from liquid	Total # of N per acre/year
T-450													
1.	Cont.r	472	**21**	87	4,963	**225**							**246**
T-427													
1							5.1	1,075	**149**				**149**
2							27.4	5,818	**149**				**149**
3							5.3	1,132	**149**				**149**
T-43													
1							10.8	2,293	**141**				**141**
2.	Cont.	135	**61**	8	507	**230**							**291**

NRCS, OR

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NUTRIENT MANAGEMENT SPECIFICATION SHEET

CODE 590

Landowner/Operator: Andres Sanchez

Job Location: T 2S,: R 9W; 5 & Sec 8 & 17

County: Tillamook SWCD Tillamook Farm/Tract No. T-427, 450, 43, 632,665

Field No. T-427 Fields: 1-3 T-450 Field 1 T-43 Fields 1-3; T-632 Fields 1-9 T-665 Field 1

Prepared By: Pedersen Date: 02/04

⇒ Purpose:

⇒ To budget and supply nutrients for plant production.

⇒ To properly utilize manure and organic by-products as a plant nutrient source.

⇒ To minimize agricultural non-point source pollution of surface and ground water resources.

⇒ To maintain or improve the physical, chemical and biological condition of soil.

Specifications:

⇒ Manure is applied to the surface of permanent pastures in accordance with the enclosed Waste Utilization Conservation Practice Jobsheet.

⇒ A target yield of 6 tons of dry matter per acre per yield is planned to utilize the nitrogen in the manure and/or commercial applied fertilizer.

⇒ Manure and commercial fertilizer is applied in accordance with soil tests.

⇒ Manure and/or commercial fertilizer is applied in split applications.

⇒ Soil tests are taken at least every 5 years.

⇒ Manure tests are taken at least every year.

⇒ In Tracts 450, 427 and 632, no more than 307 lbs. of nitrogen is applied per acre per year in accordance with the below manure Distribution, unless soil and forage tests justifies higher rates. In Tract 665 no more than 256 lbs. of nitrogen per acre per year in accordance with the Manure Distribution unless soil and forage tests justifies higher rates

⇒ Records are maintained of manure and/or commercial fertilizer applications.

⇒ Nutrient management plans are reviewed annually and adjustments are made as needed.

⇒ Manure is not applied within 35 feet of an open watercourse.

EXTENSION SERVICE
Tillamook County Office

OREGON
STATE
UNIVERSITY

2204 Fourth Street
Tillamook, Oregon
97141

Telephone
503·842·3433

May 28, 2002

Bob Pedersen
Tillamook NRCS Field Office
6415 Signal St.
Tillamook, OR 97141

Dear Bob,

Over the past five years, I have had the opportunity to study nutrient cycling dynamics on dairies in the Tillamook area. It has been observed that pastures will very in productivity based on environment, grazing management and soil fertility. Nitrogen utilization has been a major focus of my work looking specifically at nitrogen up takes by the pasture plant. I have seen pastures remove as little as 200 lbs of N per acre a year to as high as 750. Average pastures on dairies will use between 300 and 400lbs of nitrogen per acre each year.

With this understanding, it makes logical sense to me to use nitrogen utilization numbers in our animal waste management planning of 300 pounds nitrogen per year as a reasonable starting point. I think this is a conservative guess and would not hesitate adjusting this number if the landowner has other data indicating they are using N at higher levels. For example, yield data, grazing rotation records with removal data, and/or soil test data.

Sincerely,

Troy Downing

Troy Downing
Area Dairy Extension Agent

OREGON STATE UNIVERSITY EXTENSION SERVICE

Agriculture, Home Economics, 4-H Youth, Forestry, Community Development, Energy, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Tillamook County cooperating. The Extension Service offers its programs and materials equally to all people.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Andres Sanchez (All Livestock Planned)	Tract(s):	1000	Field(s):	3,4,5,6
Assisted by:	Pedersen			Date:	April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop							
2. Residual from long-term manure application							
3. Irrigation water							
4. Other (e.g., atmospheric deposition)							
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other						
8. Manure / Organic Materials (Source-)		230	230	157	157	354	354
9.	Subtotal (sum of lines 6, 7 and 8)	230	230	157	157	354	354
10.	Nutrients Recommended (from Table 1)	0	0	0	0	0	0
11.	Nutrient Status (subtract line 10 from line 9)	230	230	157	157	354	354

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS						
Amount to be Applied (lb/ac)	N		P_2O_5		K_2O	
Method, Form, and Timing of Application						

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Andres Sanchez (All Livestock Planned)	Tract(s):	1000	Field(s):	T665 1

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez (All Livestock Planned)	Tract(s): 632 9Sample 5)	Field(s): 1,7,8,9
Assisted by: Pedersen		Date: April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	28	198	5.4		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235		6.4		

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop			0					
2. Residual from long-term manure application			0					
3. Irrigation water			0		0		0	
4. Other (e.g., atmospheric deposition)			0		0		0	
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial Fertilizer	181		0		0	
8. Manure / Organic Materials (Source-)		Dairy	126	126	62	62	266	266
9.		Subtotal (sum of lines 6, 7 and 8)	307	126	62	62	266	266
10.		Nutrients Recommended (from Table 1)	307	0	85	0	235	0
11.		Nutrient Status (subtract line 10 from line 9)	0	126	-23	62	31	266

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5		K_2O	

Method, Form, and Timing of Application

An additional 181 lbs. of nitrogen fertilizer per acre per year is recommended to achieve the 6 tons of dry matter per acre per year. See enclosed letter from the Dairy Extension Agent. Commercial fertilizer and manure application should be in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution section, for manure application rates per field per year. Recommend aplying the manure evenly over all the fields during the year. Soil testing at least every 5 years is recommended to evaluate if the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Andres Sanchez (All Livestock Planned)	Tract(s): 632(Sample 4)	Field(s): T632 2
Assisted by:	Pedersen	Date:	April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	5	383	5.6		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		85		235				

Table 2. Nutrient Sources

Credits		N		P_2O_5		K_2O	
		pounds per acre					
1. Nitrogen credits from previous legume crop		0					
2. Residual from long-term manure application		0					
3. Irrigation water		0		0		0	
4. Other (e.g., atmospheric deposition)		0		0		0	
5. Total Credits-		0		0		0	
Plant-Available Nutrients Applied to Field		N		P_2O_5		K_2O	
(Circle column that is landuser's decision)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)		0	0	0	0	0	0
7. Fertilizer	Starter						
	Other Commercial Fertilizer	186					
8. Manure / Organic Materials (Source-) Dairy		121	0	59	0	255	0
9. Subtotal (sum of lines 6, 7 and 8)		307	0	59	0	255	0
10. Nutrients Recommended (from Table 1)		307	0	85	0	235	0
11. Nutrient Status (subtract line 10 from line 9)		0	0	-26	0	20	0

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	85	K_2O	255

Method, Form, and Timing of Application

The 383 ppm. of potassium is high. An addiditional 186 lbs. of nitrogen fertilizer per acre per year is recommended to achieve the 6 tons of dry matter per acre per year. See enclosed letter from the Dairy Extension Agent. Commercial fertilizer and manure application should be in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution section, for manure application rates per field per year. Recommend aplying the manure evenly over all the fields during the year. Soil testing at least every 5 years is recommended to evaluate if the biosolid application rate matches the nitrogen needs of the forage.

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer: Andres Sanchez (All Livestock Planned)	Tract(s): 43 (Sample 3	Field(s): T43 1,2,3
Assisted by: Pedersen		Date: April 6, 2004

PURPOSE (Check all that apply)			
Budget and supply for plant production	x	Utilize manure/organic materials as a nutrient source	x
Minimize agricultural non-point source pollution (water quality)	x	Maintain or improve soil condition	x

Table 1. Field Conditions and Recommendations

CROP SEQUENCE/ROTATION (circle current crop)	EXPECTED YIELD
Hay/Pasture Mix 16 % Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
NA	10	299	5.8		

RECOMMENDED NUTRIENTS/AMENDMENTS TO MEET EXPECTED YIELD								
N (lbs/ac)		P_2O_5 (lbs/ac)		K_2O (lbs/ac)		LIME	Other	Other
Trial A	Trial B	Trial A	Trial B	Trial A	Trial B			
307		0		0		4.6		

Table 2. Nutrient Sources

Credits			N		P_2O_5		K_2O	
			pounds per acre					
1. Nitrogen credits from previous legume crop			0					
2. Residual from long-term manure application			0					
3. Irrigation water			0		0		0	
4. Other (e.g., atmospheric deposition)			0		0		0	
5. Total Credits-			0		0		0	
Plant-Available Nutrients Applied to Field			N		P_2O_5		K_2O	
(Circle column that is landuser's decision)			Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
6. Credits (from row 5, above)			0	0	0	0	0	0
7. Fertilizer	Starter							
	Other	Commercial Fertilizer	118					
8. Manure / Organic Materials (Source-)		Dairy	189		119		340	
9.		Subtotal (sum of lines 6, 7 and 8)	307	0	119	0	340	0
10.		Nutrients Recommended (from Table 1)	307	0	0	0	0	0
11.		Nutrient Status (subtract line 10 from line 9)	0	0	119	0	340	0

If line 11 is a negative number, this is the amount of additional nutrients needed to meet the crop recommendation.
If line 11 is a positive number, this is the amount by which the available nutrients exceed the crop requirements.

PLANNED NUTRIENT APPLICATIONS

Amount to be Applied (lb/ac)	N	307	P_2O_5	119	K_2O	340

Method, Form, and Timing of Application

The 299 ppm. of potassium is high. An addiditional 118 lbs. of nitrogen fertilizer per acre per year is recommended to achieve the 6 tons of dry matter per acre per year. See enclosed letter from the Dairy Extension Agent. Commercial fertilizer and manure application should be in split applications between late February to mid September. Apply 60 lbs. of nitrogen per acre per application. See attached Nutrient Management Specification Sheet, the Manure Distribution section, for manure application rates per field per year. Recommend aplying the manure evenly over all the fields during the year. Soil testing at least every 5 years is recommended to evaluate if the biosolid application rate matches the nitrogen needs of the forage.

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Traveling Big Gun Sprinkler Calibration

(Using Catch Cans)

Name:_____ Date:_____

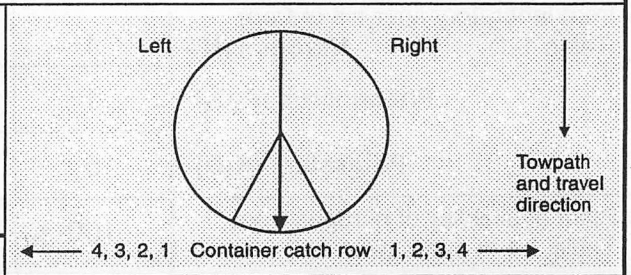
Perform the following operations to calibrate the traveling big gun sprinkler:

- ✓ Use 5 to 10 catch cans to collect the sprinkler-irrigated waste. Use straight-sided buckets for catch cans. Two pound coffee cans work well. Make sure all of the catch cans have the same diameter.
- ✓ Place one of the catch cans on a level surface and fill it with water to a known depth (1-3 inches). Pour the water from the catch can into a large measuring cup. Determine how many measuring cups of water are equal to an inch of water in the catch can.
- ✓ Place at least five catch cans across the towpath of the big gun sprinkler. Try to space the catch cans uniformly from the center of the towpath to the outer edge of the wetted area of the sprinkler. Stake the catch can in place or put a rock in the bottom of the catch can to keep it upright. Allow the traveling big gun sprinkler to completely pass over the catch cans. Use the measuring cup previously used to calibrate the catch cans to measure the amount of liquid collected in each can and convert the volume to inches. Be sure to add together the amount measured from the catch cans that would receive overlap from the adjacent towpath. For example, if catch can #4 will receive liquids from the adjacent towpaths, add the amount from container #4 on the left to container #4 on the right side to compute the total amount applied at the location of container #4 on the right and left sides of the towpath.

Catch Can Calibration:

Example: 1 inch = 5 Cups
1 cup = 0.2 Inches

Your Catch Cans: 1 inch = _____ Cups
1 cup = _____ Inches



Travel Rate Setting During Test:

Data and Calculations:

Catch Can ID	Volume of Liquid							
	Cups	Inches	Cups	Inches	Cups	Inches	Cups	Inches
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
Average =								

WASTE UTILIZATION WORKSHEET

Nitrogen Based Waste Application

Name:_____ Date:_____

Example:

Corn silage is being grown and the recommended nutrient application from the nutrient budget worksheet is 200 pounds of nitrogen(N) per acre. A traveling big gun sprinkler will be used to make 1 application of liquids from a non-agitated waste storage pond and a tractor spreader will be used to make 1 application of solids from a dry stacking facility that will not be incorporated into the field.

Waste application rates and amounts:

Steps	Example		Your Calculations			
	Liquid	Solids	Liquid	Solids	Liquid	Solids
1. Type of waste-	Dairy	Dairy				
2. Crop receiving waste-	Corn Silage	Corn Silage				
3. Desired nitrogen application rate, lb/acre-	100	100				
4. Nutrient concentrations in storage from laboratory analysis or from Table 1-1:	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
Nitrogen (N)-	4	9				
Phosphorus (P_2O_5)-	1	4				
Potassium (K_2O)-	6	19				
5. Plant availability of nitrogen from Table 1-1 in percent-	100 %	100 %	%	%	%	%
6. Nitrogen retained, in percent, after application from Table 1-2-	75 %	70 %	%	%	%	%
7. Calculate nitrogen availability- line 4 N x line 5 x line 6 ÷ 10,000=	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
	3	6.3				
8. Determine nitrogen application rate from the nutrient application charts:	Inches/acre	tons/acre	inches/acre	tons/acre	inches/acre	tons/acre
Nitrogen (N)-	1.75	17				
9. Determine the amount of phosphorus and potassium applied from nutrient concentration data on line 4 and nutrient application charts:	lb/acre	lb/acre	lb/acre	lb/acre	lb/acre	lb/acre
Phosphorus (P_2O_5)-	50	70				
Potassium (K_2O)-	250	300				
10. Total Nutrients Applied, lb/acre: **Nitrogen (N)-** (Sum of liquids and solids from line 3)	200 lb/acre		lb/acre		lb/acre	
Phosphorus (P_2O_5)- (Sum of liquids and solids from line 9)	120 lb/acre		lb/acre		lb/acre	
Potassium (K_2O)- (Sum of liquids and solids from line 9)	550 lb/acre		lb/acre		lb/acre	

Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Phosphorus Based Waste Application

Name:_____ Date:_____

Example:

Corn silage is being grown and the recommended nutrient application from the nutrient budget worksheet is 100 pounds of phosphorus(P_2O_5) per acre. A traveling big gun sprinkler will be used to make 1 application of liquids from a non-agitated waste storage pond and a tractor spreader will be used to make 1 application of solids from a dry stacking facility that will not be incorporated into the field.

Waste application rates and amounts:

Steps	Example		Your Calculations			
	Liquid	Solids	Liquid	Solids	Liquid	Solids
1. Type of waste-	Dairy	Dairy				
2. Crop receiving waste-	Corn	Corn				
3. Desired phosphorus application rate, lb/acre-	50	50				
4. Nutrient concentrations in storage from laboratory analysis or from Table 1-1:	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
Nitrogen (N)-	4	9				
Phosphorus (P_2O_5)-	1	4				
Potassium (K_2O)-	6	19				
5. Determine phosphorus application rate from the nutrient application charts: **Phosphorus (P_2O_5)-**	Inches/acre 1.0	tons/acre 14	inches/acre	tons/acre	inches/acre	tons/acre
6. Plant availability of nitrogen from Table 1-1 in percent-	100 %	100 %	%	%	%	%
7. Nitrogen retained, in percent, after application from Table 1-2-	75 %	70 %	%	%	%	%
8. Calculate nitrogen availability- line 4 N x line 6 x line 7 ÷ 10,000=	lb/1000 gal 3	lb/ton 6.3	lb/1000 gal	lb/ton	lb/1000 gal	lb/ton
9. Determine the amount of nitrogen and potassium applied from nutrient concentration data on line 8, line 4 and the nutrient application charts: **Nitrogen (N)-**	lb/acre 75	lb/acre 75	lb/acre	lb/acre	lb/acre	lb/acre
Potassium (K_2O)-	150	250				
10. Total Nutrients Applied, lb/acre: **Nitrogen (N)-** (Sum of liquids and solids from line 9)	150 lb/acre		lb/acre		lb/acre	
Phosphorus (P_2O_5)- (Sum of liquids and solids from line 3)	100 lb/acre		lb/acre		lb/acre	
Potassium (K_2O)- (Sum of liquids and solids from line 9)	400 lb/acre		lb/acre		lb/acre	

Table 1-1
Typical Manure Nutrient Concentrations for Different Handling Systems

The table below shows typical values of the nutrient content of manure from different animal waste handling systems. You can use them as a rough estimate of the nutrient content of your manure. Because manure nutrient content varies widely among farms and even over time on the same farm, it is recommended to test your manure to get realistic nutrient content numbers for your farm. Refer to Oregon State University Extension Publication PNW 505, "Which test is best?" for more information on manure testing.

Typical nutrient content, solids content, density, and nitrogen availability of animal manure at the time of application:

Solids from:	Nitrogen N (lb/Ton)[2]	Phosphorus P_2O_5 (lb/Ton)[2]	Potassium K_2O (lb/Ton)[2]	Solids (Percent)	Bulk Density (lb/cubic yard)	Nitrogen Availability (Percent)[1]
Broiler with litter	73	64	66	70	900	40-70
Laying Hen	37	57	47	40	1400	40-70
Sheep	18	9	35	28	1400	25-50
Horse	9	6	16	37	1400	0-20
Beef	12	6	17	23	1400	20-40
Dairy:						
Dry Stack	9	4	19	35	1400	20-40
Separated Solids	5	2	3	19	1100	0-20
Liquids from:	**Nitrogen N (lb/1,000gal)**	**Phosphorus P_2O_5 (lb/1,000gal)**	**Potassium K_2O (lb/1,000gal)**	**Solids (Percent)**	**Density (lb/gal)**	**Nitrogen Availability (Percent)[1]**
Dairy:						
Holding Tank	21	14	24	8	9.2	75-85
Pond, no agitation	4	1	6	<1	8.4	85-95
Pond, agitated	12	7	18	4	9.0	80-90

1 Nitrogen available in the first growing season after application. For a field that has received manure annually for 4 years or more, consider 100% of the nitrogen available.

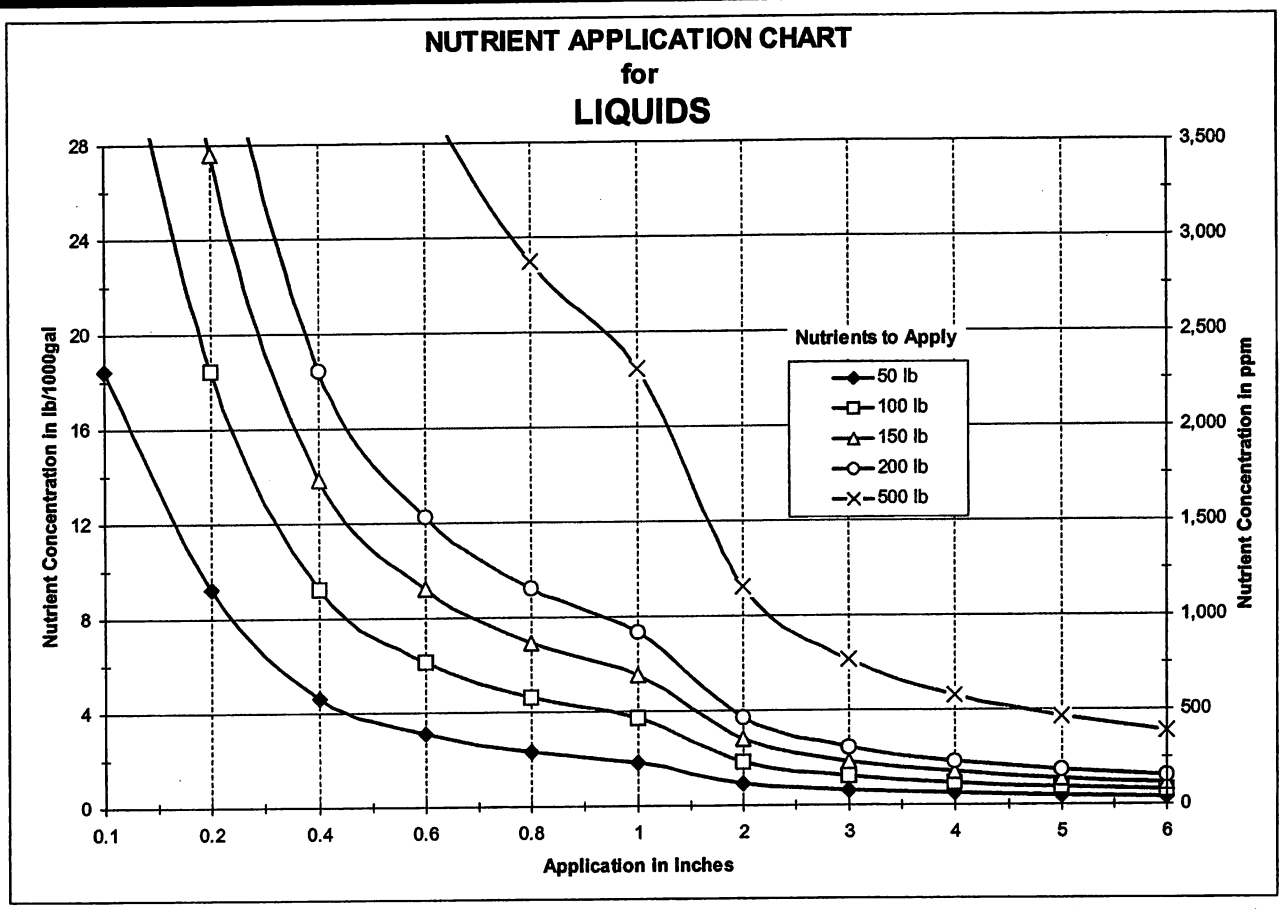
2 Manure is at the moisture content typically found in storage.

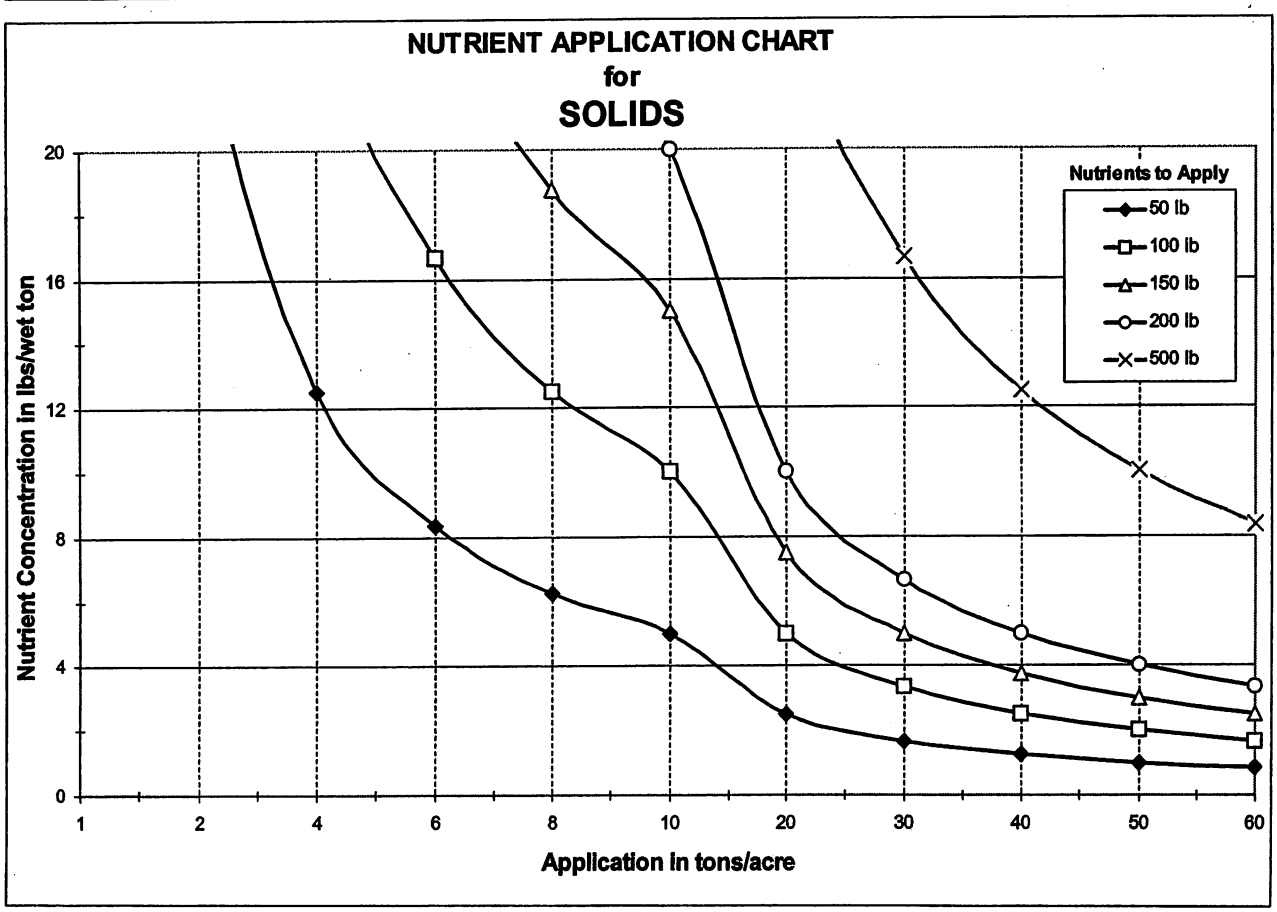
Table 1-2
Typical Nutrient Availability After Application

Typical nutrient content of animal manure retained after application:

Application Method	Percent of original nutrient content of manure retained after application		
	N	P_2O_5	K_2O
Injection	95%	100%	100%
Sprinkling	75%	100%	100%
Broadcast (Incorporated 1 day after application)	90%	100%	100%
Broadcast (Incorporated 4 days after application)	80%	100%	100%
Broadcast (Incorporated 7 or more days after application)	70%	100%	100%

WASTE UTILIZATION WORKSHEET





Natural Resources Conservation Service, Oregon February 2002

WASTE UTILIZATION WORKSHEET

Waste Application Record

Name:_____ Field ID:_____

Crop:_____ Acres:_____ Seeding Date:_____

Date	Crop Stage	Waste Type Liquids (L), Solids (S), Separated Solids (SS), Etc.	Amount Applied (Loads, Inches, Tons, Hours of Operation, Etc.)	Notes

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FILTER STRIP SPECIFICATION SHEET
CODE 393

Landowner/Operator: Andres Sanchez

Job Location: T 2S; R 9 W; Sec. 5

County: Tillamook SWCD Tillamook Farm/Tract No. T-450, 427,,43, 632

Field No. T-450 Field 1, T-427 Fields 1,2,3,4, T-43 Fields 1,2,3 T-632 Field 1

Prepared By: Pedersen Date 02/04

Purpose: To reduce manure runoff into an adjacent open watercourse and the resulting fecal and organic contamination in the watercourse.

Specifications:

⇒ A 35 foot grass filter strip will be maintained adjacent to all open water courses that flow through the farm.

⇒ No manure will be applied to the filter strip area.

⇒ Noxious weeds such as Tansy Ragwort and Canada Thistle are controlled in accordance with an Integrated Pesticide Management Plan.

⇒ Excessive accumulation of sediment and/or manure will be removed. The filter strip will be harrowed at least once each year prior to May 1st to shape and maintain at least a 1 % grade sloping away from the existing open water courses. Filter strip grade will be maintained to allow the runoff to occur along the entire length of the filter strip and not occur in only certain areas of the filter strip.

⇒ Depressions will be prevented from forming in the filter strip area where manure and sediment can be trapped.

⇒ Debris will not be allowed to accumulate in the filter strip.

⇒ Filter strips will be clipped, dragged, and or grazed at least twice during the growing season.

⇒ Grass will be at least 3 inches high by October 15th.

DESIGN APPROVAL

This practice is classified as Job Class II

Design approved by: Robert A. Pedersen Date: 4/5/04

Job Title: Basin Team Leader

Client Acknowledgement Statement:

The client acknowledges that:

a. They have received a copy of this specification and under-stands the contents and requirements.

b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice.

Accepted by:/s/ Andres Sanchez Date: 4-5-04

Certification:

I have completed a review and checked out the filter strip practice specifications and certify that the practice has been applied in accordance with specifications.

Certified by: /s/_____ Date:_____

Job Title:_____

SOIL AND MANURE SAMPLING INSTRUCTIONS FOR ANIMAL WASTE MANAGEMENT SYSTEMS

MANURE SAMPLES

Solid Manure Samples

- Solid manure samples should be sampled during the first application made in the spring(March-April).
- Lay a piece of tarp or plastic on the pasture and make a pass over or next to it to obtain a representative sample from the spreader.
- Scoop up enough material to fill the sample bag about half full.
- Label the sample with the farm or operator name, date, and solid manure sample.
- Keep the sample cool while in the field. (You can put the sample in a small cooler with some ice.)
- Freeze the sample until ready to ship to the lab.

SHIPPING INSTRUCTIONS

- Nitrogen is heat sensitive. Keeping the samples cool in shipping helps to improve reliability of data.
- Ship frozen soil samples in small cooler.
- If shipping refrigerated soil samples, it is recommended that these be shipped in a small cooler with ice.
- Ship frozen liquid or solid manure samples in a small cooler.
- Ship frozen soil samples or refrigerated soil samples with frozen liquid and/or solid samples in a small cooler. Lab should send cooler back to you if request them to do so.
- Ship any or all samples on Monday, Tuesday, or Wednesday using any parcel post service.
- Include a note with the samples for the analysis needed.

Soils Analysis Needed;

pH
P---Phosphorus (Weak Bray)
K---Potassium
NH4-N---Ammonium
NO3-N---Nitrate

Liquid and Solid Manure Analysis Needed;

Total Nitrogen, Phosphorus, & Potassium plus Ammonium and Solids

SOIL AND MANURE SAMPLING INSTRUCTIONS FOR ANIMAL WASTE MANAGEMENT SYSTEMS

SOIL SAMPLES Job Sheet 5

Spring Soil Samples

- Spring soil samples are to be collected the last 2 weeks of March or the first 2 weeks in April when soils are not saturated.
- Soil samples are to be collected on fields that have not received manure applications within the last 30 days.
- Collect several samples (about 10 one-fourth cup samples) of soils from just below the thin sod layer to a depth of 6 to 9 inches and add to bucket.
- Mix the samples in the bucket and remove a 1 cup from the mixture and place into a sample bag.
- The bag should be labeled with ;
  farm or operator name
  sample date
  field and tract (see NRCS plan map)
  sample depth (0 to 9 inches)
- Keep soil sample cool (small cooler with some ice) in the field until sample can be put in refrigerator or into freezer. Soil can be stored in refrigerator for up to 1 week or can be stored in a freezer for longer periods.
- Ship samples to lab (see shipping instructions below).

