Salem's copy

Animal Waste Management Plan

Wilsona Farms, LLC
Dan & Todd Leuthold
June, 2005

Operated by:
Dan & Todd Leuthold
2425 McCormick Loop Rd.
Tillamook, Oregon 97141
(503) 842-4877

Facility Address:
2425 McCormick Loop Rd.
Tillamook, Oregon 97141
(503) 842-4877

Operation:
Grade A Dairy
Medium Federal CAFO

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

Signature Todd A Leuthold Date 7-01-05

RECEIVED 7/28/05
MA#: 63525
AWMP: 05103
DueDate: 9/11/05

Wilsona Farms
Dan & Todd Leuthold
06/2005

BUSINESS NARRATIVE

This dairy is a ~~399~~ 390-1,000 lb. Holstein mix animal unit operation. There are ~~180~~ 185 lactating cows, 45 dry cows, ~~100~~ 110 heifers and ~~100~~ 105 calves. The lactating cows are confined for 178 days and on pasture for 187 days. The dry cows are confined for 243 days and on pasture for 123 days. The heifers are confined for 120 days and on pasture for 245 days. The calves are confined for 365 days. Livestock morality service is provided by the Tillamook County Creamery Association.

The operation exists in two locations: the milking operation (Tract 204) and the heifer operation (Tract 258). The milking operation consists of 52.1 acres of pastureland; the heifer operation consists of 43.5 acres of pastureland; both receive manure applications. Approximately 63.2 of the 95.6 acres are within the 100-year flood plain. The pastures are in good condition. The target yield is 6 tons of dry matter per acre per year.

Manure is handled 100% liquids for the lactating and dry cows. Manure for the heifers and calves is handled as 100% solids. The solid manure is transported and applied to the fields with a tractor and manure spreader. The liquid manure is transported and applied to the fields with a tractor and big gun traveler.

At the milking operation, the liquid manure storage system consist of a covered 70' x 12' x 8' below ground liquid storage tank, and an uncovered 60' x 16' above ground liquid manure storage tank. Liquid waste is transferred to the above ground tank from the below ground tank by a manure pump and waste transfer pipe. The liquid manure tanks, in combination, can store the liquid waste generated by the ~~284~~ 276-1,000 lb. animal units on the milking operation for ~~69~~ 65 days.

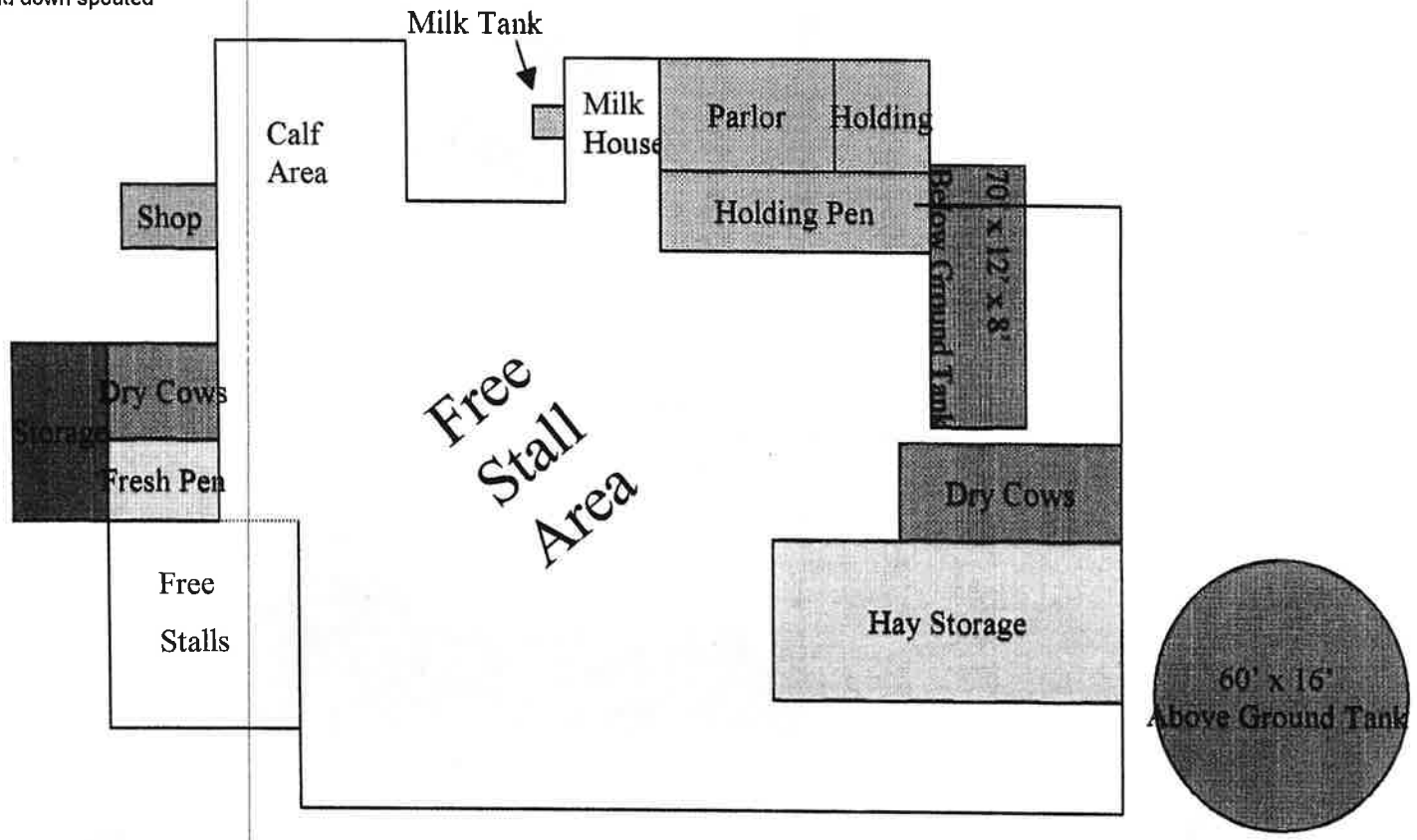
At the heifer operation, although the manure is handled as 100% solid, there is a 32' x 12' below ground liquid manure storage tank. This tank is not currently used. The solid manure is stored in a roofed 25' x 92' x 6' solid manure storage facility. The solid manure produced by the ~~115~~ 113.6-1,000 lb animal units can be stored for ~~111~~ 115 days. An additional solid manure storage facility will be added within the upcoming year, which in combination with the current solid facility, will store solid wastes accumulated at the heifer facility for approximately 365 days.

All animal confinement buildings at both locations are guttered, down-spouted and outletted in an area free of manure. All conservation practices installed will be managed and maintained in accordance with the enclosed "CONSERVATION PRACTICE OPERATION AND MAINTENTANCE WORKSHEETS."

Wilsona Farms LLC
Dan & Todd Leuthold
Milking Operation (T-204)
2005 Site Map

*Map Not to Scale

* All buildings are guttered and down spouted

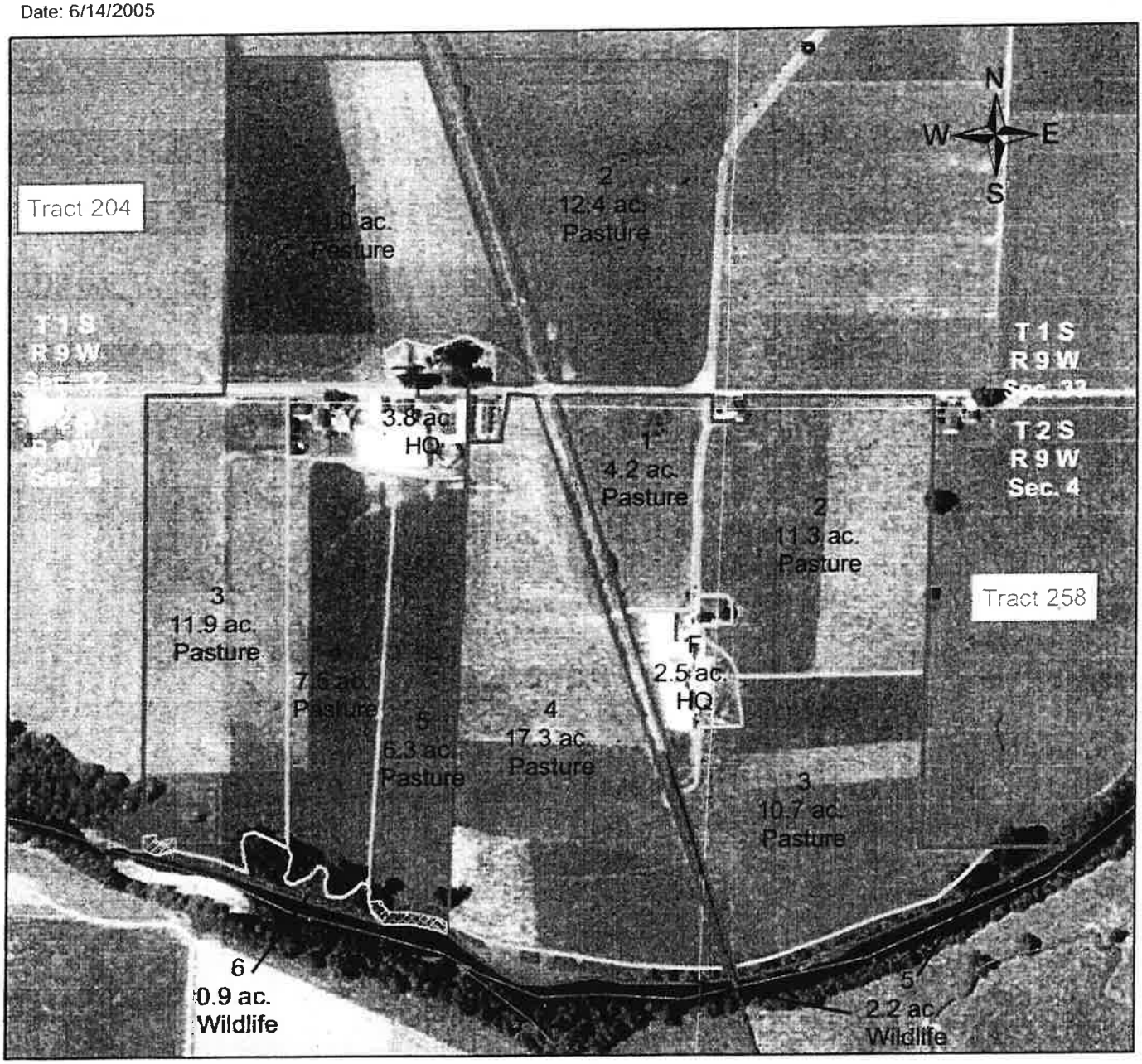


LEUTHOLD DAIRY
Wilsona Farm
Dan & Todd Leuthold
TR022

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

Tillamook County SWCD
Approximate Acres: 105.0
Date: 6/14/2005

Conservation Plan Map



320 0 320 640 960 1,280 Feet

Legend

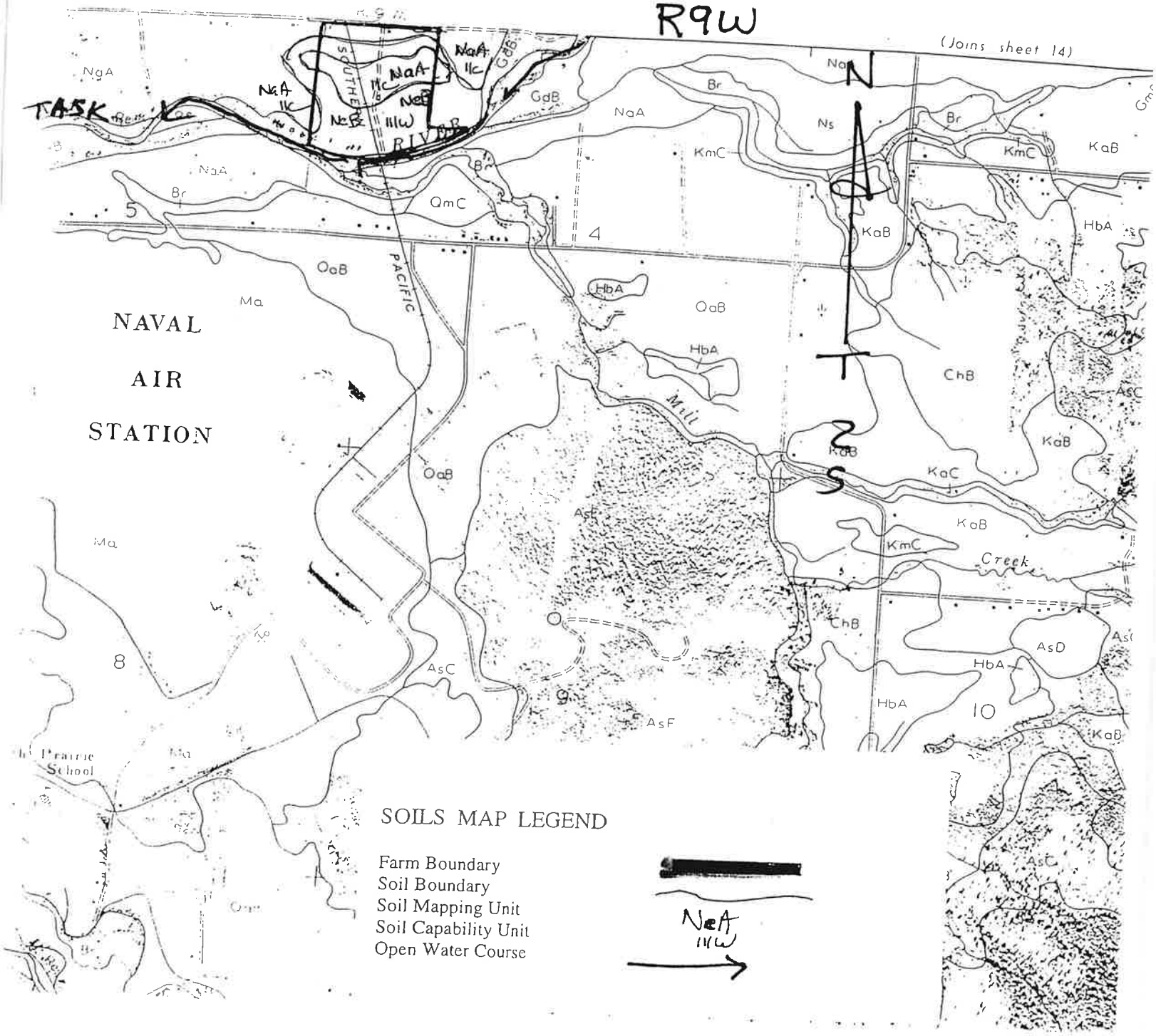
- Tract Boundary
- Planned Land Units
- Public Land Survey
- Filter Strip
- Open Water Course

CPA-015
12-85

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL MAP

Owner Dan & Todd Luethold
County Tillamook
Operator Same
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



Wilsona Farms LLC
06/2005

LAND USE SUMMARY

Tract No.	Field No.	Land Use	Acres
258	1	Pasture	4.2
	2	Pasture	11.3
	3	Pasture	10.7
	4	Pasture	17.3
	5	Wildlife	2.2
	F	Farmstead	2.5
		SUBOTAL	**48.2**
204	1	Pasture	14.0
	2	Pasture	12.4
	3	Pasture	11.9
	4	Pasture	7.5
	5	Pasture	6.3
	6	Wildlife	0.9
	F	Farmstead	3.8
		SUBOTAL	**56.8**
		TOTAL	**105.0**

A & L WESTERN AGRICULTURAL LABORATORIES

PORTLAND OFFICE • 503-968-9225
10220 S.W. Nimbus Ave., Bldg. K-9 • Portland, OR 97223
Client No: 99999

REPORT NUMBER
05-172-072

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

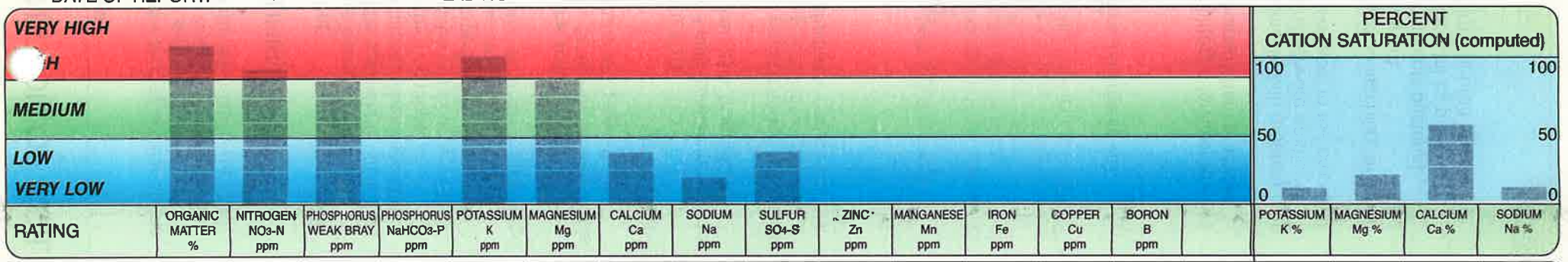
GROWER: WILSONA FARMS

SUBMITTED BY: DAN & TODD LEUTHOLD

T-204
Fields 1, 2

GRAPHICAL SOIL ANALYSIS REPORT

DATE OF REPORT: 06/23/2005 LAB NO: 59249 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	14.7	32	30	71	1106	782	3320	56	9							9.2	21.0	54.0	0.8

NaHCO3-P unreliable at this soil pH

BUFFER pH: 6.1

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

A & L WESTERN LABORATORIES, INC.