Fall Soil Samples

- Fall soil samples are to be collected during the last 2 weeks in September or the first 2 weeks in October on soils that are not saturated.
- Soil samples are to be collected on fields that have received normal manure applications during the current year.
- Sample soils and ship as outlined in the spring soil sample section above.

MANURE SAMPLES

Liquid Manure Samples

- Liquid manure samples should be sampled after agitating the storage facility for the first application made in the spring (March-April) and for the last application in the fall (September-October).
- Put a bucket in the path of the gun or carefully take bucket sample of liquid manure from the liquid manure tank wagon .
- Fill a sample bottle with some of the liquid manure from the bucket and keep cool while in the field. (you can put the sample in a small cooler with some ice)
- Label the sample with the farm or operator name, date, and liquid manure sample.
- Freeze the sample until ready to ship to the lab.

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Post-harvest Soil Nitrate Testing

for Manured Cropping Systems West of the Cascades

D.M. Sullivan and C.G. Cogger

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What's in this publication?

This publication describes the use of post-harvest soil nitrate testing as a tool for assessment of nitrogen (N) management in manured cropping systems west of the Cascade Mountains in Oregon, Washington, and south coastal British Columbia.

The first section of this publication gives general information on the test and is designed for use by growers and dairy operators. This section gives a brief introduction to soil sampling, but does not provide all of the technical details. The focus is on how to use the post-harvest test to improve nutrient management. This section describes:

- What the post-harvest test measures
- How to collect soil samples
- Units used in soil nitrate testing
- How to interpret soil nitrate test results for grass and silage corn crops

In addition, background information explains the rationale for the test:

- How to use the post-harvest test as a management tool (page 3)
- Crop and soil response to excess plant-available N (page 4)

Dan M. Sullivan, Extension soil scientist, Oregon State University, and Craig G. Cogger, Extension soil scientist, Washington State University.

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The second section of this publication is designed primarily for use by conservation planners and other agricultural professionals working with farmers to implement nutrient management plans. This section is also designed for dairy operators who do their own soil sampling. This section includes detailed suggestions for the following:

- Collecting, preserving, and analyzing the soil sample
- Developing a long-term soil sampling plan

The post-harvest test and how to use it

What the post-harvest test measures

The post-harvest soil nitrate test measures the quantity of plant-available nitrogen present in the nitrate form in the surface foot of soil in the late summer or early fall. The test measures nitrate-N not utilized by the recently harvested crop. Because crops differ in their ability to remove nitrate-N from the soil, test interpretation is crop-specific.

The test looks backward in time. It evaluates the balance between N supply and crop uptake for the crops produced during the summer. Nitrate-N accumulates in the soil when more plant-available N is supplied than can be utilized by the summer crop (see "Crop and soil response to excess plant-available N," page 4).

Use the post-harvest test to:

- Get a general idea of balance between N supply from manure and other sources and crop N demand
- Identify imbalances in N supply among fields on a farm
- Identify fields that may respond to changes in timing or amount of manure application or other agronomic practices

Soil sampling protocols

Sampling depth

Sample the 0- to 12-inch depth for the post-harvest test. This shallow sampling depth is a good predictor of nitrate in the rest of the soil profile when (1) in-season irrigation is not excessive, and (2) samples are taken prior to heavy rains in the fall.

Composite soil sample

Collect a composite soil sample consisting of a mixture of 15 to 30 soil cores from each field or management unit. See "Collecting, preserving, and analyzing the soil sample" (page 9) for detailed sampling instructions and suggestions for special situations.

What fields to sample

In general, it is not necessary to sample every field on a farm every year. Consult with your farm advisor to determine any regulatory requirements for sampling frequency. We recommend that you sample selected fields that represent typical manure and crop management practices each year to track long-term trends in post-harvest soil nitrate values. See "Developing a sampling plan" (page 11) for more information.

When to sample

In general, samples for the post-harvest test should be collected as soon as possible after a crop harvest. Avoid sampling a field that has had manure application within the past 30 days.

Samples must be taken before heavy fall rains move nitrate below the 12-inch depth. Because the timing of fall rainfall is unpredictable, the best strategy is to sample fields before October 1 whenever possible.

Collect samples from medium- to fine-textured soils (loams, clay loams, and clays) prior to 5 inches of cumulative fall rainfall. Sandy soils (sand, loamy sand, or sandy loam soil texture) have lower water-holding capacities and should be sampled prior to

continues on page 5

How to use the post-harvest test as a management tool

Sampling depth and timing are critical. Interpretation tables for this test apply only to samples taken to a 12-inch depth. Surface soil (0 to 12 inches) typically contains the highest nitrate-N levels and requires the least time and effort for sample collection. Samples must be taken before heavy fall rains move nitrate below the 12-inch depth. The target sampling period generally is August 15 to October 15.

To get the most value from this test, it is important to understand:

- How the test fits into an overall nutrient management program
- Limitations to interpretation of test results
- How *not* to use the test

Using the test as part of a nutrient management program

The post-harvest test is but one measure of success in nutrient management. Post-harvest nitrate test data should be assessed in the context of the current N management plan and records of manure application. Successful N management involves a number of components, including:

- Assessing crop N needs
- Planning manure application to meet crop N needs
- Applying manure according to the plan
- Recording manure application amount and estimated plant-available N amount
- Measuring crop yield and N content
- Monitoring success of the plan

All components of the nutrient management system should be evaluated together.

Limitations to test results

Interpretive values for post-harvest soil nitrate are:

- Calibrated only for high-rainfall portions of the Pacific Northwest (west of the Cascades). Extrapolation to other environments is not recommended.
- Provided only for corn silage and grass hay/silage crops. Field research has been used as the basis for interpretive levels for these crops. Applicable research data are not available for other crops to determine post-harvest nitrate-N levels associated with good crop and nutrient management practices. However, the test may be used for relative comparisons among fields planted to another crop (e.g., comparisons among grass pasture fields).
- Based on the assumption that summer irrigation is less than, or close to, evapotranspiration to ensure that significant nitrate leaching does not occur before the fall test.
- Designed for fields with a history of applied manure (more than 3 consecutive years of regular manure application). Lower post-harvest soil nitrate test values are attainable where only fertilizer N is used, or where manure is applied infrequently.
- Based on good management of the crop and normal yields. Crop moisture stress, insect damage, or plant disease will reduce crop yield and crop uptake of nitrogen, thus increasing post-harvest soil nitrate test levels.

How *not* to use the post-harvest test

The test will *not*:

- Detect a shortage of plant-available nitrogen for crop production. Continual mineralization of nitrogen (conversion of organic N forms to plant-available N forms in the soil) can provide enough plant-available nitrogen for a crop without accumulation of nitrate-N in soil.
- Determine the source(s) of excess plant-available N. Sources of N may include manure slurry, lagoon water, fertilizer, soil organic matter, or previous crop residues.
- Predict crop response to fall manure or N fertilizer applications. The test does not predict the amount of plant-available N that will be mineralized from soil organic matter or crop residues in the fall.

Crop and soil response to excess plant-available N

Crop response to applied N. Crop N uptake is controlled by the environment, crop N uptake potential, and management. Crops respond to plant-available nitrogen supply (ammonium + nitrate-N) by the law of diminishing returns (Figure 1). Without added N, some crop yield is produced from N supplied by soil organic matter, residual plant-available N, and other non-fertilizer sources (e.g., mineralization of crop residues). Additional N supplied from manure or fertilizer increases crop yield until site yield potential is reached.

The application rate of manure or N fertilizer needed to reach near-maximum yield is termed the *agronomic rate*. Rather than a single agronomic rate, the crop response to N is best described as an agronomic rate range (Figure 1). The agronomic rate range concept allows for variability in crop performance among years and for crop uptake of N beyond the yield maximum (increased protein).

Post-harvest soil nitrate test measures nitrate-N not used by the crop. At excessive plant-available N supply levels, crop yield and crop N uptake do not respond to further N additions. The extra soil N not used by the crop accumulates as nitrate-N.

Elevated post-harvest soil nitrate-N concentrations are an indicator of one or more of the following: (1) excess plant-available N, (2) N supplied too late in the season for crop utilization, or (3) poor crop growing conditions due to insect infestation, moisture/heat stress, plant disease, or other cultural problems. If crop yields are acceptable and crop protein is at typical levels, then the most likely explanation is that plant-available N was supplied in excess of crop needs.

Because grass is more efficient than corn at N uptake, target post-harvest soil nitrate levels given in this publication are lower for grass than for corn. There are two key reasons that grass is more efficient than corn in N removal.

- Grass has a greater capacity to take up N supplied in excess of that needed for maximum yield. After enough N has been supplied for maximum yield, grass protein content increases in response to increased N supply. With grass, soil nitrate increases only when the available N supply exceeds that required to produce near-maximum protein. Corn does not take up additional N after the maximum yield is reached. Corn silage protein does not increase much in response to excess N supply.
- Grass utilizes N mineralized late in the growing season more efficiently. Grass managed for silage or hay continues to take up N until harvest. Corn grown for silage completes its N uptake approximately 4 weeks before harvest. Some of the soil nitrate measured after corn harvest is produced by mineralization of soil organic N to available forms during the final weeks of the growing season.

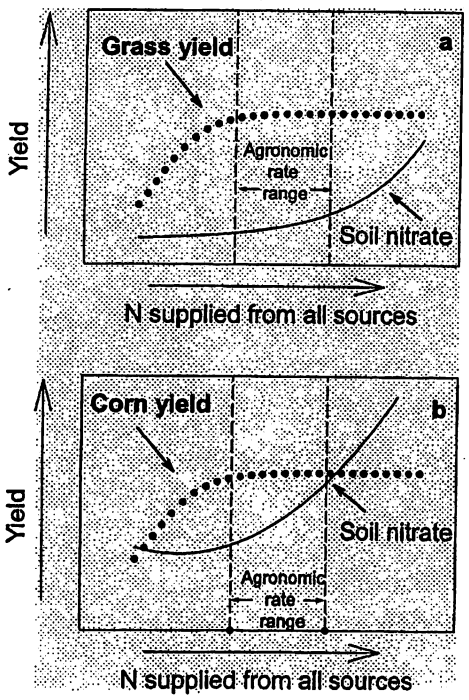

Figure 1.—Crop yield and soil nitrate response to increased N supply. Agronomic rate range = range of N supplied from all sources that results in near-maximum crop yield with acceptable post-harvest nitrate accumulation. Above the agronomic rate range, excess N accumulates as nitrate in soil. More nitrate accumulates in the agronomic rate range with corn (b) than with grass (a).

Table 1.—Average calendar date when cumulative rainfall (after September 1) reaches 5 inches west of the Cascades.[a]

Cumulative rainfall after Sept. 1	Calendar date to reach specified cumulative rainfall							
	Medford (OR)	Salem (OR)	Tillamook (OR)	Coupeville (WA)	Centralia (WA)	Lynden (WA) Abbotsford (BC)	Agassiz (BC)	Comox (BC)
(inches)								
3	10 Nov	20 Oct	26 Sep	31 Oct	8 Oct	1 Oct	26 Sep	10 Oct
5	29 Nov	1 Nov	8 Oct	24 Nov	23 Oct	15 Oct	9 Oct	25 Oct
7	16 Dec	13 Nov	18 Oct	15 Dec	4 Nov	27 Oct	19 Oct	6 Nov

[a]Average daily precipitation data for many other locations is available at: Western Regional Climate Center (http://wrcc.dri.edu) or Environment Canada (http://www.msc-smc.ec.gc.ca/climate/climate_normals/index_e.cfm).

3 inches of cumulative fall rainfall. The starting date for calculating cumulative fall rainfall is September 1. Include inches of irrigation water applied after September 1 in your estimate of cumulative rainfall.

Table 1 shows the average calendar date when cumulative fall rainfall (after September 1) reaches 5 inches at a variety of locations. For most locations, sampling prior to October 15 is acceptable in an average year. In high rainfall areas (coastal areas and the Cascade foothills), plan to sample earlier. A late October sampling date usually is acceptable in lower rainfall areas of southern Oregon, the Puget Sound islands, Olympic Peninsula, or Vancouver Island.

Units used in soil nitrate testing

In this publication, interpretation of a post-harvest soil nitrate test (Tables 3 and 4) is based on units of parts per million (ppm). Some labs report soil test nitrate-N in units of lb/acre by assuming a standard value for soil bulk density. If the lab reports nitrate-N results in pounds per acre, ask them to provide a conversion factor to express data in units of ppm. The conversion factor assumed by laboratories usually is between 3 and 4, because 1 acre-foot of dry soil usually weighs about 3.5 million pounds (3.5 lb per acre-foot = 1 ppm).

Table 2.—Units used to report soil nitrate analyses.

Name	Interpretation	Equivalent units
nitrate-N or NO_3-N	N present in the nitrate form, soil dry weight basis	mg/kg or ppm (dry weight basis)

Interpreting soil nitrate test results

Data quality and variability

The first step in evaluating your soil nitrate data is to verify data quality. Determine whether the sample collection method, timing of sample collection, sample preservation, and laboratory analysis methods are acceptable. Reject data that did not result from reasonable protocols. For example, Tables 3 and 4 should not be used for soil samples collected in November after heavy fall rains.

Make sure that you understand the units used to report test results. See Table 2 for an explanation of units found in soil test reports.

Response of post-harvest soil test N to changes in management

Success in N management is indicated by long-term trends in post-harvest soil nitrate (at least 3 to 5 years). **Because of the large pool of readily mineralizable N in manured soils, fall soil nitrate values may not decline for 3 to 5 years in response to improved management.** For multiyear comparisons, sampling methods and timing must be consistent.

Some portions of a crop rotation will have higher fall nitrate values because of rapid N mineralization stimulated by tillage or incorporation of crop residues. For example, soil nitrate concentrations typically are high, regardless of overall N management, after a perennial grass sod is plowed down and reseeded.

Reductions in fall soil N are most likely to be measured when (1) commercial N fertilizer amounts are reduced or eliminated, (2) cropping systems that maximize N removal in late summer and fall (August to October) are used, and (3) manure or N application is eliminated after August 1. It is more difficult to attain post-harvest soil nitrate-N values of less than 20 ppm for corn than for grass (see "Crop and soil response to excess plant-available N," page 4).

Interpretation for individual fields

Interpretations of soil test nitrate-N should be made first at the field level. You may be able to discover a probable cause for differences in test values among fields. Questions to ask include:

- Are relationships present between known management factors (e.g., manure application rate or timing, crop yield and quality, irrigation frequency, distance to the barn) and soil test values?
- Is a large amount of variation present between fields? Is there a logical explanation for unusual values?
- Are values for grass and corn fields similar?

Annual averages across grass and corn crops

After looking at test values for individual fields, it may be useful to look at averages across all grass or corn fields. You may want to calculate averages only for fields under similar management.

Average nitrate-N test values are most useful for consideration of changes in whole farm nutrient management. Tables 3 and 4 present interpretive information separately for grass and corn fields.

If a few fields have unusual test values, you may be justified in excluding those fields from an average. Although you may want to exclude unusually high test values from the farm average, you definitely should evaluate those fields further to determine the probable cause of the high soil test values. The unusually high test values may reflect the need for management changes or may reflect a soil sampling or analytical error.

Using the interpretive tables (Tables 3 and 4)

Interpretations and management suggestions given in Tables 3 and 4 (pages 7–8) are general in nature and should serve as only one portion of a nutrient management plan evaluation. Some of the management suggestions can be implemented for individual fields, while others need to be implemented on a whole farm basis.

Remember not to focus solely on post-harvest nitrate-N in evaluating N management. Include other important aspects of N management in your evaluation, such as success in following a plan for manure application, calibration of manure application equipment, maintaining good manure application records, and effective irrigation management.

Table 3.—Silage corn. Suggested interpretation for post-harvest soil nitrate-N (0- to 12-inch depth).[a]

If post-harvest nitrate-N is less than 20 ppm (less than approximately 70 lb N per acre)

- Continue present N management.

If post-harvest nitrate-N is 20 to 45 ppm (approximately 70 to 160 lb N per acre)

- Reduce or eliminate sidedress N fertilizer application. Use the pre-sidedress nitrate test (PSNT). Apply sidedress N only when PSNT indicates a need.
- Reduce lagoon water application after August 1.
- Keep records to document crop yield, dry matter, and crop N removal. Total applied manure-N + fertilizer-N should be less than 125 percent of documented crop N removal.
- Reduce manure application on fields where corn follows grass sod plow-down.
- Plan to reduce manure-N application by 10 to 25 percent.
- Improve whole farm N balance.

If post-harvest nitrate-N is greater than 45 ppm (greater than approximately 160 lb N per acre)

- Apply only starter N (20 to 40 lb N/acre at planting).
- Plan not to sidedress N fertilizer in June. Apply sidedress N only when PSNT indicates a need.
- Eliminate lagoon water application after August 1.
- Keep records to document crop yield, dry matter, and crop N removal. Apply manure N at a rate less than or equal to crop N removal (approximately 200 lb total N per acre).
- Eliminate manure application on a few fields or a few strips within a field next year to determine the contribution of mineralized N vs. current-season application of manure.
- Plan to reduce manure-N application by 25 to 40 percent.
- Consult experts to improve whole farm nutrient balance.

[a]The post-harvest test values listed above are for the *end* of a growing season. Management changes (if needed) should be implemented in future years. Interpretive values assume near-optimum crop yields. If yield is below average, improve agronomic practices to increase crop yield and crop N uptake.

Table 4.—Grass for hay or silage. Suggested interpretation for post-harvest soil nitrate-N (0- to 12-inch depth).[a]

If post-harvest nitrate-N is less than 15 ppm (less than approximately 55 lb N per acre)

- Continue present N management.

If post-harvest nitrate-N is 15 to 30 ppm (approximately 55 to 105 lb N/acre)

- Apply manure earlier in the growing season.
- Keep records to document crop yield, dry matter, and crop N removal. Total applied manure-N + fertilizer-N should be less than 125 percent of documented crop N removal.
- Check protein levels in forage. Grass crude protein greater than 21 percent is associated with increased potential for nitrate toxicity to cows.
- Plan to reduce manure-N application by 10 to 25 percent.
- Improve whole farm nutrient balance.

If post-harvest nitrate-N is greater than 30 ppm N (greater than approximately 105 lb N/acre)

- Apply manure earlier in the growing season. Reduce manure application after August 1.
- Keep records to document crop yield, dry matter, and crop N removal. Total manure-N + fertilizer-N should be less than or equal to crop N removal. Even if calculated crop removal exceeds 400 lb N per acre, apply manure-N + fertilizer-N not to exceed 400 lb N per acre per year.
- Consider reseeding or interseeding if grass yield is limited by poor stand or undesirable species.
- Check protein levels in forage. Grass crude protein greater than 21 percent is associated with increased potential for nitrate toxicity to cows.
- Plan to reduce manure-N application by 25 to 40 percent.
- Consult experts to improve whole farm nutrient balance and reduce danger of nitrate toxicity to cows.

[a] The post-harvest test values listed above are for the *end* of a growing season. Management changes (if needed) should be implemented in future years. Interpretive values assume near-optimum crop yields. If yield is below average, improve agronomic practices to increase crop yield and crop N uptake.

Detailed suggestions for soil sampling and planning

Collecting, preserving, and analyzing the soil sample

Tools for field sampling

Collect a sample that is representative of the entire sampling depth. For example, a representative sample for a 0- to 12-inch depth has the same amount of soil from the soil surface (0 to 6 inches) and from the bottom of the sampling depth (6 to 12 inches).

Always use a tool specifically designed for soil sampling. Don't use a shovel, because the samples won't be uniform with depth. Tools for soil sampling often are called soil probes or augers. There are several kinds available.

Push probes are tubes that you push into the soil. They have a T-shaped handle attached to a cylindrical tube (about 1 inch diameter) with a beveled tip. The tube collects a cylinder, or "core," of soil. Push probes work well in soft, uncompacted soils.

Hammer probes are designed for hard or compacted soils. They have a sliding weight (hammer) instead of a T-handle to drive the probe into soil.

Soil test consultants often use hydraulic probes mounted on a tractor or pickup to sample soils. These reduce the time and effort of sampling in hard soils. Gravelly and rocky soils are difficult to sample. A hydraulic probe with a rotating auger can sample some gravelly soils.

A mud auger or bucket auger is the best tool for hand-sampling at sites that are difficult to sample with push probes. Use an auger for compacted, muddy, rocky, or dry soils. Augers can be purchased from several manufacturers. A 2- to 4-inch diameter mud auger (open-sided) works best for most situations because it is easy to remove the sample from the bucket. Use a larger diameter auger for soils with large rocks. Augers sample a 4- to 6-inch depth. You will need to take several bites from the same hole to sample to 12-inch depth. You will collect a larger sample volume, about 5 to 10 times that collected with a push tube. Because of the extra effort required for auger sampling, use this method only if other sampling methods are difficult or impossible.

Field sampling protocol

Plan ahead. Use field maps and soil maps to divide the farm into different management units. A management unit is usually a field, but you may want to subdivide a large field if sections can be managed separately for nutrient application. The simplest approach is to collect a composite sample from the entire management unit. You may choose to restrict sampling to the dominant soil type if the management unit has soils that differ markedly in visual appearance (soil color, texture, organic matter).

Alternatively, you can restrict your sampling to a representative area (usually about an acre in size) within the management unit. Choosing a representative area within the field where manure application rate, timing, and uniformity are well documented is essential. If you use the "representative area" sampling approach, record the sampling location using a GPS receiver or record the distance from a fixed location (e.g., fenceline).

Avoid large buffer zones that are sometimes present adjacent to water bodies or roads, especially with big gun manure applicators. Avoid small atypical areas such as:

- Swales
- Very rocky or shallow soil (less than 12 inches deep)
- Site of an old manure pile or a feeding, watering, or resting area for livestock
- Abandoned field roads
- Field edges

Collect 15 to 30 soil cores from each management unit or representative sampling area with a push probe or similar tool. If you use an auger, 10 holes per management unit or zone is sufficient.

Choose sampling locations in a zigzag pattern across the field. Your general route of travel should be across rows, rather than down one row in the field. Make sure you sample within the part of the field where manure is routinely applied. For grazed pastures, choose sampling locations that have average crop growth and productive forage species.

Scrape away loose crop residues or manure present on the soil surface. Sample only the soil. Including the accumulated organic debris from the soil surface in the soil sample will increase variability in test results.

Once you are satisfied with a sampling strategy, repeat the same procedure each year. This will increase the validity of year-to-year comparisons of results.

Obtaining a representative sample from fields where manure has been injected into soil or placed in bands on the soil surface is difficult. The depth of manure injection, the width of injection zone, and the spacing between bands depend on equipment, soil, and the applicator. Some injection equipment can place manure below the 12-inch sampling depth used for the post-harvest nitrate test. Manure may be injected or banded more than one time per year, with several orientations in a field (e.g., north–south or east–west). Because of the added variability associated with manure injection or banding, plan to collect a larger number of soil cores to obtain a representative composite sample.

Sample handling

Mixing. If it is not too hard to break up the soil cores, break them, mix them all together, and homogenize thoroughly. Take a 1-cup subsample for shipment to the lab. If the soil cores are too hard to break apart, send the entire sample to the lab, where they can pass the sample through a mechanical grinder. Check with the lab to make sure they will grind and mix the *entire* sample before subsampling.

Preservation. Soils kept moist and warm continue to accumulate nitrate via biological activity after sampling. The simplest way to limit biological activity is to cool the soil after collection. Put the samples in plastic bags and place them in a cooler on ice while still in the field. Refrigerate them when you return from the field. Freeze the samples if they will be held longer than 48 hours before analysis.

Shipment. Keep the samples refrigerated or frozen until you deliver them to the lab. Contact the lab before you sample, so they will be prepared to receive the samples. Use a shipping method that will get the samples to the lab within 48 hours. You may want to freeze the samples before shipping to make sure they remain cool in transit.

Working with an analytical laboratory

Choose a laboratory that has experience with agricultural samples. Ask if they participate in the North American Proficiency Testing Program or a similar quality assurance program for agricultural testing labs. Find out what extraction and analytical procedures they use. Procedures should be consistent with those recommended for the western states (Gavlak et al., 1994).

Labs may use one of several colorimetric (color-based) lab procedures or they may use an electrode method to measure nitrate. Sample comparisons have shown that the colorimetric procedures usually are more precise than the electrode method.

Some testing labs also have sampling and consulting services. This can be convenient for people who have little experience in sampling or need help with sampling.

Find out how the lab reports soil test data. Standard units for soil nitrate-N are parts per million (ppm, Table 2). If you aren't familiar with the lab, it's a good idea to obtain a copy of a sample laboratory report.

Because you will use sample results to compare post-harvest soil nitrate across years, laboratory consistency over time is a major issue. A standard reference sample (soil sample with known concentration of nitrate) can help you assess laboratory variability. Consider submitting a standard reference sample (approximately 50 to 100 g dry weight) with a nitrate-N concentration of 20 to 45 ppm with each batch of soil samples. Keep track of test results for the standard reference sample over time. If you note a major error in the nitrate concentration reported for the standard reference sample, then the test data is questionable.

Standard reference samples are available from the North American Proficiency Testing Program (see "For more information," page 15). Standard reference samples must be dried, ground, and thoroughly mixed.

We do not recommend that you split a field sample to check laboratory consistency. The one-time nature of such comparisons, the uncertainty of obtaining a homogeneous sample, and the uncertainty of sample preservation in-transit to the lab limit the interpretation of split-sample data.

Developing a sampling plan

Nutrient management plans can be voluntary, required by regulatory agencies, or a part of an agreement with a conservation planning agency (e.g., Natural Resources Conservation Service or conservation district). If your nutrient management plan is not voluntary, consult the agency that supervises your nutrient management plan to determine whether they have specific requirements for how often fields must/should be sampled. Suggestions given here for sampling frequency are general in nature and are not intended to serve as policy for any agency.

Representative fields for long-term monitoring

Representative fields are fields that you sample every year to track trends in sample values over time. Select fields that represent typical management practices. Criteria that can be used to choose representative fields include: (1) records or estimates of annual manure application rate, (2) number of years of continuous manure application, (3) soil test values for P and K. On dairies where P and K fertilizers are not routinely applied, soil test values above 75 ppm P (Bray P1 method) and 400 ppm K (ammonium acetate method) usually reflect substantial manure application in the past.

Sample the representative fields every year to assess trends over time. If you grow corn silage and perennial grass forage, plan to sample at least four grass fields and four corn fields each year. At a small dairy (fewer than four fields), sample all fields each year.

Other fields

Periodically, you will need to evaluate the fields not designated as "representative" fields. Consider sampling all fields every 3 years. Compare whole farm soil data to representative field data.

If you have only a few fields with elevated soil test N, then focus management on those fields. If all fields on the farm give similar test data, then focus your N management efforts at the whole farm level. If representative fields consistently have test values of less than 15 ppm (grass) or less than 20 ppm (corn) over a 3-year period, and all other fields sampled have similar test values, consider reducing the number of post-harvest soil nitrate tests.

Sampling priority

Prioritize fields for fall sampling ahead of time so that you get high-priority fields sampled at an appropriate time. Highest priority should be given to representative fields used to track long-term trends. Fields with high manure application rates or elevated soil test N the previous year should also have a high priority.

Corn fields can be sampled for soil nitrate in June (PSNT, pre-sidedress nitrate test) or in the fall (post-harvest test described in this publication). You will get the most management information by sampling your high-priority representative corn fields both in June (PSNT) and after harvest. You also may want to sample fields with PSNT values greater than 45 ppm nitrate-N again in the fall.

For other corn fields where only one soil test per year is planned, we recommend using the PSNT in preference to the post-harvest soil nitrate test. The PSNT is preferred because test results are applicable to in-season N management. Growers can save money and reduce post-harvest nitrate by omitting sidedress N fertilizer application on fields where sufficient soil nitrate-N is present in June.

Sampling corn fields at PSNT time also will reduce the number of post-harvest samples that need to be collected during the short interval between harvest and the end of the fall sampling window (approximately October 15). If you miss a planned fall sampling on a corn field, consider sampling next year using the PSNT.

Grass fields are best sampled in the fall, using the protocols described in this publication. Think carefully about the best way to achieve consistent timing of sample collection for your fields. The timing of manure application and the timing of grass harvest are key variables to consider.

Samples collected shortly after manure application are not a good indicator of the balance between N supply and crop N demand over the entire growing season. If manure is applied late in the year, postpone soil sampling until after a fall grass harvest. Wait at least 30 days after a late-season manure application before sampling. Sampling need *not* be postponed until after the last manure application or until after the last grass harvest in the fall.

Questions and answers

Why is it difficult to achieve post-harvest nitrate-N less than 15 to 20 ppm with organic sources such as manure?

First, the timing and rate of application for organic sources is less flexible than for fertilizer N. Second, environmental processes that control the quantity and timing of N availability from organic sources are difficult to manage. The biggest factors controlling N availability are soil temperature and moisture. The timing of crop N uptake usually does not match the timing of N supplied from manure and other organic sources. Soil temperature and moisture often support continued release of available N after crop N uptake is complete.

Is there a relationship between soil organic matter content and potential N mineralization?

Research west of the Cascades has demonstrated a lack of correlation between soil organic matter content and N mineralization potential for soils having 3 to 8 percent organic matter. The active fraction of soil organic matter that controls annual N mineralization rates is a small proportion of total organic matter (usually less than 10 percent of total). Recent site management affects soil N mineralization potential; it does not have much effect on soil organic matter content. Because most soil total N is contained in soil organic matter, soil total N is also an unreliable indicator of mineralization potential.

What other soil tests can be used to provide information to guide N management for corn?

Soil nitrate testing in spring and early summer can assist with N management for silage corn. Test soil ammonium + nitrate-N several weeks after a spring manure application to track early-season N availability. Test soil nitrate when corn is at the four- to six-leaf stage (pre-sidedress nitrate test, PSNT) to determine the need for sidedress N application to corn.

How much variability should I expect in post-harvest nitrate-N test values for the same grass field sampled between August 15 and October 15?

It all depends on weather, soil biology, and crop management. A good stand of actively growing grass can maintain nitrate-N concentrations of less than 15 ppm throughout the post-harvest sampling period. Where soil is dry in late summer, increased N availability may occur for 2 or 3 weeks following the first heavy rain. It may be useful to take several soil nitrate tests from the same field in the fall to document changes in nitrate concentration with time. Soil nitrate values given in the interpretive table in this publication are for typical precipitation and sampling date.

Ammonium-N is plant-available. Why doesn't the post-harvest test include ammonium-N analysis?

Post-harvest ammonium-N analyses cost money, and they do not yield reliable interpretive information. Ammonium-N does not accumulate in soils supplied with an excess of plant-available N. It is rapidly converted to nitrate. Soil samples taken at least 30 days after manure application usually have negligible ammonium-N concentrations unless soil has remained dry.

Drying of soils after sampling releases ammonium-N from microbial biomass. Most dried soils have 2 to 20 ppm ammonium-N that is caused by the soil drying process. Dry soil ammonium-N concentrations are poorly correlated with other indices of N availability in controlled experiments.

Should post-harvest nitrate tests be used for fields with organic soils?

Other methods should be used to assess the success of nutrient management plans on organic soils. Goals for post-harvest nitrate-N of less than 20 ppm are difficult if not impossible to attain on organic soils, which contain more than 20 percent organic matter. These soils formed as organic matter accumulated under natural poorly drained conditions. Soil organic matter decomposition and N mineralization processes are greatly accelerated under typical farming practices such as artificial drainage and tillage.

Should I measure or estimate soil bulk density to estimate post-harvest nitrate-N in units of pounds per acre?

The variation in bulk densities among soils typically is less than the variation associated with soil nitrate sampling and testing. Interpretive information in this publication is based on units of parts per million (ppm; mg per kg dry soil). You can approximate soil nitrate-N in the surface foot of soil by assuming typical bulk density (ppm x 3.5 = lb/acre). This conversion factor is based on the weight of 1 acre-foot of soil at a bulk density of 1.3 g cm^3 (1 acre-foot = 3.5 million lb). Organic soils (more than 20 percent organic matter) have lower bulk density (0.6 to 0.8 g cm^3).

What is whole farm nutrient management?

The goals of whole farm management are: (1) to move toward a balance of nutrient imports and exports, and (2) to utilize nutrients on the farm at agronomic rates that minimize nutrient losses to the environment. Managing nutrients at the whole farm level requires knowledge of the major nutrient imports, major nutrient exports, crop

utilization of nutrients on the farm, and nutrient losses to air and water.

The Livestock and Poultry Environmental Stewardship (LPES) Curriculum, available through the Midwest Plan Service, includes a Web presentation of whole farm nutrient management principles and a worksheet for evaluating whole farm nutrient balance. See "For more information" (page 15) for details.

What is the role of post-harvest nitrate testing in connection with Comprehensive Nutrient Management Plans (CNMPs)?

CNMPs, developed by the Natural Resources Conservation Service (NRCS) or other nutrient management professionals under NRCS supervision, are broader than just nutrient management. Other components of a CNMP are: (1) manure and wastewater handling and storage, (2) land treatment practices, (3) record-keeping, (4) feed management, and (5) other waste utilization options.

Post-harvest nitrate test values may be used as part of a process to develop a new CNMP or to update an existing CNMP. The CNMP typically includes a plan for regular soil testing. Appropriate timing of the post-harvest nitrate test is critical (see "When to sample," page 2), while soil samples for P and K analysis may be collected any time of the year. Soil samples collected for the post-harvest nitrate test can be analyzed by routine agronomic soil testing procedures and used in developing plans for P and K utilization in a CNMP.

What are the implications of high nitrate concentrations in forages?

Nitrate in ensiled forages can interfere with normal fermentation processes, resulting in poor-quality forage. Forage nitrate affects the distribution of nitrogen compounds in silage. It is difficult to use the silage to formulate rations that meet cow needs for specific protein fractions. Enough nitrate is sometimes present in the silage itself to create a health risk to the animal. Grass silage that is greater than 21 percent crude protein should be tested for the level of nitrate-N. See Johnson et al. (2002) for interpretation of forage nitrate concentrations.

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Many OSU Extension Service publications, as well as additional gardening information, may be viewed or downloaded from the Web (http://eesc.oregonstate.edu).

Copies of many of our publications and videos also are available from OSU Extension and Experiment Station Communications. For prices and ordering information, visit our online catalog (http://eesc.oregonstate.edu) or contact us by fax (541-737-0817), e-mail (puborders@oregonstate.edu), or phone (541-737-2513).

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Soil Test Interpretation Guide

E.S. Marx, J. Hart, and R.G. Stevens

Regular soil testing is an important element in nutrient management. You can use soil tests as a diagnostic tool or to identify trends through time. To obtain meaningful test results, you must sample soil correctly, at the same time each year, and you must maintain records. For more information, see EC 628, *How to take a soil sample. . .and why* (see "For more information," page 7).

Soil testing laboratories use different test methods, which may influence results and sufficiency ranges. Therefore, the sufficiency ranges in this publication are accurate only for the test methods listed.

Soil tests used to evaluate fertility measure the soil nutrients that are expected to become plant-available. They do not measure total amounts of nutrients in the soil. Measurements of total nutrient content are not useful indicators of sufficiency for plant growth, because only a small portion of the nutrients are plant-available.

Adequate soil nutrient levels vary depending on plant species. Similarly, plant tolerance of excessive nutrient levels, nutrient imbalances, or less-than-optimum growing conditions varies. If excessive nutrient levels exist, review management to determine the cause.

Nutrient concentrations vary with soil depth. Depth of sampling, therefore, affects test results. To determine the proper sampling depth, you must consider the purpose of the soil test. To estimate nutrient availability for a crop prior to planting, sample soil to the depth where most root activity will occur. Shallow sampling sometimes is used to evaluate surface conditions in perennial crops where fertilizers have been applied to the soil surface. Deep sampling may be necessary to diagnose problems in orchards.

Soil test values do not vary greatly from year to year. Drastic changes in test values may indicate an unrepresentative soil sample or a laboratory error. When in doubt, submit a new sample or ask the lab to repeat the analysis.

This publication provides general guidelines for interpreting soil test results. Fertilizer guides for many individual crops are available from your county office of the OSU Extension Service or Washington State University Cooperative Extension, or from Extension and Experiment Station Communications, Oregon State University (see "For more information").

Nitrogen (N)

Plant-available nitrogen (nitrate and ammonium)

Plant-available forms of nitrogen are nitrate (NO_3^--N) and ammonium (NH_4^+-N). Soil concentrations of NO_3^--N and NH_4^+-N depend on biological activity, and therefore fluctuate with changes in conditions such as temperature and moisture. Nitrate is easily leached from the soil with high rainfall or excessive irrigation. Soil tests can determine NO_3^--N and NH_4^+-N concentrations at the time of sampling, but do not reflect future conditions.

When you collect samples for nitrogen testing, keep them cold, or dry them immediately to prevent NO_3^--N and NH_4^+-N concentrations from changing.

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OREGON STATE UNIVERSITY EXTENSION SERVICE

Ammonium-nitrogen (NH_4^+-N)

Ammonium-nitrogen does not accumulate in the soil, as soil temperature and moisture conditions suitable for plant growth also are ideal for conversion of NH_4^+-N to NO_3^--N. Ammonium-nitrogen concentrations of 2–10 ppm are typical. Soil NH_4^+-N levels above 10 ppm may occur in cold or extremely wet soils, or if the soil contains fertilizer residue.

Nitrate-nitrogen (NO_3^--N)

West of the Cascades. Soil nitrate-nitrogen measurements are most useful as a post-harvest "report card" to evaluate N management. Nitrate remaining in the soil after harvest can leach during winter rains, contaminating surface and groundwater. If residual nitrate levels are consistently high, reduce fertilizer N inputs in future growing seasons.

Table 1.—Residual soil nitrate-nitrogen for evaluating N management.

	NO_3^--N in surface foot (ppm)*	#/Ac
low	<10	< 36.5
medium	10–20	36.5–73.0
high	20–30	73.0–109.5
excessive	>30	>109.5

*See Table 13 (page 7) for conversion of ppm to lb/acre.

Mid-season measurement of soil nitrate is used for field corn production. See EM 8650, *The Pre-sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington*, for more information.

East of the Cascades. In arid regions, soil nitrate (NO_3^--N) is evaluated by measuring NO_3^--N to the expected rooting depth of the crop to be grown. If test results are reported in ppm, convert to lb/acre using Table 13 (page 7). Then subtract the soil nitrate from the crop requirement to determine a fertilizer rate.

Failure to account for NO_3^--N in the soil can lead to over-application of nitrogen fertilizers. Also, irrigation water should be analyzed for NO_3^--N content, and fertilizer rates reduced accordingly. Proper irrigation increases N use efficiency and reduces nitrate leaching.

Total nitrogen

Total nitrogen analysis measures N in all organic and inorganic forms. Total nitrogen does *not* indicate plant-available N, and is not included in standard soil testing programs.

A typical agricultural soil in the Willamette Valley contains about 0.10 to 0.15 percent N, or approximately 5,000 lb N/acre in the surface foot. Only 1 to 4 percent of this total N becomes plant-available during a growing season. East of the Cascades, soils tend to have smaller amounts of total N.

Total N analysis, while not recommended as part of a standard soil testing program, may be better than organic matter analysis for estimating soil N supplying capability.

Phosphorus (P)

The Bray P1 (for acid soils) and the Olsen sodium bicarbonate ($NaHCO_3$) (for alkaline soils) tests estimate plant-available phosphorus. Soil testing laboratories also use several other extraction methods. For interpretation of results from other extraction methods, contact the laboratory that performed the analysis.

Phosphorus soil tests are an index of P availability. The test values cannot be used to calculate available lb P_2O_5/acre.

When sampling soil, you must be aware of previous P management. Phosphorus is relatively immobile in soil. If phosphorus has been applied in a fertilizer band, concentrations of P may persist where the band was placed. Avoid fertilizer bands when collecting soil samples.

Table 2.—Phosphorus soil test.

	West of Cascades (Bray P1 test) ppm P	East of Cascades (Olsen test) ppm P
low	<20	<10
medium	20–40	10–20
high	40–100	20–40
excessive	>100	>40

The phosphorus application rate necessary to correct P deficiencies varies depending on soil properties. Phosphorus availability decreases in cool, wet soils. In many situations, banded phosphorus applications are more effective than broadcast applications.

Phosphorus applications generally are not recommended if tests are high or excessive. High soil phosphorus combined with surface runoff can cause excessive growth of plants and algae in surface waters, damaging aquatic ecosystems.

Cations

Of the three primary cations (potassium, calcium, and magnesium), potassium requires the most management attention. Few crops have responded to calcium and magnesium in the Pacific Northwest.

If extremely high levels of a single cation exist, plant deficiencies of other cations may occur due to competition for plant uptake.

The soil test ranges in Tables 3, 4, and 5 are for the ammonium acetate extraction method. If a sodium bicarbonate ($NaHCO_3$) extraction is used, test values may be slightly lower.

Potassium (K)

Excessive soil potassium levels can result in elevated K levels in grass forage crops, which may be detrimental to animal health.

Table 3.—Extractable potassium (K).

	K
low	<150 ppm* <0.4 meq/100 g soil
medium	150–250 ppm 0.4–0.6 meq/100 g soil
high	250–800 ppm 0.6–2.0 meq/100 g soil
excessive	>800 ppm >2.0 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Calcium (Ca)

Calcium deficiencies usually are found only on very acid soils. They can be corrected by liming with calcium carbonate ($CaCO_3$).

Table 4.—Extractable calcium (Ca).

	Ca
low	<1,000 ppm* <5 meq/100 g soil
medium	1,000–2,000 ppm 5–10 meq/100 g soil
high	>2,000 ppm >10 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Magnesium (Mg)

Magnesium deficiencies on acid soils can be corrected by liming with dolomitic lime.

Magnesium toxicity can occur on serpentine soils in southwest Oregon.

Table 5.—Extractable magnesium (Mg).

	Mg
low	<60 ppm* <0.5 meq/100 g soil
medium	60–180 ppm 0.5–1.5 meq/100 g soil
high	>180 ppm > 1.5 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Sulfate-sulfur (SO_4^{2-}-S)

Plants absorb sulfur in the sulfate (SO_4^{2-}-S) form. In high rainfall areas west of the Cascades, SO_4^{2-} is readily leached, and soil test data are not well correlated with plant growth. In arid regions east of the Cascades, soil test information may be useful. Also, irrigation water may contain significant amounts of sulfate-sulfur. Plant analysis often is useful for diagnosing sulfur deficiency.

Table 6.—Sulfate-sulfur, east of the Cascades.

	SO_4^{2-}-S (ppm)
low	<2
medium	2–10
sufficient	>10

Micronutrients

Deficiencies of micronutrients other than boron and zinc are uncommon. Availability of most micronutrients is largely pH-dependent; availability decreases as pH increases (except for molybdenum, which becomes more available as pH increases). Deficiencies rarely occur in soils with pH below 6.5.

Soil testing for micronutrients other than boron and zinc is recommended only when a deficiency is suspected. If you suspect a micronutrient deficiency, plant tissue testing may be a better diagnostic tool than soil testing.

Boron (B)

Crops such as alfalfa, table beets, brassicas, caneberries, and root crops have responded to boron fertilization on B-deficient soils in western Oregon. Tree fruits and alfalfa are examples of crops sensitive to low boron levels east of the Cascades.

While low levels of boron may limit plant growth, high concentrations can be toxic. When applying boron, apply uniformly and mix thoroughly with the soil.

Table 7.—Boron by the hot water extraction method.*

	B (ppm)
low	<0.5
medium	0.5–2
high	>2

*The hot water extraction method for boron may result in incorrectly high values on soils with high organic matter content.

Zinc (Zn)

Zinc values above 1.0 ppm using the DTPA extraction method are sufficient. Zinc deficiencies have been identified in some crops in certain regions. Corn, beans, grapes, hops, onions, and deciduous fruit trees are especially sensitive to low levels of available zinc. Deficiencies sometimes are associated with high soil concentrations, soils high in fine clay and silt, or soils with high pH.

Copper (Cu)

Copper values above 0.6 ppm using the DTPA extraction method are sufficient. Copper deficiencies are uncommon. Deficiencies have been identified on muck soils such as those in the Klamath area in Oregon and the Colville area in Washington.

Manganese (Mn)

Manganese values above 1.5 ppm using the DTPA extraction method are sufficient. Manganese deficiencies generally occur only in soils with pH 7.0 or above. Manganese toxicity may occur on acid soils. On alkaline soils east of the Cascades, Mn availability may increase in acidified microzones where fertilizers have been placed. These acidified microzones can alleviate Mn deficiencies sometimes encountered on high pH soils. In some instances, however, acidic microzones can result in Mn toxicity.

Iron (Fe)

Soil testing for iron is not recommended. Most test methods do not discern between forms of iron, and therefore have little meaning for plant nutrition.

Iron deficiencies are uncommon on acid soils in the Pacific Northwest. Where deficiencies occur, they often are associated with acid soil plants, such as azaleas or rhododendrons, growing on soils with unsuitably high pH. Acidifying fertilizers such as ammonium sulfate will help correct problems.

Iron applications on alkaline soils are inefficient unless a chelated form is used. Lowering soil pH to increase iron availability on a field scale is not economical. However, adding acidifying materials such as elemental sulfur to fertilizer mixes can acidify microzones around the fertilizer material and increase Fe availability.

Foliar applications of Fe sometimes are used to correct deficiencies in fruit, turf, and other high-value crops.

Molybdenum (Mo)

Soil Mo concentrations are too low for most labs to evaluate. Molybdenum deficiencies are rare, and are of concern mostly for leguminous crops. Molybdenum-deficient legumes appear chlorotic. Liming to raise soil pH may alleviate deficiencies. Molybdenum-coated seed also can be used.

Excessive molybdenum in forage can harm animal health. If you suspect excessive molybdenum in your forage, determine Mo content by forage analysis.

Chloride (Cl^-)

Soil testing for chloride is not a common practice, and little data exists for interpretation of test results. Evidence indicates that wheat sometimes benefits from chloride applications. The values in Table 8 are based on wheat research in Montana and South Dakota. Little information exists on chloride soil testing in Washington and Oregon.

Table 8.—Chloride soil test ranges for wheat in Montana and South Dakota, 2-foot sampling depth.

	ppm	lb/acre
low	0–4	0–32
medium	4–8	32–64
high	>8	>64

pH, lime requirement (LR)

Soil pH is a measure of soil acidity. Most crops grow best if the soil pH is between 6.0 and 7.5.

Table 9.—Soil pH ranges.

	pH
strongly acid	below 5.1
moderately acid	5.2–6.0
slightly acid	6.1–6.5
neutral	6.6–7.3
moderately alkaline	7.4–8.4
strongly alkaline	above 8.5

Soil pH can be increased by liming. The soil pH test indicates *if* lime is needed. The lime requirement test determines *how much* lime is needed. Accurate lime recommendations cannot be made without performing an SMP or similar test.

SMP* lime requirement test

The SMP lime requirement test is used to estimate the amount of lime required to raise the pH of 6 inches of soil. The SMP test is performed by mixing soil with a buffered pH 7.5 solution and determining the pH of the mixture. During the reaction, the soil's reserve acidity lowers the pH of the SMP solution. Soils with low SMP values have high reserve acidity and high lime requirements.

Some soils may have a low pH (<5.3) and a fairly high SMP buffer value (>6.2). This condition can be caused by the application of fertilizer. In this case, the low pH value is temporary, and the pH of the soil will increase as the fertilizer completes its reaction with the soil.

Sandy soils also may have a low pH and high SMP buffer value. This condition occurs because sandy soils have low amounts of reserve acidity due to low cation exchange capacity (CEC). In such cases, a light application of lime (1 to 2 t/a) should suffice to neutralize soil acidity.

Table 10 is used to determine the amount of lime required, based on the SMP test, to raise soil pH to a desired level. The target pH is determined by the crop to be grown and possibly by other factors.

*SMP stands for Shoemaker, MacLean, and Pratt—the people who developed the test.

Without an SMP or similar test, there is no way to know how much lime is required to adjust soil pH to a desired level. Accurate lime recommendations cannot be made solely on the basis of soil pH.

Table 10.—SMP lime requirement—field scale.

SMP buffer	Tons/acre of 100-score lime needed to raise pH of surface 6 inches of soil to the following pH's			
	5.3	5.6	6.0	6.4
6.7	—	—	—	—
6.6	—	—	—	1.1
6.5	—	—	1.0	1.7
6.4	—	—	1.1	2.2
6.3	—	—	1.5	2.7
6.2	—	1.0	2.0	3.2
6.1	—	1.4	2.4	3.7
6.0	1.0	1.7	2.9	4.2
5.9	1.4	2.1	3.3	4.7
5.8	1.7	2.5	3.7	5.3
5.7	2.0	2.8	4.2	5.8
5.6	2.3	3.2	4.6	6.3
5.5	2.6	3.6	5.1	6.8
5.4	2.9	3.9	5.5	7.3
5.3	3.2	4.3	6.0	7.8
5.2	3.6	4.7	6.4	8.3
5.1	3.9	5.0	6.9	8.9
5.0	4.2	5.4	7.3	9.4
4.9	4.5	5.8	7.7	9.9
4.8	4.8	6.2	8.2	10.4

Example: If the "SMP buffer" value is 5.9, the amount of lime needed to raise the pH to 6.0 is 3.3 tons of 100-score lime/acre.

Table 11.—SMP lime requirement—gardens.

If the SMP lime requirement test is	Apply this amount of lime (lb/1,000 ft²)
5.4 or below	250
5.5–6.0	150–250
6.0–6.5	100–150
above 6.5	0

Some plants, such as blueberries, rhododendrons, azaleas, and cranberries, grow best in acid soils. Fertilizers such as ammonium sulfate can help maintain acidic conditions.

Sodium (Na)

Sodium is not a plant nutrient and therefore is not necessary for plant growth. High levels of sodium are detrimental to soil tilth and plant growth.

Sodium levels are evaluated based on Exchangeable Sodium Percentage (ESP). The ESP is the percent of the cation exchange capacity (CEC) occupied by Na.

ESP values above 10 percent are of concern. Excessive sodium levels can occur naturally or can result from irrigation with high-sodium water. Reclamation involves establishment of drainage followed by gypsum application and leaching with low-sodium water.

Soluble salts (SS)

Soluble salt problems usually are associated with arid regions such as eastern Oregon and Washington. Soils with high levels of soluble salts are called saline soils. Soils high in sodium are called sodic soils (see "Sodium"). Saline-sodic soils are high in both soluble salts and sodium. Soluble salts are measured by electrical conductivity (EC) of a saturated paste soil extract.

Table 12.—Soluble salts.

	Conductivity (mmhos/cm*)	ppm salt**
low	<1.0	<640
medium	1.0–2.0	640–1,280
high	>2.0	>1,280

*mmhos/cm is equivalent to decisiemen/m.

**Multiply mmhos/cm by 640 to estimate ppm salt.

Because salts move readily with water, salt problems often are transient. Salt toxicity can occur, and salts may leach before soil is tested. Low salt values, therefore, do not always rule out salt toxicity as a cause of problems.

Salt tolerance varies greatly among plant species. Seedlings are especially sensitive to high salt concentrations. Excessive salts may inhibit seed germination. Excessive fertilization and poor irrigation water quality are sources of salts.

Organic matter

Maintenance of soil organic matter is one of the most important goals of soil management. Accurate measurement of soil organic matter is difficult.

Many laboratory methods are used. Most methods are indirect; they measure soil carbon and make an assumption about the percent carbon content of organic matter. The Walkley-Black method is common and gives consistent results. The loss on ignition method can give inconsistent results and tends to overestimate organic matter.

When estimating potential nitrogen release of a soil, total N testing is preferred to organic matter determination. Neither approach provides accurate estimates of soil N availability. If you are monitoring changes in organic matter over time, use the same lab for all analyses.

Cation exchange capacity (CEC)

CEC is a measure of a soil's capacity to retain and release elements such as K, Ca, Mg, and Na. Soils with high clay or organic matter content tend to have a high CEC. Sandy soils have a low CEC. Soil CEC is relatively constant over time, so there is no need for repeated analyses.

CEC often is determined by the ammonium acetate (NH_4OAc) or sodium acetate (NaOAc) methods. While these methods are standard in many regions, there are potential sources of error. Errors are most likely to occur for soils containing appreciable amounts of $CaCO_3$ or gypsum.

Some labs estimate CEC based on soil texture, organic matter content, cations, and pH. Such estimates often are inaccurate. The "sum of bases" method for calculating CEC of alkaline soils can give inaccurate results, especially if there are significant amounts of free $CaCO_3$.

CEC determination can be important for predicting behavior of pesticides and other chemicals in soils.

Base saturation

Base saturation is the percentage of the CEC that is occupied by cations other than hydrogen (H) and aluminum (Al). Soils with low base saturation generally are acidic. Base saturation and pH increase together.

For more information

Hart, J. *Analytical Laboratories Serving Oregon*, FG 74 (Oregon State University, Corvallis, reprinted 1997). No charge

Hart, J. *How to take a soil sample. . .and why*, EC 628 (Oregon State University, Corvallis, revised 1995). No charge

Marx, E.S., N.W. Christensen, J. Hart, M. Gangwer, C.G. Cogger, and A.I. Bary, *The Pre-sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington*, EM 8650 (Oregon State University, Corvallis, reprinted 1997). 75¢

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Table 13.—Conversions.

To convert column 1 into column 2, *divide* by	Column 1	Column 2	To convert column 2 into column 1, *multiply* by
390	ppm K	meq K/100 g soil	390
200	ppm Ca	meq Ca/100 g soil	200
121	ppm Mg	meq Mg/100 g soil	121
230	ppm Na	meq Na/100 g soil	230
1	meq/100 g soil	cmol/kg soil	1
2*	lb/acre (7 inch depth)	ppm	2*
3.65*	lb/acre (1 foot depth)	ppm	3.65*
43.56	lb/acre	lb/1,000 sq ft	43.56
43,560	square feet	acres	43,560
2.471	acres	hectares	2.471

*These values vary with soil bulk density.

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EM 8585 • April 1996
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NUTRIENT MANAGEMENT
FOR DAIRY PRODUCTION

Manure Application Rates for Forage Production

J. Hart, E.S. Marx, and M. Gangwer

Most dairies can supply all the nitrogen, phosphorus, potassium, and other nutrients needed for forage production by applying manure to forage crops. As a manager, your goal is to match nutrient supply with crop needs by deciding when and how much manure to apply.

This publication explains how to estimate the amount of manure to apply for forage production. To do so, you need:

- A current manure analysis for your dairy (or see EM 8586, *Dairy Manure as a Fertilizer Source*)
- A list of forage crops to be produced
- A soil test from each field where manure will be applied

Too much manure results in excess plant uptake of nutrients such as potassium. High-potassium grass forages can lead to health problems, especially in dry cows. In addition, excess manure contributes to nutrients and microorganisms in runoff water and potential nutrient leaching to groundwater.

John Hart, Extension soil scientist; E.S. Marx, research assistant in soil science; and Mike Gangwer, Extension agent, Marion County; Oregon State University.

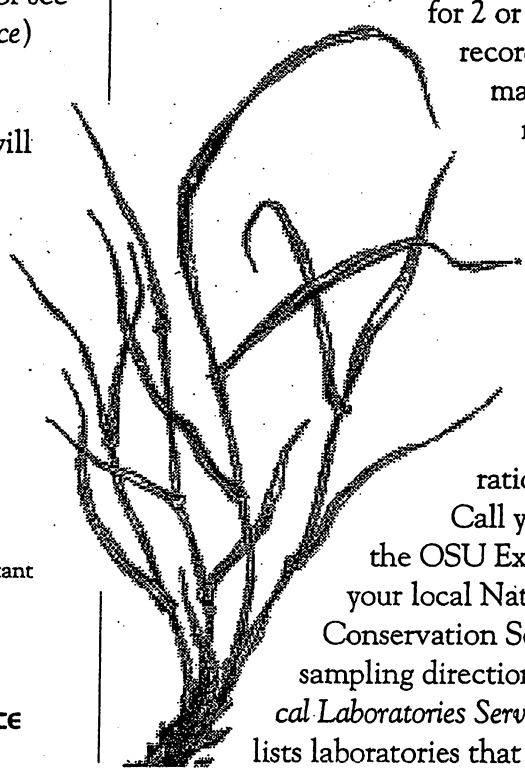
OREGON STATE UNIVERSITY EXTENSION SERVICE

The application rates in this publication are based on soil tests and growing conditions in western Oregon.

Manure analysis

Analyzing your manure is critical to determining the correct application rate. If you don't test your dairy's manure, you can only guess its nutrient value.

Manure testing in western Oregon has shown more variation among dairies than within one dairy. Develop a manure nutrient history for your dairy by testing manure two or three times a year for 2 or 3 years. These records will help you manage nutrient resources.



Also test manure when you expect a change in nutrient content; for example, when you make a large change in the ration.

Call your county office of the OSU Extension Service or your local Natural Resource Conservation Service office for sampling directions. *A List of Analytical Laboratories Serving Oregon* (FG 74) lists laboratories that test manure.

Crop nitrogen requirements

Nitrogen (N) is the nutrient needed for crop production on dairies. Tables 1 and 2 show the estimated nitrogen removal rate (or uptake) for average yields of the most common forage crops grown on dairies.

Determining manure application rate

Your goal is to match manure nutrient application rates with crop removal. Table 1 and Figures 1–3 provide the information you need for perennial crops, and Table 2 and Figures 4–6 apply to annual crops. Instructions on how to use them follow. (An example is illustrated on page 3.)

Perennial crops

1. In Table 1, find the crop you will grow and the average yield per cutting. Let's assume you grow perennial ryegrass. Table 1 shows that an average yield per cutting is 1.2 tons per acre of dry matter (about 3 tons of harvested grass).
2. Now find the nitrogen removal rate for the average yield. Table 1 shows that perennial ryegrass takes up about 60 pounds of N per acre for each cutting. Thus, you should apply about 60 lb N/a after cutting the ryegrass.
3. Find the figure below (Figures 1–3) that represents the type of manure you want to apply. Let's assume you want to apply lagoon effluent, so you'll use Figure 2.
4. Figure 2 contains three lines representing N application rates of 50, 100, and 150 lb N/a. Find the line that is closest to the rate you need to apply. You'll use the line for 50 lb/a because it is closest to 60 lb/a.
5. Select your manure analysis for nitrogen on the left side of the graph. Let's assume a manure test shows that the effluent contains 6 lb/1,000 gallons or 750 ppm N. Move to the right across the graph until you meet the line for the application rate you have chosen (50 lb N/a).

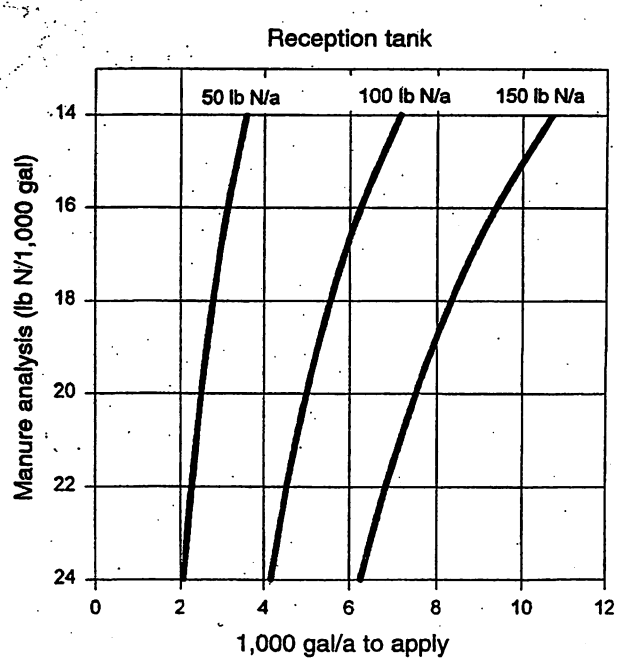


Figure 1.—Determining application rate for reception tank manure.

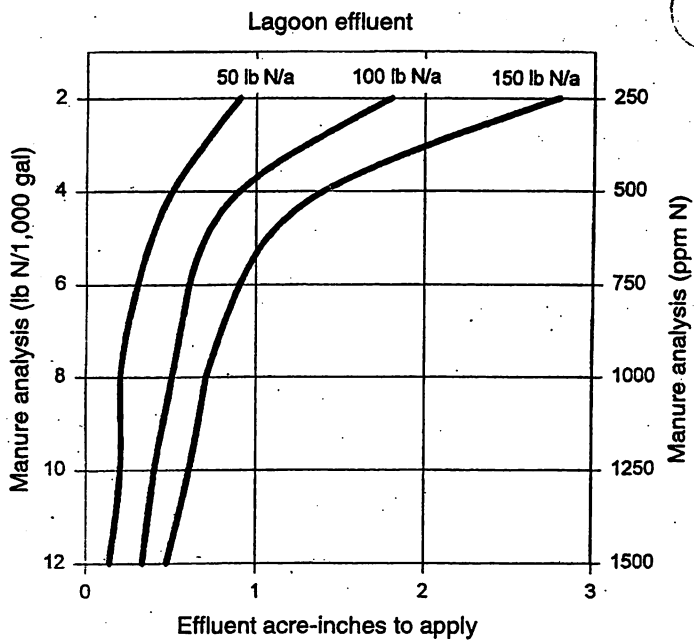


Figure 2.—Determining application rate for lagoon effluent.

Note: Recommendations in Figures 1–6 assume that nitrogen applications should not exceed crop removal. We assume that N mineralization will offset any volatile losses that occur during application.

Table 1.—Approximate nitrogen removal by perennial forage crops and suggested nitrogen application rates.