REPORT NUMBER
05-172-072

A & L WESTERN AGRICULTURAL LABORATORIES

PORTLAND OFFICE • 503-968-9225
10220 S.W. Nimbus Ave., Bldg. K-9 • Portland, OR 97223
Client No: 99999

SEND TO: AMY KRAHN
1340 NW GARFIELD AVE
CORVALLIS, OR 97330-2536

GROWER: WILSONA FARMS

SUBMITTED BY: DAN & TODD LEUTHOLD

DATE OF REPORT: 06/23/2005 LAB NO: 59250

GRAPHICAL SOIL ANALYSIS REPORT

SAMPLE ID: 2 T-204 Fields 3, 4, 5 PAGE: 2

VERY HIGH
HIGH
MEDIUM
LOW
VERY LOW

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
TEST RESULTS	12.9	18	19	51	763	709	3713	61	4					

PERCENT CATION SATURATION (computed)

100 / 50 / 0

POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
6.3	19.9	59.9	0.9

LOW AVERAGE HIGH

ECe dS/m — INCREASING SALINITY

NaHCO3-P unreliable at this soil pH

CEC meq/100g: 30.9

EX. LIME:

pH: 6.1 (ACIDIC — BASIC)

INCREASING NEED FOR LIME

CROP:

BUFFER pH: 6.2

SOIL FERTILITY GUIDELINES

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

DARCY PEEBLES, CCA

REPORT NUMBER
050172-072

A & L WESTERN AGRICULTURAL LABORATORIES

PORTLAND OFFICE • 503-968-9225
10220 S.W. Nimbus Ave., Bldg. K-9 • Portland, OR 97223
Client No: 99999

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

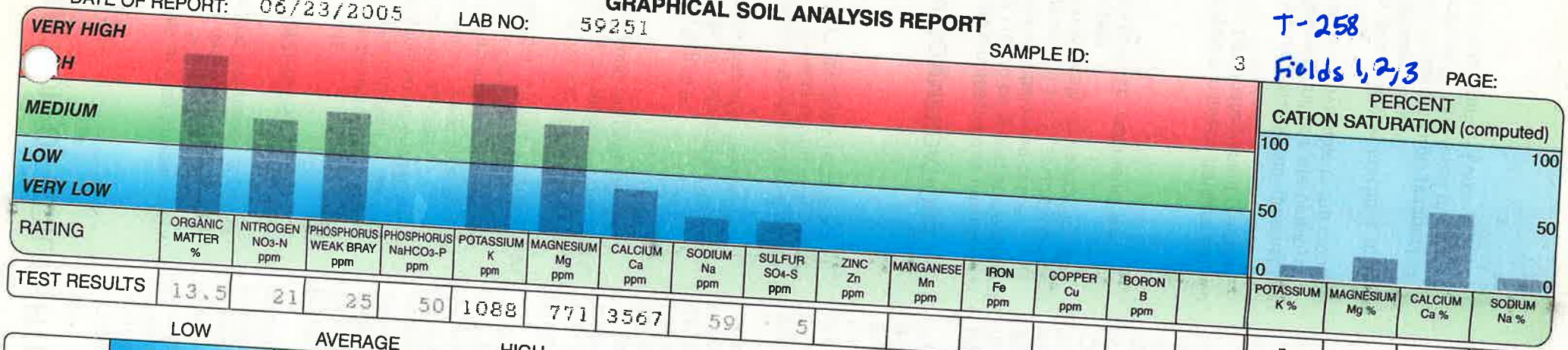
GROWER: WILSONA FARMS

SUBMITTED BY: DAN & TODD LEUTHOLD

DATE OF REPORT: 06/23/2005 LAB NO: 59251

GRAPHICAL SOIL ANALYSIS REPORT

T-258
SAMPLE ID: 3 Fields 1, 2, 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
TEST RESULTS	13.5	21	25	50	1088	771	3567	59	5					

PERCENT CATION SATURATION (computed)

POTASSIUM K %	MAGNESIUM Mg %	CALCIUM Ca %	SODIUM Na %
8.7	19.8	55.7	0.8

LOW AVERAGE HIGH

ECe dS/m: INCREASING SALINITY →

CEC meq/100g: 32.0

EX. LIME:

pH: 6.0 (ACIDIC — BASIC)

← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 6.2

CROP:

SOIL FERTILITY GUIDELINES

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 Peebles, CCA

REPORT NUMBER
05-172-072

A & L WESTERN AGRICULTURAL LABORATORIES

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Client No: 99999

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

GROWER: WILSONA FARMS

SUBMITTED BY: DAN & TODD LEUTHOLD

GRAPHICAL SOIL ANALYSIS REPORT

T-258
Field 4

DATE OF REPORT: 06/23/2005 LAB NO: 59252 SAMPLE ID: 4 PAGE: 4

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	* 72	34	76	1241	876	3773	91	25						9.1	20.7	54.1	1.1

LOW AVERAGE HIGH

ECe dS/m — INCREASING SALINITY →

34.8 CEC meq/100g

EX. LIME

6.0 pH

ACIDIC BASIC

← INCREASING NEED FOR LIME

NaHCO3-P unreliable at this soil pH

BUFFER pH: 6.3

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

* N-levels falsely elevated due to recent manure application.

Darcy Peebles

DARCY PEEBLES, CCA

A & L WESTERN LABORATORIES, INC.

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Wilsona Farms / Leuthold County: Tillamook Tract No. 204 Field No(s). 3,4,5 Date: 06/2005

Soil Map Unit(s): Nehalem silt loam & overwash Soil Test P: 19 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Manure Spreader & 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)	1.5	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)	2.25	2.25
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)	3.75	5

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Wilsona Farms / Leuthold County: Tillamook Tract No. 258 Field No(s). 1,2,3 Date: 06/2005

Soil Map Unit(s): Nehalem silt loam & overwash Soil Test P: 19 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Manure Spreader & 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)	1.5	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)	2.25	2.25
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)	3.75	'5

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Wilsona Farms / Leuthold County: Tillamook Tract No. 258 Field No(s). 4 Date: 06/2005

Soil Map Unit(s): Nehalem silt loam & overwash Soil Test P: 34 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Manure Spreader & 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)	1.5	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)	2.25	2.25
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)	3.75	

PHOSPHORUS INDEX WORKSHEET – **WESTERN** OREGON

Producer: Wilsona Farms / Leuthold County: Tillamook Tract No. 204 Field No(s). 1,2 Date: 06/2005

Soil Map Unit(s): Nehalem silt loam & overwash Soil Test P: 30 ppm Lab. Method: Weak Bray Sample Depth: 6 "

Crop Rotation: Permanent Pasture Nutrient Application Method(s) Manure Spreader & 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)	1.5	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)	2.25	2.25
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)	3.75	3

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FENCING SPECIFICATION SHEET

CODE 382

For: Landowner/Operator Wilsona Farms, LLC

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

County Tillamook SWCD Tillamook County Farm/Tract No T-204 & T-258

Field No.: T-204 Fields 1-5 T-258 Field 1-4

Prepared By Amy Krahn Date 06/05

⇒ **Purpose: To exclude livestock from stream and protect riparian vegetation plantings and existing vegetation from livestock damage.**

Specifications:

⇒ At least a two-strand high tensile smooth wire fence will be installed.

⇒ Wire fence will be at least 12 1/2 gauge and have at least 200,000 psi tensile strength.

⇒ Wire spacing should be 20 at the bottom and 32 inches at the top.

⇒ Wire clips will be either metal or plastic.

⇒ The line wood posts will be pressure treated and at least 6 1/2 feet long and a minimum 4 inch top diameter. Post depth will be at least 30 inches.

⇒ Maximum spacing between posts will not exceed 100 feet with wooden stays at 20 foot intervals.

⇒ Corner, brace and gate post will be at least 7 feet in length and 5 inches in diameter. Minimum post depth will be 4 feet.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FILTER STRIP SPECIFICATION SHEET
CODE 393

For: Landowner/Operator Wilsona Farms, LLC

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

County Tillamook SWCD Tillamook County Farm/Tract No T-204 & T-258

Field No.: T-204 Fields 1-5 T-258 Field 1-4

Prepared By Amy Krahn Date 06/05

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.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FORAGE HARVEST MANAGEMENT SPECIFICATION SHEET

CODE 511

For: Landowner/Operator Wilsona Farms, LLC

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

County Tillamook SWCD Tillamook County Farm/Tract No T-204 & T-258

Field No.: T-204 Fields 1-5 T-258 Field 1-4

Prepared By Amy Krahn Date 06/05

⇒ 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.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

PRESCRIBED GRAZING SPECIFICATION SHEET

CODE 528A

For: Landowner/Operator Wilsona Farms, LLC

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

County Tillamook SWCD Tillamook County Farm/Tract No T-204 & T-258

Field No.: T-204 Fields 1-5 T-258 Field 1-4

Prepared By Amy Krahn Date 06/05

⇒ 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 grazing and management efficiency to promote economic stability.

Specifications:

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

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

⇒ A rotational grazing system is used. A 21-day re-growth period is used during the normal years. During low rainfall years, the re-growth period varies between 30 to 35 days.

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

⇒ Pastures are clipped and dragged at least twice during the growing season.

⇒ 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.

⇒ Manure is applied to pastures in accordance with the enclosed Waste Utilization Conservation Practice and Nutrient Management Specification Sheets.

⇒ Spring grazing is delayed until the grasses have at least 6 inches of growth and the soil is firm.

⇒ Pastures are not grazed below 2 inches any time during the growing season.

ANIMAL WASTE MANAGEMENT WORKSHEET

Version 2.0

CLIENT: Wilsona Farms - All animals
ASSISTED BY: 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)			(lbs./day)					
				N	P	K	N	P	K		Days Confined	Days Grazed
MILKER	185	1,200	222.0	0.53	0.09	0.30	117.93	19.98	66.64	1.47	178	187
MILKER (DRY)	45	1,200	54.0	0.36	0.05	0.23	19.44	2.70	12.42	1.10	243	123
HEIFERS (12-24 Months)	110	700	77.0	0.31	0.04	0.24	23.87	3.08	18.48	1.30	108	257
CALVES (1-12 Months)	105	350	36.8	0.31	0.04	0.24	11.39	1.47	8.82	1.30	365	0
Totals/Averages-	445	863	389.8	0.44	0.07	0.27	172.6	27.2	106.4	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	80%	0%	0%	0%	0%	50%	80%	80%	80%	80%	80%	80%	
	185	185	185	185	185	185	185	185	185	185	185	185	1,354
MILKER (DRY)	50%	0%	0%	0%	0%	50%	50%	50%	50%	50%	50%	50%	
	45	45	45	45	45	45	45	45	45	45	45	45	216
HEIFERS (12-24 Months)	100%	20%	0%	0%	20%	100%	100%	100%	100%	100%	100%	100%	
	110	110	110	110	110	110	110	110	110	110	110	110	647
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	105	105	105	105	105	105	105	105	105	105	105	105	0
													0
													0
													0
													0
													0
													0
Total AUM's Available>	99						102	102	102	101	101	101	708
Total AUM's Needed>>>	282	15	0	0	15	215	282	282	282	282	282	282	2,217
Total AUM's>>>>>>>>>>	-183	-15	0	0	-15	-215	-180	-180	-180	-181	-181	-181	-1,509

CLIENT: Wilsona Farms - All animals
ASSISTED BY:
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	Sawdust	12.00	3.10	0.15	33	688
MILKER (DRY)	Loose Housing	Sawdust	12.00	12.40	1.03	56	670
HEIFERS (12-24 Months)	Free Stall	Chopped Straw	7.00	2.70	0.39	30	208
CALVES (1-12 Months)	Loose Housing	Loose Straw	7.00	11.00	1.57	58	404

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	Dry Scrape System	0%	0	74	326	0	216	36	0
MILKER (DRY)	Dry Scrape System	0%	0	63	59	0	27	36	0
HEIFERS (12-24 Months)	Dry Scrape System	100%	130	0	0	100	0	36	4,673
CALVES (1-12 Months)	Dry Scrape System	100%	106	0	0	48	0	36	3,799
Total Solids>>>			235	137	385	148	242		8,472

CLIENT: **Wilsona Farms - All animals**
ASSISTED BY: **0**

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	1,032	380	730	353	104	329	3,966	1,450	2,914	0	0	0	5,352	1,934	3,973
November	4,121	1,559	2,858	915	270	853	143	42	134	0	0	0	5,179	1,872	3,845
December	4,258	1,611	2,953	1,093	323	1,020	0	0	0	0	0	0	5,352	1,934	3,973
January	4,258	1,611	2,953	1,093	323	1,020	0	0	0	0	0	0	5,352	1,934	3,973
February	3,846	1,455	2,667	854	252	796	134	40	125	0	0	0	4,834	1,747	3,589
March	2,129	805	1,477	353	104	329	2,869	1,024	2,167	0	0	0	5,352	1,934	3,973
April	999	367	706	342	101	319	3,838	1,403	2,820	0	0	0	5,179	1,872	3,845
May	1,032	380	730	353	104	329	3,966	1,450	2,914	0	0	0	5,352	1,934	3,973
June	999	367	706	342	101	319	3,838	1,403	2,820	0	0	0	5,179	1,872	3,845
July	1,032	380	730	353	104	329	3,966	1,450	2,914	0	0	0	5,352	1,934	3,973
August	1,032	380	730	353	104	329	3,966	1,450	2,914	0	0	0	5,352	1,934	3,973
September	999	367	706	342	101	319	3,838	1,403	2,820	0	0	0	5,179	1,872	3,845
Annual	**25,741**	**9,662**	**17,947**	**6,746**	**1,994**	**6,293**	**30,524**	**11,114**	**22,540**	**0**	**0**	**0**	**63,011**	**22,770**	**46,780**

CLIENT: **Wilsona Farms - All animals**
ASSISTED BY: **0**

CHECKED BY:

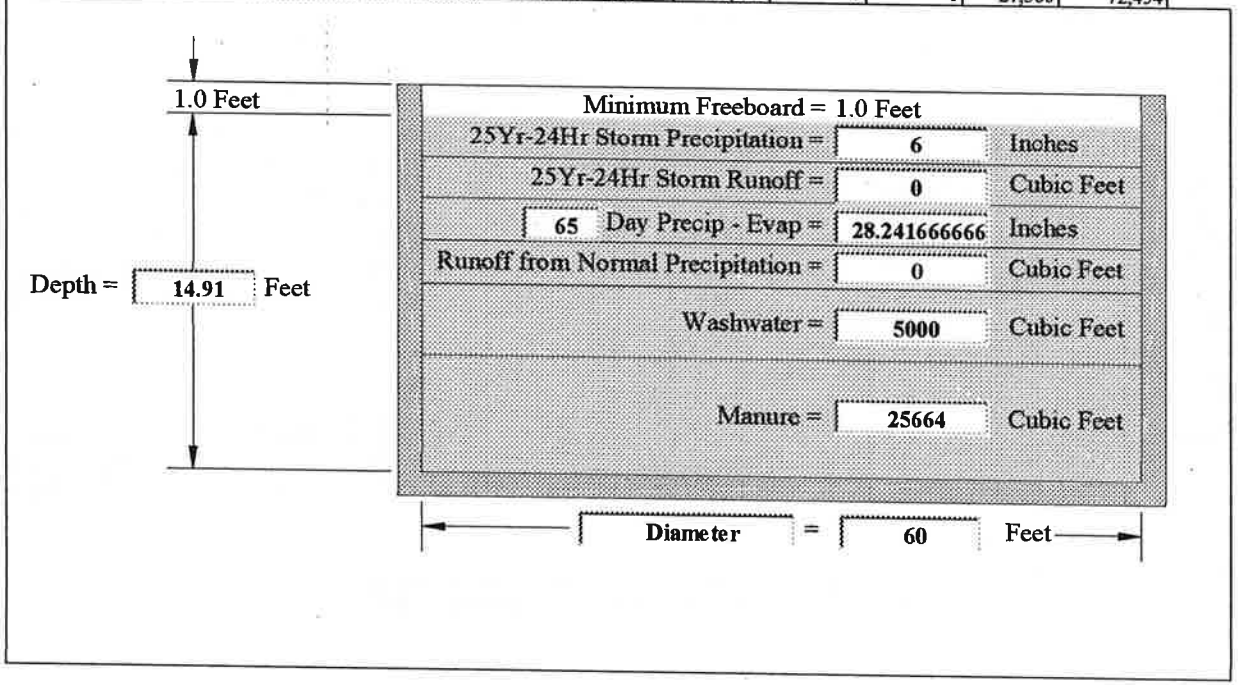
ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

Tank Parameters	Value
Storage Period, Days=	65
Tank Diameter, Feet=	60
Existing Storage, Cubic Feet=	5,880.00
Surface Area of Existing Storage, SF=	0
25 Year-24 Hour Storm Runoff, CF=	0
Volume Needed, Cubic Feet=	48,033
Design Volume, Cubic Feet=	42,135
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	2,325	2,939
November	30	2,838	0	0	2,250	11,549
December	31	3,215	0	0	2,325	11,934
January	31	3,057	0	0	2,325	11,934
February	28	2,277	0	0	2,100	10,779
March	31	2,141	0	0	2,325	5,967
April	30	973	0	0	2,250	2,844
May	31	240	0	0	2,325	2,939
June	30	-57	0	0	2,250	2,844
July	31	-582	0	0	2,325	2,939
August	31	-422	0	0	2,325	2,939
September	30	271	0	0	2,250	2,844
Annual	365	15,378	0	0	27,380	72,454



CLIENT: **Wilsona Farms - All animals**
ASSISTED BY: **0**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM APPLICATION

NAGEMENT CRITERIA FOR TANK WAGON APPLICATION OF LIQUIDS

ply **972,807** gallons of liquids generated from the operation it will take approximately **243** trips annually. Based on applying NITROGEN, N

nomic rates use the application depths, travel lengths, and loads per acre listed below for each crop.

er	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
1,2	26.4	Hay/Pasture Mix 20% Protein	4,000	15	2,220	18.52	384	1.00	0.47	911	3.2
,5	25.7	Hay/Pasture Mix 20% Protein	4,000	15	2,220	18.52	384	1.00	0.47	911	3.2
1,2,3	26.2	Hay/Pasture Mix 20% Protein	4,000	15	2,220	18.52	384	1.00	0.47	911	3.2
	17.3	Hay/Pasture Mix 20% Protein	4,000	15	2,220	18.52	384	1.00	0.47	911	3.2

CLIENT: **Wilsona Farms - All animals**
STED BY: **0**

CHECKED BY:

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

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

er	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
204 1,2	26.4	Hay/Pasture Mix 20% Protein	28%	3,051	8	28%	804	2	28%	6,245	16
3,4,5	25.7	Hay/Pasture Mix 20% Protein	27%	2,974	8	27%	775	2	27%	6,022	16
'58 1,2,3	26.2	Hay/Pasture Mix 20% Protein	27%	2,992	8	28%	804	2	28%	6,245	16
4	17.3	Hay/Pasture Mix 20% Protein	18%	2,044	5	18%	522	1	18%	4,015	10
0											
0											
0											
0											
0											
ff-Farm			0%	21		0%	0		0%	0	
		TOTALS-	100%	11,081	29	100%	2,904	8	100%	22,527	59

'RIENT BALANCE BASED ON AVAILABLE ACRES

er	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
204 1,2	26.4	Hay/Pasture Mix 20% Protein	383	221	455	384	106	294	-1	115	162
3,4,5	25.7	Hay/Pasture Mix 20% Protein	380	220	453	384	106	294	-4	114	159
'58 1,2,3	26.2	Hay/Pasture Mix 20% Protein	383	221	456	384	106	294	-1	115	162
4	17.3	Hay/Pasture Mix 20% Protein	380	221	454	384	106	294	-4	115	160
0											
0											
0											
0											
0											
ff-Farm											

NUTRIENT MANAGEMENT DESIGN AND SPECIFICATIONS

Producer:	Wilsona Farms - All animals	Tract(s): 204	Field(s): 3,4,5
Assisted by:	0	Date:	August 15, 2005

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 20% Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
18	19	763	6.1		

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			
384		106		294				

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-)		Dairy	380	380	220	220	453	453
9.		Subtotal (sum of lines 6, 7 and 8)	380	380	220	220	453	453
10.		Nutrients Recommended (from Table 1)	384	0	106	0	294	0
11.		Nutrient Status (subtract line 10 from line 9)	-4	380	114	220	159	453

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:	Wilsona Farms - All animals	Tract(s): 258	Field(s): 4
Assisted by:	0	Date:	August 15, 2005

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 20% Protein	6

CURRENT SOIL TEST LEVELS (ppm or lb/ac)					
N	P	K	pH	S.O.M.%	EC
72	34	1241	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			
384		106		294				

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-							
Plant-Available Nutrients Applied to Field		0		0		0	
(Circle column that is landuser's decision)		N		P_2O_5		K_2O	
6. Credits (from row 5, above)		Trial A	Trial B	Trial A	Trial B	Trial A	Trial B
7. Fertilizer	Starter	0	0	0	0	0	0
	Other						
8. Manure / Organic Materials (Source-)							
9.	Subtotal (sum of lines 6, 7 and 8)	380	380	221	221	454	454
10.	Nutrients Recommended (from Table 1)	380	380	221	221	454	454
11.	Nutrient Status (subtract line 10 from line 9)	384	0	106	0	294	0
		-4	380	115	221	160	454