Crop	Average yield per cutting (t/a)	N removal rate for average yield per cutting (lb N/a)	Suggested N application rate (lb N/t of forage*)
Orchard grass	1.4	70	50–60
Perennial ryegrass	1.2	60	50–60
Tall fescue	1.4	70	50–60

*All rates are on dry matter basis unless noted otherwise.

6. Now move down to the line labeled "effluent acre-inches to apply." Estimate the number of acre-inches of effluent to apply (about 0.3 acre-inch). Remember that you will need about 10 percent more nitrogen because no line exists for the 60 lb N/a required by ryegrass. Your final result will be about 0.4 acre-inch.

Note: If you know your own yield per cutting, you can figure your nitrogen need more accurately. To do so, multiply your tons per acre per cutting by the "suggested N application rate (lb N/t of forage)" in Table 1. The result is your N removal rate. Use the line in the appropriate figure that is closest to that rate.

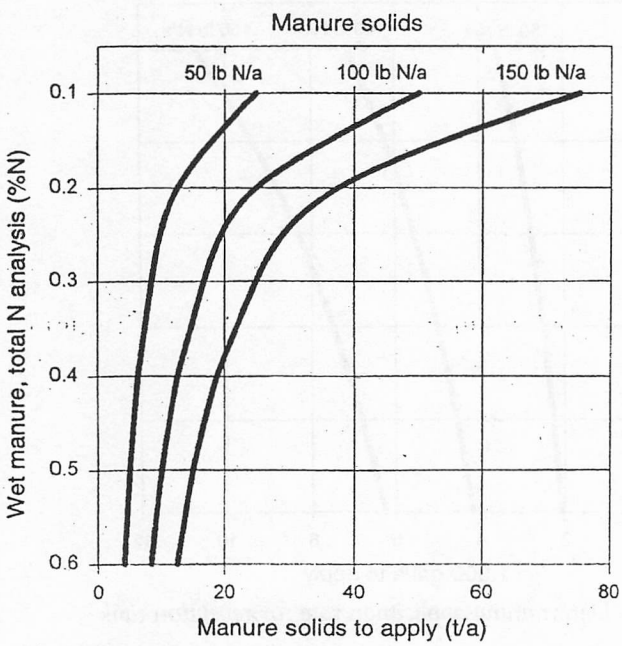


Figure 3.—Determining application rate for manure solids.

Example

Crop: perennial ryegrass

Manure: lagoon effluent

1. Average yield per cutting = 1.2 t/a (Table 1).
2. Nitrogen removal rate = 60 lb N/a per cutting (Table 1).
3. Find the lagoon effluent graph (Figure 2).
4. Use the 50 lb/a line because it is closest to the 60 lb/a you need to apply.
5. Your manure test shows 6 lb/1,000 gal. Find this line on the left of the graph. Move across to the 50 lb/a line.
6. Move down to the bottom line to find the number of acre-inches to apply (0.3 acre-inch).

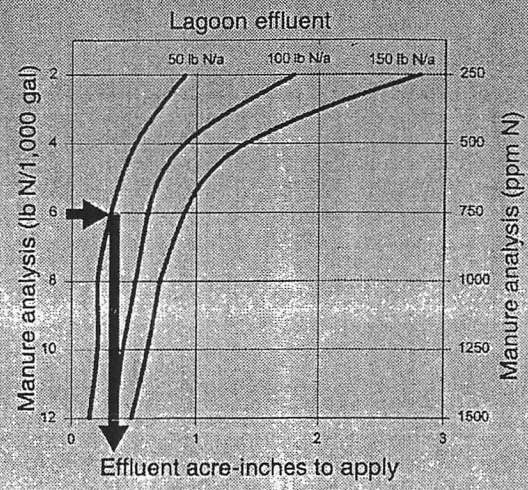


Table 2.—Approximate nitrogen removal by annual forage crops and suggested nitrogen application rates.

Crop	Average total yield (t/a)	N removal rate for average yield (lb N/a)	Suggested N application rate (lb N/t of forage*)
Silage corn			
75% moisture	30	180	5–7
dry matter basis	7	180	20–30
Annual ryegrass	5	100	15–25
Triticale	8	160	15–25
Oats	4	80	15–25
Sudan grass	5	250	50–60

*All rates are on dry matter basis unless noted otherwise.

Annual crops

You can follow a similar procedure to estimate the amount of manure needed for annual crops. For example:

1. From Table 2, find the total amount of N that is needed by the annual crop you will grow. We will use silage corn as an example. A 30-ton yield of silage corn requires 180 lb N/a.
2. Find the figure (Figures 4–6) that represents the type of manure you want to apply. Let's assume you'll apply separated solids, so use Figure 6.
3. Figure 6 contains three lines representing N application rates of 50, 100, and 150 lb N/a. Find the line that is closest to the rate you need to apply. You'll use the line for 150 lb/a since it is the closest to the rate you need to apply (180 lb/a).
4. Find your manure analysis for nitrogen on the left side of the graph. Let's assume your manure test shows that the solids contain 5 pounds of N/t or 0.25 percent N on a wet basis. Since 0.25 percent N is not on the graph, estimate a point halfway between 0.2 and 0.3. Move to the right until you meet the line for 150 lb N/a.
5. Now move down to the line labeled "manure solids to apply (t/a)." You should find 30 tons. Remember that 20 percent more nitrogen will be needed because no line exists for the 180 lb N/a required by the silage corn. The total estimated amount of solids required should be 35 t/a.

Note: If you know your own yield, you can figure your nitrogen need more accurately. To do so, multiply your tons per acre by the "suggested N application rate (lb N/t of forage)" in Table 2. The result is your N removal rate. Use the line in the appropriate figure that is closest to that rate.

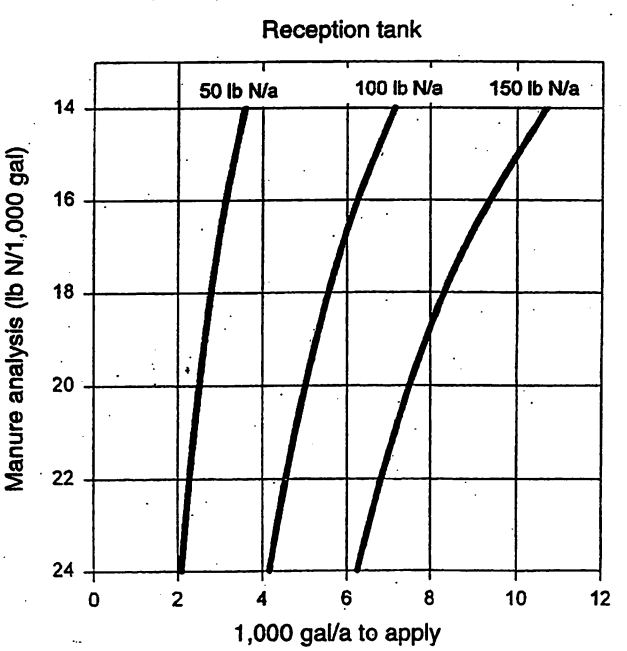


Figure 4.—Determining application rate for reception tank manure.

Special cases

The manure application rates in this publication are based on the assumption that manure already has been applied to fields for at least 4 consecutive years, not including the current year.

If your fields have received manure for less than 4 years, increase rates as shown in Table 3 if you use reception tank, separated solids, or dry stack material. Lagoon effluent provides sufficient available N for any situation when applied during the growing season.

Checking your application rate for silage corn

With silage corn, you can confirm that you applied sufficient manure by using the pre-sidedress soil nitrate test (PSNT). When the corn is 12 inches tall or at the five-leaf development stage, sample soil between rows to a depth of 12 inches. Have the sample analyzed for nitrate nitrogen (NO_3-N).

Compare the soil test results to Table 4. Apply the appropriate amount of lagoon effluent or fertilizer N to the growing crop based on the PSNT and Table 4.

It is important to handle samples properly. For more information, see *The Pre-sidedress Soil Nitrate Test (PSNT)*, EM 8650.

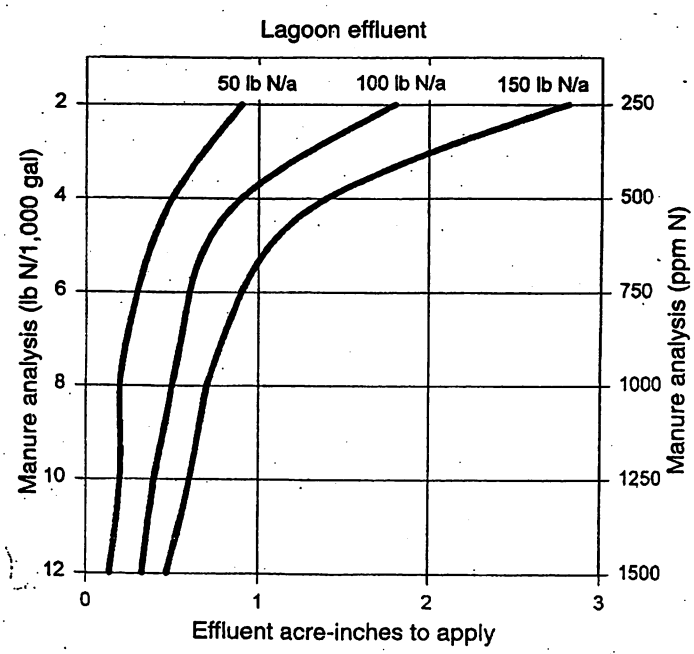


Figure 5.—Determining application rate for lagoon effluent.

Table 3.—Manure application rates based on number of years field has received manure.

If your field has received manure this many years:	Multiply suggested application rate by:
0	3.0
1	2.5
2	2.0
3	1.5
4 or more	Use suggested rates

Table 4.—Amount of nitrogen to apply for silage corn production based on the PSNT.

PSNT (ppm)	Nitrogen (lb/a)
0–10	100–150
10–20	50–100
20–25	0–50
above 25	0

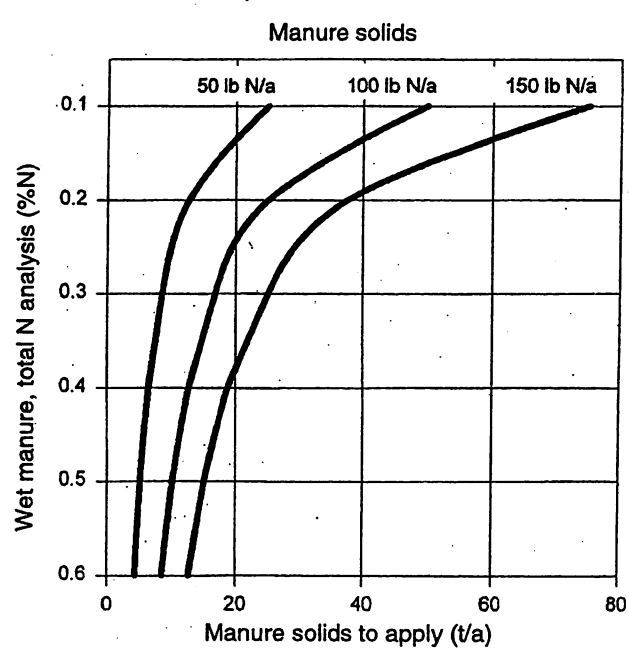


Figure 6.—Determining application rate for manure solids.

Testing your soil for P and K

Test your soil for phosphorus (P) and potassium (K) before applying manure. Table 5 provides interpretations of P and K soil tests.

If you've applied manure for more than 5 years, additions of P and K usually are not needed. For example, potassium usually is not deficient in soils where manure has been applied unless the applications were light and a high yield of grass hay was removed.

A manure application that meets crop nitrogen needs usually supplies sufficient amounts of P and K. Manure contains as much, if not more, K than N. For more information, see EM 8586, *Dairy Manure as a Fertilizer Source.*

In fact, fields that have received manure for a decade or more often have high soil test values for P and K. Fields with soil test K above 1,000 ppm can produce grass forage with a high K concentration. When grass forage with more than 3 percent K is fed to dry cows, serious illness or death may occur.

In some cases, a soil test shows excessive K, but is needed. In this case, you have two options:

- Apply separated solids, which are lower in K than other forms of manure.
- If another area is available for manure application, apply manure there and buy N fertilizer for the area that has excess K.

Contact your county office of the OSU Extension Service for additional information.

New plantings

Little N is needed by new plantings. After N, phosphorus is the nutrient most likely to limit forage production. For new plantings or annual crops where manure has not been applied, apply 30 lb P_2O_5/a in a band-placed starter fertilizer. For more information, see FG 63, *Pasture Fertilizer Guide.*

Table 5.—Interpretation of soil tests for P and K.

Soil status	Nutrient: Phosphorus (P) (ppm)	Nutrient: Potassium (K) (ppm)
deficient	below 25	below 150
sufficient	25–50	150–500
high	50–75	500–1,000
excess	above 75	above 1,000

If P is deficient (see Table 5), also apply one of the following :

- 25 tons of separated solids
- 5,000 gallons of reception tank manure
- 5 wet tons of dry stack manure

End-of-season testing

The tables and figures in this publication provide only an estimate of manure application rates. An end-of-season soil test for nitrate nitrogen or stalk nitrate test for silage corn can aid in adjusting next season's manure application rates.

"Report card" soil testing

1. Sample soil to a depth of 12 inches as described for PSNT sampling. Sample from between rows, and avoid fertilizer bands. See EM 8650 for more information.
2. Prepare and handle the sample as described for PSNT sampling.
3. Have the sample analyzed for nitrate nitrogen (NO_3-N).

If soil NO_3-N test results are above 15 ppm, nitrogen probably was supplied in excess of crop needs. (To convert ppm to lb/a, multiply by 3.65.)

Corn stalk nitrate testing at harvest

1. Collect 10 mature corn plants by cutting the stalks just above the brace roots. Select representative plants away from edges of the field.
2. Cut an 8-inch section of stalk from the bottom of each harvested plant.
3. Remove the dried outer leaves from each 8-inch section.
4. Split each section of stalk lengthwise to aid in drying.
5. Place the split stalks together in a bag and send to a lab for nitrate nitrogen (NO_3-N) analysis.
6. Use Table 6 to interpret results.

Table 6.—Interpretation of corn stalk nitrate tests.

Stalk NO_3-N concentration at harvest	Interpretation
<3,500 ppm	N may have limited yield
3,500–5,500 ppm	N sufficient for optimum yield
>5,500 ppm	N supplied in excess of crop demand

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Hart, J. *A List of Analytical Laboratories Serving Oregon*, FG 74 (Oregon State University, Corvallis, revised 1996). No charge

Hart, J., G. Pirelli, L. Cannon, and S. Fransen. *Pastures Fertilizer Guide*, FG 63 (Oregon State University, Corvallis, 1993). No charge

Hart, J., M. Gangwer, M. Graham, and E. Marx. *Dairy Manure as a Fertilizer Source*, EM 8586 (Oregon State University, Corvallis, reprinted 1996). 75¢

Marx, E., N.W. Christensen, J. Hart, M. Gangwer, C.G. Cogger, and A.I. Bary. *The Pre-sidedress Soil Nitrate Test*, EM 8650 (Oregon State University, Corvallis, 1996). 75¢

Other publications

Marx, E. *Evaluation of Soil and Plant Analyses as Components of a Nitrogen Monitoring Program for Silage Corn* (Masters thesis, Oregon State University, 1995).

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COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U.S. DEPARTMENT OF AGRICULTURE
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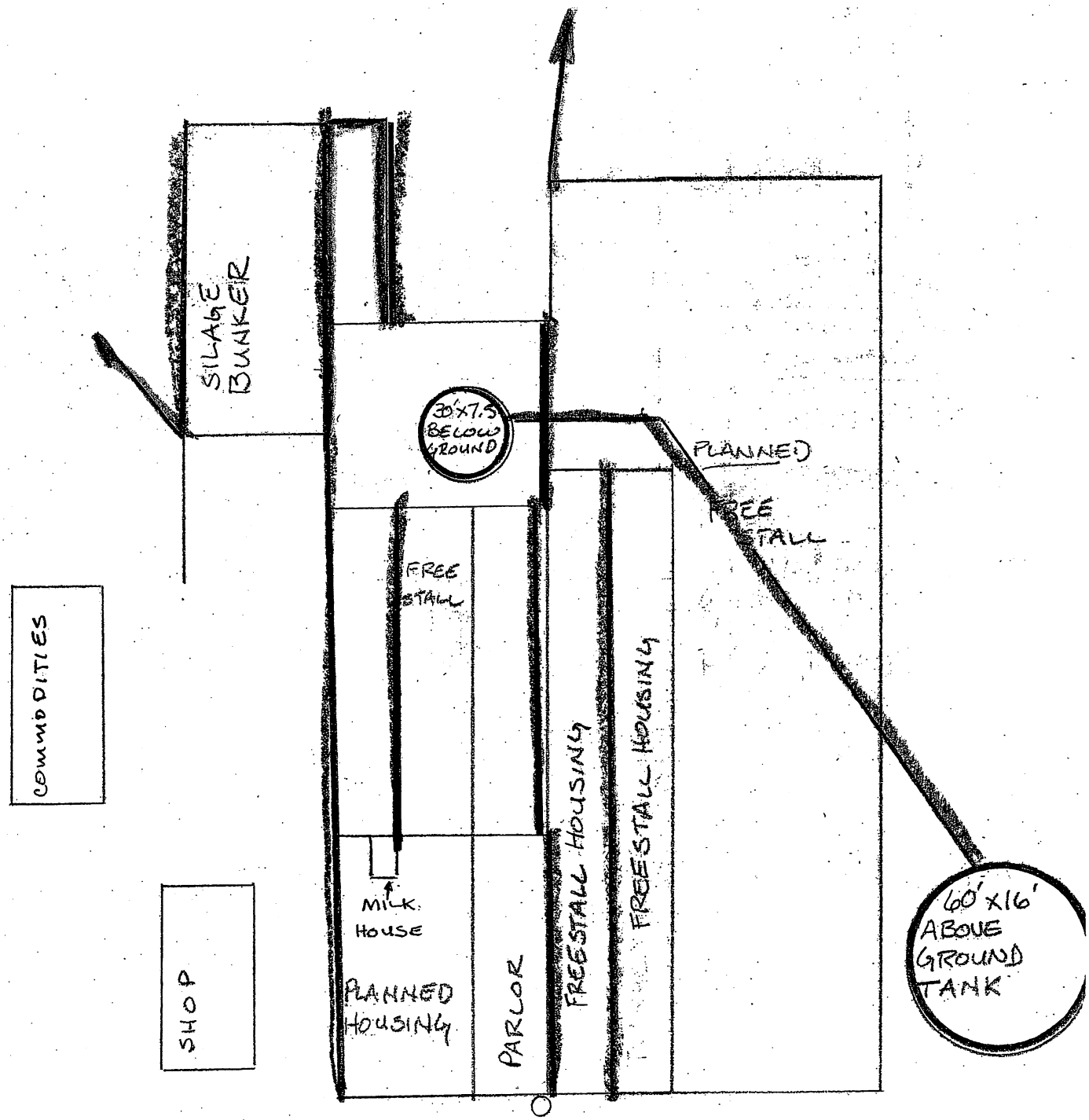
BY KWP	DATE 9/98	CHECKED BY	DATE	JOB NO.
SUBJECT FARMSTEAD LAYOUT				SHEET ____ OF ____



LEGEND
BELOW GROUND TANK
ABOVE GROUND TANK
DRY STORAGE FACILITY
GUTTERS & DOWNSPOUTS
WASTE TRANSFER PIPELINE
GUTTER OUTLET (PLANNED)
ROOFING (PLANNED)

SCALE: 1" = 50'

OPERATOR AGREEMENT
FOR
SANCHES DAIRY

As owner and operator of the Sanches Dairy located at 4720 Long Prairie Road, Tillamook, Oregon 97141. I have read, understand, and concur with the facilities and management set forth in my Animal Waste Management System Plan.

Signature: Andres Sanchez — 2-24-99
Owner/Operator — Date

This plan has been prepared by: **Robert A. Pedersen**

Signature: Robert A. Pedersen — 02/24/99
Resource Conservationist — Date
Natural Resources
Conservation Service
Tillamook, Oregon

AWMP 9906
REC'D 2-26-99

Andres Sanches
9/98

LAND USE SUMMARY

Tract No.	Field No.	Land Use	Acres	
427	1	Pasture	7.0	
	2	Pasture	6.5	
	3	Pasture	23.9	
	4	Pasture	17.9	
	5	Wildlife	4.4	??
	F	Farmstead	2.3	
450 (Leased)	1	Pasture	22.1	T450
43 (Leased)	1	Pasture	16.6	T43
	2	Pasture	5.1	
	3	Pasture	1.7	
632 (Leased)	1	Hayland	7.6	T632
AIRPORT	2	Hayland	34.1	
	3	Hayland	17.6	
	4	Hayland	1.4	
	5	Hayland	1.4	
	6	Hayland	2.0	
	7	Hayland	2.4	
	8.	Hayland	14.0	
	9.	Hayland	19.8	
	10	Hayland	13.3	
		Total	**221.1**	

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

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SOIL CONSERVATION SERVICE

STATE OREGON		PROJECT ANDRES SANCHEZ - TRASK RIVER		
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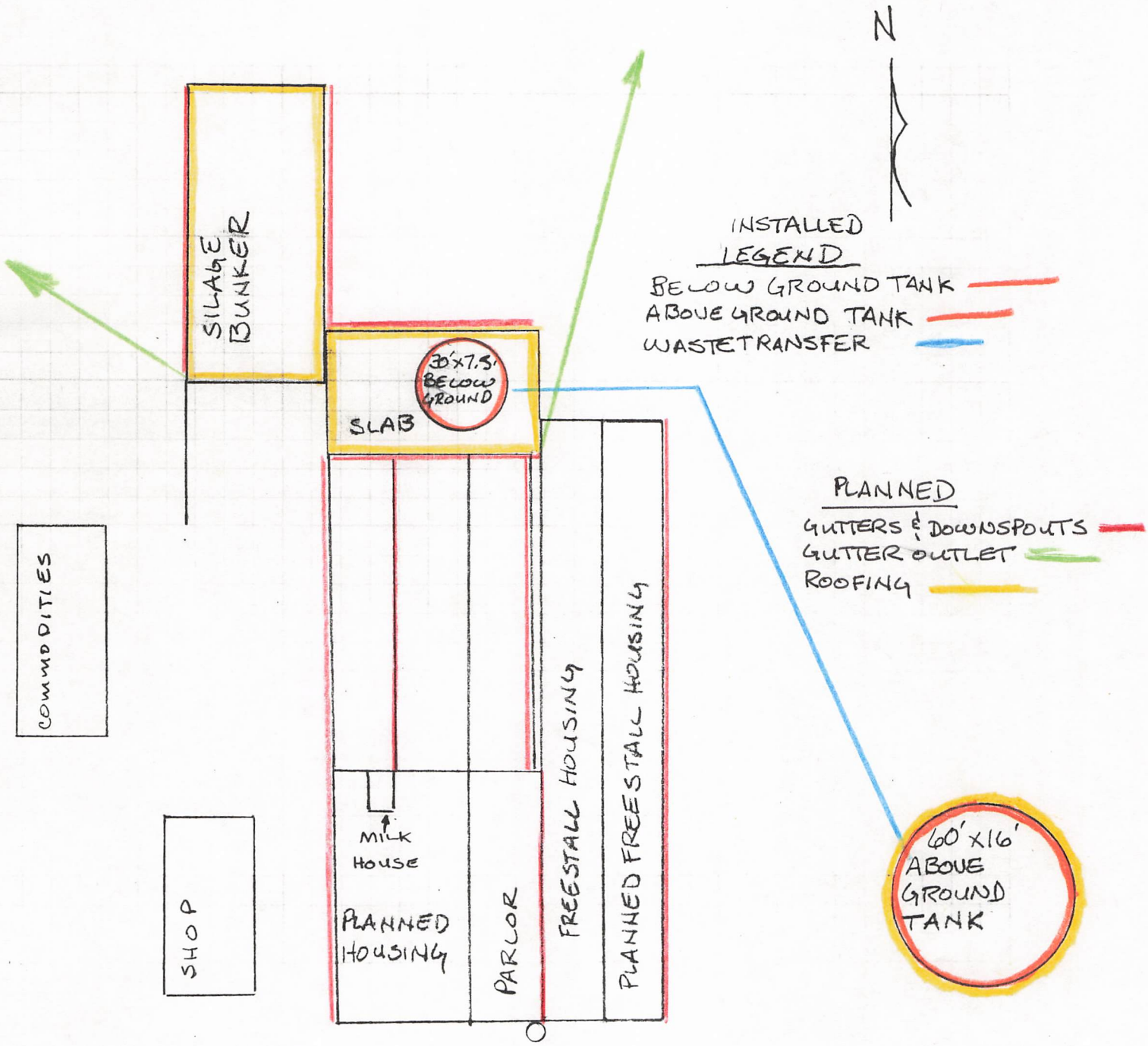

SCALE 1"=50'

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Tillamook (503)842-2848

CONSERVATION PLAN COVER PAGE

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

Farm	Tract	ACRES	LAND UNIT NAME	OWNER NAME
1	427	62.0	Dairy Operations	
	632	113.6	Hayland (Leased)	
	43	23.4	Pasture	
	450	22.1	Pasture (Leased)	
	TOTAL	221.1 ACRES		

BUSINESS OBJECTIVES

01/09/99
Implement a waste management system that is economically feasible that improves the overall dairy operation and allows for increase in cow numbers. The system will prevent surface and/or ground water pollution. The operation will be in compliance with ODA's Confined Feeding Operation regulations, rules, and permit conditions.

CONSERVATION PLAN

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

LAND UNITS		PLANNED			APPLIED		
TRACT	FIELD	AMOUNT	MONTH	YEAR	AMOUNT	DATE	PLANNED CONSERVATION TREATMENT
							Farmstead
427	F	2.3Ac					Thr major land use is the farmstead. The animal confinement buildings, milkhouse and parlor, silage bunker, and waste storage facilities are located within this land use. The landscape is the lower agricultural lands within the Trask River Watershed. The soils are well drained and subject to flooding. The annual precipitation is 90 inches. This Resource Management System will prevent groundwater and/or surface water degredation associated with the waste runoff at the animal confinement area.
427	F	1.0no	09	2008			WASTE MANAGEMENT SYSTEM A waste management system consisting of structural and vegetative practices for the collection, transfer, storage and land application of waste generated from the confined animal feeding operation will be installed, maintained, and managed. The identified practices will allow the management of the wastes during periods when direct application may contribute to surface and/or groundwater degradation. Conservation practices will be operated and maintained in accordance with the enclosed "CONSERVATION PRACTICE OPERATION AND MAINTENANCE PLAN". Practices will be installed in accordance with NRCS specifications and/or NRCS approved design drawings provided prior to installation of a practice. Waste utilization will be applied in accordance with Job Sheet 1: Waste Utilization. Pastures will be managed in accordance with Job Sheet 2: Prescribed Grazing.
427	F	3318.0Sq	08	2007			ROOF RUNOFF MANAGEMENT (Roof) A cover will be installed over the above ground liquid manure tank to keep out the rain and increase the liquid waste storage capacity. The cover will increase the liquid waste storage for the 359 - 1000 lb units to 72 days.
427	F	5500.0Sq	08	2004			ROOF RUNOFF MANAGEMENT (Roof) A roof will be installed over the silage bunker. The roof will be 50'x 110'.
427	F	2520.0Sq	08	2003			ROOF RUNOFF MANAGEMENT (Roof) A roof will be installed over the existing liquid manure tank to keep rainwater from entering the tank. The roof will cover the manure accumulation area on the north side of the confinement building surrounding the liquid manure tank.

CONSERVATION PLAN

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

LAND UNITS		PLANNED			APPLIED		
TRACT	FIELD	AMOUNT	MONTH	YEAR	AMOUNT	DATE	PLANNED CONSERVATION TREATMENT
427	F	450.0Ft	09	1999			UNDERGROUND OUTLET (6 inch pipe) A 6-inch underground PVC nonperforated pipe will be installed to outlet gutter downspouts in an area free of manure.
427	F	1725.0Ft	09	1999			ROOF RUNOFF MANAGEMENT (Gutters & Downspouts) Gutters and downspouts will be installed on all existing animal confinement buildings that do not have adequate guttering.
427	F	1.0No	07	1997	1.0No	07/14/1997	MANURE TRANSFER (Pump) A manure pump has been installed to transfer liquid manure from the below ground liquid manure tank to the above ground liquid manure tank.
427	F	1.0No	12	1995	1.0No	12/08/1995	WASTE STORAGE FACILITY (Agitator) An agitator has been installed in the above ground liquid manure tank to prevent solid manure buildup in the tank and keep the manure in a slurry so it can be pump to the pastures.
427	F	400.0Ft	12	1995	400.0Ft	12/08/1995	MANURE TRANSFER (5 inch pipe) A 5 inch PVC 160 psi pipe has been installed to transfer the liquid manure from the below ground liquid manure tanks to the above ground liquid manure tank.
427	F	45302.0Cf	10	1995	45302.0Cf	10/16/1995	WASTE STORAGE FACILITY (Above Ground Liquid Manure Tank) An above ground liquid manure tank has been installed. A 60'x 16' above ground liquid waste storage tank was installed in accordance with an approved NRCS design and specifications. The tank in combination with the below ground liquid waste storage tank will store the liquid wastes from the planned 359 - 1000 lb units for 56 days.
427	F	5301.0Cf	06	1987	5301.0Cf	06/08/1997	WASTE STORAGE FACILITY (Below Ground Liquid Manure Tank) A below ground liquid manure tank has been installed. A 30'x 7.5' below ground liquid waste storage tank was installed. This tank will store the lilquid wastes from the planned 359 - 1000 lb units for 5 days.
							Hayland
632	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	113.6Ac					
632	1	7.6ac	09	2000			WASTE UTILIZATION
	2	34.1ac	09	2000			Manure will applied to hayland in accordance with Job Sheet

CONSERVATION PLAN

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

LAND UNITS		PLANNED			APPLIED		
TRACT	FIELD	AMOUNT	MONTH	YEAR	AMOUNT	DATE	PLANNED CONSERVATION TREATMENT
	3	17.6ac	09	2000			#1: Waste Utilization.
	4	1.4ac	09	2000			Soil and manure samples will be taken in accordance with Job
	5	1.4ac	09	2000			Sheet #5.
	6	2.0ac	09	2000			
	7	2.4ac	09	2000			
	8	14.0ac	09	2000			
	9	19.8ac	09	2000			
	10	13.3ac	09	2000			
632	1	7.6ac	09	1999			FORAGE HARVEST MANAGEMENT
	2	34.1ac	09	1999			Forage will be harvested in accordance with Job Sheet #4:
	3	17.6ac	09	1999			Forage Harvest Management
	4	1.4ac	09	1999			Forage samples will be taken during the growing season to
	5	1.4ac	09	1999			document crude protein.
	6	2.0ac	09	1999			
	7	2.4ac	09	1999			
	8	14.0ac	09	1999			
	9	19.8ac	09	1999			
	10	13.3ac	09	1999			
632	1	7.6ac	06	1999			PEST MANAGEMENT
	2	34.1ac	06	1999			WHEN APPLYING CHEMICALS FOR WEED CONTROL, MANUFACTURER'S
	3	17.6ac	06	1999			LABEL APPLICATION RATES WILL BE FOLLOWED. Chemicals will be
	4	1.4ac	06	1999			used to control the following weeds: Tansy Ragwort, Canada
	5	1.4ac	06	1999			Thistle, Bull Thistle, and Curly Dock. No pesticides will be
	6	2.0ac	06	1999			sprayed into an open water course. Chemicals will be applied
	7	2.4ac	06	1999			during periods of minimum potential for drift. Pesticide
	8	14.0ac	06	1999			containers will be stored and disposed of according to
	9	19.8ac	06	1999			manufacturer's label directions.
	10	13.3ac	06	1999			
							Pasture
43	1, 2, 3	23.4Ac					
427	1, 2, 3, 4	55.3Ac					
450	1	22.1Ac					
43	1	16.6ac	09	2000			WASTE UTILIZATION
	2	5.1ac	09	2000			Manure will applied to the pastures in accordance to the
	3	1.7ac	09	2000			enclosed Job Sheet #1: Waste Utilization
427	1	7.0ac	09	2000			Soil and manure tests will be taken in accordance with Job
	2	6.5ac	09	2000			Sheet #5.
	3	23.9ac	09	2000			
	4	17.9ac	09	2000			
450	1	22.1ac	09	2000			
43	1	16.6ac	09	1999			PRESCRIBED GRAZING

CONSERVATION PLAN

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

LAND UNITS		PLANNED			APPLIED		
TRACT	FIELD	AMOUNT	MONTH	YEAR	AMOUNT	DATE	PLANNED CONSERVATION TREATMENT
	2	5.1ac	09	1999			Pastures will be managed in accordance with the enclosed Job
	3	1.7ac	09	1999			Sheet #2: Prescribed Grazing.
427	1	7.0ac	09	1999			Forage tests will be taken during the growing season to
	2	6.5ac	09	1999			document crude protein.
	3	23.9ac	09	1999			
	4	17.9ac	09	1999			
450	1	22.1ac	09	1999			
43	1	16.6ac	05	1999			PEST MANAGEMENT
	2	5.1ac	05	1999			WHEN APPLYING CHEMICALS FOR WEED CONTROL, MANUFACTURER'S
	3	1.7ac	05	1999			LABEL APPLICATION RATES WILL BE FOLLOWED. Chemicals will be
427	1	7.0ac	05	1999			used to control the following weeds: Tansy Ragwort, Canada
	2	6.5ac	05	1999			Thistle, Bull Thistle, and Curly Dock. No pesticides will be
	3	23.9ac	05	1999			sprayed into an open water course. Chemicals will be applied
450	1	22.1ac	05	1999			during periods of minimum potential for drift. Pesticide
							containers will be stored and disposed of according to
							manufacturer's label directions.

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CONSERVATION PLAN APPROVAL

Client: Sanches, Andres Sanches Dairy
Assisted By: Robert A.Pedersen

Farm	Tract	ACRES	LAND UNIT NAME	OWNER NAME
1	427	62.0	Dairy Operations	
	632	113.6	Hayland (Leased)	
	43	23.4	Pasture	
	450	22.1	Pasture (Leased)	
	TOTAL	221.1 ACRES		

Cooperator (Producer) Date

The above Conservation Plan meets the requirements of the Field Office Technical Guide.

Designated Conservationist Date

Approved by

Conservation District Date

Planned Waste Storage

SUMMARY OF ANIMAL WASTE MANAGEMENT
PLANNING WORKSHEET
FOR

Andres Sanchez

Assisted by- Pedersen Date- 02-08-1999

NUMBER OF ANIMALS, AVERAGE WEIGHT AND STORAGE PERIODS
REF: NRCS Agricultural Waste Management Field Handbook (AWMFH) by 2007

DESCRIPTION	NUMBER	WEIGHT LBS	CONFINEMENT START	CONFINEMENT END	CONFINEMENT DAYS	DAYS GRAZED	DAYS STORAGE LIQUIDS	DAYS STORAGE SOLIDS
MILKER Holstein)	210	1300	NOV	APR	181	184	72	0
MILKER JERSEY	100	800	NOV	APR	181	184	72	0
CALVES (Holsteins)	10	400	DEC	NOV	365	0	72	0
CALVES (Jersey)	10	200	DEC	NOV	365	0	72	0
	330							

NRCS Animal Waste Management System(PS 312), Job Class- II 359 AUs

1000LB ANIMAL UNITS(AU)	CF/DAY MANURE	LB/DAY N	LB/DAY P	LB/DAY K
359	524.4	186.3	28.8	107.2

BEDDING AND SEPARATOR FACTORS **REF: AWMFH Chapter 9**
TYPE OF BEDDING- Paper
DAILY BEDDING FACTOR- 0.02 CF/DAY/AU OR 7 CF/DAY
NO SOLIDS SEPARATED

VOLUME OF WASH WATER **REF: AWMFH Chapter 10**
Total Daily Volume = 975 GAL/DAY OR 130.38 CF/DAY

TOTAL RAINFALL RUNOFF AREA CONTRIBUTING TO STORAGE = 0 SF
Does silage seepage enter liquid storage facility (Y/N)-? YES

CLIMATIC STATION - TILLAMOOK 1 W **REF: AWMFH Chapter 10**

LIQUID STORAGE FACILITY - Tank(Covered)
NO SOLIDS TO STORE

STORAGE VOLUMES -	LIQUID	SOLID
Volume to Store for 72 Days =	47595 CF	0 CF
Volume of Existing Facilities =	5301 CF	0 CF
Volume of Planned Facility =	42294 CF	0 CF

CROPS AND NUTRIENT ACCOUNTING- **REF: AWMFH Chapter 6**

Crops	Yield Units	Target Yield	Nutrients Utilized Pounds/Acre N	P2O5	K2O	Application Inches/Acre Liquid	Solid
Tillamook Mix	(Ton)	6	307.2	74.1	205.3	0.79	0.00

51.2 lbs/ton

AVAILABLE ACRES= 214.4	Nitrogen	Nutrients in Pounds Phosphorous(P2O5)	Potassium(K2O)
TOTAL NUTRIENTS PRODUCED>	42,870	22,857	44,779
TOTAL ACRES NEEDED>>>>>>>	140	308	218

ok

221 ok 221

ORAWM Version 5.6 January 1999

ANIMAL WASTE MANAGEMENT
PLANNING WORKSHEET
FOR
Andres Sanchez

Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

NUMBER OF ANIMALS, AVERAGE WEIGHT AND STORAGE PERIODS
REF: NRCS Agricultural Waste Management Field Handbook Chapter 4 & 10

DESCRIPTION	NUMBER	WEIGHT LBS	CONFINEMENT START	CONFINEMENT END	CONFINEMENT DAYS	DAYS GRAZED	DAYS STORAGE LIQUIDS	DAYS STORAGE SOLIDS
MILKER Holstein)	210	1300	NOV	APR	181	184	72	0
MILKER JERSEY	100	800	NOV	APR	181	184	72	0
CALVES (Holsteins)	10	400	DEC	NOV	365	0	72	0
CALVES (Jersey)	10	200	DEC	NOV	365	0	72	0

DAILY NUTRIENTS AND VOLUMES PRODUCED REF: AWMFH Chapter 4
NRCS Animal Waste Management System(PS 312), Job Class- II 359 AUs

DESCRIPTION	1000 LB ANIMAL UNITS(AU)	CF/D/AU MANURE	LB/DAY/AU N	LB/DAY/AU P	LB/DAY/AU K
MILKER Holstein)	273.00	1.57	0.57	0.09	0.32
MILKER JERSEY	80.00	1.10	0.36	0.05	0.23
CALVES (Holsteins)	4.00	1.30	0.31	0.04	0.24
CALVES (Jersey)	2.00	1.30	0.31	0.04	0.24
TOTALS>>>>>>>>>>>>>>>>>>	359.00	1.46	0.52	0.08	0.30

5.27

BEDDING AND SEPARATOR FACTORS REF: AWMFH Chapter 9

TYPE OF BEDDING- Paper
DAILY BEDDING FACTOR- 0.02 CF/DAY/AU

NO SOLIDS SEPARATED

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

VOLUME OF WASH WATER REF: AWMFH Chapter 10

DESCRIPTION	RANGE	SELECTED GAL/DAY	SELECTED CF/DAY
Cow Preparation-			
Manual.....	(3-7Gal or 0.5-1CF /Cow-Day)	0.5	0.067
Automatic- Stall Wash...	(5-15Gal or 1-2CF /Cow-Day)		
Sprinkler Wash.....	(25-40Gal or 3-5.5CF /Cow-Day)		
Total Daily Volume = 210 Cows X Total Selected Amount=		105	14.07
Bulk Tank- Automatic.....	(60-110Gal or 8-15CF /Wash)	60	8.021
Manual.....	(30-50Gal or 4-7CF /Wash)		
Miscellaneous Equipment.....	(25-35Gal or 3-5CF /Wash)		
Pipelines.....	(75-150Gal or 10-20CF /Wash)	75	10.027
Milkhouse and Parlor.....	(300-700Gal or 40-90CF /Wash)	300	40.107
Holding Area.....	(500-1200Gal or 70-160CF /Wash)	0	0
Total Daily Volume= 2 Washes X Total Selected Amount=		870	116.31

RAINFALL RUNOFF AREA CONTRIBUTING TO STORAGE

DESCRIPTION	AREA IN SQUARE FEET
Roof.....	
Concrete Slab, Scraped Daily, (Y/N)- NO	0
Unsurfaced Lot.....	0
Total-	0 SF

Does silage seepage enter liquid storage facility (Y/N)-? YES

CLIMATIC AND HYDROLOGIC DATA REF: AWMFH Chapter 10

CLIMATIC STATION- TILLAMOOK 1 W
25YR-24HR STORM RAINFALL- 6.00 Inches

Month	Average Monthly in Inches Precipitation	Evaporation	% Lot Runoff Factors Concrete	Unpaved
JAN	13.46	0.48	60	25
FEB	10.45	0.78	50	25
MAR	10.35	1.26	45	15
APR	6.03	1.90	40	15
MAY	4.24	3.22	40	10
JUN	3.16	3.40	35	10
JUL	1.44	3.91	30	0
AUG	1.73	3.52	40	10
SEP	3.69	2.54	45	15
OCT	7.48	1.42	50	20
NOV	12.80	0.75	60	25
DEC	14.25	0.60	60	25
ANNUAL	89.08	23.78		

Landowner/Operator- Ares Sanchez
Location- Tillamook
Assisted by- Pedersen

Date- 02-08-1999

RAINFALL RUNOFF ENTERING LIQUID STORAGE FACILITY

Month	<<<<<<<<<<<<<<<<<<<<RUNOFF IN CUBIC FEET>>>>>>>>>>>>>>>>>>>				
	0SF Roof	0SF Concrete Slab	0SF Unsurfaced Lot	2,826SF Storage Surface	Monthly Totals
JAN	0	0	0	3,170	3,170
FEB	0	0	0	2,461	2,461
MAR	0	0	0	2,437	2,437
APR	0	0	0	1,420	1,420
MAY	0	0	0	999	999
JUN	0	0	0	744	744
JUL	0	0	0	339	339
AUG	0	0	0	407	407
SEP	0	0	0	869	869
OCT	0	0	0	1,762	1,762
NOV	0	0	0	3,014	3,014
DEC	0	0	0	3,356	3,356

TOTAL MONTHLY INFLOWS ENTERING LIQUID STORAGE FACILITY

Month	<<<<<<<<<<<<<<<<<<<<<<<<<<INFLOW IN CUBIC FEET>>>>>>>>>>>>>>>>>>>>>>>>					
	Surface Runoff	Evaporation	Seepage	Wash Water	Manure	Totals
JAN	3,170	-113	946	4,042	16,257	24,301
FEB	2,461	-184	734	3,651	14,683	21,346
MAR	2,437	-297	727	4,042	16,257	23,167
APR	1,420	-447	424	3,911	15,732	21,040
MAY	999	-758	298	4,042	242	4,822
JUN	744	-801	222	3,911	234	4,311
JUL	339	-921	101	4,042	242	3,803
AUG	407	-829	122	4,042	242	3,984
SEP	869	-598	259	3,911	234	4,676
OCT	1,762	-334	526	4,042	242	6,236
NOV	3,014	-177	900	3,911	15,732	23,381
DEC	3,356	-141	1,002	4,042	16,257	24,515
ANNUAL	20,978	-5,600	6,261	47,589	96,353	165,581

Total Liquids Entering Liquid Storage Facility Based on 72 Day Storage-

Roof, Slab and Lot Runoff=	0 CF	or	0.0 AF
Seepage=	450 CF	or	0.0 AF
Washwater=	9,387 CF	or	0.2 AF
Manure=	37,758 CF	or	0.9 AF
25Yr-24Hr Rainfall Runoff=	0 CF	or	0.0 AF
Existing Storage=	5,301 CF	or	0.1 AF
Existing Storage Surface Area=	0 SF	or	0.0 AC

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

DESCRIPTION OF LIQUID WASTE MANAGEMENT SYSTEM

STORAGE METHOD>>> Tank(Covered)

Diameter of Tank=	60 ft.
Depth of Tank=	14.97 ft.
Is Tank Covered, (Y/N)?-	YES - 2003 YR
Volume of Liquids to Store=	47595 CF
Volume of Facility=	42294 CF

APPLICATION METHOD>>> Sprinkling
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR LIQUIDS>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds 34,057	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds 12,032	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds 23,700
Storage	80	27,246	90	10,829	90	21,330
Application	75	20,434	100	10,829	100	21,330
Denitrification	87	17,778	100	10,829	100	21,330

MANAGEMENT CRITERIA FOR Sprinkling APPLICATION OF LIQUIDS>>>

Sprinkler Flowrate=	220 GPM
Wetted Diameter=	200 FEET
Application Rate=	0.68 INCHES/HOUR
NITROGEN Concentration in Storage=	2637 PPM OR 21.99 LBS/1000 GAL

To apply 1,238,548 gallons of liquids generated from the operation, it will take approximately 94 hours of pumping annually. Based on applying NITROGEN at the agronomic rate, use the application depths, set times and travel rates listed below for each crop:

CROP	Application (NO)	(LBS)	(INCHES)	Set Time (HOURS)	Travel Rate (FEET/MINUTE)
Tillamook Mix	1.0	307	0.79	1.2	2.2

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

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DESCRIPTION OF SOLIDS WASTE MANAGEMENT SYSTEM

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STORAGE METHOD>>> Solids Storage(Roofed)
NO SOLIDS TO STORE - BUT NO SEPARATING SYSTEM

APPLICATION METHOD>>> Broadcast
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR SOLIDS>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds 0	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds 0	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds 0
Storage	75	0	0	0	90	0
Application	80	0	100	0	100	0
Denitrification	87	0	100	0	100	0

MANAGEMENT CRITERIA FOR Broadcast APPLICATION OF SOLIDS>>>
Tractor Spreader Capacity= 160 BUSHELS or 199 CF
Width of Application= 12 FEET
NITROGEN Concentration in Storage= 0 PPM OR 0.00 LBS/100CF

To apply 0 cubic feet of solids generated from the operation, it will take approximately 0 trips annually using a tractor spreader. Based on applying NITROGEN at the agronomic rate, use the application depths, travel lengths and loads per acre listed below for each crop:

CROP	Application (NO)	Application (LBS)	Application (INCHES)	Travel Length (FEET) per Load	Loads per Acre (NO)
Tillamook Mix	1.5	210	0.00	0	0.0

Landowner/Operator- [illegible]es Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

DESCRIPTION OF WASTE MANAGEMENT FOR GRAZING SYSTEM

STORAGE METHOD>>> None (grazing)

APPLICATION METHOD>>> Grazing
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR GRAZING>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds
		33,931		12,028		23,449
Storage	100	33,931	100	12,028	100	23,449
Application	85	28,842	100	12,028	100	23,449
Denitrification	87	25,092	100	12,028	100	23,449

CROP INVENTORY N-Nitrogen P2O5-Phosphorous K2O-Potassium

REF: AWMFH Chapter 6

Crops	Yield Units	Target Yield	Nutrients Utilized Pounds/Acre N	P2O5	K2O	Allowable Application Inches/Acre Liquid	Solid
Tillamook Mix	(Ton)	6	307.2	74.1	205.3	0.79	0.00

UTILIZATION ACRES BASED ON NITROGEN

Crop	Percent to be Applied / Acres Liquids	Solids	Grazing
Tillamook Mix	100 / 58	100 / 0	100 / 82
TOTALS>>>>>>>>>>>>>>>>>>>>>>>	100 / 58	100 / 0	100 / 82

Landowner/Operator- Andrés Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

NUTRIENTS TO BE UTILIZED AND VALUE IN DOLLARS PER POUND

Nutrient Form	Nutrients in Pounds Nitrogen	Phosphorous(P2O5)	Potassium(K2O)
Liquid-	17,778	10,829	21,330
Solid-	0	0	0
Grazing-	25,092	12,028	23,449
TOTAL>>>>>>>>>>>>>>>	42,870	22,857	44,779
Nutrient Value>>>>>>	$0.30/Lb	$0.60/Lb	$0.15/Lb

NUTRIENT MANAGEMENT COSTS AND NUTRIENT BALANCE

System Life = 40 YEARS
Annual Percentage Rate = 8 %
Fertilizer Application Cost = $6.25 /Acre
Manure Application Cost = $20.00 /Acre

Utilization Area Acres	Cost Savings $/Yr	Breakeven Cost $/Life	Nutrients Utilized Lbs N	P2O5	K2O	Nutrient Balance Lbs N	P2O5	K2O
***140	$21,447	$255,752	42870	10345	28654	-0	-12512	-16125
185	$24,244	$289,095	56831	13714	37986	13961	-9143	-6794
247	$27,158	$323,843	75774	18285	50647	32904	-4571	5868
***308	$29,052	$346,439	94718	22857	63309	51848	0	18530
370	$28,204	$336,328	113661	27428	75971	70791	4571	31192
432	$27,357	$326,217	132605	31999	88633	89735	9143	43854

NOTE: Negative values under Nutrient Balance indicate excess nutrients available. Positive values under Nutrient Balance indicate additional nutrients may be needed to meet target yields.

NUTRIENT APPLICATION CALENDAR

REF: AWMFH Chapter 10

S - Storage Period
A - Application Period

Fm= 0.70 Fs Liquids= 0.76 Fs Solids= 0.61 Fl= 0.91
Fn= 0.74 Fa Liquids= 0.9 Fa Solids= 1.0 Lf= 0 Ef= 0

MONTH>>>>>	---JAN---	--FEB--	----MAR----	----APR----
WEEK>>>>>	1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16 17
APPLY>>>>>	A A A A A	A A A A	A A A A	A A A A

MONTH>>>>>	------MAY-----	----JUN----	------JUL-----	----AUG----
WEEK>>>>>	18 19 20 21 22	23 24 25 26	27 28 29 30 31	32 33 34 35
APPLY>>>>>	A A A A A	A A A A	A A A A A	A A A A

MONTH>>>>>	----SEP----	------OCT-----	----NOV----	----DEC----
WEEK>>>>>	36 37 38 39 40	41 42 43 44 45	46 47 48 49 50	51 52
APPLY>>>>>	A A A A S	S S S S S	S S S S S	A A

Existing Waste Storage

SUMMARY OF ANIMAL WASTE MANAGEMENT
PLANNING WORKSHEET
FOR

Andres Sanchez

Assisted by- Pedersen Date- 02-08-1999

NUMBER OF ANIMALS, AVERAGE WEIGHT AND STORAGE PERIODS
REF: NRCS Agricultural Waste Management Field Handbook (AWMFH)

DESCRIPTION	NUMBER	WEIGHT LBS	CONFINEMENT START	CONFINEMENT END	CONFINEMENT DAYS	DAYS GRAZED	DAYS STORAGE LIQUIDS	DAYS STORAGE SOLIDS
MILKER Holstein)	210	1300	NOV	APR	181	184	56	0
MILKER JERSEY	100	800	NOV	APR	181	184	56	0
CALVES (Holsteins)	10	400	DEC	NOV	365	0	56	0
CALVES (Jersey)	10	200	DEC	NOV	365	0	56	0

NRCS Animal Waste Management System(PS 312), Job Class- II 359 AUs

1000LB ANIMAL UNITS(AU)	CF/DAY MANURE	LB/DAY N	LB/DAY P	LB/DAY K
359	524.4	186.3	28.8	107.2

BEDDING AND SEPARATOR FACTORS **REF: AWMFH Chapter 9**
TYPE OF BEDDING- Paper
DAILY BEDDING FACTOR- 0.02 CF/DAY/AU OR 7 CF/DAY
NO SOLIDS SEPARATED

VOLUME OF WASH WATER **REF: AWMFH Chapter 10**
Total Daily Volume = 975 GAL/DAY OR 130.38 CF/DAY

TOTAL RAINFALL RUNOFF AREA CONTRIBUTING TO STORAGE = 3,108 SF
Does silage seepage enter liquid storage facility (Y/N)-? YES

CLIMATIC STATION - TILLAMOOK 1 W **REF: AWMFH Chapter 10**

LIQUID STORAGE FACILITY - Tank(Uncovered)
NO SOLIDS TO STORE

STORAGE VOLUMES -	LIQUID	SOLID
Volume to Store for 56 Days =	47457 CF	0 CF
Volume of Existing Facilities =	5301 CF	0 CF
Volume of Planned Facility =	42156 CF	0 CF

CROPS AND NUTRIENT ACCOUNTING- **REF: AWMFH Chapter 6**

Crops	Yield Units	Target Yield	Nutrients Utilized Pounds/Acre N	P2O5	K2O	Application Inches/Acre Liquid	Solid
Tillamook Mix	(Ton)	6	307.2	74.1	205.3	0.93	0.00

AVAILABLE ACRES= 214.4	Nitrogen	Nutrients in Pounds Phosphorous(P2O5)	Potassium(K2O)
TOTAL NUTRIENTS PRODUCED>	40,648	22,255	43,594
TOTAL ACRES NEEDED>>>>>>>	132	300	212

ORAWM Version 5.6 January 1999

ANIMAL WASTE MANAGEMENT
PLANNING WORKSHEET
FOR
Andres Sanchez

Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

NUMBER OF ANIMALS, AVERAGE WEIGHT AND STORAGE PERIODS
REF: NRCS Agricultural Waste Management Field Handbook Chapter 4 & 10

DESCRIPTION	NUMBER	WEIGHT LBS	CONFINEMENT START	CONFINEMENT END	CONFINEMENT DAYS	DAYS GRAZED	DAYS STORAGE LIQUIDS	DAYS STORAGE SOLIDS
MILKER Holstein)	210	1300	NOV	APR	181	184	56	0
MILKER JERSEY	100	800	NOV	APR	181	184	56	0
CALVES (Holsteins)	10	400	DEC	NOV	365	0	56	0
CALVES (Jersey)	10	200	DEC	NOV	365	0	56	0

DAILY NUTRIENTS AND VOLUMES PRODUCED REF: AWMFH Chapter 4
NRCS Animal Waste Management System(PS 312), Job Class- II 359 AUs

DESCRIPTION	1000 LB ANIMAL UNITS(AU)	CF/D/AU MANURE	LB/DAY/AU N	LB/DAY/AU P	LB/DAY/AU K
MILKER Holstein)	273.00	1.57	0.57	0.09	0.32
MILKER JERSEY	80.00	1.10	0.36	0.05	0.23
CALVES (Holsteins)	4.00	1.30	0.31	0.04	0.24
CALVES (Jersey)	2.00	1.30	0.31	0.04	0.24
TOTALS>>>>>>>>>>>>>>>>>>	359.00	1.46	0.52	0.08	0.30

BEDDING AND SEPARATOR FACTORS REF: AWMFH Chapter 9

TYPE OF BEDDING- Paper
DAILY BEDDING FACTOR- 0.02 CF/DAY/AU

NO SOLIDS SEPARATED

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

VOLUME OF WASH WATER REF: AWMFH Chapter 10

DESCRIPTION	RANGE	SELECTED GAL/DAY	SELECTED CF/DAY
Cow Preparation-			
Manual.....	(3-7Gal or 0.5-1CF /Cow-Day)	0.5	0.067
Automatic- Stall Wash...	(5-15Gal or 1-2CF /Cow-Day)		
Sprinkler Wash.....	(25-40Gal or 3-5.5CF /Cow-Day)		
Total Daily Volume = 210 Cows X Total Selected Amount=		105	14.07
Bulk Tank- Automatic.....	(60-110Gal or 8-15CF /Wash)	60	8.021
Manual.....	(30-50Gal or 4-7CF /Wash)		
Miscellaneous Equipment.....	(25-35Gal or 3-5CF /Wash)		
Pipelines.....	(75-150Gal or 10-20CF /Wash)	75	10.027
Milkhouse and Parlor.....	(300-700Gal or 40-90CF /Wash)	300	40.107
Holding Area.....	(500-1200Gal or 70-160CF /Wash)	0	0
Total Daily Volume= 2 Washes X Total Selected Amount=		870	116.31

RAINFALL RUNOFF AREA CONTRIBUTING TO STORAGE

DESCRIPTION	AREA IN SQUARE FEET
Roof.....	
Concrete Slab, Scraped Daily, (Y/N)- NO	0
Unsurfaced Lot.....	3108
Total-	3,108 SF

Does silage seepage enter liquid storage facility (Y/N)-? YES

CLIMATIC AND HYDROLOGIC DATA REF: AWMFH Chapter 10

CLIMATIC STATION- TILLAMOOK 1 W
25YR-24HR STORM RAINFALL- 6.00 Inches

Month	Average Monthly in Inches Precipitation	Evaporation	% Lot Runoff Factors Concrete	Unpaved
JAN	13.46	0.48	60	25
FEB	10.45	0.78	50	25
MAR	10.35	1.26	45	15
APR	6.03	1.90	40	15
MAY	4.24	3.22	40	10
JUN	3.16	3.40	35	10
JUL	1.44	3.91	30	0
AUG	1.73	3.52	40	10
SEP	3.69	2.54	45	15
OCT	7.48	1.42	50	20
NOV	12.80	0.75	60	25
DEC	14.25	0.60	60	25
ANNUAL	89.08	23.78		

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

RAINFALL RUNOFF ENTERING LIQUID STORAGE FACILITY

Month	<<<<<<<<<<<<<<<<<<<<RUNOFF IN CUBIC FEET>>>>>>>>>>>>>>>>>>> 0SF Roof	0SF Concrete Slab	3,108SF Unsurfaced Lot	2,826SF Storage Surface	Monthly Totals
JAN	0	0	872	3,170	4,041
FEB	0	0	677	2,461	3,138
MAR	0	0	402	2,437	2,840
APR	0	0	234	1,420	1,654
MAY	0	0	110	999	1,108
JUN	0	0	82	744	826
JUL	0	0	0	339	339
AUG	0	0	45	407	452
SEP	0	0	143	869	1,012
OCT	0	0	387	1,762	2,149
NOV	0	0	829	3,014	3,843
DEC	0	0	923	3,356	4,279

TOTAL MONTHLY INFLOWS ENTERING LIQUID STORAGE FACILITY

Month	<<<<<<<<<<<<<<<<<<<<<<<<<<INFLOW IN CUBIC FEET>>>>>>>>>>>>>>>>>>>>>>>> Surface Runoff	Evaporation	Seepage	Wash Water	Manure	Totals
JAN	4,041	-113	946	4,042	16,257	25,173
FEB	3,138	-184	734	3,651	14,683	22,023
MAR	2,840	-297	727	4,042	16,257	23,569
APR	1,654	-447	424	3,911	15,732	21,274
MAY	1,108	-758	298	4,042	242	4,932
JUN	826	-801	222	3,911	234	4,393
JUL	339	-921	101	4,042	242	3,803
AUG	452	-829	122	4,042	242	4,028
SEP	1,012	-598	259	3,911	234	4,819
OCT	2,149	-334	526	4,042	242	6,624
NOV	3,843	-177	900	3,911	15,732	24,210
DEC	4,279	-141	1,002	4,042	16,257	25,437
ANNUAL	25,682	-5,600	6,261	47,589	96,353	170,285

Total Liquids Entering Liquid Storage Facility Based on 56 Day Storage-

56 Day Precipitation - Evaporation=	5,864 CF	or	0.1 AF
Roof, Slab and Lot Runoff=	1,678 CF	or	0.0 AF
Seepage=	280 CF	or	0.0 AF
Washwater=	7,301 CF	or	0.2 AF
Manure=	29,367 CF	or	0.7 AF
25Yr-24Hr Rainfall Runoff=	1,554 CF	or	0.0 AF
Existing Storage=	5,301 CF	or	0.1 AF
Existing Storage Surface Area=	0 SF	or	0.0 AC

Landowner/Operator- Andrés Sanchez
Location- Tillamook
Assisted by- Pedersen

Date- 02-08-1999

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DESCRIPTION OF LIQUID WASTE MANAGEMENT SYSTEM

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STORAGE METHOD>>> Tank(Uncovered)

Diameter of Tank=	60 ft.
Depth of Tank=	14.92 ft.
Is Tank Covered, (Y/N)?-	NO
Volume of Liquids to Store=	47457 CF
Volume of Facility=	42156 CF

APPLICATION METHOD>>> Sprinkling
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR LIQUIDS>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds 34,057	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds 12,032	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds 23,700
Storage	70	23,840	85	10,227	85	20,145
Application	75	17,880	100	10,227	100	20,145
Denitrification	87	15,556	100	10,227	100	20,145

MANAGEMENT CRITERIA FOR Sprinkling APPLICATION OF LIQUIDS>>>

Sprinkler Flowrate=	220 GPM
Wetted Diameter=	200 FEET
Application Rate=	0.68 INCHES/HOUR
NITROGEN Concentration in Storage=	2244 PPM OR 18.71 LBS/1000 GAL

To apply 1,273,729 gallons of liquids generated from the operation, it will take approximately 96 hours of pumping annually. Based on applying NITROGEN at the agronomic rate, use the application depths, set times and travel rates listed below for each crop:

CROP	Application (NO)	Application (LBS)	Application (INCHES)	Set Time (HOURS)	Travel Rate (FEET/MINUTE)
Tillamook Mix	1.0	307	0.93	1.4	1.9

Landowner/Operator- Andrés Sanchez
Location- Tillamook
Assisted by- Pedersen Date- 02-08-1999

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DESCRIPTION OF SOLIDS WASTE MANAGEMENT SYSTEM

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STORAGE METHOD>>> Solids Storage(Roofed)
NO SOLIDS TO STORE

APPLICATION METHOD>>> Broadcast
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR SOLIDS>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds 0	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds 0	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds 0
Storage	75	0	0	0	90	0
Application	80	0	100	0	100	0
Denitrification	87	0	100	0	100	0

MANAGEMENT CRITERIA FOR Broadcast APPLICATION OF SOLIDS>>>
Tractor Spreader Capacity= 160 BUSHELS or 199 CF
Width of Application= 12 FEET
NITROGEN Concentration in Storage= 0 PPM OR 0.00 LBS/100CF

To apply 0 cubic feet of solids generated from the operation, it will take approximately 0 trips annually using a tractor spreader. Based on applying NITROGEN at the agronomic rate, use the application depths, travel lengths and loads per acre listed below for each crop:

CROP	Application (NO)	Application (LBS)	Application (INCHES)	Travel Length (FEET)	Loads per Load	Loads per Acre (NO)
Tillamook Mix	1.5	210	0.00		0	0.0

Landowner/Operator- A[illegible]s Sanchez
Location- Tillamook
Assisted by- Pedersen

Date- 02-08-1999

DESCRIPTION OF WASTE MANAGEMENT FOR GRAZING SYSTEM

STORAGE METHOD>>> None (grazing)

APPLICATION METHOD>>> Grazing
Well Drained Soil Drainage Class
Location- Coast

NUTRIENT ACCOUNTING FOR GRAZING>>> REF: AWMFH Chapter 11

Loss Category	Nitrogen Remaining Percent	Nitrogen Remaining Pounds	Phosphorous(P2O5) Remaining Percent	Phosphorous(P2O5) Remaining Pounds	Potassium(K2O) Remaining Percent	Potassium(K2O) Remaining Pounds
		33,931		12,028		23,449
Storage	100	33,931	100	12,028	100	23,449
Application	85	28,842	100	12,028	100	23,449
Denitrification	87	25,092	100	12,028	100	23,449

CROP INVENTORY N-Nitrogen P2O5-Phosphorous K2O-Potassium

REF: AWMFH Chapter 6

Crops	Yield Units	Target Yield	Nutrients Utilized Pounds/Acre N	P2O5	K2O	Allowable Application Inches/Acre Liquid	Solid
Tillamook Mix	(Ton)	6	307.2	74.1	205.3	0.93	0.00

UTILIZATION ACRES BASED ON NITROGEN

Crop	Percent to be Applied / Acres Liquids	Solids	Grazing
Tillamook Mix	100 / 51	100 / 0	100 / 82
TOTALS>>>>>>>>>>>>>>>>>>>>>>>	100 / 51	100 / 0	100 / 82

Landowner/Operator- Andres Sanchez
Location- Tillamook
Assisted by- Pedersen

Date- 02-08-1999

NUTRIENTS TO BE UTILIZED AND VALUE IN DOLLARS PER POUND

Nutrient Form	Nutrients in Pounds Nitrogen	Phosphorous(P2O5)	Potassium(K2O)
Liquid-	15,556	10,227	20,145
Solid-	0	0	0
Grazing-	25,092	12,028	23,449
TOTAL>>>>>>>>>>>>>>>	40,648	22,255	43,594
Nutrient Value>>>>>>	$0.30/Lb	$0.60/Lb	$0.15/Lb

NUTRIENT MANAGEMENT COSTS AND NUTRIENT BALANCE

System Life = 40 YEARS
Annual Percentage Rate = 8 %
Fertilizer Application Cost = $6.25 /Acre
Manure Application Cost = $20.00 /Acre

Utilization Area Acres	Cost Savings $/Yr	Breakeven Cost $/Life	Nutrients Utilized Lbs N	P2O5	K2O	Nutrient Balance Lbs N	P2O5	K2O
***132	$20,336	$242,495	40648	9809	27169	0	-12446	-16425
180	$23,277	$277,573	55335	13353	36986	14687	-8902	-6608
240	$26,114	$311,394	73780	17804	49314	33132	-4451	5720
***300	$27,959	$333,395	92225	22255	61643	51577	-0	18049
360	$27,133	$323,551	110670	26706	73972	70022	4451	30377
420	$26,307	$313,706	129115	31157	86300	88467	8902	42706

NOTE: Negative values under Nutrient Balance indicate excess nutrients available. Positive values under Nutrient Balance indicate additional nutrients may be needed to meet target yields.