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						

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Waste Utilization

Conservation Practice Jobsheet

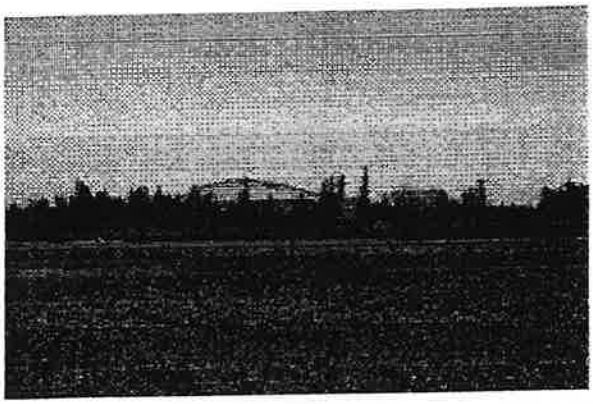
633 OR-JS

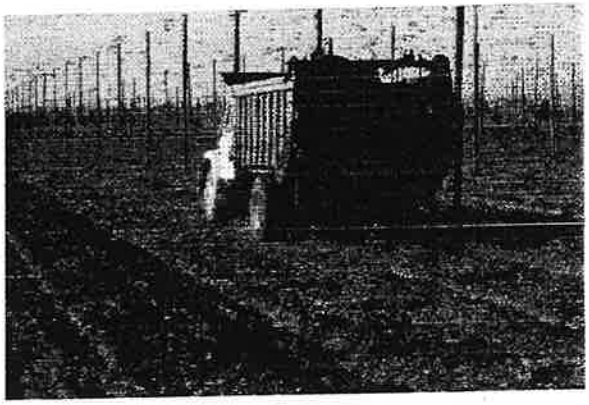
Natural Resources Conservation Service, Oregon

February 2002

Client Wilsona Farms, LLC

Date 06/2005





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

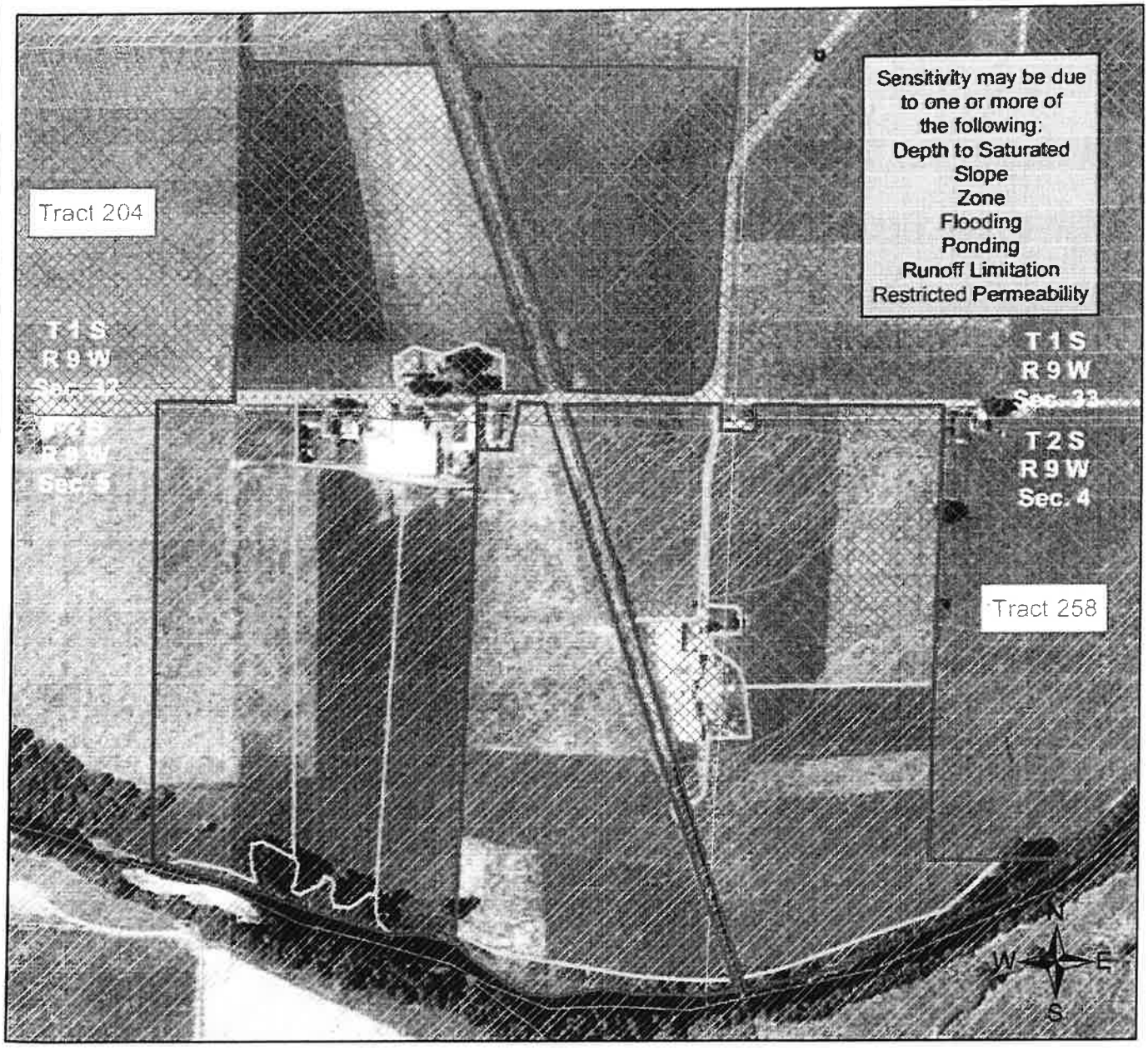
Waste utilization is most effective when used with other conservation practices such as cover crop, residue management, conservation buffers, irrigation water management, nutrient management, pest management, and conservation crop rotation.

LEUTHOLD DAIRY
WILSONA FARM
Dan & Todd Leuthold
TR022

TILLAMOOK SERVICE CENTER
USDA - NRCS
TILLAMOOK COUNTY, OREGON

District: Tillamook County SWCD
Approximate Acres: 105.0
Date: 6/24/2005

Flood Boundary Map
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

633 OR-Specification

Natural Resources Conservation Service, Oregon — February 2002

WASTE UTILIZATION SPECIFICATION SHEET

Client Wilsona Farms / Dan & Todd Leuthold

Location: 2425 McCormick Loop Road Tillamook, OR 97141

Tillamook SWCD _____ Tract No. 204, 258

Prepared By Amy Krahn _____ Date 06/2005

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 in an open watercourse will be reported to Oregon Department of Agriculture (ODA) within 24 hours. Within 5 days a written statement describing the discharge will be submitted to ODA. Annual CAFO permit Reports will be submitted to ODA on time.

633 OR-Specification

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:

633 OR-Specification

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:

633 OR-Specification

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	

WASTE UTILIZATION WORKSHEET

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

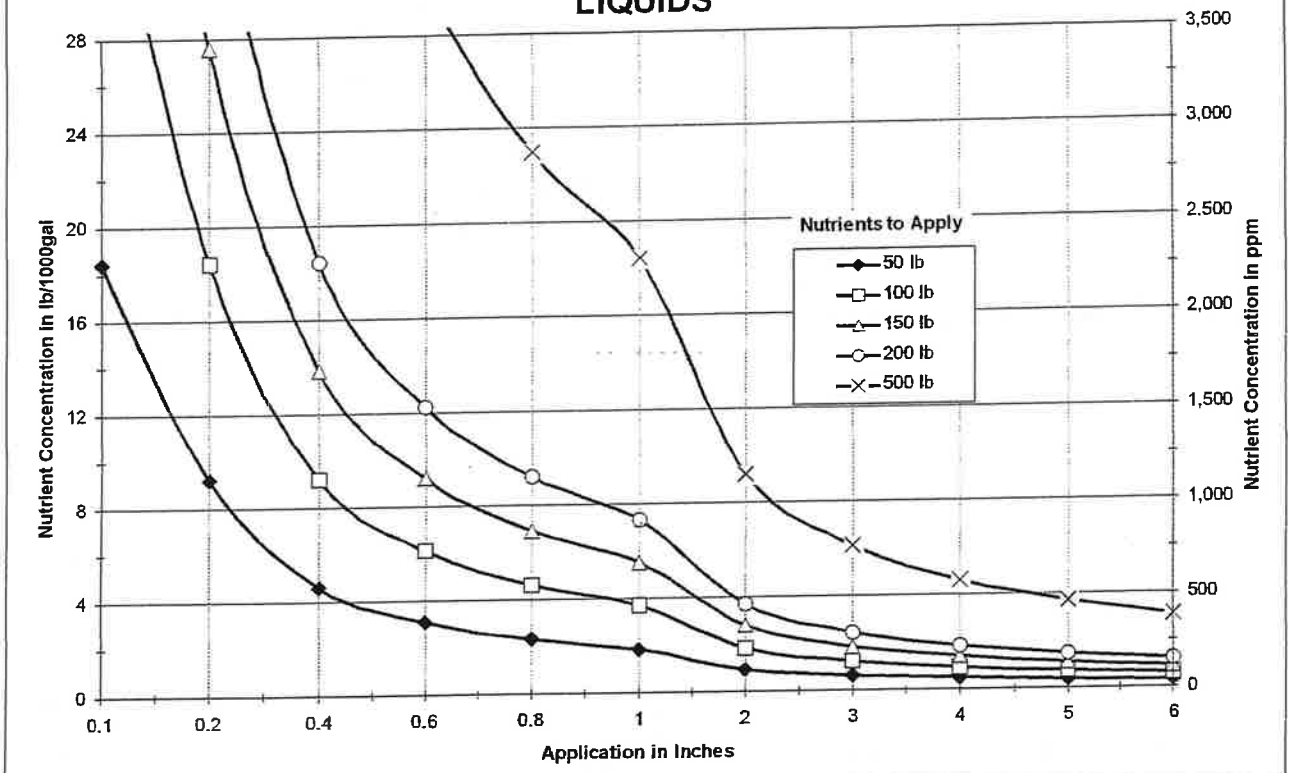
Typical Nutrient Availability After Application

Typical nutrient content of animal manure retained after application:

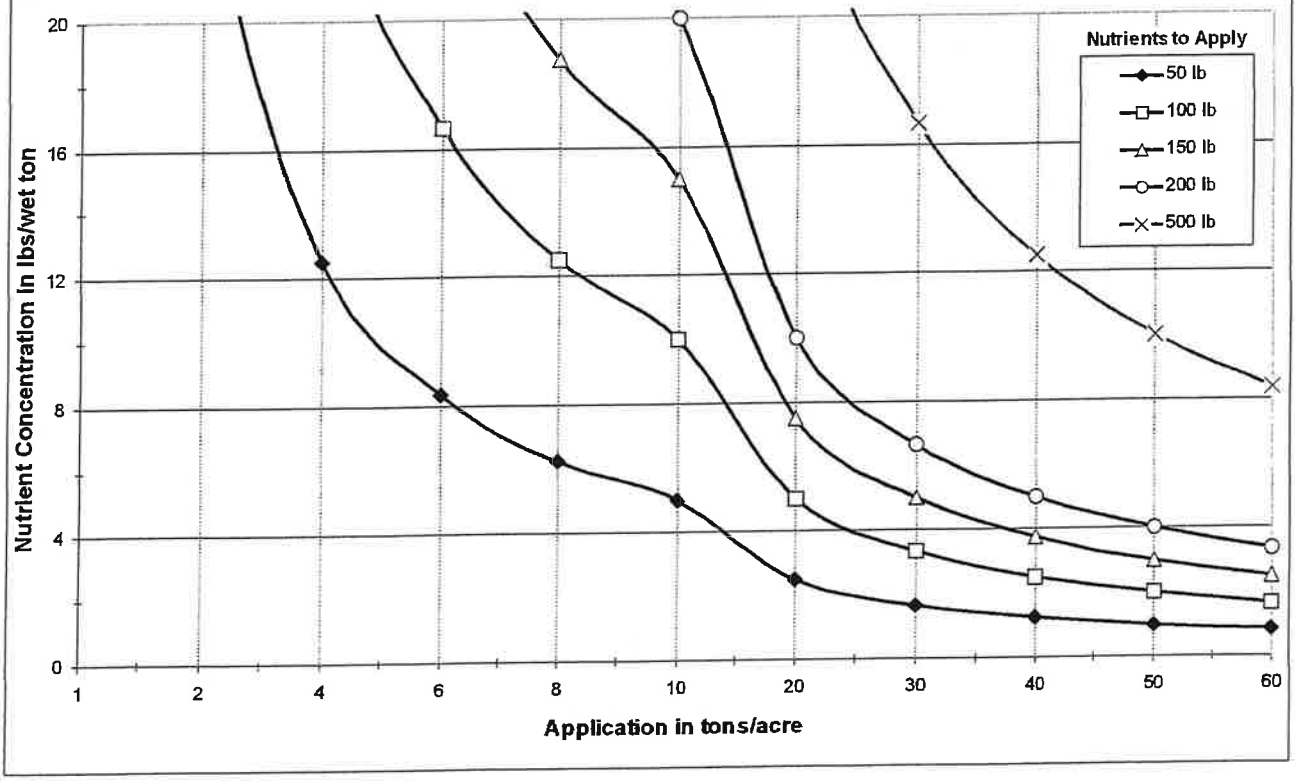
Application Method	Percent of original nutrient content of manure retained after application		
	N	P_2O_5	K_2O
Injection	95%	100%	100%
Sprinkling	75%	100%	100%
Broadcast (Incorporated 1 day after application)	90%	100%	100%
Broadcast (Incorporated 4 days after application)	80%	100%	100%
Broadcast (Incorporated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

WASTE UTILIZATION WORKSHEET

NUTRIENT APPLICATION CHART for LIQUIDS



NUTRIENT APPLICATION CHART for SOLIDS



U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY
CODE 313

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

Tract 204

- ***60' x 16' Above Ground Liquid Waste Storage Facility***
- ***70' x 12' x 8' Below Ground Liquid Waste Storage Facility***

Tract 258

- ***32' x 12' Below Ground Liquid Waste 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 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.

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 Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 258

Prepared By Amy Krahn Date 06/05

Tract 258

- ***25' x 92'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.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Operation and Maintenance Worksheet

FENCING

Code 382

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

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

STREAM HABITAT IMPROVEMENT AND MANAGEMENT

CODE 395

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 258

Prepared By Amy Krahn Date 06/05

Operation and Maintenance Items

A properly operated and maintained stream habitat and management structure is an asset to your farm. The structure was designed and installed to improve in stream fish habitat. The structure will reduce downstream sedimentation and improve fish spawning and rearing areas. 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:

⇒ Check annually the large woody debris structure for damage.

⇒ Maintain a vigorous growth of streambank vegetation adjacent to the large woody debris.

⇒ Maintain the fences to prevent unauthorized or livestock entry.

⇒ Remove debris that accumulates in the large woody debris structure area and immediately upstream or downstream of the structures.

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

⇒ Determine cause of any structural failure and take appropriate actions to prevent further loss of the structure.

⇒ 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.

⇒ 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

PRESCRIBED GRAZING
CODE 528A

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

Operation and Maintenance Items

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

⇒ Pastures are reestablished when forage production falls below planned yield threshold.

⇒ A rotational grazing system is used to maintain plant vigor.

⇒ Pastures are clipped and dragged during the growing season to maintain plant vigor and spread the livestock droppings to prevent grass from becoming rank.

⇒ Manure and commercial fertilizer applied in accordance with soil and forage tests.

⇒ Pasture weeds are controlled.

⇒ Pasture grasses are not grazed below 2 inches during the growing season.

⇒ Livestock are removed when the soils become wet in the fall.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

OPERATION AND MAINTENANCE WORKSHEET

WASTE STORAGE FACILITY (ROOF)
CODE 313

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

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 Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

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 Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

- ***Gutter Outlet***

Operation and Maintenance Items

Properly operated and maintained under ground 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

MANURE TANK AGITATOR
CODE 634

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

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 promptly 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

PUMP
CODE 634

For: Landowner/Operator Wilsona Farms, LLC / Dan & Todd Leuthold

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

County Tillamook SWCD Tillamook County Farm/Tract No. 204 & 258

Prepared By Amy Krahn Date 06/05

Operation and Maintenance Items

A properly operated and maintained pump is an asset to your farm. This pump was designed and installed to transport liquid waste through a buried mainline and applying to the pastures with a manure gun traveler. The estimated life span of this installation is at least 10 years. The life of the pump 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 pressure gauges and flow control valves function properly. Adjust water packing around pump shaft for minimal leaking.

⇒ Maintain screens, trash racks to prevent debris from entering suction pipeline and pump impeller. Maintain check valves for proper operation.

⇒ Drain the pump and components when subject to freezing. If parts of the system cannot be drained, a non-toxic antifreeze solution may be added.

⇒ Maintain adequate ventilation around engine.

⇒ Perform preventative maintenance per manufacturer's recommendations.

⇒ Use portable pressure gauge (preferably liquid filled gauge) to monitor pump performance.

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

Amy Krahn
Conservation Technician

Conservation Plan

Wilsona Farms LLC
2425 MCCORMICK LOOP RD
TILLAMOOK, OR 97141

Objective(s)

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

Farmstead

Tract: 204

Comprehensive Nutrient Management Plan

A Comprehensive Nutrient Management Plan consisting of structural and vegetative practices for the collecting, transferring, 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	2008		
Total:	1 no				

Manure Transfer

112 feet of 8 inch PVC Class Code 125 manure transfer pipe was installed. to transfer liquid manure seepage from the solid manure storage facility to the existing below ground liquid waste storage tank.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	8	1987	1 no	9/21/1987
Total:	1 no			1 no	

Manure Transfer

A concrete curb was installed. between the solid manure storage facility and the confinement buildings to prevent manure runoff.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	8	1987	1 no	9/22/1987
Total:	1 no			1 no	

Waste Storage Facility

A 30' x 70' x 6' solid manure storage facility with roof, gutters, and downspouts will be installed for storing the separated solids. The facility is not currently being used to store solid waste.

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

Waste Storage Facility

A 54.6' x 42.7' x 6' solid manure storage facility was installed. The 13,988 cubic foot solid manure storage facility is not currently being used.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	7	1987	1 no	8/26/1987
Total:	1 no			1 no	

Waste Storage Facility

A 70' x 12' x 8' below ground liquid manure tank was installed. This 6,720 cubic foot liquid waste storage tank in combination with the above ground liquid waste storage tank will store the liquid wastes produced by the 284-1,000 lb. animal units for 69 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	6	1975	1 no	7/22/1975
Total:	1 no			1 no	

Waste Storage Facility

An 60' x 16' above ground liquid manure tank has been installed. This 45,239 cubic foot liquid waste storage tank in combination with the below ground liquid waste storage tank will store the liquid waste produced by the 284-1,000 lb. animal unit for 69 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	9	1984	1 no	10/18/1984
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	1	1985	1 no	2/19/1985
Total:	1 no			1 no	

Waste Storage Facility

A 25' x 92' x 6' solid manure storage facility with roof, gutters, and downspouts will be installed for storing the separated solids. The facility in combination with the other solid manure storage facility will store the solid manure produced by the 115-1,000 lb. animal units for 111 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	8	2005		
Total:	1 no				

Waste Storage Facility

A 32' x 8' below ground liquid waste tank was installed. This 6,434 cubic foot liquid waste storage tank is not currently being used.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	10	1988	1 no	11/1/1988
Total:	1 no			1 no	

Waste Storage Facility

A 44' x 58.1' x 6' solid manure storage facility was installed. The 15,418 cubic foot solid manure storage facility , in combination with the planned Solid manure storage facility will store the solid manure produced by the 115-1,000 lb. animal units for 365 days.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	1	1993	1 no	2/1/1993
Total:	1 no			1 no	

Waste Storage Facility

A 7,085 square foot roof has been installed over the manure accumulation slab and the existing below ground liquid waste storage tank.

Field	Planned Amount	Month	Year	Applied Amount	Date
F	1 no	1	1993	1 no	2/1/1993
Total:	1 no			1 no	

Pasture

Tract: 204

Fence

Trask River has been fenced to exclude livestock from the watercourse.

Field	Planned Amount	Month	Year	Applied Amount	Date
5	850 ft	7	1997	850 ft	7/19/1997
Total:	850 ft			850 ft	

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	14 ac	9	2005R		
2	12.4 ac	9	2005R		
3	11.9 ac	9	2005R		
4	7.5 ac	9	2005R		
5	6.3 ft	6	2005R		
Total:	52.1 ac				

Tract: 258

Fence

Trask River has been fenced to exclude livestock from the watercourse.

Field	Planned Amount	Month	Year	Applied Amount	Date
4	800 ft	6	2000	800 ft	7/14/2000
Total:	800 ft			800 ft	

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	4.2 ac	10	2007R		
2	11.3 ac	10	2007R		
3	10.7 ac	10	2007R		
4	17.3 ac	10	2007R		
Total:	43.5 ac				

Prescribed Grazing

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

Field	Planned Amount	Month	Year	Applied Amount	Date
1	4.2 ac	9	2005R		
2	11.3 ac	9	2005R		
3	10.7 ac	9	2005R		
4	17.3 ac	9	2005R		
Total:	43.5 ac				

CERTIFICATION OF PARTICIPANTS

Todd A Leuthold 7/01/05
DAN LEUTHOLD Date

CERTIFICATION OF:

Conservation Technician
Amy Kraft 7/1/05
Amy Kraft Date

CONSERVATION DISTRICT

TILLAMOOK SOIL & WATER CO Date

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R - Designates Recurring Practices

EXTENSION SERVICE
Tillamook County Office

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

2204 Fourth Street
Tillamook, Oregon
97141

Telephone
503-842-3433

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 whithin 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 about 1 cup from the mixture and place into a sample bag.
- The bags should be labeled with;
  Farm or operator name
  Sample date
  Field and tract (see NRCS plan map)
  Sample depth (0 to 9 inches)
  Soil type if determined
- 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).

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.

EM 8832-E
May 2003
$2.00

Post-harvest Soil Nitrate Testing

for Manured Cropping Systems West of the Cascades

D.M. Sullivan and C.G. Cogger

Contents

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.

OREGON STATE UNIVERSITY
EXTENSION SERVICE

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.

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.

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.

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

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.

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

For more information

OSU Extension Service publications

Hart, J. 2002. A List of Analytical Laboratories Serving Oregon, EM 8677.

Marx, E.S., J. Hart, and R.G. Stevens. 1996. Soil Test Interpretation Guide, EC 1478.

Marx, E.S., N.W. Christensen, J. Hart, M. Gangwer, C.G. Cogger, and A.I. Bary. 1996. The Pre-sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington, EM 8650.

Sullivan, D.M., C.G. Cogger, and A.I. Bary. 1997. Which Test Is Best? Customizing Dairy Manure Nutrient Testing, PNW 505.

Sullivan, D.M., C.G. Cogger, and A.I. Bary. 1997. Date, Rate, and Place: The Field Book for Dairy Manure Applicators, PNW 506.

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).

WSU Cooperative Extension publications

Bary, A.I., C.G. Cogger, and D.M. Sullivan. 2000. Fertilizing with Manure, PNW 533.

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Visit the WSU Cooperative Extension publications Web site at http://pubs.wsu.edu

Other resources

Gavlak, R.G., D.A. Horneck, and R.O. Miller. 1994. Plant, Soil and Water Reference Methods for the Western Region, WREP 125 (University of Alaska-Fairbanks).

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Mahler, R.L. and T.A. Tindall. 1994. Soil Sampling, Bulletin 704 (University of Idaho Cooperative Extension System, Moscow, ID).

Midwest Plan Service. Livestock and Poultry Environmental Stewardship (LPES) Curriculum. Available at: http://www.lpes.org/. Verified 14 January 2002.

North American Proficiency Testing Program. Standard Reference Soil Samples (Soil Science Society of America, 677 S. Segoe Rd., Madison, WI 53711; phone: 608-273-8080; Web: http://www.soils.org).

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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.

OREGON STATE UNIVERSITY EXTENSION SERVICE

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.

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.

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.

EM 8585 • Reprinted August 1997
$1.50

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, former research assistant in soil science; and Mike Gangwer, Extension agent, Marion County; Oregon State University.

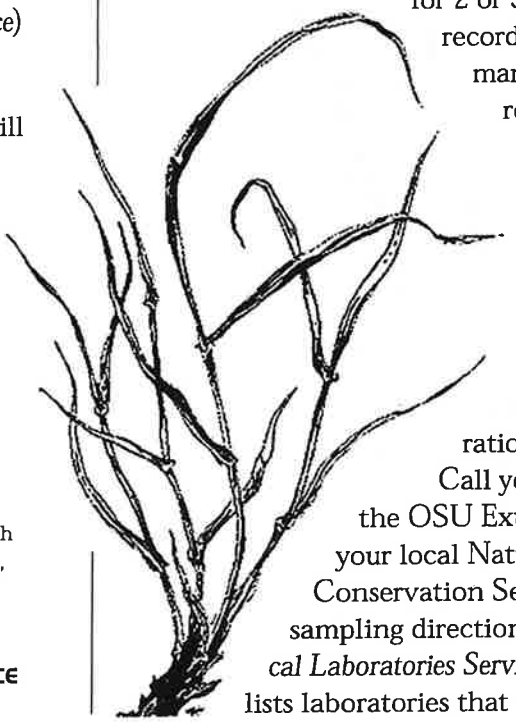
OREGON STATE UNIVERSITY EXTENSION SERVICE

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 Resources Conservation Service office for sampling directions. *A List of Analytical Laboratories Serving Oregon* (FG 74) lists laboratories that test manure.

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.

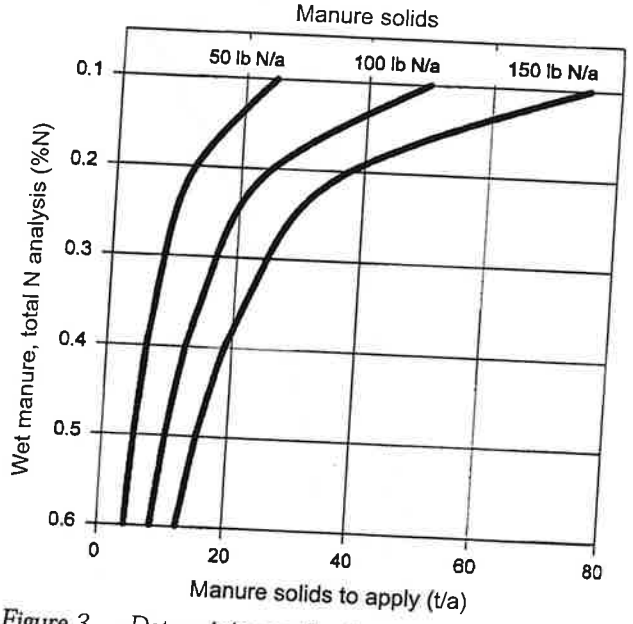


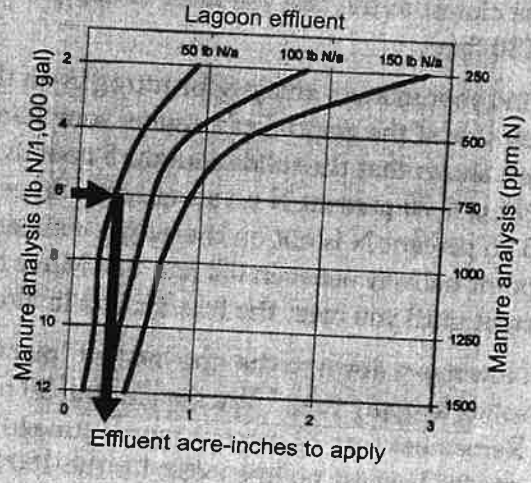
Figure 3.—Determining application rate for manure solids.

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).



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.

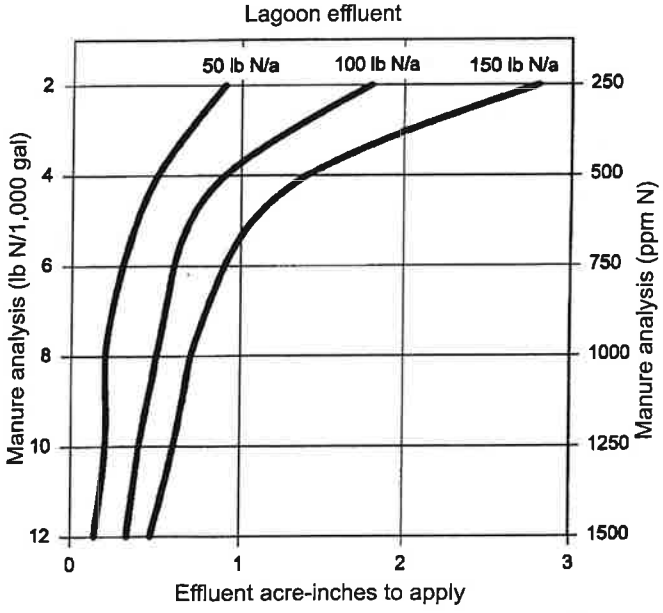


Figure 5.—Determining application rate for lagoon effluent.

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

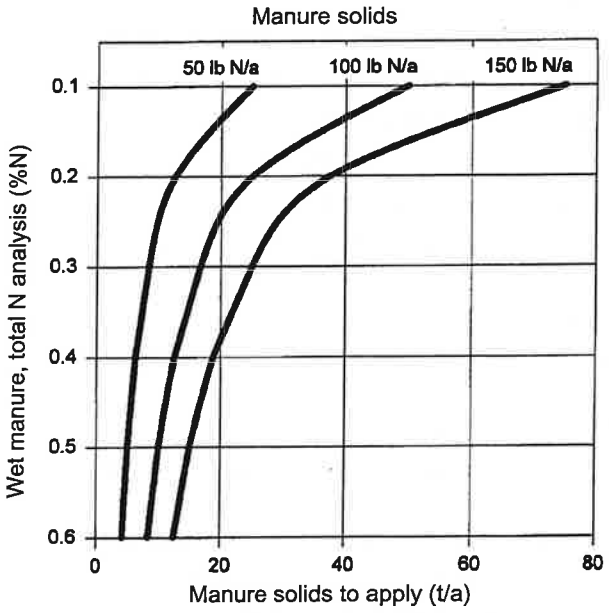


Figure 6.—Determining application rate for manure solids.

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.S. Marx. *Dairy Manure as a Fertilizer Source*, EM 8586 (Oregon State University, Corvallis, reprinted 1996). $1.00

Marx, E.S., 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). $1.00

Other publications

Marx, E. *Evaluation of Soil and Plant Analyses as Components of a Nitrogen Monitoring Program for Silage Corn* (Master's thesis, Oregon State University, 1995).

Oregon
Theodore R. Kulongoski, Governor

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

August 16, 2005

Dan Leuthold
Wilsona Farms
2425 McCormick Loop Road
Tillamook, Oregon 97141

RE: Animal Waste Management Plan (AWMP) review

Dear ~~Mr. Leuthold~~ Dan:

On July 28, 2005, the department received an AWMP for your dairy facility located at 2425 McCormick Loop Road in Tillamook, Oregon. Our conclusion follows.

AWMP Status: Approved
The AWMP you provided was logged into our files as #05103. The AWMP has been reviewed and is hereby approved. Please find enclosed the AWMP review memo.

Construction Status: None proposed 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: No change

The department appreciates the effort put forth to complete the AWMP before your required due date of October 1, 2005. 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

Enclosure: AWMP review memo

DG/kh/cw

63525
MFC

MEMO

To: Debbie Gorham
From: Kathryn Higgs
Subject: AWMP review for Mr. Dan Leuthold
Date: August 16, 2005

Mr. Leuthold owns and operates Wilsona Farms in Tillamook. On July 28, 2005, Mr. Leuthold submitted an AWMP for his dairy facility located at 2425 McCormick Loop Road. The AWMP was logged into our files at AWMP #05103.

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	
(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.	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.	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

(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.	Not applicable
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
AWMP Minimum Required Elements	**Notes**
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	
a) Inspections	
(i) Check storm water diversions, runoff diversions, waste transport, storage structures, storage structure volume weekly.	Not applicable
(ii) Check water lines daily.	Not applicable
(iii) Check for application equipment leaks periodically.	Not applicable
b) Record keeping	

Oregon
Department
of Agriculture

May 11, 1995

Dan Leuthold
Wilsona Farms
2425 McCormik Loop Road
TILLAMOOK, OR 97141

RE: ANIMAL WASTE MANAGEMENT PLAN NO. 9525

DATE RECEIVED: April 10, 1995

CONSTRUCTION STATUS: **APPROVED**

PROJECT DESCRIPTION:
- a 45,239 cu. ft.above ground liquid manure tank with agitator;
- a 6,720 cu. ft. below ground liquid manure tank with pump;
- a manure accumulation slab with roof, gutters, and downspouts;
- a 12,510 cu.ft. solid manure stacking facility with concrete curbing, roof, gutters, and downspouts;
- 120 ft. of waste transfer pipeline;
- 3500 ft. of buried manure mainline PVC pipe class code 125.

PERMIT STATUS: UNCHANGED

MAXIMUM NUMBER OF ANIMALS PERMITTED IS 270.

The permitted herd consists of 150 milkers and dry cows, and a total of 120 heifers and calves. Your permit allows you to exceed the maximum number by 10% if necessary.

Reviewed by:

David Wilkinson
CAFO Coordinator
Natural Resources Division
(503) 986-4712
FAX (503) 986-4730

cc: Tillamook County SWCD
Bruce Wilson, NRCS

John A. Kitzhaber
Governor

635 Capitol Street NE
Salem, OR 97310-0110

United States Department of Agriculture
Natural Resources Conservation Service
2204 4th Street
Suite B
Tillamook, OR 97141

Subject: Tillamook County
Animal Waste Management
System

Date: May 3, 1995

The manure management system for Dan Leuthold in Tillamook County has been planned and designed in accordance with The Natural Resources Conservation Service's Field Office Technical Guide and the Oregon Animal Waste Installation Guidebook.

Approved By:
Natural Resources Conservation Service
Tillamook, Oregon

9525

Friday, May 5, 1995

To: David Wilkinson, CAFO Coordinator

From: Joel D. Palmer, PE

INTERNAL FILE REPORT
DAN LEUTHOLD -- WILSONA FARMS
CAFO PLAN MODIFICATION

The latest submittal of material supporting this CAFO permit was received by the department on April 10, 1995 and should be responded to by May 25, 1995.

Current allowed herd size = 270 animals

Proposed herd size = 290 animals (this is within the 25 animals or 10% increase allowed by the current General Permit).

Proposed modification: Construction of 3500 ft of buried manure mainline to supply travelling gun sprinkler (1995); and implementation of pasture and hayland management practices (1995).

1) The plan does not include a statement or signature from anyone taking overall responsibility for having prepared the plan, or for its adequacy or conformance with OAWIG and Division 51 rules. Neither is there any mention of the qualified person(s) who will inspect construction.

2) The O&M section of the plan requires that the below ground tank not be pumped to a level lower than 3.5 feet below water table levels in the surrounding soils. However, the plan does not address the issue of high water tables at the site of the tanks, which if they occur will decrease the effective storage time for these facilities. The soils information suggest the tanks are located in well to moderately-well drained soils, but also mentions flooding potential; no mention is made of depth to seasonal water tables.

3) The O&M section of the plan requires that the storage tanks maintain a one-foot freeboard to prevent spillage. Volume and storage time calculations do not appear to take this requirement into account. However, the waste utilization calculations appear to involve other, off-setting errors in estimating storage volume and time.

Assuming the overall dimensions of the below ground tank are as stated, the maximum storage capacity with freeboard is 5880 cubic feet rather than 6720 cubic feet, and storage

time 15 days rather than 17 days. The above ground tank is described as providing 91 days of storage. Yet the volume of a 60-foot inside-diameter, 16-foot deep tank is 45,239 cubic feet, implying 113 days of storage. Accounting for freeboard, correct storage time would be 106 days for the above ground tank. Total liquid storage would be 106 + 15 = 121 days rather than 108 days as stated. The discrepancy is unexplained.

4) The O&M section of the plan requires that the liquid manure tanks be cleaned of debris and restored to their full useable volume once every five years. An argument traditionally applied to waste ponds and lagoons, applied here, would suggest that volumes of debris, sludge, etc. expected to accumulate over five years be subtracted from the volumes upon which storage times are based. No such adjustment has been made in this plan.

5) The plan refers to solid manure spreading, although there is no description of the locations and method for land application.

6) The waste disposal calculations include the usual problems seen with other recent submissions prepared by the Tillamook NRCS Field Office, e.g. , the assumption that the soil above the water table is completely dry; apparent failure to account for capillarity & vadose zone; summing solid and liquid manure volumes to calculate required water holding capacity beneath the soil surface. Too little detail is provided to test the accuracy of the plan's conclusion that "no schedule [of application] is required to assure runoff and leaching is not likely to be a concern."

7) The plan concludes that 2.5 hours after any rainfall event, 0.4 inches of liquid waste can be applied without concern for runoff or leaching. Given actual expected conditions and management requirements, this conclusion cannot be supported by the information supplied. No information is provided about the intake rates of the soils, or the application rate of the sprinkler system.

8) The plan provides no guidance for the management requirements of the travelling gun. In the absence of more detailed information, little can be concluded about the ability of the operator to apply liquid wastes in a manner that will not produce either runoff or leaching.

9) The plan does not account for seasonal variation in crop growth, consumptive use of water, and nutrient uptake rates. The pasture and hayland specifications require that no spring applications of nutrients be made until the crop has utilized winter applications. This requirement suggests the need for waste, soil, and crop testing, none of which are mentioned in the plan.

10) The calculations treat all soils, fields, and crops as identical in character. It is unclear from the plan on which fields the liquid wastes will be applied. For example, the drawings indicate the travelling gun will operate only in Fields 1, 2, & 3, a total of 50.9 acres, while the "liquid only" calculations assume 66.4 acres are available. Because of the railroad right-of-way, the overall coverage pattern for Fields 1 & 2 suggest either incomplete or overlapping coverage, which has implications for the effective area available for liquid disposal, and depth of application.

11) The O&M section of the plan has no inspection or maintenance consideration for concrete slabs, or the disposal facilities (sprinkler and spreader). The plan does not indicate if the above ground tank is covered. If so, there should probably be a safety warning relating to entering the tank without ventilation. If the tank is uncovered, no

consideration has been made in the plan for rainfall volumes that would reduce effective storage capacity.

12) The plan uses default values for confined and pastured periods, and for crop yields; actual conditions are not known.