NUTRIENT APPLICATION CALENDAR

REF: AWMFH Chapter 10

S - Storage Period
A - Application Period

Fm= 0.70 Fs Liquids= 0.76 Fs Solids= 0.61 Fl= 0.91
Fn= 0.74 Fa Liquids= 0.9 Fa Solids= 1.0 Lf= 0 Ef= 0

MONTH>>>>>	---JAN---		--FEB--			----MAR----				----APR----							
WEEK>>>>>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
APPLY>>>>>	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

MONTH>>>>>	------MAY-----					----JUN----				------JUL-----					----AUG----			
WEEK>>>>>	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
APPLY>>>>>	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

MONTH>>>>>	----SEP----					------OCT-----				----NOV----				----DEC----			
WEEK>>>>>	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
APPLY>>>>>	A	A	A	A	S	S	S	S	S	S	S	S	S	S	S	A	A

CONSERVATION PRACTICES OPERATION AND MAINTENANCE PLAN
1/99
Andres Sanches

ABOVE GROUND LIQUID MANURE STORAGE FACILITY
Facility will be pumped out within the first two years following construction to check for structural damage. All damages will be corrected. Thereafter, it will be pumped out at least every five years to check for damages and/or removal of rocks, gravel, wire and other debris. A one foot free board will be maintained to prevent spillage. Apply manure to fields when weather and soil conditions are favorable.

BELOW GROUND LIQUID MANURE STORAGE FACILITY
Facility will be pumped out within the first two years following construction to check for structural damage. All damages will be corrected. Thereafter, it will be pumped out at least every five years to check for damages and/or removal of rocks, gravel, wire and other debris. A one foot free board will be maintained to prevent spillage. Apply manure to fields when weather and soil conditions are favorable. Care shall be taken in pumping the tank out during periods of high water table. Failure to follow these quidelines in pumping the tank could result in catastrophic results. The tank liquid will not be pumped more than 3.5 feet lower than the surrounding ground water level. The tank lid will not be subjected to more than two 8,000 pound wheel loads. WARNING: ENTERING UNVENTILATED TANKS IS EXTREMELY "HAZARDOUS"!

PUMP AND AGITATOR
Pump will be operated and maintained according to manufacturer's manual. Liquids will be drained from pump during freezing weather. Pump will be inspected periodically to prevent debris from wrapping around impeller. Agitator will be operated and maintained in accordance with manufacture's manual. All plumbing will be inspected annually. Broken lines will be replaced and/ or repaired. Loose connections will be tightened.

ROOF
Roof will be inspected annually. All rusted sections will be repaired and/or replaced. Loose sections will be secured. All broken trusses, rafters, beams, poles, gutters and down spouts will be repaired and/or replaced.

GUTTERS AND DOWN SPOUTS
Gutters will be inspected annually to insure all gutters are free of foreign materials. Broken gutters or down spouts will be replaced and/or repaired. All gutters will be connected to the down spouts. Leaky gutters and down spouts will be repaired. Weeds and sediment will be removed from outlets. All down spouts will be connected to outlets which are kept free-flowing. Broken rodent guards will be repaired or replaced.

OUTLETS
Gutter outlets will be inspected annually. Outlets will be kept free of vegetation and sediment. If erosion is occurring at the outlet, it will be corrected. Damaged or broken lines will be replaced or repaired. Damaged or broken rodent guards will be repaired and/or replaced.

CONCRETE CURB
Concrete curbs will be inspected periodically. Broken curbs will be repaired. Manure will be prevented from flowing over the curb.

PUMP

Pump will be operated and maintained according to manufacturer's manual. Liquids will be drained from pump during freezing weather. Pump will be inspected periodically to prevent debris from wrapping around impeller. Broken lines will be replaced and/or repaired. Loose connections will be tightened.

WASTE TRANSFER PIPELINE

Pipeline will be flushed regularly to prevent clogging. Any leaks or broken section will be repaired and/or replaced.

FENCES

Fences will be inspected periodically. Broken posts will be replaced. Sagging wire will be tightened. Broken or missing insulators will be replaced. Broken wires will be spliced or replaced.

USE EXCLUSION

Fences will be periodically inspected and remedial repairs will be performed as needed to protect the riparian vegetation from livestock damage. If grazing is desired, a system as it relates to grazing and stocking rates will be developed following the 5th year of riparian channel vegetation establishment .

PEST MANAGEMENT

Maintain mechanical equipment in good working condition and calibrate application equipment to ensure recommended rates are applied. Replace worn components of pesticide application equipment as well as other pest management implements.

Operators of equipment must be alert at all times to avoid bodily injury and unnecessary exposure to chemicals.

Pesticides users must read and follow label directions, maintain appropriate Material Safety Data Sheets (MSDS), and become certified to apply restricted use pesticides.

Apply chemicals during periods of minimum potential for drift.

Minimize exposure to chemicals, wear protective clothing, and use safety equipment as appropriate.

Ensure that the pesticide applicator knows the exact field location to be treated. Post signs according to label directions or State and Federal Laws around fields that have been treated. Follow the established re-entry time as stated on the MSDS.

Properly locate chemical mixing and equipment rinsing stations relative to potential foe contamination of ground or surface water. Extreme care must be taken to follow loading and mixing procedures. Provide for managing accidental spills.

Properly rinse equipment and re-use rinse solution for subsequent batches of the same pesticides, where possible.

Store pesticides in original containers in a locked, well ventilated weather resistant building. Post warning signs on or around the building. Locate the building so that accidental spills will create minimal environmental effects. Dispose of pesticide containers according to label directions and adhere to local or state regulations.

Provide emergency wash stations for personnel who might be accidentally exposed to chemicals, and formulate a safety plan complete with information about locations of emergency treatment centers for personnel exposed to chemicals.

Ensure that back flow prevention devices are installed and operating properly on irrigation systems used for applying pesticides.

Recognize the dangers from excessive exposure to the take appropriate precautionary measures. This is especially important for farm workers who spend long hours in the field.

Andrea Sanches
01/98

SOIL DESCRIPTION

Br - Brenner silt loams are poorly drained, strongly acid soils. These soils are on bottomlands in the lowest part of the floodplains. The erosion hazard is slight. Permeability is slow. Runoff is slow to ponded. NRCS capability classification is IIIw because of poor drainage. Available water holding capacity is 8.5 to 9.5 inches. Soils are well suited for pastures.
of flooding

GdB - Gardiner fine sand loam, over washed soils, 3 to 7% slopes occur in low lying bends of major rivers. They are subject to overflow due to high water. The soil is well-drained, coarse and textured. Most areas have recently deposited sand on the surface. Runoff is slow and erosion hazard is moderate. Permeability is rapid. NRCS capability classification is IVe because of the erosion hazard. Effective rooting depth is greater than 60 inches. Water holding capacity is 5 to 6.5 inches. Soils are used primarily for pastureland and green chop.

Ma - Made Land - This unit consists of approximately 3 square miles of land leveled for a blimp base in the Second World War. Hills were cut and low areas filled to form a level surface consisting of heterogeneous material that originated from marine sediment, alluvial terraces, and recent alluvium. This is the only large tract of Made Land in the Tillamook survey area. It is now used mainly as an airport and for various industrial developments. (Capability unit VIIIs-1; woodland suitability group 18.)

NaA - Nehalem silt loam, 0-3% slopes, are well to moderately well drained soils. These occupy level to gently undulating river floodplains. The erosion hazard is slight. Permeability is moderate. Runoff is slow. NRCS capability classification is IIc due to climate. Effective rooting depth is greater than 60 inches. Available water holding capacity is 11 to 12.5 inches. Nehalem soils are excellent for pastures. Manure application is restricted when flood potential is high.

QaB - Quillayute loams, 0-7% slopes, are well drained soils. These soils are located on terraces. The erosion hazard is slight to moderate. Permeability is moderate. NRCS capability classification is IIe because of erosion potential on higher slopes. The effective rooting depth is greater than 60 inches. The total available water holding capacity is 12 to 17 inches. These soils are well suited for pasture.

Re - The Riverwash soil series consist of narrow, irregular strips in the bends of stream channels and along drainage ways. The strips are from 40 to 200 yards in width and consist of well-rounded sand, gravel, stones, and boulders. Riverwash slopes are from 0-5 percent. Depth to bedrock is 20 to more than 60 inches. Permeability is rapid. Available water holding capacity and water supply capacity are variable. Effective rooting depth is 20 to 60 inches. The water erosion hazard is severe.

TILLAMOOK AREA, OREGON

USDA-SCS
1-88

SOIL INTERPRETATIONS RECORD

Br BRENNER SILT LOAM

THE BRENNER SERIES CONSISTS OF VERY DEEP, POORLY-DRAINED SOILS FORMED IN MIXED ALLUVIUM. THEY OCCUR ON FLOODPLAINS. TYPICALLY, THE SURFACE LAYER IS VERY DARK GRAYISH-BROWN SILT LOAM, ABOUT 13 INCHES THICK. THE SUBSOIL IS DARK GRAYISH-BROWN SILT LOAM ABOUT 27 INCHES THICK. THE SUBSTRATUM IS DARK GREENISH GRAY SILTY CLAY EXTENDING BELOW 60 INCHES. MEAN ANNUAL PRECIP. IS 60 TO 90 INCHES. MEAN ANNUAL AIR TEMP. IS 48 TO 52 DEGREES F. FROST FREE PERIOD IS 160 TO 265 DAYS

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
	160-265			P	0-3

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT. 3-10 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	CLAY (PCT)
0-13	SIL	ML	A-4	0	0	100	100	90-100	80-90	20-27
13-40	SICL, SIL	CL	A-6	0	0	100	100	95-100	85-95	18-30
40-60	SICL	MH, ML	A-6, A-7	0	0	100	100	95-100	85-95	27-50

DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)
0-13	25-35	NP-5	0.90-1.20	0.6-2.0	0.19-0.21	3.6-5.5	-				
13-40	30-40	10-20	1.10-1.30	0.2-0.6	0.19-0.21	3.6-5.5	-				
40-60	35-55	10-20	1.10-1.30	0.06-0.2	0.15-0.17	3.6-6.5	-				

DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CONCRETE
0-13	5-10	LOW	.32	5	6	48	HIGH	HIGH
13-40		MODERATE	.24					
40-60		MODERATE	.24					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
FREQUENT	BRIEF	DEC-APR	+.5-1.0	PERCHED	DEC-APR	-		>60		-		D	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-FLOODING,PONDING,PERCS SLOWLY
SEWAGE LAGOON AREAS	SEVERE-FLOODING,PONDING
SANITARY LANDFILL (TRENCH)	SEVERE-FLOODING,PONDING
SANITARY LANDFILL (AREA)	SEVERE-FLOODING,PONDING
DAILY COVER FOR LANDFILL	POOR-PONDING

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-PONDING
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING,PONDING
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING,PONDING
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING,PONDING
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH,PONDING,FLOODING
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-PONDING,FLOODING

CONSTRUCTION MATERIAL

ROADFILL	POOR-LOW STRENGTH,WETNESS
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	POOR-WETNESS

WATER MANAGEMENT

POND RESERVOIR AREA	SLIGHT
EMBANKMENTS DIKES AND LEVEES	SEVERE-THIN LAYER,PONDING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	PONDING,FLOODING
IRRIGATION	PONDING,PERCS SLOWLY,FLOODING
TERRACES AND DIVERSIONS	PONDING
GRASSED WATERWAYS	WETNESS

Br BRENNER SILT LOAM

USDA-SCS
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RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING,PONDING	PLAYGROUNDS	SEVERE-PONDING,FLOODING
PICNIC AREAS	SEVERE-PONDING	PATHS AND TRAILS	SEVERE-PONDING

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPA-BILITY		PASTURE (AUM)		GREEN CHOP (TONS)											
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR	NIRR	IRR.	NIRR	IRR.
	3W		8		8											

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			TREES TO PLANT
		EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	
							NONE			

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
FAIR	FAIR	FAIR	POOR	POOR	FAIR	GOOD	FAIR	FAIR	POOR	FAIR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				
RUSH	JUNCU					
SEDGE	CAREX					
OTHER ANNUAL GRASSES	AAGG					
OTHER ANNUAL FORBS	AAFF					
OTHER ANNUAL GRASSLIKES	AAGL					
OTHER PERENNIAL GRASSLIKES	PPGL					
SKUNKCABBAGE	LYSIC					
POTENTIAL PRODUCTION (LBS /AC. DRY WT)						
FAVORABLE YEARS						
NORMAL YEARS						
UNFAVORABLE YEARS						

FOOTNOTES

TILLAMOOK AREA, OREGON

USDA-SCS
11-83

SOIL INTERPRETATIONS RECORD

GdB GARDINER FINE SANDY LOAM, OVERWASHED, 3 TO 7 PERCENT SLOPES

THE GARDINER SERIES CONSISTS OF WELL DRAINED SOILS FORMED IN COARSE-TEXTURED, MIXED ALLUVIUM ON FLOOD PLAINS. TYPICALLY THE SURFACE LAYER IS DARK BROWN FINE SANDY LOAM ABOUT 8 INCHES THICK. THE SUBSOIL IS DARK YELLOWISH-BROWN LOAMY FINE SAND 52 INCHES OR MORE WITH THIN LAYERS OF FINER TEXTURES. ELEVATIONS ARE 0 TO 100 FEET. MEAN ANNUAL PRECIP. IS 60 TO 90 INCHES. MEAN ANNUAL AIR TEMP. IS 50 TO 52 DEGREES F. THE FROST FREE PERIOD IS 220 TO 290 DAYS.

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
	220-290		0-100	W	0-3

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT. 3-10 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO 4	10	40	200	CLAY (PCT)
0-8	FSL	SM	A-4	0	0	100	100	65-85	35-50	10-15
8-60	LFS, LS	SM	A-2	0	0	100	100	50-75	15-35	5-10

DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)
0-8	20-25	NP-5	1.20-1.40	2.0-6.0	0.14-0.17	5.1-5.5	-				
8-60	-	NP	1.30-1.40	6.0-20	0.09-0.10	5.1-5.5	-				

DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	EROSION FACTORS T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-8	2-3	LOW	.24	5	3	86	MODERATE	MODERATE
8-60		LOW	.10					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
FREQUENT	BRIEF	NOV-MAR	>6.0			-		>60		-		A	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-FLOODING, POOR FILTER
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE, FLOODING
SANITARY LANDFILL (TRENCH)	SEVERE-FLOODING, SEEPAGE
SANITARY LANDFILL (AREA)	SEVERE-FLOODING, SEEPAGE
DAILY COVER FOR LANDFILL	FAIR-TOO SANDY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING
LOCAL ROADS AND STREETS	SEVERE-FLOODING
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-FLOODING

CONSTRUCTION MATERIAL

ROADFILL	GOOD
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	GOOD

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-SEEPAGE, PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	SOIL BLOWING, FLOODING
TERRACES AND DIVERSIONS	TOO SANDY, SOIL BLOWING
GRASSED WATERWAYS	FAVORABLE

GdB GARDINER FINE SANDY LOAM, OVERWASHED, 3 TO 7 PERCENT SLOPES

USDA-SCS
11-83

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING	PLAYGROUNDS	SEVERE-FLOODING
PICNIC AREAS	MODERATE-FLOODING	PATHS AND TRAILS	MODERATE-FLOODING

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPABILITY		PASTURE (AUM)													
	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	4W		6	14												

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			TREES TO PLANT
		EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	
							NONE			

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
POOR	FAIR	FAIR	FAIR	POOR	POOR	POOR	V. POOR	FAIR	FAIR	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				
POTENTIAL PRODUCTION (LBS./AC. DRY WT):						
FAVORABLE YEARS						
NORMAL YEARS						
UNFAVORABLE YEARS						

FOOTNOTES

1 EXCESSIVE PERMEABILITY MAY CAUSE POLLUTION OF GROUND WATER

TILLAMOOK AREA, OREGON

USDA-SCS
06-89

SOIL INTERPRETATIONS RECORD

Ma MADE LAND

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)

ESTIMATED SOIL PROPERTIES

DEPTH (IN)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >10 IN (PCT)	FRACT 3-10 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO 4	10	40	200	CLAY (PCT)

DEPTH (IN)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)

DEPTH (IN)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CONCRETE

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	
SEWAGE LAGOON AREAS	
SANITARY LANDFILL (TRENCH)	
SANITARY LANDFILL (AREA)	
DAILY COVER FOR LANDFILL	

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	
DWELLINGS WITHOUT BASEMENTS	
DWELLINGS WITH BASEMENTS	
SMALL COMMERCIAL BUILDINGS	
LOCAL ROADS AND STREETS	
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	

CONSTRUCTION MATERIAL

ROADFILL	
SAND	
GRAVEL	
TOPSOIL	

WATER MANAGEMENT

POND RESERVOIR AREA	
EMBANKMENTS DIKES AND LEVEES	
EXCAVATED PONDS AQUIFER FED	
DRAINAGE	
IRRIGATION	
TERRACES AND DIVERSIONS	
GRASSED WATERWAYS	

Ma MADE LAND

USDA-SCS
06-89

RECREATIONAL DEVELOPMENT

CAMP AREAS		PLAYGROUNDS	
PICNIC AREAS		PATHS AND TRAILS	

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPA-BILITY															
	NIRR	IRR	NIRR	IRR.	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR.	NIRR	IRR.	NIRR	IRR

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			
		EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	TREES TO PLANT

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				
POTENTIAL PRODUCTION (LBS./AC. DRY WT): FAVORABLE YEARS						
NORMAL YEARS						
UNFAVORABLE YEARS						

FOOTNOTES

SOIL INTERPRETATIONS RECORD

NaA NEHALEM SILT LOAM, 0 TO 3 PERCENT SLOPES

THE NEHALEM SERIES CONSISTS OF WELL DRAINED SOILS FORMED IN MIXED ALLUVIUM ON FLOODPLAINS. TYPICALLY THE SURFACE LAYER IS VERY DARK GRAYISH BROWN OVER DARK BROWN SILT LOAM ABOUT 17 INCHES THICK. THE SUBSOIL IS DARK BROWN SILTY CLAY LOAM ABOUT 20 INCHES THICK. THE SUBSTRATUM IS DARK BROWN SILTY CLAY LOAM TO 60 INCHES OR MORE. ELEVATIONS RANGE FROM 10 TO 750 FEET. THE MEAN ANNUAL PRECIP. IS 50 TO 100 INCHES. MEAN ANNUAL AIR TEMP. IS 48 TO 53 DEGREES F. FROST FREE PERIOD IS 160 TO 265 DAYS.

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
	160-265		10-750	W	0-3

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT. > 3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	CLAY (PCT)
0-17	SIL	ML, CL-ML	A-4	0	0	100	100	90-100	70-90	15-25
17-37	SIL, SICL	CL	A-6, A-7	0	0	100	100	90-100	75-95	20-35
37-60	SICL, SIL, L	CL, CL-ML	A-6, A-4		0-5	85-100	80-100	80-95	60-90	20-35

DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)
0-17	25-35	5-10	1.10-1.20	0.6-2.0	0.19-0.21	4.5-6.0	-				
17-37	30-45	10-20	1.20-1.30	0.6-2.0	0.19-0.21	4.5-5.5	-				
37-60	25-40	5-15	1.25-1.35	0.2-0.6	0.19-0.21	4.5-5.0	-				

DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CONCRETE
0-17	5-10	LOW	.32	5	6	48	HIGH	HIGH
17-37		MODERATE	.37					
37-60		LOW	.37					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
RARE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-PERCS SLOWLY
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE
SANITARY LANDFILL (TRENCH)	MODERATE-FLOODING,TOO CLAYEY
SANITARY LANDFILL (AREA)	MODERATE-FLOODING
DAILY COVER FOR LANDFILL	FAIR-TOO CLAYEY

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SLIGHT
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SLIGHT

CONSTRUCTION MATERIAL

ROADFILL	FAIR-LOW STRENGTH
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	GOOD

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	FAVORABLE
TERRACES AND DIVERSIONS	ERODES EASILY
GRASSED WATERWAYS	ERODES EASILY

NaA NEHALEM SILT LOAM, 0 TO 3 PERCENT SLOPES

USDA-SCS
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RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING	PLAYGROUNDS	MODERATE-PERCS SLOWLY
PICNIC AREAS	MODERATE-PERCS SLOWLY	PATHS AND TRAILS	SLIGHT

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPA-BILITY		PASTURE (AUM)		GRASS-LEGUME HAY (TONS)		GREEN CHOP (TONS)									
	NIRR	IRR	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR
	2C		8	15	3	6										

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			TREES TO PLANT
		EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	
	13A	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SEVERE	DOUGLAS FIR WESTERN HEMLOCK RED ALDER	131	13	DOUGLAS FIR WESTERN HEMLOCK

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
POOR	GOOD	GOOD	GOOD	GOOD	GOOD	POOR	V. POOR	FAIR	GOOD	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				
RED ALDER	ALRU2					
SALAL	GASH					
VINE MAPLE	ACCI					
WESTERN SWORDFERN	POMU					
SALMONBERRY	RUSP					
POTENTIAL PRODUCTION (LBS./AC DRY WT)						
FAVORABLE YEARS						
NORMAL YEARS						
UNFAVORABLE YEARS						

FOOTNOTES

SOIL INTERPRETATIONS RECORD

0aB OUILLAYUTE SILT LOAM, 0 TO 7 PERCENT SLOPES

THE OUILLAMOOK SERIES CONSISTS OF VERY DEEP, WELL DRAINED SOILS FORMED IN SILTY ALLUVIUM DOMINATED BY AMORPHOUS MATERIAL ON TERRACES. THE SURFACE LAYER IS BLACK VERY DARK GRAY, AND VERY DARK GRAYISH BROWN SILT LOAM ABOUT 34 INCHES THICK. THE SUBSOIL IS DARK YELLOWISH BROWN SILT LOAM ABOUT 24 INCHES THICK. THE SUBSTRATUM IS DARK YELLOWISH BROWN LOAMY SAND TO 60 INCHES OR MORE. ELEVATION IS 50 TO 300 FEET. MEAN ANNUAL PRECIPITATION IS 70 TO 100 INCHES. MEAN ANNUAL AIR TEMPERATURE IS 49 TO 52 DEGREES F. FROST-FREE PERIOD IS 160 TO 210 DAYS.

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
49-52	160-210	70-100	50-300	W	0-7

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >10 IN (PCT)	FRACT. 3-10 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO 4	10	40	200	CLAY (PCT)
0-21	SIL	MH, OH	A-5	0	0	100	100	90-100	70-90	15-25
21-60	SIL, SICL	MH, ML	A-5, A-7	0	0	100	100	90-100	80-95	18-30

DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)
0-21	50-80	NP-5	0.50-0.85	0.6-2.0	0.25-0.40	4.5-5.0	-				
21-60	40-60	5-20	0.75-0.85	0.6-2.0	0.20-0.35	4.5-5.0	-				

DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CONCRETE
0-21	15-25	LOW	.37	5	6	48	HIGH	HIGH
21-60		LOW	.32					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	MODERATE-PERCS SLOWLY
SEWAGE LAGOON AREAS	MODERATE-SEEPAGE,SLOPE,EXCESS HUMUS
SANITARY LANDFILL (TRENCH)	SEVERE-EXCESS HUMUS
SANITARY LANDFILL (AREA)	SLIGHT
DAILY COVER FOR LANDFILL	POOR-HARD TO PACK

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE,EXCESS HUMUS
DWELLINGS WITHOUT BASEMENTS	SEVERE-LOW STRENGTH
DWELLINGS WITH BASEMENTS	SLIGHT
SMALL COMMERCIAL BUILDINGS	SEVERE-LOW STRENGTH
LOCAL ROADS AND STREETS	MODERATE-LOW STRENGTH
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SLIGHT

CONSTRUCTION MATERIAL

ROADFILL	GOOD
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	GOOD

WATER MANAGEMENT

POND RESERVOIR AREA	MODERATE-SEEPAGE,SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-EXCESS HUMUS,HARD TO PACK
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	SLOPE,ERODES EASILY
TERRACES AND DIVERSIONS	ERODES EASILY
GRASSED WATERWAYS	ERODES EASILY

048 QUILLAYUTE SILT LOAM, 0 TO 7 PERCENT SLOPES

USDA-SCS
1-68

RECREATIONAL DEVELOPMENT

CAMP AREAS	SLIGHT	PLAYGROUNDS	MODERATE-SLOPE
PICNIC AREAS	SLIGHT	PATHS AND TRAILS	SLIGHT

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPABILITY		GRASS-LEGUME HAY (TONS)		PASTURE (AUM)											
	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR	NIRR	IRR
	2E	2E	3	4	14	16										

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			TREES TO PLANT
		EROS'N HAZARD	EQUIP LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	
		SLIGHT	SLIGHT	SLIGHT	SLIGHT	SEVERE	DOUGLAS FIR WESTERN HEMLOCK SITKA SPRUCE RED ALDER			DOUGLAS FIR WESTERN HEMLOCK SITKA SPRUCE

WINDBREAKS

	SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
	NONE							

WILDLIFE HABITAT SUITABILITY

	POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR			
	GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
	FAIR	GOOD	GOOD	GOOD	GOOD	GOOD	POOR	V. POOR	GOOD	GOOD	V. POOR	-

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				
POTENTIAL PRODUCTION (LBS /AC. DRY WT): FAVORABLE YEARS NORMAL YEARS UNFAVORABLE YEARS						

FOOTNOTES

TILLAMOOK AREA, OREGON

USDA-SCS
3-82

SOIL INTERPRETATIONS RECORD

Re RIVERWASH

RIVERWASH GRAVELLY IS UNSTABILIZED GRAVELLY SEDIMENTS THAT IS FLOODED AND WASHED AND REWORKED FREQUENTLY BY RIVERS. THEY OCCUR MAINLY ALONG THE HEAD WATER AND MAIN STREAM CHANNEL AREAS WHERE RIVER VELOCITIES ARE RELATIVELY RAPID.