13) The plan contains no description of waste disposal under "emergency" conditions.

14) The plan does not describe how the waste by pastured animals figures into the application calculations. In documentation of the Tillman program not included in the plan, it appears that after all losses are considered for manure from pastured and confined animals, the program assumes that all the available Nitrogen from all sources is contained in the liquid wastes.

15) The plan does not contrast existing with proposed operations.

16) OAR 340-51-015(1) requires that the plan constitute "a complete, descriptive proposal." I have a concern that the material submitted to the Department is neither complete nor descriptive of the applicant's facilities, operations, or managerial responsibilities.

17) I recommend that all of the construction be approved. The waste utilization practices and overall plan, however, cannot be reasonably said to be consistent with OAWIG, Division 51 rules, or the General Permit due to the deficiencies described above.

9525

Animal Waste Management Plan Checklist

A. General Description

___ Name, address and phone number of the owner/operator NO
___ Type of operation
___ Type, number and weights of animals existing and planned NO INCREASE NO
___ Existing waste handling facilities including storage capacities
___ Nutrient disposal area including soils and crop information unclear
___ Location of any surface water bodies that may be affected by runoff from the operation QUADSHEET/SOIL MAP SHOWS ONLY TRASK RIVER
___ Waste management problems that exist
___ Waste management system selected including a description of each component more or less
___ A statement signed by the owner/operator indicating they have approved the plan and will operate in accordance with the planned conditions, schedules, and specifications

B. Water, Waste, and Nutrient Computations

___ Total number of 1,000 lb animal units
___ Confinement period in days or months Tillman default values
___ Pastured period in days or months
___ Storage period in days or months for solid and liquid wastes solids value changes liquid values incorrect in consistent
___ Total volume of solids and liquids produced during the storage period
___ Total lot, roof and pond surface area contributing to storage facility unclear from schematic; Tillman says no extra liquid
___ Climatic station location used to determine rainfall and evaporation amounts
___ Total nutrient production from all animals for the confinement, pastured and storage periods
___ Nutrient losses for handling, storage, application and denitrification of the waste
___ Total nutrients applied and utilized by crops in the disposal area

generalized, monolithic treatment of conditions, no accounting for seasonal variability or management requirements

C. Inspection Plan for Structural and Vegetative Components

___ Description of all components to be inspected moot
___ Implementation schedule for structural and vegetative components to be installed mainline for travelling gun sprinkler
___ Name and qualifications of the personnel who will do the inspection and verify that each component is in place and functioning in accordance with the plan

#9525 Dave

RECEIVED

APR 10 1995

NATURAL RESOURCES DIVISION

Tillamook County Soil and Water Conservation District
2204 Fourth St., Suite B - Tillamook, OR 97141

Subject: Animal Waste Management System

Date: APRIL 4, 1995

To: Oregon Department of Agriculture
Natural Resources Division
635 Capitol Street N.E.
Salem, Oregon 97310-0110

WILSONA FARMS
Mr. Dan Leuthold
2425 McCormik Loop Rd.
Tillamook, Or 97141

MAX 270 x 1020 = 297 290 PROPOSED OK

The manure management system for Dan Leuthold, Tillamook County SWCD has been designed to include the following special features:

1. The system will serve about 244 1000 lb. dairy cattle.

2. Spreading will be done by traveling gun and solid spreader wagon.

3. Storage facilities will consist of

Above ground tank 60'x 16' =45239 cf.

Below ground tank =70'x 12'x 8' = 6720 cf.

Solid manure stacking facility = 13988 cf.

discrepancy w/ calcs

inconsistent w/ calcs

in combination will store manure for about Liquids 108 days / Solids 382 days.

4. The storage system will be constructed in accordance with approved NRCS plans and specifications. I have read this plan and understand its contents and will operate in accordance with the plan and design.

LANDOWNER [signature] DATE 4/5/95

REVIEWED BY: [signature] DATE 4-6-95

TILLAMOOK COUNTY SWCD DIRECTOR

DAN LEUTHOLD
APRIL 1995

LANDUSE SUMMARY

1. PASTURELAND	OWNED	11.9 ACRES
2. PASTURELAND	OWNED	14.0 ACRES
3. PASTURELAND	OWNED	25.0 ACRES
4. PASTURELAND	LEASED	17.6 ACRES
5. PASTURELAND	LEASED	5.3 ACRES
6. FARMSTEAD	OWNED	2.9 ACRES
	TOTAL	76.7 ACRES
		73.8 ACRES PASTURE

50.9

+ = 68.5?

+ = 73.8 ok

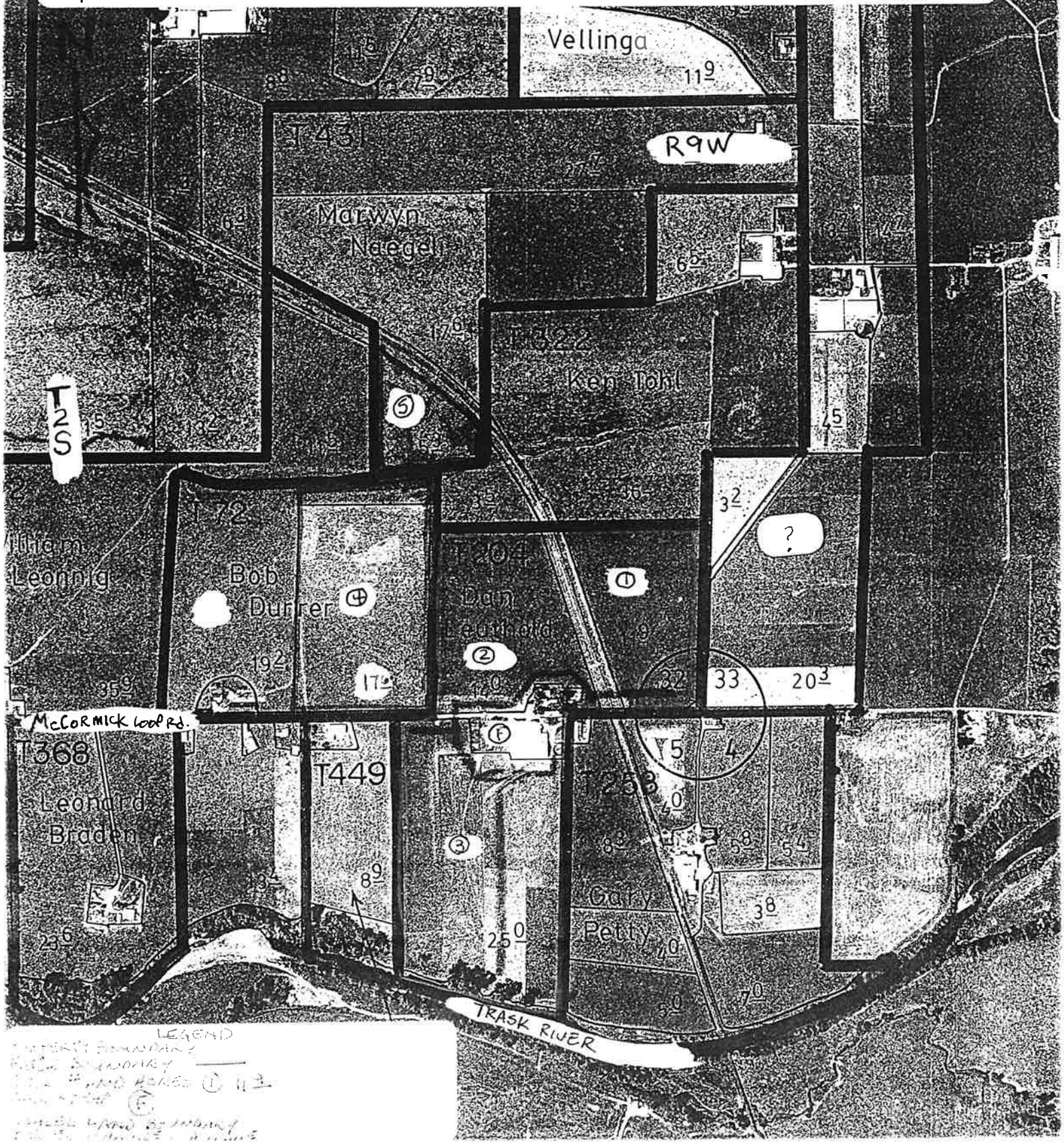
are liquids applied to fields 4 & 5, 1 & 2? also 1 & 2?

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SCS - CPA - 16
2 - 81

CONSERVATION PLAN MAP

Owner DAN LEUTHOLD Operator SAME
County TILLAMOOK State OREGON Date 3-30-95
Approximate acres _____ Approximate scale 1" = 660'
Cooperating with TILLAMOOK Conservation District
Plan identification _____ Photo number CFSA 1990 F13
Assisted by PERKINS USDA Soil Conservation Service



LEGEND

U. S. DEPARTMENT OF AGRICULTURE

SCS-CPA-15
(3-88)

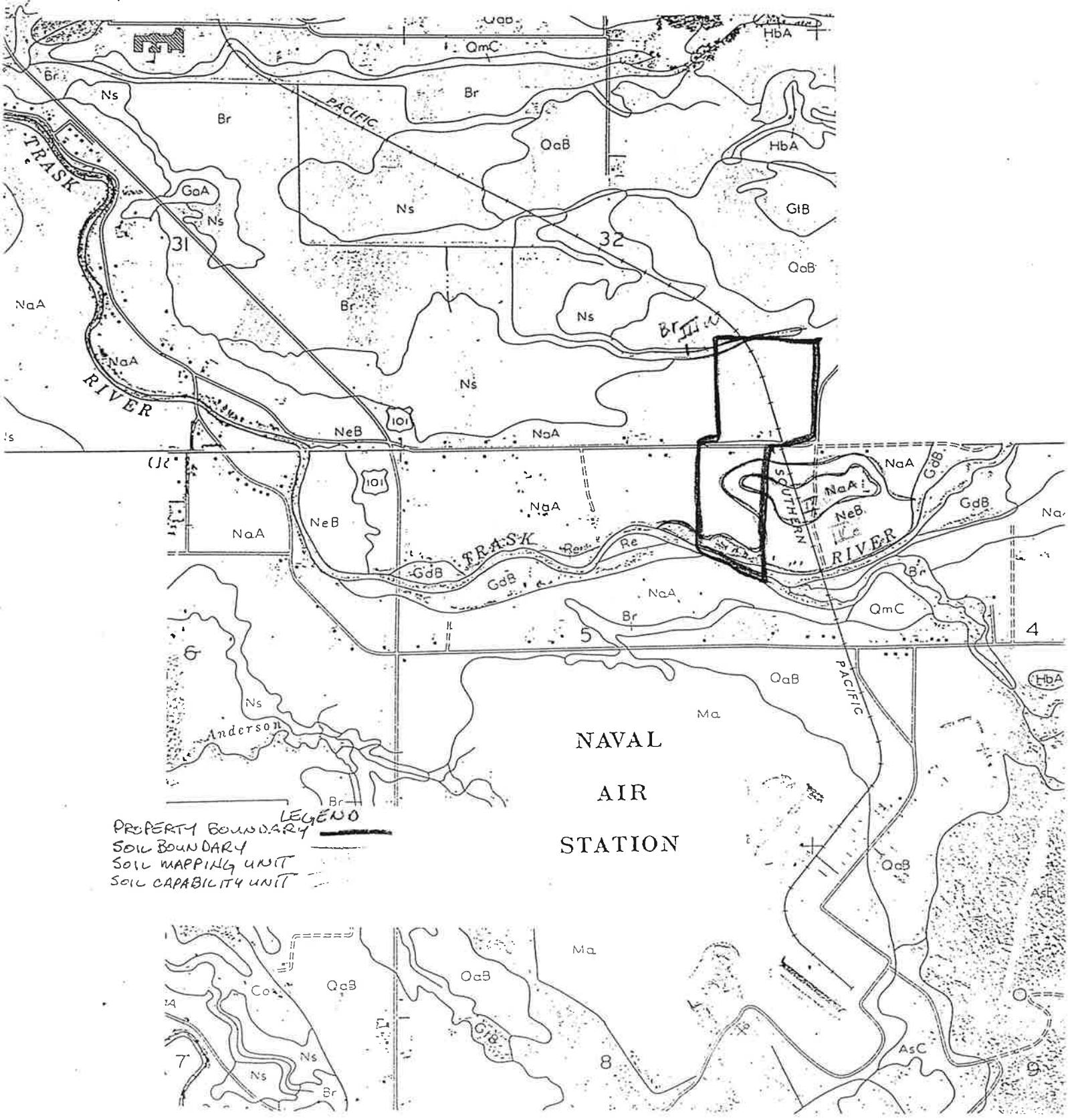
SOIL MAP

Owner DAN LEUTHOLD Operator SAME

County TILLAMOOK State OREGON

Soil survey sheet (s) or code nos. #14 & 17 Approximate scale 1:20000

Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with TILLAMOOK Conservation District



SOILS DESCRIPTIONS

DAN LEUTHOLD

MARCH 31, 1995

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. SCS capability classification is IIw due to climate. Effective rooting depth is greater than 60 inches. Nehalem soils are excellent for pastures. Manure application is restricted when flood potential is high.

Br - Brenner silt loams are poorly drained, strongly acid soils. These soils are on bottomlands in the lowest part of the floodplains.

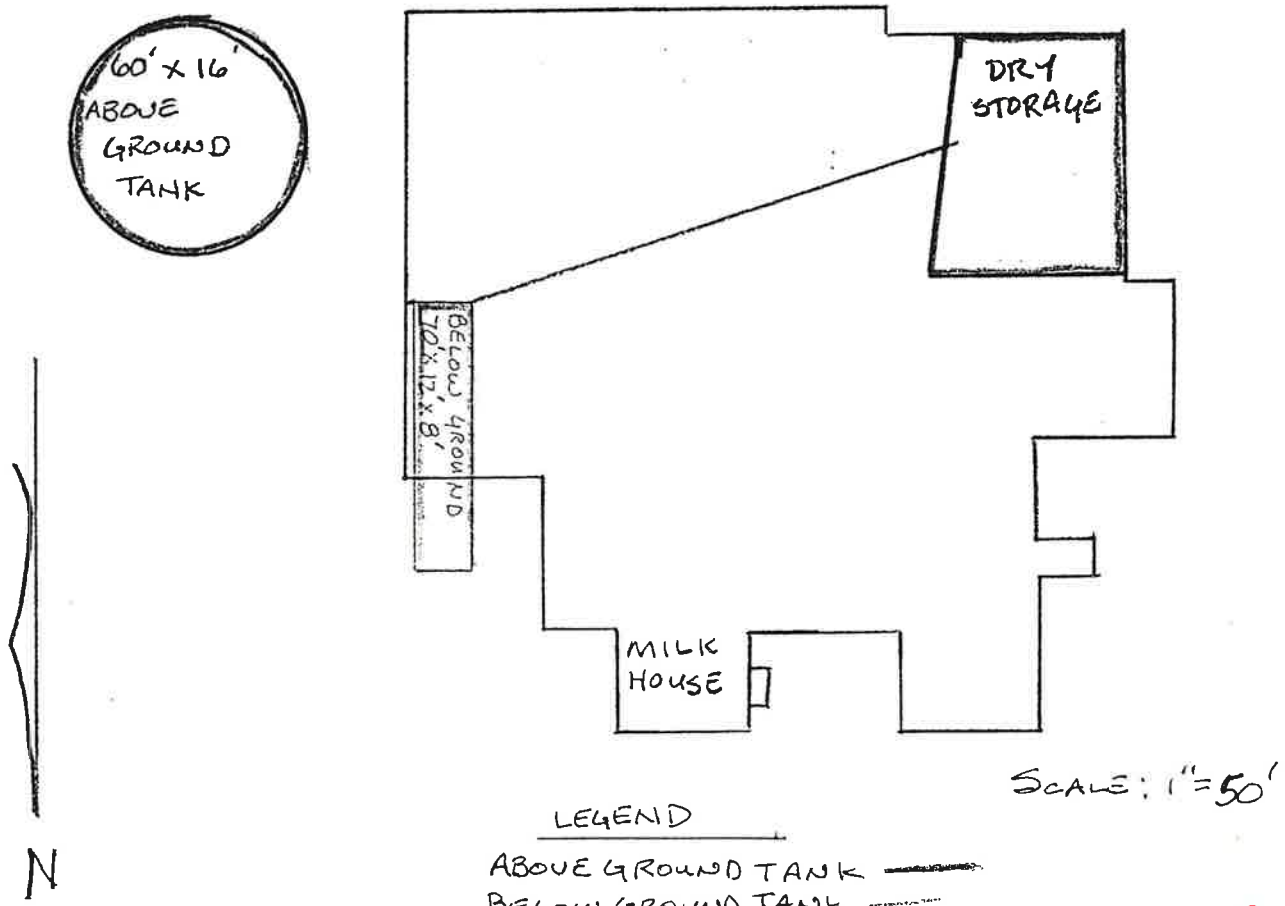
The erosion hazard is slight. Permeability is slow. Runoff is slow to ponded. SCS capability classification is IIIw because of poor drainage. Effective rooting depth is limited by the silt clay layer about 27 inches and by the seasonal water table. Available water holding capacity is 8.5 to 9.5 inches. Soils are well suited for pastures. However, animal waste application is limited unless adequately drained during the wet season. In tidal areas, tidegates may be needed.

NeB Nehalem silt loam overwash, 33-7% slopes are moderately well drained soils, characterized by fresh deposits of silt and sand at a depth of 1 to 10 inches.

Erosion hazard is severe. Runoff is slow. Permability is moderate. SCS capability classification is IVe due to erosion. Effective rooting depth is more than 60 inches. Available watering holding capacity is 11 to 12.5 inches. These soils are excellent for pasturelands and green chop.

OREGON
KWP 4-3-95
FARMSTEAD LAYOUT

DAN LEUTHOLD - TRASK RIVER



SCALE: 1" = 50'

LEGEND

ABOVE GROUND TANK
BELOW GROUND TANK
DRY STORAGE FACILITY
CURBING
WASTE TRANSFER PIPELINE

Assume entire facility is roofed?

Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
Tract Number 204					
					Headquarters
F	1 No.	Jul 95			312 - Waste Management Systems The waste management system consists of structural practices for collecting, storing and applying waste to pasturelands. These practices will prevent pollution by providing an adequate waste management system at the animal confinement operation until wastes are applied to pastures. ALL PRACTICES HAVE AND WILL BE INSTALLED IN ACCORDANCE WITH NATURAL RESOURCES CONSERVATION SERVICE'S SPECIFICATIONS. ALL INSTALLED PRACTICES HAVE BEEN AND WILL BE OPERATED AND MANAGED IN ACCORDANCE WITH THE ENCLOSED "OPERATION AND MAINTENANCE PLAN".
F	45240 Cf.	Aug 95	45230	10/19/94	313-A - Above Ground Liquid Manure Tank An above ground liquid manure tank has been constructed. Tank is a 60'x 16' above ground tank providing approx. 91 days of storage.
F	6720 Cf.	Jul 95	6720	07/04/95	313-B - Below Ground Liquid Manure Tank A below ground liquid manure tank has been constructed. Tank is approx. 70'x 12'x 8' and is about 1 foot [illegible]

95?

Roofed? Covered?

Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
F	12510 Cf.	Sep 86	13988	08/27/87	313-C - Solid Manure Storage Facility A solid manure storage facility with roof, gutters and downspouts has been constructed. Structure has 13988 cf of storage providing approx. 382 days of storage.
F	1 No.	Aug 85	1	02/20/85	313-G - Pump Manure pump has been installed in the below ground liquid manure tank.
F	1 No.	Aug 85	1	02/20/85	313-H - Agitator Agitator was installed in the above ground tank to agitate manure and prevent solid buildup on bottom of tank.
F	1344 Sf.	Oct 87	1344	08/27/87	313-I - Roof A roof has been constructed over an existing manure accumulation slab.
F	100 Ft.	Aug 87	112	09/22/87	362-B - Waste Transfer Pipe Pipeline transfers liquid manure seepage from the dry storage facility to an existing manure tank.
F	1 No.	Aug 87	1	09/22/87	362-A - Curbing A concrete curb has been installed. Speed bump curbing was installed to prevent liquid manure from running out to the dry manure storage.

Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
F	1045 Ft.	Jul 86	1060	07/11/85	558-6 - Gutter Outlets A 6-inch underground PVC nonperforated pipe has been installed to outlet gutter downspouts in an area free of manure.
F	815 Ft.	Jul 86	815	07/11/85	558-A - Gutters and Downspouts Pasture
1-3	3500 Ft.	Jul 95			362-E - Buried Manure Mainline PVC pipe class code 125 will be installed to transfer liquid manure from the planned above ground liquid manure tank to the field in a non-polluting manner.
1-5	73.8 Ac.	Sep 95			510 - Pasture and Hayland Management Pastures will be managed in accordance with the enclosed Job Sheet 2: Pasture Management.
1-3	59 Ac.	Nov 88	59	11/08/88	633 - Waste Utilization Manure will be applied to pastures and or hayland in accordance with the enclosed Waste Utilization Specification.

CONSERVATION PRACTICES OPERATION AND MAINTENANCE PLAN

APRIL 4 , 1995

DAN LEUTHOLD

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 shall be maintained to prevent spillage. If the tank will provide storage capacity to the waste management system it shall be completely emptied at the beginning of the storage period and the contents applied to cropland as weather and crop conditions permit.

Covered? Safety?

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 should be maintained to prevent spillage. If the solid storage will provide storage capacity to the waste management system it shall be completely emptied at the beginnning of the storage period and the contents applied to cropland as weather and crop conditions permit. 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"!

?

SOLID MANURE STORAGE FACILITY

Solid manure storage facility will be inspected annually. All broken trusses, rafters, poles, rusted roof sections, missing bolts, and broken gutters and/or downspouts will be repaired or replaced. Check for adequacy/function of drain away from downspouts. If the solid storage will provide storage capacity to the waste management sustem it shall be completely emptied at the beginning of the storage period and the contents applied to cropland as weather and crop conditions permit.

CURB

Concrete curbs will be inspected periodically. Broken curbs will be repaired. Manure will be prevented from flowing over the curb.

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.

BURIED MANURE MAINLINE

Buried manure mainline will be inspected periodically for leaks. All leaks will be repaired. Lines should be flushed after every manure application. Water and pressure will be relieved during cold weather to prevent freezing or broken lines. Nozzles will be checked annually. Worn nozzles and/or orifices will be replaced.

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 downspouts will be repaired and/or replaced.

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 impellor. Agitator will be operated and maintained in accordance with manufacturer's manual. All plumbing will be inspected annually. Broken lines will be replaced and/or repaired. Loose connections will be tightened.

GUTTERS AND DOWNSPOUTS

Gutters will be inspected annually to insure all gutters are free of foreign materials. Broken gutters or downspouts will be replaced and/or repaired. All gutters will be connected to the downspouts. Leaky gutters and downspouts will be repaired. Weeds and sediment will be removed from outlets. All downspouts will be connected to outlets which are kept free-flowing. Broken rodent guards will be repaired or replaced.

WASTE TRANSFER PIPELINE

Pipeline will be flushed regularly to prevent clogging. Any leaks or broken section will be repaired and/or replaced.

no mention of sprinkler / spreader

DAN LEUTHOLD

APRIL 1995

ANIMAL WASTE UTILIZATION

SPECIFICATIONS

1. Manure will not be spread directly into an open water course or where runoff will enter an open watercourse.

2. Manure will not be spread on fields when soil is saturated or when surface water is present.

3. Fields receiving manure during winter time will not receive an early spring application of manure or commercial fertilizer until warm weather when grass has utilized the winter applied materials.

4. At least two equal manure applications per year will be applied to the acres required for the nitrogen application as indicated by waste utilization calculation or in accordance with a soil test.

5. For winter application of manure, weather forecast will be observed to attempt to minimize manure runoff.

6. If available, well-drained soils will be used for winter applications of manure.

7. When well-drained soils are not available, fields that have subsurface drainage systems will be used for Winter applications of manure.

no deadline for application testing

JOB SHEET #2

PASTURELAND MANAGEMENT

SPECIFICATIONS

DAN LEUTHOLD

MARCH 31, 1995

1. Grazing of new seedings will be delayed until grasses have at least 8 inches of growth and are firmly rooted.

2. Spring grazing of established stands will be delayed until grasses have at least 6 inches of growth and ground is firm.

3. Cattle will be removed in the Fall when ground is wet and grass has at least 2 inches of top growth going into the Winter.

4. Pastures will be clipped and dragged at least twice annually.

5. Grazing will be discontinued on pastures when grass height is 2 inches.

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE UTILIZATION CALCULATIONS V4.2

NAME OF DAIRY: Dan Leuthold
ASSISTED/APPROVED BY: Kent Perkins — Kent Perkins
DATE: 3/30/95 — ENGINEERING JOB CLASS III.

ANIMAL SIZE AND NUMBER:

12ØØ LB UNITS:	5Ø
11ØØ LB UNITS:	1ØØ
8ØØ LB UNITS:	4Ø
6ØØ LB UNITS:	25
4ØØ LB UNITS:	45
3ØØ LB UNITS:	3Ø
2ØØ LB UNITS:	Ø

THE NUMBER OF COWS BEING MILKED: 13Ø.

MANURE WILL BE HANDLED 9Ø % LIQUID AND 1Ø % SOLID.

NUMBER OF 1ØØØ LB UNITS ARE: 244.

290

USING Ø.2 CU.FT./DAY/1ØØØ LB UNIT TIMES 244.Ø UNITS = 48.8 CU.FT. BEDDING/DAY.
NO ADDITIONAL CONTAMINATED WATER OR LOT RUNOFF ENTERING THE SYSTEM.

THE TOTAL DAILY MANURE PRODUCED IS: 317.2Ø CUBIC FEET.
THE DAILY LIQUID STORAGE VOLUME IS: 398.3Ø CUBIC FEET.
THE DAILY SOLID STORAGE VOLUME IS: 36.6Ø CUBIC FEET.

STORAGE REQUIREMENTS (IN CU.FT.) FOR:

DAYS	-SOLID-	-LIQUID-
3Ø	1Ø98.Ø	11949.Ø
6Ø	2196.Ø	23898.Ø
9Ø	3294.Ø	35847.Ø
12Ø	4392.Ø	47796.Ø

EXISTING FACILITIES

SOLID 12,510 cf = 347 DAYS STORAGE

LIQUID 60'x16' = 91 DAYS STORAGE
70x12x8' = 6720 cf = 17 DAYS STORAGE
108 DAYS STORAGE

USE: _____ USE: _____

THE ANIMALS ARE CONFINED FOR 225 DAYS AND ON PASTURE FOR 140 DAYS.

TOTAL DAILY NITROGEN PRODUCED IS: 1Ø9.8Ø POUNDS.
TOTAL DAILY PHOSPHORUS PRODUCED IS: 17.Ø8 POUNDS.
TOTAL DAILY POTASSIUM PRODUCED IS: 63.44 POUNDS.

$\pi \frac{60^2}{4}(16) = 45{,}239 FT^3$ TL = 113 DAYS
W/FREEBOARD $\pi \frac{60^2}{4}(15) = 42{,}412 FT^3$ = 106 DAYS
roofed?

LIQ. STORAGE METHOD IS SCRAPE/ABOVE GRND AND APP. METHOD IS SPRINKLER.
SOLID STOR. METHOD IS DRY W/ROOF AND APP. METHOD IS BROADCAST. 70x12x8 = 6720 FT³ = 17 DAYS
THE PASTURE PERIOD ONLY USES SUMMER/PASTURE APPLICATION METHOD. 70x12x7 = 5880 FT³ = 15 DAYS
NUTRIENTS WILL BE APPLIED TO RYE GRASS PASTURE (LOCAL MIX).
PASTURE MANAGEMENT LEVEL IS HIGH MANAGEMENT OR 8 TONS DRY MATTER PER YEAR.
AVOIDABLE LOSSES CONSIDER USING WELL DRAINED SOIL. moderately well?
NUTRIENTS ARE MINERIALIZED CONSIDERING CONTINUAL YEARLY APPLICATION. for soils info

THERE IS 1338.50 POUNDS OF AVAIL. NITROGEN AFTER ALL LOSSES ARE CONSIDERED.
THERE IS 3109.27 POUNDS OF AVAIL. PHOSPHORUS AFTER ALL LOSSES ARE CONSIDERED.
THERE IS 1677.14 POUNDS OF AVAIL. POTASSIUM AFTER ALL LOSSES ARE CONSIDERED.

USE [illegible] LB. FOR NITROGEN AVAILABILITY FROM CONFINED PERIOD SOLID STORAGE
USE 24.1 LBS. FOR NITROGEN APPLICATION FROM CONFINED PERIOD LIQUID STORAGE.

NEED [illegible] LBS. NEEDED FOR NITROGEN APPLICATION IS: 56.5 AC. AVAIL. = 73.8 AC. PASTURE
NEED [illegible] LBS. NEEDED FOR PHOSPHORUS APPLICATION IS: [illegible]
NEED [illegible] LBS. NEEDED FOR POTASSIUM APPLICATION IS: 23.6

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE APPLICATION CALCULATIONS

DAIRY: Dan Leuthold
ASSIST.BY: Kent Perkins
DATE: April 4, 1995

GIVEN:
CROP - ALL PASTURE ACRES: 73.8 TONS: 8

VOLUME OF WASTE WATER APPLIED ANNUALLY:
434.9 C.F. X 365 DAYS = 158,739 CUBIC FEET

AVAILABLE WATER HOLDING CAPACITY OF THE SOIL:
Ø.2 IN./IN. X 3Ø" RT.DP.= 6.Ø INCHES

ALLOWABLE ANNUAL DEPTH OF APPLICATION:
TOTAL VOL*YEARLY N NEED*12IN/FT/4356Ø*YEARLY N PRODUCED=
158738 C.F. X 363.2 # *12/4356Ø* 2Ø531.52 # N = Ø.77 INCHES/ACRE

SINCE Ø.77 IN. < 6.Ø INCHES ONLY ONE APP. IS NEEDED

NOTE: IT IS THE POLICY OF NRCS-TILLAMOOK TO HAVE WASTE APPLIED IN A MINIMUM OF 2 APPLICATIONS.

DEPTH OF UNIFORM APPLICATION OVER ALL ACRES:
158738 CF*12 / 73.8 ACRES*4356Ø= Ø.59 IN/ACRE
Ø.59 IN/AC = 278.2 # N/ACRE

N BALANCE = -85.Ø # N / ACRE

ALLOWABLE RECOMMENDED APPLICATION:
Ø.77 IN. / 2 = Ø.39 INCHES

WEATHER AND SOIL APPLICATION TIMING:
FIND AMOUNT OF SOIL DEPTH TO HOLD REQUIRED APPLICATION:
[illegible] / Ø.2 IN/IN = 1.93 " DEPTH

FIND TIME REQUIRED FOR WATER TO MOVE OUT OF THE SOIL PROFILE
USING 10% SAFETY FACTOR AND DRAINAGE COEFF. =
Ø.21 IN + Ø.39 / Ø.25 " / HR.= 2.5 HRS.OF NO RAIN BEFORE APP.

[illegible] DO NO DISTRIBUTION PERIODS TO CAPFUL APPLY WASTE
[illegible] PERIOD IS PER. 1a-1d
[illegible] .08 DAYS

solids + liquids
solids + liquids
one liquids applied to leased land?
inappropriate for solids + liquids
only if soil at wilting point
what is drainage coef? where does it come from? default?
default?
can sprinkler system apply @ 250 gal/min continuously for 1.08 days?

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE APPLICATION CALCULATIONS

DAIRY: Dan Leuthold (liquid only)
ASSIST.BY: Kent Perkins
DATE: April 4, 1995

GIVEN:
CROP - ALL PASTURE ACRES:66.42 TONS: 8

VOLUME OF WASTE WATER APPLIED ANNUALLY:
398.3 C.F. X 365 DAYS = 145,38Ø CUBIC FEET

AVAILABLE WATER HOLDING CAPACITY OF THE SOIL:
Ø.2 IN./IN. X 3Ø" RT.DP.= 6.Ø INCHES

ALLOWABLE ANNUAL DEPTH OF APPLICATION:
TOTAL VOL*YEARLY N NEED*12IN/FT/4356Ø*YEARLY N PRODUCED=
145379 C.F. X 363.2 # *12/4356Ø* 18478.37 # N = Ø.79 INCHES/ACRE

SINCE Ø.79 IN. < 6.Ø INCHES ONLY ONE APP. IS NEEDED

NOTE: IT IS THE POLICY OF NRCS-TILLAMOOK TO HAVE WASTE APPLIED IN A MINIMUM OF 2 APPLICATIONS.

DEPTH OF UNIFORM APPLICATION OVER ALL ACRES:
145379 CF*12 / 66.42 ACRES*4356Ø= Ø.6Ø IN/ACRE
Ø.6Ø IN/AC = 278.2 # N/ACRE

N BALANCE = -85.Ø # N / ACRE

ALLOWABLE RECOMMENDED APPLICATION:
Ø.79 IN. / 2 = Ø.39 INCHES

WEATHER AND SOIL APPLICATION TIMING:
FIND AMOUNT OF SOIL DEPTH TO HOLD REQUIRED APPLICATION:
Ø.39 IN. / [illegible] IN/IN = [illegible] " DEPTH

FIND TIME REQUIRED FOR WATER TO MOVE OUT OF THE SOIL PROFILE
USING SOIL WATER RATIO AND DRAINAGE CODE =
Ø.39 IN. / [illegible] " / HR.= [illegible] HRS.OF NO RAIN
BEFORE A.T.

THERE SHOULD BE NO RESTRICTIVE PERIODS TO FAVELY APPLY WASTE
AFTER SOIL & WATER CONSERVATION PRACTICES ARE APPLIED.
[illegible] PER ACRE OR PER 1000 GAL.

defaults

USDA SOIL CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
TILLAMOOK, OREGON 97141

TRAVELING SPRINKLER SYSTEMS

BY: S. RYCHETSKY
DATE: FEB.1994

DEPTH OF WATER APPLIED BY TRAVELING SPRINKLERS, INCHES

G.P.M.	Spacing Between Travel Lanes, Ft.	Travel Speed, Feet Per Minute							
		0.4	0.5	1	2	4	6	8	10
100	165	2.43	1.95	0.97	0.49	0.24	0.16	0.12	0.10
200	180	4.46	3.57	1.78	0.89	0.45	0.30	0.22	0.18
	200	4.01	3.21	1.61	0.81	0.40	0.27	0.20	0.16
300	200	6.02	4.82	2.41	1.20	0.60	0.40	0.30	0.24
	270	4.46	3.57	1.78	0.89	0.45	0.30	0.22	0.18
400	240	6.69	5.35	2.68	1.34	0.67	0.45	0.33	0.27
	300	5.35	4.28	2.14	1.07	0.54	0.36	0.27	0.21
500	270	7.43	5.94	2.97	1.49	0.74	0.50	0.37	0.30
	330	6.08	4.86	2.43	1.22	0.61	0.41	0.30	0.24
600	270	8.92	7.13	3.57	1.80	0.89	0.59	0.45	0.36
	330	7.30	5.84	2.92	1.46	0.73	0.49	0.36	0.29

290 ?

FORMULA:

$$\text{Average Water Depth Applied, Inches} = \frac{1.605 \times \text{Sprinkler G.P.M.}}{\text{Lane Spacing, Ft.} \times \text{Travel Speed, Ft./Min.}}$$

$\frac{IN}{HR} = 0.10 \frac{AC}{HR} \frac{FT^3}{HR}$

$250 \frac{GAL}{MIN} \left| \frac{60 MIN}{HR} \right| \frac{FT^3}{7.5 GAL} = 2000 \frac{FT^3}{HR} \frac{AC}{43560 FT^2}$

$\frac{2000}{43560} \frac{AC\text{-}FT}{HR} = .76 \frac{IN}{HR}$

IRRIGATION RATE FOR TRAVELING SPRINKLERS

Travel Speed Ft./Min.	Acres Irrigated per Hour — Travel Lane Spacing, Ft.								Hours Req'd for 1/4 Mile Travel
	165	200	240	270	300	330	360	400	
0.4	0.09	0.10	0.13	0.15	0.16	0.18	0.20	0.22	55.0
0.5	0.11	0.14	0.16	0.19	0.21	0.23	0.25	0.28	44.0
1	0.22	0.27	0.33	0.37	0.41	0.45	0.49	0.55	22.0
2	0.45	0.54	0.66	0.75	0.82	0.9	0.99	1.10	11.0
4	0.90	1.10	1.32	1.49	1.65	1.81	1.98	2.20	5.50
6	1.36	1.65	1.98	2.23	2.48	2.72	2.98	3.30	3.67
8	1.81	2.20	2.64	2.97	3.30	3.63	3.96	4.40	2.75
10	2.27	2.75	3.30	3.72	4.13	4.54	4.95	5.50	2.20
Acres Irrig. in 1/4 mile Travel	5.0	6.1	7.3	8.2	9.1	10.0	10.9	12.1	

FORMULA:

$$\text{Acres Irrigated per Hour} = \frac{\text{Travel Speed, Ft./Min.} \times \text{Spacing Between Runs, Ft.}}{726}$$

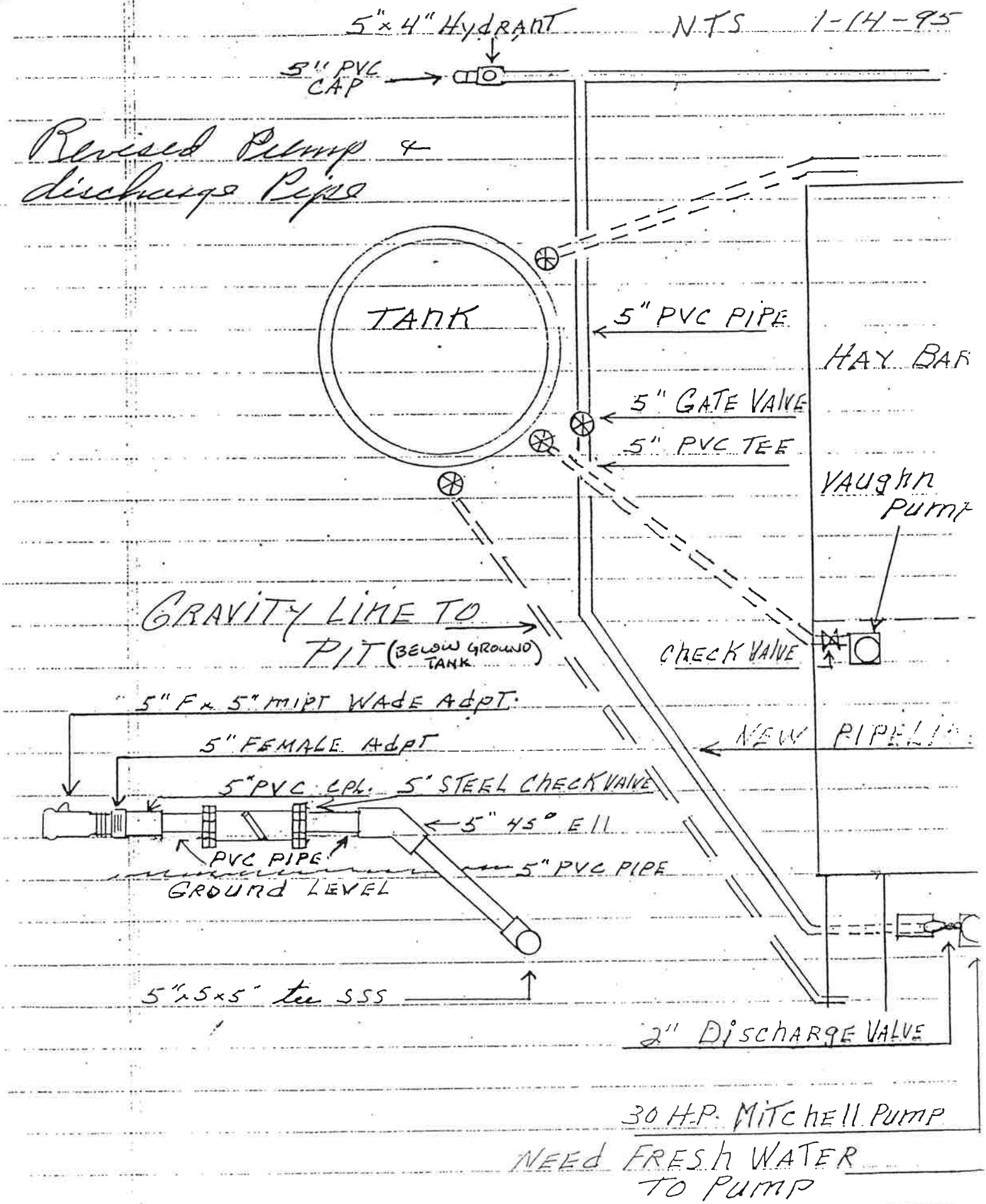
$$\text{Acres Irrigated per 1/4 Mile travel} = \frac{\text{Spacing, Ft.}}{33}$$

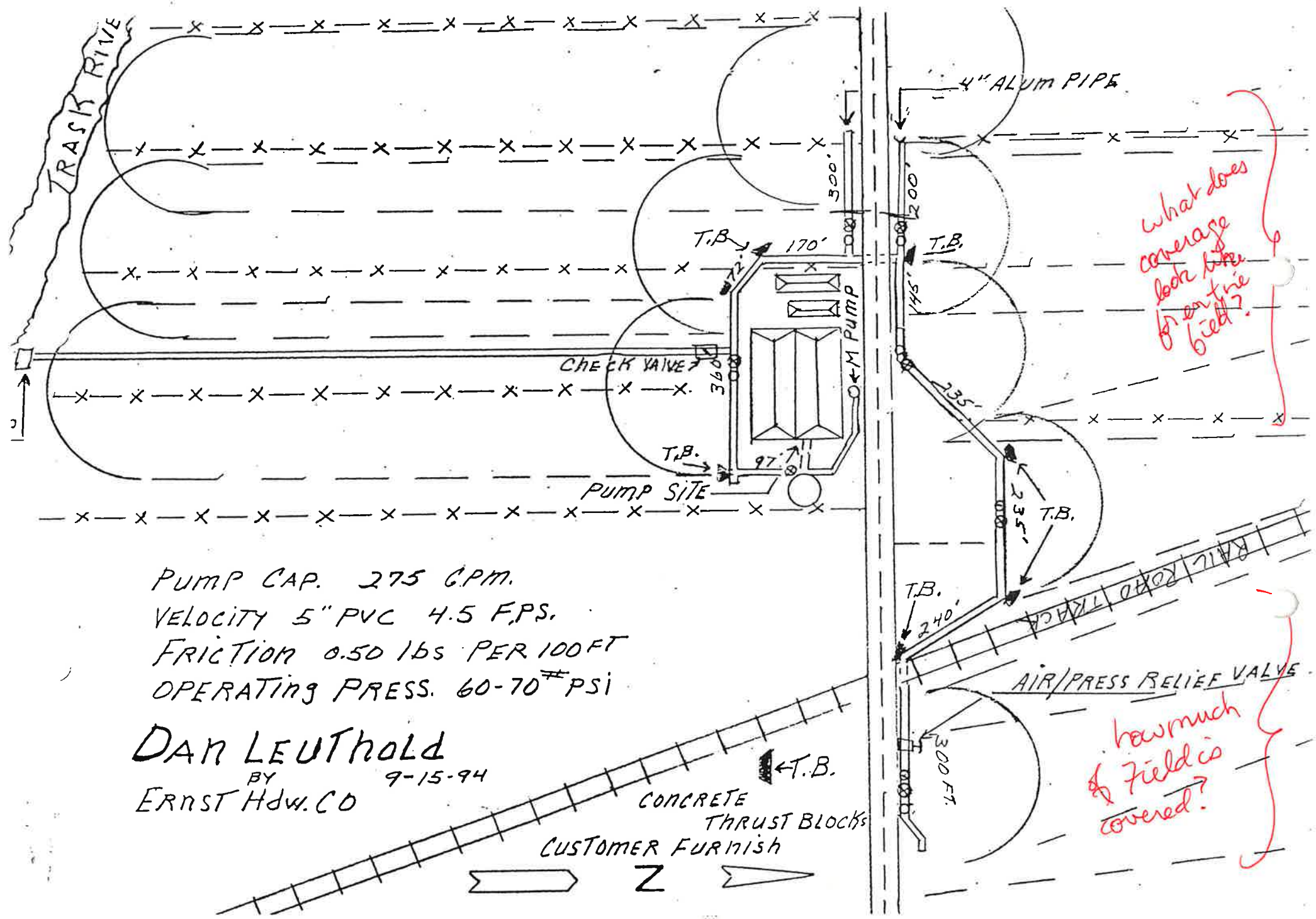
$$\text{Hours Required Per 1/4 Mile Travel} = \frac{22}{\text{Travel Speed, Ft./Min.}}$$

NEW PLAN

DAN LEUTHOLD

5" x 4" Hydrant NTS 1-14-95





PUMP CAP. 275 G.P.M.
VELOCITY 5" PVC 4.5 F.P.S.
FRICTION 0.50 lbs PER 100 FT
OPERATING PRESS. 60-70 PSI

DAN LEUTHOLD
BY
ERNST Hdw. CO
9-15-94

DEPARTMENT OF AGRICULTURE

OFFICIAL USE ONLY
455/55-06-00-00
831.008 - $50 / 831.205 - $25
Facility I.D. No: 1023919
Hydrocode No: _____

FOR CASHIER'S USE ONLY

GENERAL PERMIT REGISTRATION FOR CONFINED ANIMAL FEEDING OPERATION (CAFO)

Dairy

NEW APPLICANTS:

New Application Fee	$50
Annual Management Fee	$25
Total	$75

EXISTING PERMIT HOLDERS:

Annual Management Fee	$25
Total	$25

1a. Name and mailing address:
Dan Leuthold
2475 McCormick Lp
Tillamook OR 97141

1b. Assumed business name:
Wilsona farms
Telephone No.: _____

2. Location of CAFO facility if different than 1.:
Tillamook

3. Brief description of CAFO facility (see instructions):
165 Cow Dairy with underground + above ground waste storage

4a. Number and type of confined animals on hand (see instructions):
140 lactating 25 Dry Cows 60 heifers 30 calves

4b. Number of animals for which the waste handling facilities were designed (see instructions): 270 dairy cows

5. Describe the sources of wastewater generated (see instructions):
manure wash water from milking parlor

6. Describe the type and size of wastewater and manure collection and storage facilities (see instructions):
60 x 16 [illegible]
6 x 12 [illegible]
13 - 18?

7. Describe the manure and wastewater land application system (see instructions):
[illegible]

NPDES # 6 A. 270

(Turn page over to complete form.)

8. Describe the land available for manure and wastewater application (see instructions): Annual to permanent pasture
60 acres owned (in flood plain)
20 leased (in flood plain)
80 leased (for heifers)

9. Do you have a written animal waste management plan? Yes Tillamook County ASCS
(Yes/No)

10. Attach a simple diagram of your CAFO operation, including the confinement facility, all wastewaters and where they go, the storage facilities, and land application area. Also show surface streams, lakes, and waterways in the vicinity of the collection, storage, and application areas. (An aerial photograph of your facility with the various units marked on the photo will be accepted in lieu of the diagram.)

I hereby certify that the information that is included in this application is true and accurate to the best of my knowledge.

Signature: Dan Leuthold
Title: Owner
Date: 7/31/90

FEES MUST ACCOMPANY THIS APPLICATION AND BE RETURNED BY JULY 31, 1990

RETURN APPLICATION TO:

Oregon Department of Agriculture
Natural Resources Division
635 Capitol St. NE
Salem, OR 97310-0110

NOTE: Oregon Revised Statutes, ORS 468.740, require that any person with a wastewater disposal system must have a permit issued by the DEQ. Liquid manure and wastewater disposal systems used by CAFO facilities, except those that confine for four months or less, are included under that requirement and must have a permit to construct and/or operate the wastewater and liquid manure disposal system, even though the manure is put to beneficial use.

DO NOT COMPLETE THIS APPLICATION IF YOUR OPERATION CONFINES FOR FOUR MONTHS OR LESS. IN THIS CASE A PERMIT IS NOT REQUIRED.

If you have any questions about this application or how it applies to your operation, please contact the Natural Resources Division of the State Department of Agriculture at the address above, or phone (503) 378-3810.

If you desire some technical advice on your CAFO operation or your wastewater management system, please contact the Natural Resources Division at the same address and telephone number.

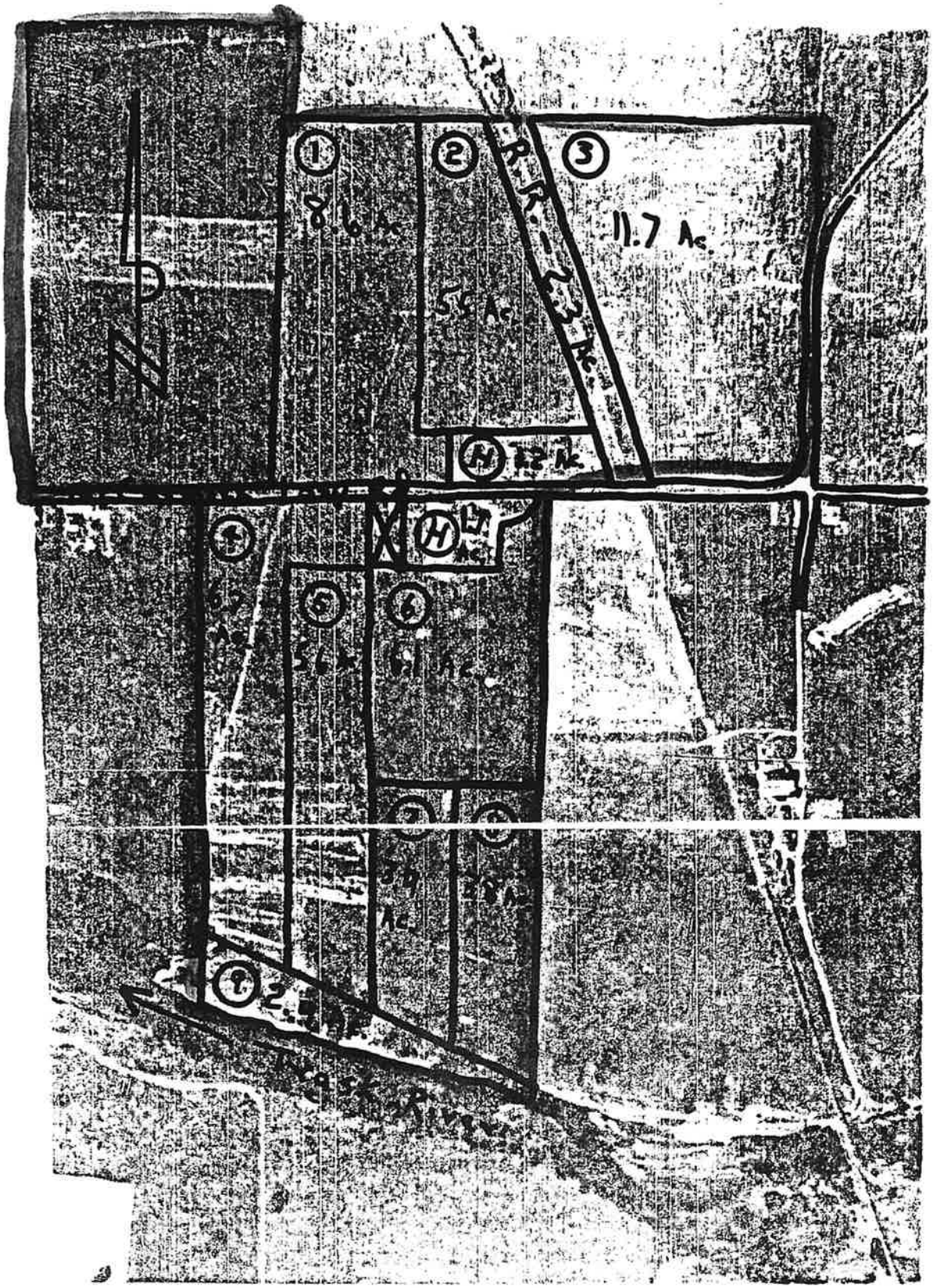
NR/for/SW108
FORM 7001

CONSERVATION F[illegible]N MAP

Prepared by UNITED STATES DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE
cooperating with
Tillamook Soil & Water Conservation Dist.
S.C. DISTRICT

OWNER Dan Lenthold
OPERATOR Same
Tillamook COUNTY, Oregon STATE

FARM NO. 79 DATE 7/24/79
SCALE PHOTO NO. ACRES APPROXIMATE 58



#9525 Dave

RECEIVED

APR 10 1995

NATURAL RESOURCES DIVISION

Tillamook County Soil and Water Conservation District
2204 Fourth St., Suite B - Tillamook, OR 97141

Subject: Animal Waste Management System

Date: APRIL 4, 1995

To: Oregon Department of Agriculture
Natural Resources Division
635 Capitol Street N.E.
Salem, Oregon 97310-0110

Mr. Dan Leuthold
2425 McCormik Loop Rd.
Tillamook, Or 97141

The manure management system for Dan Leuthold, Tillamook County SWCD has been designed to include the following special features:

1. The system will serve about 244 1000 lb. dairy cattle.

2. Spreading will be done by traveling gun and solid spreader wagon.

3. Storage facilities will consist of

Above ground tank 60'x 16' =45239 cf.

Below ground tank =70'x 12'x 8' = 6720 cf.

Solid manure stacking facility = 13988 cf.

in combination will store manure for about Liquids 108 days / Solids 382 days.

4. The storage system will be constructed in accordance with approved NRCS plans and specifications. I have read this plan and understand its contents and will operate in accordance with the plan and design.

LANDOWNER Dan Leuthold DATE 4/5/95

REVIEWED BY:
Rudy Fonk DATE 4-6-95
TILLAMOOK COUNTY SWCD DIRECTOR

DAN LEUTHOLD
APRIL 1995

LANDUSE SUMMARY

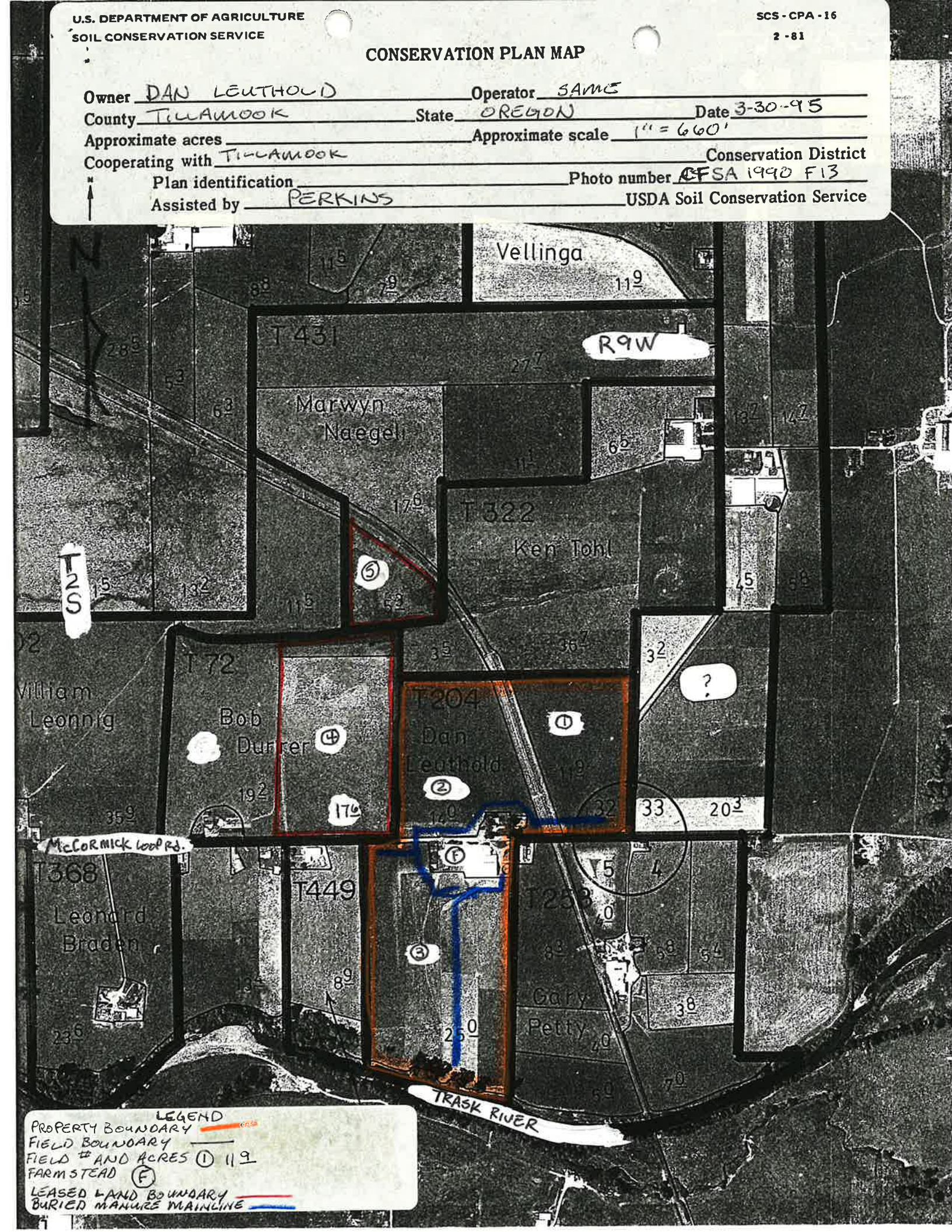
1. PASTURELAND	OWNED		11.9 ACRES
2. PASTURELAND	OWNED		14.0 ACRES
3. PASTURELAND	OWNED		25.0 ACRES
4. PASTURELAND	LEASED		17.6 ACRES
5. PASTURELAND	LEASED		5.3 ACRES
6. FARMSTEAD	OWNED		2.9 ACRES
		TOTAL	76.7 ACRES
			73.8 ACRES PASTURE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SCS - CPA - 16
2 - 81