LANDSCAPE AND CLIMATE PROPERTIES

ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
					0-3

ESTIMATED SOIL PROPERTIES

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT > 3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	CLAY (PCT)
0-6	GRX-S	GP, GW	A-1		0-25	10-40	10-35	5-25	0-5	0-1
6-60	SR-GR-S-GRX-COS	GP, SP, GW, SW	A-1		0-25	25-55	25-50	10-30	0-5	0-1

DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)
0-6	-	NP	-	>6.0	0.01-0.02	-	-				
6-60	-	NP	-	>6.0	0.02-0.03	-	-				

DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY STEEL	CONCRETE
0-6	<.1	LOW	-	-	8	-		
6-60		LOW	-					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENT'L FROST ACTION
FREQUENT	LONG-V.LONG	OCT-JUL	0-2.0	APPARENT	JAN-DEC	-		>60		-		D	-

SANITARY FACILITIES

SEPTIC TANK ABSORPTION FIELDS	SEVERE-FLOODING,WETNESS,POOR FILTER
SEWAGE LAGOON AREAS	SEVERE-SEEPAGE,FLOODING,WETNESS
SANITARY LANDFILL (TRENCH)	SEVERE-FLOODING,SEEPAGE,WETNESS
SANITARY LANDFILL (AREA)	SEVERE-FLOODING,SEEPAGE,WETNESS
DAILY COVER FOR LANDFILL	POOR-TOO SANDY,SMALL STONES,WETNESS

BUILDING SITE DEVELOPMENT

SHALLOW EXCAVATIONS	SEVERE-CUTBANKS CAVE,WETNESS
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING,WETNESS
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING,WETNESS
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING,WETNESS
LOCAL ROADS AND STREETS	SEVERE-WETNESS,FLOODING
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-SMALL STONES,WETNESS,DROUGHTY

CONSTRUCTION MATERIAL

ROADFILL	POOR-WETNESS
SAND	PROBABLE
GRAVEL	PROBABLE
TOPSOIL	POOR-TOO SANDY,SMALL STONES,AREA RECLAIM

WATER MANAGEMENT

POND RESERVOIR AREA	SEVERE-SEEPAGE
EMBANKMENTS DIKES AND LEVEES	SEVERE-WETNESS
EXCAVATED PONDS AQUIFER FED	SEVERE-CUTBANKS CAVE
DRAINAGE	FLOODING,CUTBANKS CAVE
IRRIGATION	WETNESS,DROUGHTY,FAST INTAKE
TERRACES AND DIVERSIONS	LARGE STONES,WETNESS,TOO SANDY
GRASSED WATERWAYS	LARGE STONES,WETNESS,DROUGHTY

Rg RIVERWASH

USDA-SCS
3-82

RECREATIONAL DEVELOPMENT

CAMP AREAS	SEVERE-FLOODING, SMALL STONES, WETNESS	PLAYGROUNDS	SEVERE-SMALL STONES, TOO SANDY, WETNESS
PICNIC AREAS	SEVERE-WETNESS, TOO SANDY, SMALL STONES	PATHS AND TRAILS	SEVERE-WETNESS, TOO SANDY, SMALL STONES

CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE (HIGH LEVEL MANAGEMENT)

	CAPA-BILITY															
	NIRR	IRR.	NIRR	IRR	NIRR	IRR	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.	NIRR	IRR.
	8W															

WOODLAND SUITABILITY

	ORD SYM	MANAGEMENT PROBLEMS					POTENTIAL PRODUCTIVITY			TREES TO PLANT
		EROS'N HAZARD	EQUIP. LIMIT	SEEDL. MORT'Y	WINDTH HAZARD	PLANT COMPET	COMMON TREES	SITE INDX	PROD CLAS	
							NONE			

WINDBREAKS

SPECIES	HT	SPECIES	HT	SPECIES	HT	SPECIES	HT
NONE							

WILDLIFE HABITAT SUITABILITY

POTENTIAL FOR HABITAT ELEMENTS								POTENTIAL AS HABITAT FOR:			
GRAIN & SEED	GRASS & LEGUME	WILD HERB.	HARDWD TREES	CONIFER PLANTS	SHRUBS	WETLAND PLANTS	SHALLOW WATER	OPENLD WILDLF	WOODLD WILDLF	WETLAND WILDLF	RANGELD WILDLF
V. POOR	V. POOR	V. POOR	V. POOR	V. POOR	V. POOR	V. POOR	POOR	V. POOR	V. POOR	POOR	V. POOR

POTENTIAL NATIVE PLANT COMMUNITY (RANGELAND OR FOREST UNDERSTORY VEGETATION)

COMMON PLANT NAME	PLANT SYMBOL (NLSPN)	PERCENTAGE COMPOSITION (DRY WEIGHT)				

POTENTIAL PRODUCTION (LBS./AC. DRY WT):					
FAVORABLE YEARS					
NORMAL YEARS					
UNFAVORABLE YEARS					

FOOTNOTES

Andres Sanches
01/99

WASTE UTILIZATION

Job Sheet #1
PRACTICE CODE

Tract No. 427
Field No. 1,2,3,4

Tract No. 450
Field No. 1

Tract No. 43
Field No. 1,2,3

Tract No. 632
Field No. 1,2,3,4,5,6,7,8,9,10

1. Manure will not be spread directly into an open water course or where manure will enter an open water course. Wind speed and direction will be observed when operating the manure gun adjacent to an open water course.

2. The liquid waste storage facilities will be empty by October 1st to begin the winter storage.

3. Normally, no manure will be applied to the fields from October 1st through December 13th except under emergency conditions.

4. For winter manure applications the following will apply:

   a) Manure will not be spread closer than 50 feet from an open water course.

   b) Application will be based on weather forecast. Manure will not be applied during a rainfall event.

   c) Only those areas outlined in green on the Conservation Plan Map will be used for emergency winter manure application areas.

CONFLICT: #3 PAGE 1

d) From October 1st to January 1st manure application rate will not exceed 25 lbs per acre. The stationery manure gun will not be set in one place for more than 12 minutes. No more than loads of manure will be applied to the fields with the gallon manure tank wagon.

e) Fields receiving winter manure application will not receive manure or commercial fertilizer until at least June 1st.

5. Manure will not be spread on fields when the soils are saturated, ponded, or flooded or during times when manure runoff is likely.

6. A 6 ton dry matter forage yield per acre per year will be the target yield.

7. Recommend 5 applications of manure per acre per year. No more than 60 lbs of nitrogen should be applied per acre per application. The stationery manure gun should not be set in one place for longer than 24 minutes. No more than loads of liquid manure should be applied per application with the gallon manure tank wagon.

8. The application of only manure to supply the recommended amount of nitrogen per acre per year to the pastures and haylands will cause an over application of phosphorous and potassium. Recommend that soil and manure tests be used to monitor phosphorous and potassium levels in the soil and manure. If phosphorous concentration levels exceed 100 ppm in the soil and/or potassium concentration levels exceed 800 ppm in the soil, measures will be taken to reduce the annual loading of these nutrients.

9. Refer to Oregon State University Extension Publication EM 8585, "Manure Application Rates for Forage Production" for additional guidance in determining rates for manure application based on nutrient concentrations in manure and soil.

10. If commercial fertilizer is used, the application rates will be based on soil tests. Refer to Oregon State University Publication EC 1478, "Soil Test Interpretive Guide" for guidance in collecting soil samples for testing and interpreting soil test results.

Andres Sanches
01/99

PRESCRIBED GRAZING

Job Sheet # 2
PRACTICE CODE 528A

Tract No. 427
Field No. 1,2,3,4

Tract No. 450
Field No. 1

Tract No. 43
Field No. 1,2,3

1. Pastures will be managed to assure at least 6 tons of dry matter are produced per acre per year.
2. Pastures will be reestablished when the forage yields fall below 5 tons of dry matter per acre per year.
3. A rotational grazing season will be used. There will be 8 pastures in the rotation. A minimum of 21 day regrowth period will be used.
4. Noxious weeds such as Tansy Ragwort and Canada Thistle will be controlled.
5. Pastures will be clipped and dragged at least twice during the growing season.
6. No more than 307 lbs of nitrogen per acre per year will be applied. Commercial fertilizer will be applied in accordance with a soil test.
7. Manure will be applied to the pastures in accordance with the enclosed Waste Utilization Job Sheet #1.
8. Spring grazing will be delayed until the grasses have at least 6 inches of growth and the soil is firm.
9. Pastures will not be grazed below 2 inches at ant time during the growing season.
10. Livestock will be removed in the fall when the ground becomes wet and the grasses have at least 4 inches of growth going into the winter.

Andres Sanches
01/99

FORAGE HARVEST MANAGEMENT

Job Sheet #4
PRACTICE CODE 511

Tract No. 632
Fields No. 1,2,3,4,5,6,7,8,9,10

1. Harvesting newly seeded fields will be delayed until the grasses have at least 8 inches of growth and ground is firm.

2. Harvesting estalblished stands will be delayed until grasses have at least 6 inches of growth and ground is firm.

3. Harvesting will not be done when the fields are saturated or ponded.

4. Grasses will not be cut if height is less than 2 inches.

5. No more than 307 lbs of nitrogen will be applied to the fields per acre per year. Commercial fertilizer will be applied in accordance with a soil test.

6. Manure will be applied to the fields in accordance with enclosed Waste Utilization Job Sheet #1.

7. Fields will be reestablished when undesireable forage species dominate and/or the forage yield falls below 5 tons of dry matter per acre per year.

8. Noxious weeds such as Tansy Ragwort and Canada Thistle will be controlled.

SOIL AND MANURE SAMPLING INSTRUCTIONS FOR ANIMAL WASTE MANAGEMENT SYSTEMS

SOIL SAMPLES Job Sheet 5

Spring Soil Samples

- Spring soil samples are to be collected the last 2 weeks of March or the first 2 weeks in April when soils are not saturated.
- Soil samples are to be collected on fields that have not received manure applications within the last 30 days.
- Collect several samples (about 10 one-fourth cup samples) of soils from just below the thin sod layer to a depth of 6 to 9 inches and add to bucket.
- Mix the samples in the bucket and remove a 1 cup from the mixture and place into a sample bag.
- The bag should be labeled with ;
  - farm or operator name
  - sample date
  - field and tract (see NRCS plan map)
  - sample depth (0 to 9 inches)
- Keep soil sample cool (small cooler with some ice) in the field until sample can be put in refrigerator or into freezer. Soil can be stored in refrigerator for up to 1 week or can be stored in a freezer for longer periods.
- Ship samples to lab (see shipping instructions below).

Fall Soil Samples

- Fall soil samples are to be collected during the last 2 weeks in September or the first 2 weeks in October on soils that are not saturated.
- Soil samples are to be collected on fields that have received normal manure applications during the current year.
- Sample soils and ship as outlined in the spring soil sample section above.

MANURE SAMPLES

Liquid Manure Samples

- Liquid manure samples should be sampled after agitating the storage facility for the first application made in the spring (March-April) and for the last application in the fall (September-October).
- Put a bucket in the path of the gun or carefully take bucket sample of liquid manure from the liquid manure tank wagon .
- Fill a sample bottle with some of the liquid manure from the bucket and keep cool while in the field. (you can put the sample in a small cooler with some ice)
- Label the sample with the farm or operator name, date, and liquid manure sample.
- Freeze the sample until ready to ship to the lab.

SOIL AND MANURE SAMPLING INSTRUCTIONS FOR ANIMAL WASTE MANAGEMENT SYSTEMS

MANURE SAMPLES

Solid Manure Samples

- Solid manure samples should be sampled during the first application made in the spring(March-April).
- Lay a piece of tarp or plastic on the pasture and make a pass over or next to it to obtain a representative sample from the spreader.
- Scoop up enough material to fill the sample bag about half full.
- Label the sample with the farm or operator name, date, and solid manure sample.
- Keep the sample cool while in the field. (You can put the sample in a small cooler with some ice.)
- Freeze the sample until ready to ship to the lab.

SHIPPING INSTRUCTIONS

- Nitrogen is heat sensitive. Keeping the samples cool in shipping helps to improve reliability of data.
- Ship frozen soil samples in small cooler.
- If shipping refrigerated soil samples, it is recommended that these be shipped in a small cooler with ice.
- Ship frozen liquid or solid manure samples in a small cooler.
- Ship frozen soil samples or refrigerated soil samples with frozen liquid and/or solid samples in a small cooler. Lab should send cooler back to you if request them to do so.
- Ship any or all samples on Monday, Tuesday, or Wednesday using any parcel post service.
- Include a note with the samples for the analysis needed.

Soils Analysis Needed;
pH
P---Phosphorus (Weak Bray)
K---Potassium
NH4-N---Ammonium
NO3-N---Nitrate

Liquid and Solid Manure Analysis Needed;
Total Nitrogen, Phosphorus, & Potassium plus Ammonium and Solids

EM 8585 • April 1996
$1.00

NUTRIENT MANAGEMENT
FOR DAIRY PRODUCTION

Manure Application Rates for Forage Production

J. Hart, E.S. Marx, and M. Gangwer

Most dairies can supply all the nitrogen, phosphorus, potassium, and other nutrients needed for forage production by applying manure to forage crops. As a manager, your goal is to match nutrient supply with crop needs by deciding when and how much manure to apply.

This publication explains how to estimate the amount of manure to apply for forage production. To do so, you need:

- A current manure analysis for your dairy (or see EM 8586, *Dairy Manure as a Fertilizer Source*)
- A list of forage crops to be produced
- A soil test from each field where manure will be applied

Too much manure results in excess plant uptake of nutrients such as potassium. High-potassium grass forages can lead to health problems, especially in dry cows. In addition, excess manure contributes to nutrients and microorganisms in runoff water and potential nutrient leaching to groundwater.

John Hart, Extension soil scientist; E.S. Marx, research assistant in soil science; and Mike Gangwer, Extension agent, Marion County; Oregon State University.

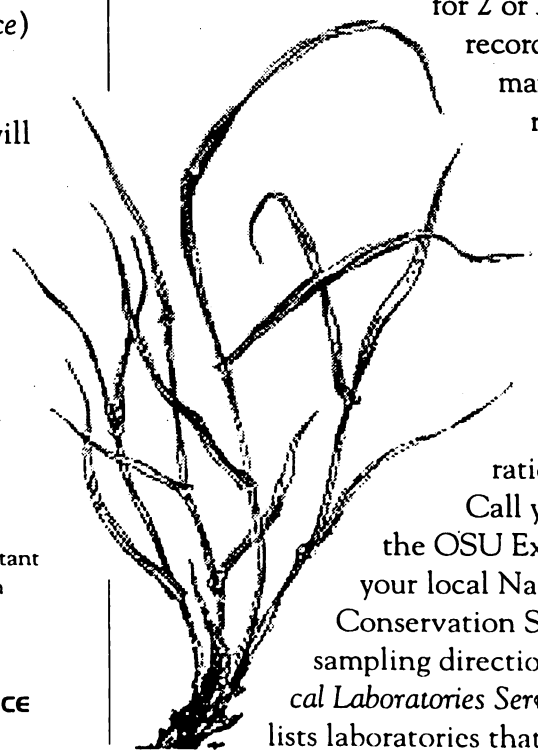
OREGON STATE UNIVERSITY EXTENSION SERVICE

The application rates in this publication are based on soil tests and growing conditions in western Oregon.

Manure analysis

Analyzing your manure is critical to determining the correct application rate. If you don't test your dairy's manure, you can only guess its nutrient value.

Manure testing in western Oregon has shown more variation among dairies than within one dairy. Develop a manure nutrient history for your dairy by testing manure two or three times a year for 2 or 3 years. These records will help you manage nutrient resources.



Also test manure when you expect a change in nutrient content; for example, when you make a large change in the ration.

Call your county office of the OSU Extension Service or your local Natural Resource Conservation Service office for sampling directions. A *List of Analytical Laboratories Serving Oregon* (FG 74) lists laboratories that test manure.

Crop nitrogen requirements

Nitrogen (N) is the nutrient needed for crop production on dairies. Tables 1 and 2 show the estimated nitrogen removal rate (or uptake) for average yields of the most common forage crops grown on dairies.

Determining manure application rate

Your goal is to match manure nutrient application rates with crop removal. Table 1 and Figures 1–3 provide the information you need for perennial crops, and Table 2 and Figures 4–6 apply to annual crops. Instructions on how to use them follow. (An example is illustrated on page 3.)

Perennial crops

1. In Table 1, find the crop you will grow and the average yield per cutting. Let's assume you grow perennial ryegrass. Table 1 shows that an average yield per cutting is 1.2 tons per acre of dry matter (about 3 tons of harvested grass).
2. Now find the nitrogen removal rate for the average yield. Table 1 shows that perennial ryegrass takes up about 60 pounds of N per acre for each cutting. Thus, you should apply about 60 lb N/a after cutting the ryegrass.
3. Find the figure below (Figures 1–3) that represents the type of manure you want to apply. Let's assume you want to apply lagoon effluent, so you'll use Figure 2.
4. Figure 2 contains three lines representing N application rates of 50, 100, and 150 lb N/a. Find the line that is closest to the rate you need to apply. You'll use the line for 50 lb/a because it is closest to 60 lb/a.
5. Select your manure analysis for nitrogen on the left side of the graph. Let's assume a manure test shows that the effluent contains 6 lb/1,000 gallons or 750 ppm N. Move to the right across the graph until you meet the line for the application rate you have chosen (50 lb N/a).

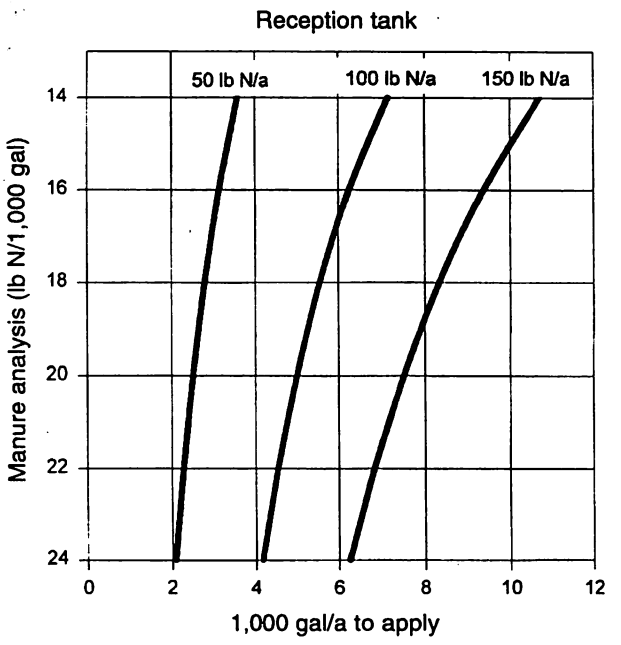


Figure 1.—Determining application rate for reception tank manure.

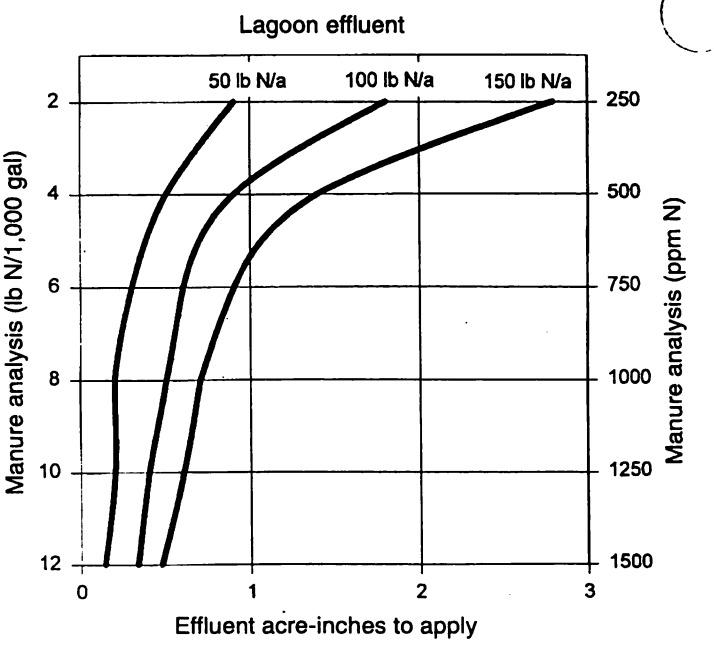


Figure 2.—Determining application rate for lagoon effluent.

Note: Recommendations in Figures 1–6 assume that nitrogen applications should not exceed crop removal. We assume that N mineralization will offset any volatile losses that occur during application.

Table 1.—Approximate nitrogen removal by perennial forage crops and suggested nitrogen application rates.

Crop	Average yield per cutting (t/a)	N removal rate for average yield per cutting (lb N/a)	Suggested N application rate (lb N/t of forage*)
Orchard grass	1.4	70	50–60
Perennial ryegrass	1.2	60	50–60
Tall fescue	1.4	70	50–60

*All rates are on dry matter basis unless noted otherwise.

6. Now move down to the line labeled "effluent acre-inches to apply." Estimate the number of acre-inches of effluent to apply (about 0.3 acre-inch). Remember that you will need about 10 percent more nitrogen because no line exists for the 60 lb N/a required by ryegrass. Your final result will be about 0.4 acre-inch.

Note: If you know your own yield per cutting, you can figure your nitrogen need more accurately. To do so, multiply your tons per acre per cutting by the "suggested N application rate (lb N/t of forage)" in Table 1. The result is your N removal rate. Use the line in the appropriate figure that is closest to that rate.

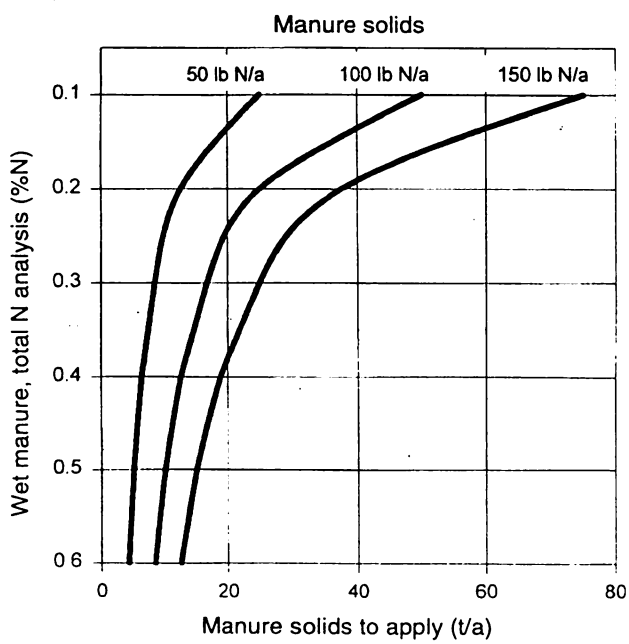


Figure 3.—Determining application rate for manure solids.

Example

Crop: perennial ryegrass

Manure: lagoon effluent

1. Average yield per cutting = 1.2 t/a (Table 1).
2. Nitrogen removal rate = 60 lb N/a per cutting (Table 1).
3. Find the lagoon effluent graph (Figure 2).
4. Use the 50 lb/a line because it is closest to the 60 lb/a you need to apply.
5. Your manure test shows 6 lb/1,000 gal. Find this line on the left of the graph. Move across to the 50 lb/a line.
6. Move down to the bottom line to find the number of acre-inches to apply (0.3 acre-inch).

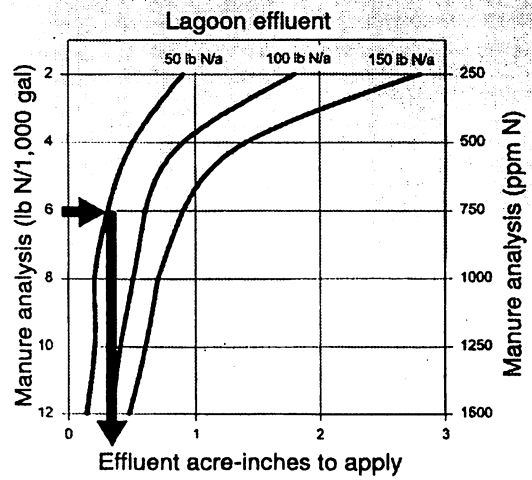


Table 2.—Approximate nitrogen removal by annual forage crops and suggested nitrogen application rates.

Crop	Average total yield (t/a)	N removal rate for average yield (lb N/a)	Suggested N application rate (lb N/t of forage*)
Silage corn			
75% moisture	30	180	5–7
dry matter basis	7	180	20–30
Annual ryegrass	5	100	15–25
Triticale	8	160	15–25
Oats	4	80	15–25
Sudan grass	5	250	50–60

*All rates are on dry matter basis unless noted otherwise.

Annual crops

You can follow a similar procedure to estimate the amount of manure needed for annual crops. For example:

1. From Table 2, find the total amount of N that is needed by the annual crop you will grow. We will use silage corn as an example. A 30-ton yield of silage corn requires 180 lb N/a.
2. Find the figure (Figures 4–6) that represents the type of manure you want to apply. Let's assume you'll apply separated solids, so use Figure 6.
3. Figure 6 contains three lines representing N application rates of 50, 100, and 150 lb N/a. Find the line that is closest to the rate you need to apply. You'll use the line for 150 lb/a since it is the closest to the rate you need to apply (180 lb/a).
4. Find your manure analysis for nitrogen on the left side of the graph. Let's assume your manure test shows that the solids contain 5 pounds of N/t or 0.25 percent N on a wet basis. Since 0.25 percent N is not on the graph, estimate a point halfway between 0.2 and 0.3. Move to the right until you meet the line for 150 lb N/a.
5. Now move down to the line labeled "manure solids to apply (t/a)." You should find 30 tons. Remember that 20 percent more nitrogen will be needed because no line exists for the 180 lb N/a required by the silage corn. The total estimated amount of solids required should be 35 t/a.

Note: If you know your own yield, you can figure your nitrogen need more accurately. To do so, multiply your tons per acre by the "suggested N application rate (lb N/t of forage)" in Table 2. The result is your N removal rate. Use the line in the appropriate figure that is closest to that rate.

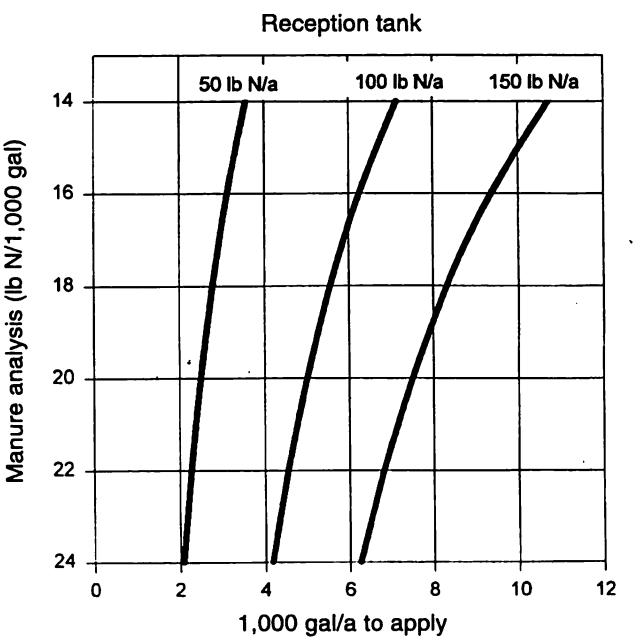


Figure 4.—Determining application rate for reception tank manure.

Special cases

The manure application rates in this publication are based on the assumption that manure already has been applied to fields for at least 4 consecutive years, not including the current year.

If your fields have received manure for less than 4 years, increase rates as shown in Table 3 if you use reception tank, separated solids, or dry stack material. Lagoon effluent provides sufficient available N for any situation when applied during the growing season.

Checking your application rate for silage corn

With silage corn, you can confirm that you applied sufficient manure by using the pre-sidedress soil nitrate test (PSNT). When the corn is 12 inches tall or at the five-leaf development stage, sample soil between rows to a depth of 12 inches. Have the sample analyzed for nitrate nitrogen (NO_3-N).

Compare the soil test results to Table 4. Apply the appropriate amount of lagoon effluent or fertilizer N to the growing crop based on the PSNT and Table 4.

It is important to handle samples properly. For more information, see *The Pre-sidedress Soil Nitrate Test (PSNT)*, EM 8650.

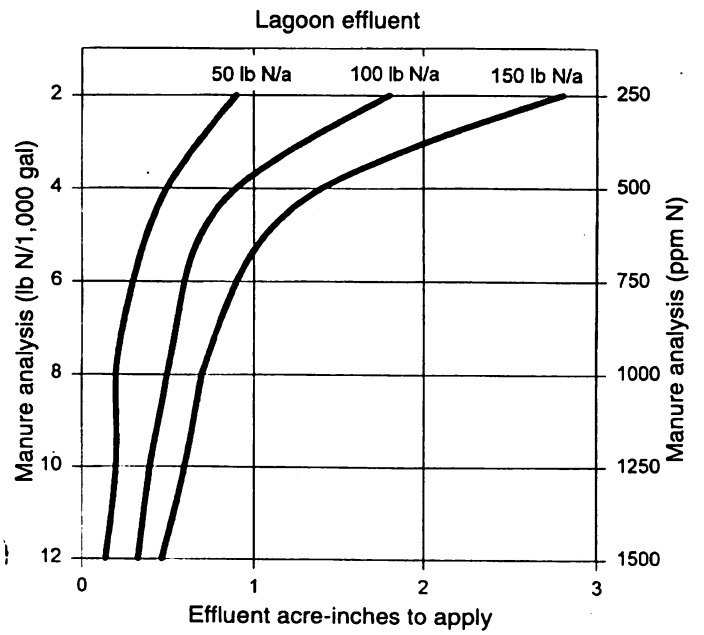


Figure 5.—Determining application rate for lagoon effluent.

Table 3.—Manure application rates based on number of years field has received manure.

If your field has received manure this many years:	Multiply suggested application rate by:
0	3.0
1	2.5
2	2.0
3	1.5
4 or more	Use suggested rates

Table 4.—Amount of nitrogen to apply for silage corn production based on the PSNT.

PSNT (ppm)	Nitrogen (lb/a)
0–10	100–150
10–20	50–100
20–25	0–50
above 25	0

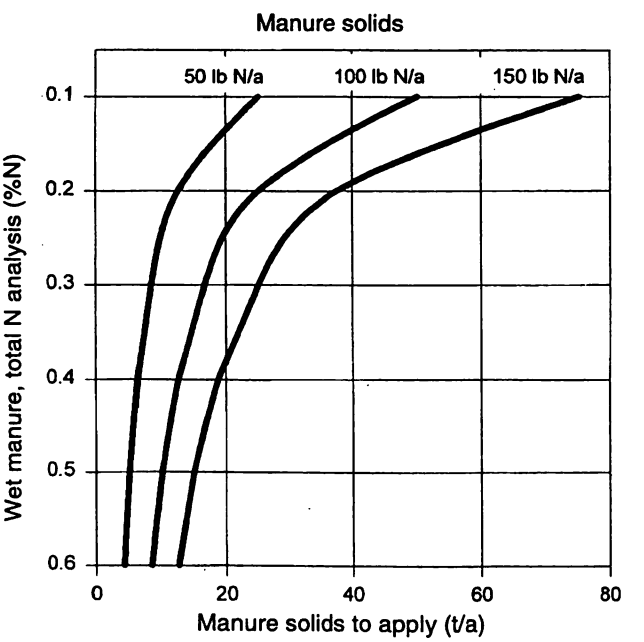


Figure 6.—Determining application rate for manure solids.

Testing your soil for P and K

Test your soil for phosphorus (P) and potassium (K) before applying manure. Table 5 provides interpretations of P and K soil tests.

If you've applied manure for more than 5 years, additions of P and K usually are not needed. For example, potassium usually is not deficient in soils where manure has been applied unless the applications were light and a high yield of grass hay was removed.

A manure application that meets crop nitrogen needs usually supplies sufficient amounts of P and K. Manure contains as much, if not more, K than N. For more information, see EM 8586, *Dairy Manure as a Fertilizer Source.*

In fact, fields that have received manure for a decade or more often have high soil test values for P and K. Fields with soil test K above 1,000 ppm can produce grass forage with a high K concentration. When grass forage with more than 3 percent K is fed to dry cows, serious illness or death may occur.

In some cases, a soil test shows excessive K, but N is needed. In this case, you have two options:

- Apply separated solids, which are lower in K than other forms of manure.
- If another area is available for manure application, apply manure there and buy N fertilizer for the area that has excess K.

Contact your county office of the OSU Extension Service for additional information.

New plantings

Little N is needed by new plantings. After N, phosphorus is the nutrient most likely to limit forage production. For new plantings or annual crops where manure has not been applied, apply 30 lb P_2O_5/a in a band-placed starter fertilizer. For more information, see FG 63, *Pasture Fertilizer Guide.*

Table 5.—Interpretation of soil tests for P and K.

Soil status	Nutrient Phosphorus (P) (ppm)	Potassium (K)
deficient	below 25	below 150
sufficient	25–50	150–500
high	50–75	500–1,000
excess	above 75	above 1,000

If P is deficient (see Table 5), also apply one of the following :

- 25 tons of separated solids
- 5,000 gallons of reception tank manure
- 5 wet tons of dry stack manure

End-of-season testing

The tables and figures in this publication provide only an estimate of manure application rates. An end-of-season soil test for nitrate nitrogen or stalk nitrate test for silage corn can aid in adjusting next season's manure application rates.

"Report card" soil testing

1. Sample soil to a depth of 12 inches as described for PSNT sampling. Sample from between rows, and avoid fertilizer bands. See EM 8650 for more information.
2. Prepare and handle the sample as described for PSNT sampling.
3. Have the sample analyzed for nitrate nitrogen (NO_3-N).

If soil NO_3-N test results are above 15 ppm, nitrogen probably was supplied in excess of crop needs. (To convert ppm to lb/a, multiply by 3.65.)

Corn stalk nitrate testing at harvest

1. Collect 10 mature corn plants by cutting the stalks just above the brace roots. Select representative plants away from edges of the field.
2. Cut an 8-inch section of stalk from the bottom of each harvested plant.
3. Remove the dried outer leaves from each 8-inch section.
4. Split each section of stalk lengthwise to aid in drying.
5. Place the split stalks together in a bag and send to a lab for nitrate nitrogen (NO_3-N) analysis.
6. Use Table 6 to interpret results.

Table 6.—Interpretation of corn stalk nitrate tests.

Stalk NO_3-N concentration at harvest	Interpretation
<3,500 ppm	N may have limited yield
3,500–5,500 ppm	N sufficient for optimum yield
>5,500 ppm	N supplied in excess of crop demand

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Hart, J. *A List of Analytical Laboratories Serving Oregon*, FG 74 (Oregon State University, Corvallis, revised 1996). No charge

Hart, J., G. Pirelli, L. Cannon, and S. Fransen. *Pastures Fertilizer Guide*, FG 63 (Oregon State University, Corvallis, 1993). No charge

Hart, J., M. Gangwer, M. Graham, and E. Marx. *Dairy Manure as a Fertilizer Source*, EM 8586 (Oregon State University, Corvallis, reprinted 1996). 75¢

Marx, E., N.W. Christensen, J. Hart, M. Gangwer, C.G. Cogger, and A.I. Bary. *The Pre-sidedress Soil Nitrate Test*, EM 8650 (Oregon State University, Corvallis, 1996). 75¢

Other publications

Marx, E. *Evaluation of Soil and Plant Analyses as Components of a Nitrogen Monitoring Program for Silage Corn* (Masters thesis, Oregon State University, 1995).

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Soil Test Interpretation Guide

E.S. Marx, J. Hart, and R.G. Stevens

Regular soil testing is an important element in nutrient management. You can use soil tests as a diagnostic tool or to identify trends through time. To obtain meaningful test results, you must sample soil correctly, at the same time each year, and you must maintain records. For more information, see EC 628, *How to take a soil sample. . .and why* (see "For more information," page 7).

Soil testing laboratories use different test methods, which may influence results and sufficiency ranges. Therefore, the sufficiency ranges in this publication are accurate only for the test methods listed.

Soil tests used to evaluate fertility measure the soil nutrients that are expected to become plant-available. They do not measure total amounts of nutrients in the soil. Measurements of total nutrient content are not useful indicators of sufficiency for plant growth, because only a small portion of the nutrients are plant-available.

Adequate soil nutrient levels vary depending on plant species. Similarly, plant tolerance of excessive nutrient levels, nutrient imbalances, or less-than-optimum growing conditions varies. If excessive nutrient levels exist, review management to determine the cause.

Nutrient concentrations vary with soil depth. Depth of sampling, therefore, affects test results. To determine the proper sampling depth, you must consider the purpose of the soil test. To estimate nutrient availability for a crop prior to planting, sample soil to the depth where most root activity will occur. Shallow sampling sometimes is used to evaluate surface conditions in perennial crops where fertilizers have been applied to the soil surface. Deep sampling may be necessary to diagnose problems in orchards.

Soil test values do not vary greatly from year to year. Drastic changes in test values may indicate an unrepresentative soil sample or a laboratory error. When in doubt, submit a new sample or ask the lab to repeat the analysis.

This publication provides general guidelines for interpreting soil test results. Fertilizer guides for many individual crops are available from your county office of the OSU Extension Service or Washington State University Cooperative Extension, or from Extension and Experiment Station Communications, Oregon State University (see "For more information").

Nitrogen (N)

Plant-available nitrogen (nitrate and ammonium)

Plant-available forms of nitrogen are nitrate (NO_3^--N) and ammonium (NH_4^+-N). Soil concentrations of NO_3^--N and NH_4^+-N depend on biological activity, and therefore fluctuate with changes in conditions such as temperature and moisture. Nitrate is easily leached from the soil with high rainfall or excessive irrigation. Soil tests can determine NO_3^--N and NH_4^+-N concentrations at the time of sampling, but do not reflect future conditions.

When you collect samples for nitrogen testing, keep them cold, or dry them immediately to prevent NO_3^--N and NH_4^+-N concentrations from changing.

E.S. Marx, former research assistant in soil science, and John Hart, Extension soil scientist, Oregon State University; and Bob Stevens, Extension soil scientist, Washington State University.

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Ammonium-nitrogen (NH_4^+-N)

Ammonium-nitrogen does not accumulate in the soil, as soil temperature and moisture conditions suitable for plant growth also are ideal for conversion of NH_4^+-N to NO_3^--N. Ammonium-nitrogen concentrations of 2–10 ppm are typical. Soil NH_4^+-N levels above 10 ppm may occur in cold or extremely wet soils, or if the soil contains fertilizer residue.

Nitrate-nitrogen (NO_3^--N)

West of the Cascades. Soil nitrate-nitrogen measurements are most useful as a post-harvest "report card" to evaluate N management. Nitrate remaining in the soil after harvest can leach during winter rains, contaminating surface and groundwater. If residual nitrate levels are consistently high, reduce fertilizer N inputs in future growing seasons.

Table 1.—Residual soil nitrate-nitrogen for evaluating N management.

	NO_3^--N in surface foot (ppm)*
low	<10
medium	10–20
high	20–30
excessive	>30

*See Table 13 (page 7) for conversion of ppm to lb/acre.

Mid-season measurement of soil nitrate is used for field corn production. See EM 8650, *The Pre-sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington*, for more information.

East of the Cascades. In arid regions, soil nitrate (NO_3^--N) is evaluated by measuring NO_3^--N to the expected rooting depth of the crop to be grown. If test results are reported in ppm, convert to lb/acre using Table 13 (page 7). Then subtract the soil nitrate from the crop requirement to determine a fertilizer rate.

Failure to account for NO_3^--N in the soil can lead to over-application of nitrogen fertilizers. Also, irrigation water should be analyzed for NO_3^--N content, and fertilizer rates reduced accordingly. Proper irrigation increases N use efficiency and reduces nitrate leaching.

Total nitrogen

Total nitrogen analysis measures N in all organic and inorganic forms. Total nitrogen does *not* indicate plant-available N, and is not included in standard soil testing programs.

A typical agricultural soil in the Willamette Valley contains about 0.10 to 0.15 percent N, or approximately 5,000 lb N/acre in the surface foot. Only 1 to 4 percent of this total N becomes plant-available during a growing season. East of the Cascades, soils tend to have smaller amounts of total N.

Total N analysis, while not recommended as part of a standard soil testing program, may be better than organic matter analysis for estimating soil N supplying capability.

Phosphorus (P)

The Bray P1 (for acid soils) and the Olsen sodium bicarbonate ($NaHCO_3$) (for alkaline soils) tests estimate plant-available phosphorus. Soil testing laboratories also use several other extraction methods. For interpretation of results from other extraction methods, contact the laboratory that performed the analysis.

Phosphorus soil tests are an index of P availability. The test values cannot be used to calculate available lb P_2O_5/acre.

When sampling soil, you must be aware of previous P management. Phosphorus is relatively immobile in soil. If phosphorus has been applied in a fertilizer band, concentrations of P may persist where the band was placed. Avoid fertilizer bands when collecting soil samples.

Table 2.—Phosphorus soil test.

	West of Cascades (Bray P1 test) ppm P	East of Cascades (Olsen test) ppm P
low	<20	<10
medium	20–40	10–20
high	40–100	20–40
excessive	>100	>40

The phosphorus application rate necessary to correct P deficiencies varies depending on soil properties. Phosphorus availability decreases in cool, wet soils. In many situations, banded phosphorus applications are more effective than broadcast applications.

Phosphorus applications generally are not recommended if tests are high or excessive. High soil phosphorus combined with surface runoff can cause excessive growth of plants and algae in surface waters, damaging aquatic ecosystems.

Cations

Of the three primary cations (potassium, calcium, and magnesium), potassium requires the most management attention. Few crops have responded to calcium and magnesium in the Pacific Northwest.

If extremely high levels of a single cation exist, plant deficiencies of other cations may occur due to competition for plant uptake.

The soil test ranges in Tables 3, 4, and 5 are for the ammonium acetate extraction method. If a sodium bicarbonate ($NaHCO_3$) extraction is used, test values may be slightly lower.

Potassium (K)

Excessive soil potassium levels can result in elevated K levels in grass forage crops, which may be detrimental to animal health.

Table 3.—Extractable potassium (K).

	K
low	<150 ppm* <0.4 meq/100 g soil
medium	150–250 ppm 0.4–0.6 meq/100 g soil
high	250–800 ppm 0.6–2.0 meq/100 g soil
xcessive	>800 ppm >2.0 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Calcium (Ca)

Calcium deficiencies usually are found only on very acid soils. They can be corrected by liming with calcium carbonate ($CaCO_3$).

Table 4.—Extractable calcium (Ca).

	Ca
low	<1,000 ppm* <5 meq/100 g soil
medium	1,000–2,000 ppm 5–10 meq/100 g soil
high	>2,000 ppm >10 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Magnesium (Mg)

Magnesium deficiencies on acid soils can be corrected by liming with dolomitic lime.

Magnesium toxicity can occur on serpentine soils in southwest Oregon.

Table 5.—Extractable magnesium (Mg).

	Mg
low	<60 ppm* <0.5 meq/100 g soil
medium	60–180 ppm 0.5–1.5 meq/100 g soil
high	>180 ppm > 1.5 meq/100 g soil

*See Table 13 (page 7) for conversions from ppm to meq/100 g soil.

Sulfate-sulfur (SO_4^{2-}-S)

Plants absorb sulfur in the sulfate (SO_4^{2-}-S) form. In high rainfall areas west of the Cascades, SO_4^{2-} is readily leached, and soil test data are not well correlated with plant growth. In arid regions east of the Cascades, soil test information may be useful. Also, irrigation water may contain significant amounts of sulfate-sulfur. Plant analysis often is useful for diagnosing sulfur deficiency.

Table 6.—Sulfate-sulfur, east of the Cascades.

	SO_4^{2-}-S (ppm)
low	<2
medium	2–10
sufficient	>10

Micronutrients

Deficiencies of micronutrients other than boron and zinc are uncommon. Availability of most micronutrients is largely pH-dependent; availability decreases as pH increases (except for molybdenum, which becomes more available as pH increases). Deficiencies rarely occur in soils with pH below 6.5.

Soil testing for micronutrients other than boron and zinc is recommended only when a deficiency is suspected. If you suspect a micronutrient deficiency, plant tissue testing may be a better diagnostic tool than soil testing.

Boron (B)

Crops such as alfalfa, table beets, brassicas, caneberries, and root crops have responded to boron fertilization on B-deficient soils in western Oregon. Tree fruits and alfalfa are examples of crops sensitive to low boron levels east of the Cascades.

While low levels of boron may limit plant growth, high concentrations can be toxic. When applying boron, apply uniformly and mix thoroughly with the soil.

Table 7.—Boron by the hot water extraction method.*

	B (ppm)
low	<0.5
medium	0.5–2
high	>2

*The hot water extraction method for boron may result in incorrectly high values on soils with high organic matter content.

Zinc (Zn)

Zinc values above 1.0 ppm using the DTPA extraction method are sufficient. Zinc deficiencies have been identified in some crops in certain regions. Corn, beans, grapes, hops, onions, and deciduous fruit trees are especially sensitive to low levels of available zinc. Deficiencies sometimes are associated with high soil P concentrations, soils high in fine clay and silt, or soils with high pH.

Copper (Cu)

Copper values above 0.6 ppm using the DTPA extraction method are sufficient. Copper deficiencies are uncommon. Deficiencies have been identified on muck soils such as those in the Klamath area in Oregon and the Colville area in Washington.

Manganese (Mn)

Manganese values above 1.5 ppm using the DTPA extraction method are sufficient. Manganese deficiencies generally occur only in soils with pH 7.0 or above. Manganese toxicity may occur on acid soils. On alkaline soils east of the Cascades, Mn availability may increase in acidified microzones where fertilizers have been placed. These acidified microzones can alleviate Mn deficiencies sometimes encountered on high pH soils. In some instances, however, acidic microzones can result in Mn toxicity.

Iron (Fe)

Soil testing for iron is not recommended. Most test methods do not discern between forms of iron, and therefore have little meaning for plant nutrition.

Iron deficiencies are uncommon on acid soils in the Pacific Northwest. Where deficiencies occur, they often are associated with acid soil plants, such as azaleas or rhododendrons, growing on soils with unsuitably high pH. Acidifying fertilizers such as ammonium sulfate will help correct problems.

Iron applications on alkaline soils are inefficient unless a chelated form is used. Lowering soil pH to increase iron availability on a field scale is not economical. However, adding acidifying materials such as elemental sulfur to fertilizer mixes can acidify microzones around the fertilizer material and increase Fe availability.

Foliar applications of Fe sometimes are used to correct deficiencies in fruit, turf, and other high-value crops.

Molybdenum (Mo)

Soil Mo concentrations are too low for most labs to evaluate. Molybdenum deficiencies are rare, and are of concern mostly for leguminous crops. Molybdenum-deficient legumes appear chlorotic. Liming to raise soil pH may alleviate deficiencies. Molybdenum-coated seed also can be used.

Excessive molybdenum in forage can harm animal health. If you suspect excessive molybdenum in your forage, determine Mo content by forage analysis.

Chloride (Cl^-)

Soil testing for chloride is not a common practice, and little data exists for interpretation of test results. Evidence indicates that wheat sometimes benefits from chloride applications. The values in Table 8 are based on wheat research in Montana and South Dakota. Little information exists on chloride soil testing in Washington and Oregon.

Table 8.—Chloride soil test ranges for wheat in Montana and South Dakota, 2-foot sampling depth.

	ppm	lb/acre
low	0–4	0–32
medium	4–8	32–64
high	>8	>64

pH, lime requirement (LR)

Soil pH is a measure of soil acidity. Most crops grow best if the soil pH is between 6.0 and 7.5.

Table 9.—Soil pH ranges.

	pH
strongly acid	below 5.1
moderately acid	5.2–6.0
slightly acid	6.1–6.5
neutral	6.6–7.3
moderately alkaline	7.4–8.4
strongly alkaline	above 8.5

Soil pH can be increased by liming. The soil pH test indicates *if* lime is needed. The lime requirement test determines *how much* lime is needed. Accurate lime recommendations cannot be made without performing an SMP or similar test.

SMP* lime requirement test

The SMP lime requirement test is used to estimate the amount of lime required to raise the pH of 6 inches of soil. The SMP test is performed by mixing soil with a buffered pH 7.5 solution and determining the pH of the mixture. During the reaction, the soil's reserve acidity lowers the pH of the SMP solution. Soils with low SMP values have high reserve acidity and high lime requirements.

Some soils may have a low pH (<5.3) and a fairly high SMP buffer value (>6.2). This condition can be caused by the application of fertilizer. In this case, the low pH value is temporary, and the pH of the soil will increase as the fertilizer completes its reaction with the soil.

Sandy soils also may have a low pH and high SMP buffer value. This condition occurs because sandy soils have low amounts of reserve acidity due to low cation exchange capacity (CEC). In such cases, a light application of lime (1 to 2 t/a) should suffice to neutralize soil acidity.

Table 10 is used to determine the amount of lime required, based on the SMP test, to raise soil pH to a desired level. The target pH is determined by the crop to be grown and possibly by other factors.

*SMP stands for Shoemaker, MacLean, and Pratt—the people who developed the test.

Without an SMP or similar test, there is no way to know how much lime is required to adjust soil pH to a desired level. Accurate lime recommendations cannot be made solely on the basis of soil pH.

Table 10.—SMP lime requirement—field scale.

SMP buffer	Tons/acre of 100-score lime needed to raise pH of surface 6 inches of soil to the following pH's			
	5.3	5.6	6.0	6.4
6.7	—	—	—	—
6.6	—	—	—	1.1
6.5	—	—	1.0	1.7
6.4	—	—	1.1	2.2
6.3	—	—	1.5	2.7
6.2	—	1.0	2.0	3.2
6.1	—	1.4	2.4	3.7
6.0	1.0	1.7	2.9	4.2
5.9	1.4	2.1	3.3	4.7
5.8	1.7	2.5	3.7	5.3
5.7	2.0	2.8	4.2	5.8
5.6	2.3	3.2	4.6	6.3
5.5	2.6	3.6	5.1	6.8
5.4	2.9	3.9	5.5	7.3
5.3	3.2	4.3	6.0	7.8
5.2	3.6	4.7	6.4	8.3
5.1	3.9	5.0	6.9	8.9
5.0	4.2	5.4	7.3	9.4
4.9	4.5	5.8	7.7	9.9
4.8	4.8	6.2	8.2	10.4

Example: If the "SMP buffer" value is 5.9, the amount of lime needed to raise the pH to 6.0 is 3.3 tons of 100-score lime/acre.

Table 11.—SMP lime requirement—gardens.

If the SMP lime requirement test is	Apply this amount of lime (lb/1,000 ft²)
5.4 or below	250
5.5–6.0	150–250
6.0–6.5	100–150
above 6.5	0

Some plants, such as blueberries, rhododendrons, azaleas, and cranberries, grow best in acid soils. Fertilizers such as ammonium sulfate can help maintain acidic conditions.

Sodium (Na)

Sodium is not a plant nutrient and therefore is not necessary for plant growth. High levels of sodium are detrimental to soil tilth and plant growth.

Sodium levels are evaluated based on Exchangeable Sodium Percentage (ESP). The ESP is the percent of the cation exchange capacity (CEC) occupied by Na.

ESP values above 10 percent are of concern. Excessive sodium levels can occur naturally or can result from irrigation with high-sodium water. Reclamation involves establishment of drainage followed by gypsum application and leaching with low-sodium water.

Soluble salts (SS)

Soluble salt problems usually are associated with arid regions such as eastern Oregon and Washington. Soils with high levels of soluble salts are called saline soils. Soils high in sodium are called sodic soils (see "Sodium"). Saline-sodic soils are high in both soluble salts and sodium. Soluble salts are measured by electrical conductivity (EC) of a saturated paste soil extract.

Table 12.—Soluble salts.

	Conductivity (mmhos/cm*)	ppm salt**
low	<1.0	<640
medium	1.0–2.0	640–1,280
high	>2.0	>1,280

*mmhos/cm is equivalent to decisiemen/m.

**Multiply mmhos/cm by 640 to estimate ppm salt.

Because salts move readily with water, salt problems often are transient. Salt toxicity can occur, and salts may leach before soil is tested. Low salt values, therefore, do not always rule out salt toxicity as a cause of problems.

Salt tolerance varies greatly among plant species. Seedlings are especially sensitive to high salt concentrations. Excessive salts may inhibit seed germination. Excessive fertilization and poor irrigation water quality are sources of salts.

Organic matter

Maintenance of soil organic matter is one of the most important goals of soil management. Accurate measurement of soil organic matter is difficult.

Many laboratory methods are used. Most methods are indirect; they measure soil carbon and make an assumption about the percent carbon content of organic matter. The Walkley-Black method is common and gives consistent results. The loss on ignition method can give inconsistent results and tends to overestimate organic matter.

When estimating potential nitrogen release of a soil, total N testing is preferred to organic matter determination. Neither approach provides accurate estimates of soil N availability. If you are monitoring changes in organic matter over time, use the same lab for all analyses.

Cation exchange capacity (CEC)

CEC is a measure of a soil's capacity to retain and release elements such as K, Ca, Mg, and Na. Soils with high clay or organic matter content tend to have a high CEC. Sandy soils have a low CEC. Soil CEC is relatively constant over time, so there is no need for repeated analyses.

CEC often is determined by the ammonium acetate (NH_4OAc) or sodium acetate (NaOAc) methods. While these methods are standard in many regions, there are potential sources of error. Errors are most likely to occur for soils containing appreciable amounts of $CaCO_3$ or gypsum.

Some labs estimate CEC based on soil texture, organic matter content, cations, and pH. Such estimates often are inaccurate. The "sum of bases" method for calculating CEC of alkaline soils can give inaccurate results, especially if there are significant amounts of free $CaCO_3$.

CEC determination can be important for predicting behavior of pesticides and other chemicals in soils.

Base saturation

Base saturation is the percentage of the CEC that is occupied by cations other than hydrogen (H) and aluminum (Al). Soils with low base saturation generally are acidic. Base saturation and pH increase together.

For more information

Hart, J. *Analytical Laboratories Serving Oregon*, FG 74 (Oregon State University, Corvallis, reprinted 1997). No charge

Hart, J. *How to take a soil sample. . .and why,* EC 628 (Oregon State University, Corvallis, revised 1995). No charge

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Table 13.—Conversions.

To convert column 1 into column 2, *divide* by	Column 1	Column 2	To convert column 2 into column 1, *multiply* by
390	ppm K	meq K/100 g soil	390
200	ppm Ca	meq Ca/100 g soil	200
121	ppm Mg	meq Mg/100 g soil	121
230	ppm Na	meq Na/100 g soil	230
1	meq/100 g soil	cmol/kg soil	1
2*	lb/acre (7 inch depth)	ppm	2*
3.65*	lb/acre (1 foot depth)	ppm	3.65*
43.56	lb/acre	lb/1,000 sq ft	43.56
43,560	square feet	acres	43,560
2.471	acres	hectares	2.471

*These values vary with soil bulk density.

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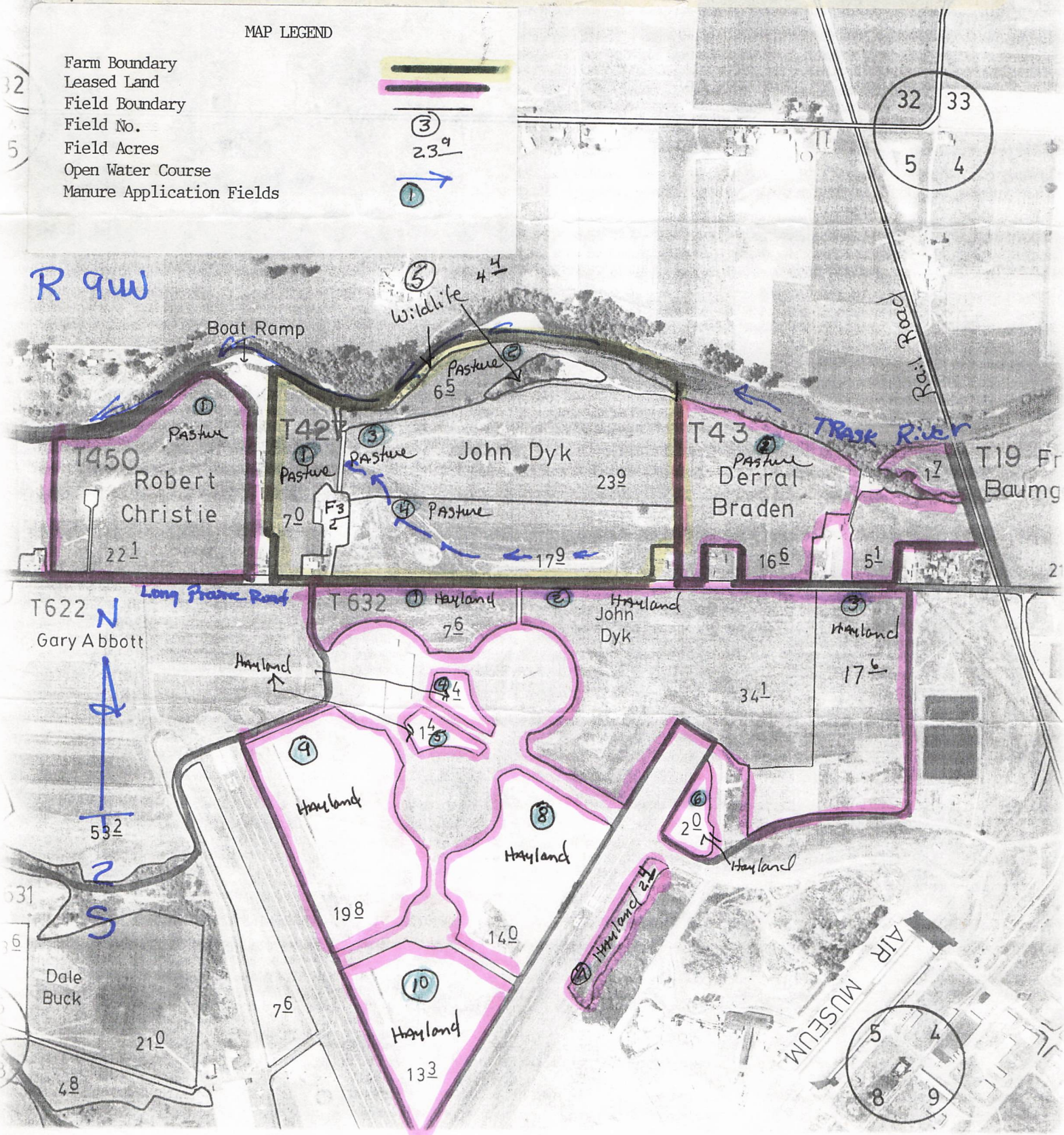
CONSERVATION PLAN MAP

Owner Sanchez Dairy **Operator** Andres Sanches
County Tillamook **State** Oregon **Date** 0/98
Approximate acres 221.1 **Approximate scale** Not to Scale
Cooperating with Tillamook County Soil and Water **Conservation District**
Plan identification **Photo number** FSA G-12
Assisted by Pedersen **USDA Soil Conservation Service**

MAP LEGEND

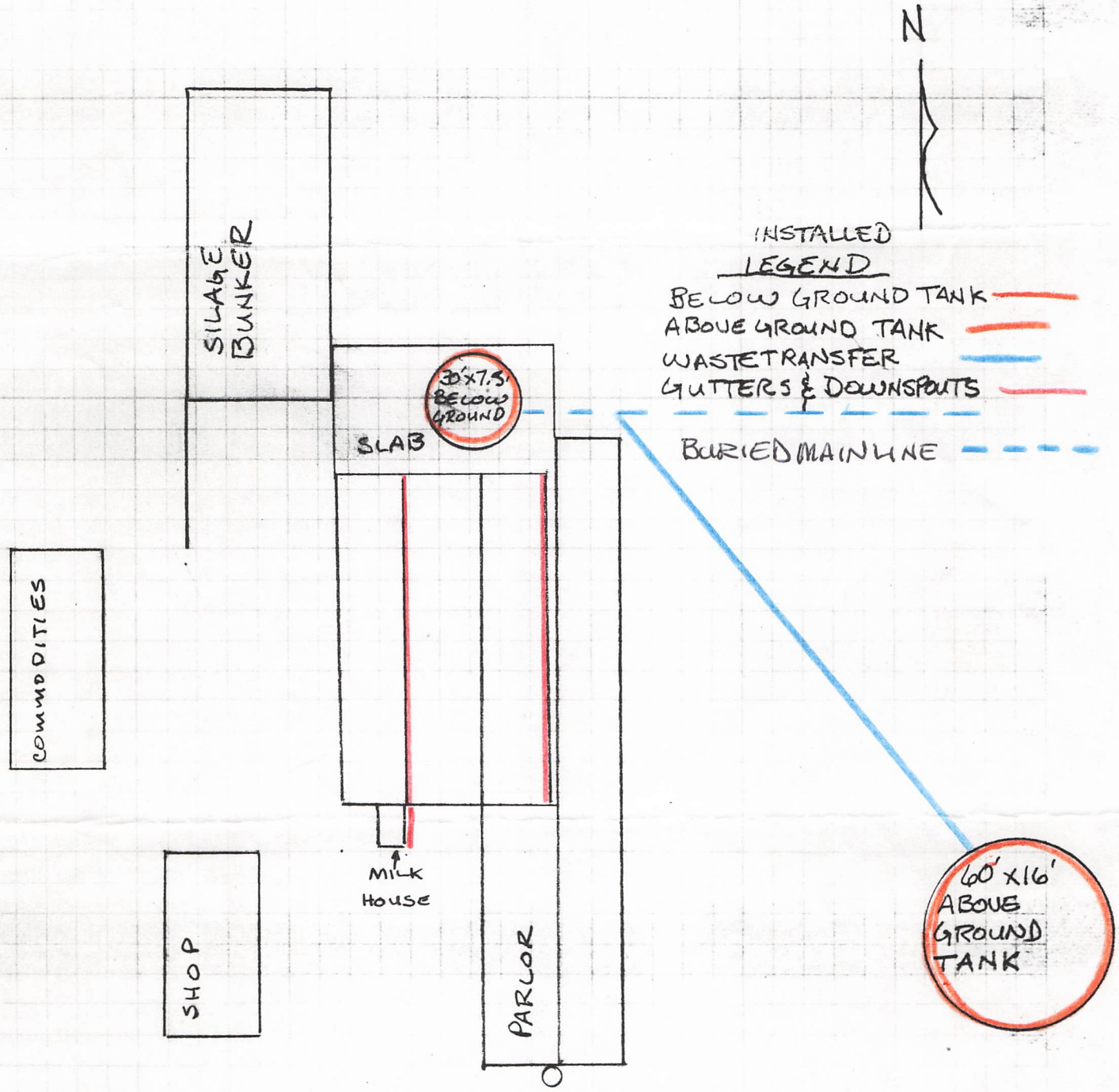
Farm Boundary
Leased Land
Field Boundary
Field No. (3)
Field Acres 23.9
Open Water Course
Manure Application Fields (1)



COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE OREGON		PROJECT ANDRES SANCHEZ - TRASK RIVER		
BY KWP	DATE 9/98	CHECKED BY	DATE	JOB NO.
SUBJECT FARMSTEAD LAYOUT				SHEET ____ OF ____



SCALE 1" = 50'