CONSERVATION PLAN MAP

Owner DAN LEUTHOLD Operator SAME
County TILLAMOOK State OREGON Date 3-30-95
Approximate acres _____ Approximate scale 1" = 660'
Cooperating with TILLAMOOK Conservation District
Plan identification _____ Photo number ASCS 1990 F13
Assisted by PERKINS USDA Soil Conservation Service



U. S. DEPARTMENT OF AGRICULTURE

SCS-CPA-15
(3-88)

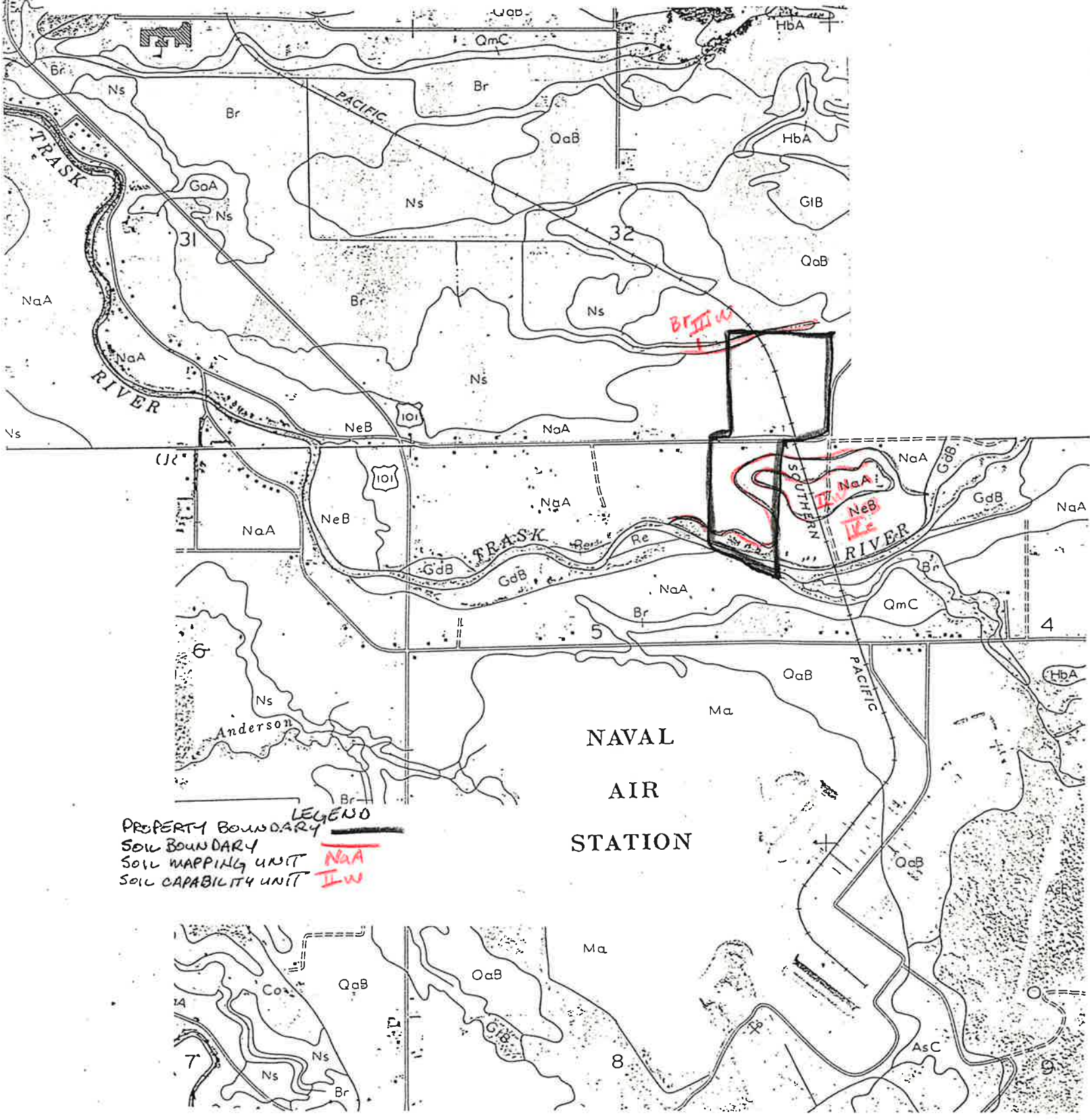
SOIL MAP

Owner DAN LEUTHOLD Operator SAME

County TILLAMOOK State OREGON

Soil survey sheet (s) or code nos. #14 & 17 Approximate scale 1:20000

Prepared by U. S. Department of Agriculture, Soil Conservation Service cooperating with TILLAMOOK Conservation District



SOILS DESCRIPTIONS

DAN LEUTHOLD

MARCH 31, 1995

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. SCS capability classification is IIw due to climate. Effective rooting depth is greater than 60 inches. Nehalem soils are excellent for pastures. Manure application is restricted when flood potential is high.

Br - Brenner silt loams are poorly drained, strongly acid soils. These soils are on bottomlands in the lowest part of the floodplains.

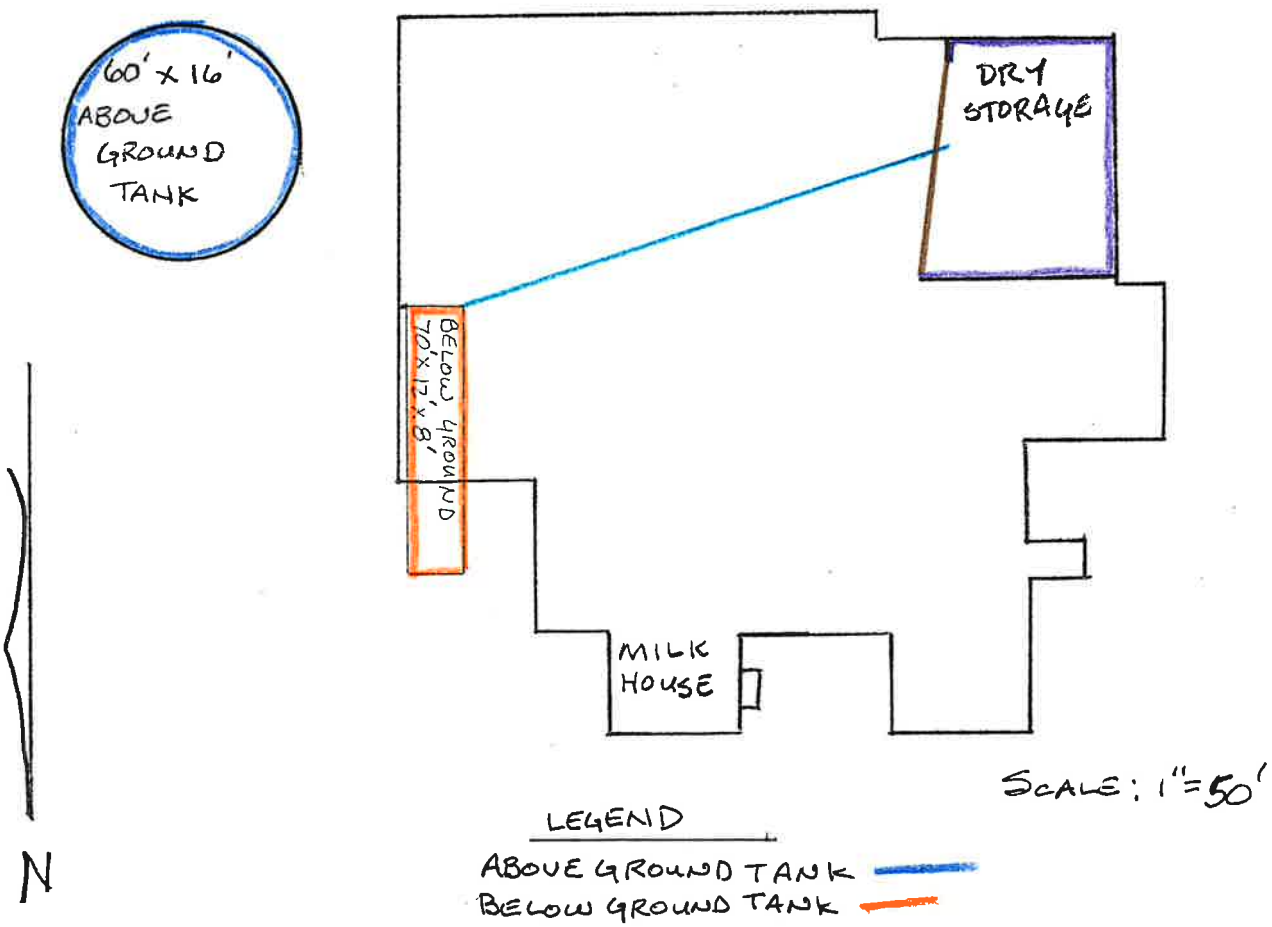
The erosion hazard is slight. Permeability is slow. Runoff is slow to ponded. SCS capability classification is IIIw because of poor drainage. Effective rooting depth is limited by the silt clay layer about 27 inches and by the seasonal water table. Available water holding capacity is 8.5 to 9.5 inches. Soils are well suited for pastures. However, animal waste application is limited unless adequately drained during the wet season. In tidal areas, tidegates may be needed.

NeB Nehalem silt loam overwash, 33-7% slopes are moderately well drained soils, characterized by fresh deposits of silt and sand at a depth of 1 to 10 inches.

Erosion hazard is severe. Runoff is slow. Permability is moderate. SCS capability classification is IVe due to erosion. Effective rooting depth is more than 60 inches. Available watering holding capacity is 11 to 12.5 inches. These soils are excellent for pasturelands and green chop.

OREGON
KWP 4-3-95
FARMSTEAD LAYOUT

DAN LEUTHOLD - TRASK RIVER



Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
Tract Number 2Ø4					
					Headquarters
F	1 No.	Jul 95			312 - Waste Management Systems The waste management system consists of structural practices for collecting, storing and applying waste to pasturelands. These practices will prevent pollution by providing an adequate waste management system at the animal confinement operation until wastes are applied to pastures. ALL PRACTICES HAVE AND WILL BE INSTALLED IN ACCORDANCE WITH NATURAL RESOURCES CONSERVATION SERVICE'S SPECIFICATIONS. ALL INSTALLED PRACTICES HAVE BEEN AND WILL BE OPERATED AND MANAGED IN ACCORDANCE WITH THE ENCLOSED "OPERATION AND MAINTENANCE PLAN".
F	45240 Cf.	Aug 85	45239	10/19/84	313-A - Above Ground Liquid Manure Tank An above ground liquid manure tank has been constructed. Tank is a 60'x 16' above ground tank providing approx. 91 days of storage.
F	6720 Cf.	Jul 63	6720	Ø7/Ø4/63	313-B - Below Ground Liquid Manure Tank A below ground liquid manure tank has been constructed. Tank is approx. 70'x 12'x 8' providing approx. 17 days of storage.

Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
F	12510 Cf.	Sep 86	13988	08/27/87	313-C - Solid Manure Storage Facility A solid manure storage facility with roof, gutters and downspouts has been constructed. Structure has 13988 cf of storage providing approx. 382 days of storage.
F	1 No.	Aug 85	1	02/20/85	313-G - Pump Manure pump has been installed in the below ground liquid manure tank.
F	1 No.	Aug 85	1	02/20/85	313-H - Agitator Agitator was installed in the above ground tank to agitate manure and prevent solid buildup on bottom of tank.
F	1344 Sf.	Oct 87	1344	08/27/87	313-I - Roof A roof has been constructed over an existing manure accumulation slab.
F	120 Ft.	Aug 87	112	09/22/87	362-8 - Waste Transfer Pipe Pipeline transfers liquid manure seepage from the dry storage facility to an existing manure tank.
F	1 Cy.	Sep 88	1	09/23/87	362-A - Curbing A concrete curb has been installed. Speed bump curbing was installed to prevent liquid manure from running out of the dry storage facility.

Dan Leuthold

RECORD OF DECISIONS AND APPLICATION

Assisted By Perkins

Field No.	Planned Amount	Planned Date	Applied Amount	Applied Date	Narrative Record
F	1Ø45 Ft.	Jul 86	1Ø6Ø	Ø7/11/85	558-6 - Gutter Outlets A 6-inch underground PVC nonperforated pipe has been installed to outlet gutter downspouts in an area free of manure.
F	815 Ft.	Jul 86	815	Ø7/11/85	558-A - Gutters and Downspouts Pasture
1-3	35ØØ Ft.	Jul 95			362-E - Buried Manure Mainline PVC pipe class code 125 will be installed to transfer liquid manure from the planned above ground liquid manure tank to the field in a non-polluting manner.
1-5	73.8 Ac.	Sep 95			51Ø - Pasture and Hayland Management Pastures will be managed in accordance with the enclosed Job Sheet 2: Pasture Management.
1-3	59 Ac.	Nov 88	59	11/Ø8/88	633 - Waste Utilization Manure will be applied to pastures and or hayland in accordance with the enclosed Waste Utilization Specification.

CONSERVATION PRACTICES OPERATION AND MAINTENANCE PLAN

APRIL 4 , 1995

DAN LEUTHOLD

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 shall be maintained to prevent spillage. If the tank will provide storage capacity to the waste management system it shall be completely emptied at the beginning of the storage period and the contents applied to cropland as weather and crop conditions permit.

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 should be maintained to prevent spillage. If the solid storage will provide storage capacity to the waste management system it shall be completely emptied at the beginnning of the storage period and the contents applied to cropland as weather and crop conditions permit. 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"!

SOLID MANURE STORAGE FACILITY

Solid manure storage facility will be inspected annually. All broken trusses, rafters, poles, rusted roof sections, missing bolts, and broken gutters and/or downspouts will be repaired or replaced. Check for adequacy/function of drain away from downspouts. If the solid storage will provide storage capacity to the waste management sustem it shall be completely emptied at the beginning of the storage period and the contents applied to cropland as weather and crop conditions permit.

CURB

Concrete curbs will be inspected periodically. Broken curbs will be repaired. Manure will be prevented from flowing over the curb.

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.

BURIED MANURE MAINLINE

Buried manure mainline will be inspected periodically for leaks. All leaks will be repaired. Lines should be flushed after every manure application. Water and pressure will be relieved during cold weather to prevent freezing or broken lines. Nozzles will be checked annually. Worn nozzles and/or orifices will be replaced.

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 downspouts will be repaired and/or replaced.

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 impellor. Agitator will be operated and maintained in accordance with manufacturer's manual. All plumbing will be inspected annually. Broken lines will be replaced and/or repaired. Loose connections will be tightened.

GUTTERS AND DOWNSPOUTS

Gutters will be inspected annually to insure all gutters are free of foreign materials. Broken gutters or downspouts will be replaced and/or repaired. All gutters will be connected to the downspouts. Leaky gutters and downspouts will be repaired. Weeds and sediment will be removed from outlets. All downspouts will be connected to outlets which are kept free-flowing. Broken rodent guards will be repaired or replaced.

WASTE TRANSFER PIPELINE

Pipeline will be flushed regularly to prevent clogging. Any leaks or broken section will be repaired and/or replaced.

DAN LEUTHOLD

APRIL 1995

ANIMAL WASTE UTILIZATION

SPECIFICATIONS

1. Manure will not be spread directly into an open water course or where runoff will enter an open watercourse.

2. Manure will not be spread on fields when soil is saturated or when surface water is present.

3. Fields receiving manure during winter time will not receive an early spring application of manure or commercial fertilizer until warm weather when grass has utilized the winter applied materials.

4. At least two equal manure applications per year will be applied to the acres required for the nitrogen application as indicated by waste utilization calculation or in accordance with a soil test.

5. For winter application of manure, weather forecast will be observed to attempt to minimize manure runoff.

6. If available, well-drained soils will be used for winter applications of manure.

7. When well-drained soils are not available, fields that have subsurface drainage systems will be used for Winter applications of manure.

JOB SHEET #2

PASTURELAND MANAGEMENT

SPECIFICATIONS

DAN LEUTHOLD

MARCH 31, 1995

1. Grazing of new seedings will be delayed until grasses have at least 8 inches of growth and are firmly rooted.

2. Spring grazing of established stands will be delayed until grasses have at least 6 inches of growth and ground is firm.

3. Cattle will be removed in the Fall when ground is wet and grass has at least 2 inches of top growth going into the Winter.

4. Pastures will be clipped and dragged at least twice annually.

5. Grazing will be discontinued on pastures when grass height is 2 inches.

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE UTILIZATION CALCULATIONS V4.2

NAME OF DAIRY: Dan Leuthold
ASSISTED/APPROVED BY: Kent Perkins
DATE: 3/30/95

Kent Perkins
ENGINEERING JOB CLASS III.

ANIMAL SIZE AND NUMBER:

1200 LB UNITS:	50	THE NUMBER OF COWS BEING MILKED: 130.
1100 LB UNITS:	100	
800 LB UNITS:	40	MANURE WILL BE HANDLED 90 % LIQUID
600 LB UNITS:	25	AND 10 % SOLID.
400 LB UNITS:	45	
300 LB UNITS:	30	
200 LB UNITS:	0	NUMBER OF 1000 LB UNITS ARE: 244.
	290	

USING 0.2 CU.FT./DAY/1000 LB UNIT TIMES 244.0 UNITS = 48.8 CU.FT. BEDDING/DAY.
NO ADDITIONAL CONTAMINATED WATER OR LOT RUNOFF ENTERING THE SYSTEM.

THE TOTAL DAILY MANURE PRODUCED IS: 317.20 CUBIC FEET.
THE DAILY LIQUID STORAGE VOLUME IS: 398.30 CUBIC FEET.
THE DAILY SOLID STORAGE VOLUME IS: 36.60 CUBIC FEET.

STORAGE REQUIREMENTS (IN CU.FT.) FOR:

DAYS	-SOLID-	-LIQUID-
30	1098.0	11949.0
60	2196.0	23898.0
90	3294.0	35847.0
120	4392.0	47796.0

EXISTING FACILITIES

SOLID 12,510 cf = 347 DAYS STORAGE

LIQUID 60'x16' = 91 DAYS STORAGE
70'x12'x8' = 6720 cf = 17 DAYS STORAGE
108 DAYS STORAGE

USE:_____ USE:_____

THE ANIMALS ARE CONFINED FOR 225 DAYS AND ON PASTURE FOR 140 DAYS.

TOTAL DAILY NITROGEN PRODUCED IS: 109.80 POUNDS.
TOTAL DAILY PHOSPHORUS PRODUCED IS: 17.08 POUNDS.
TOTAL DAILY POTASSIUM PRODUCED IS: 63.44 POUNDS.

LIQ. STORAGE METHOD IS **SCRAPE/ABOVE GRND** AND APP. METHOD IS **SPRINKLER.**
SOLID STOR. METHOD IS **DRY W/ROOF** AND APP. METHOD IS **BROADCAST.**
THE PASTURE PERIOD ONLY USES SUMMER/PASTURE APPLICATION METHOD.
NUTRIENTS WILL BE APPLIED TO RYE GRASS PASTURE (LOCAL MIX).
PASTURE MANAGEMENT LEVEL IS **HIGH MANAGEMENT OR 8 TONS DRY MATTER PER YEAR.**
ALLOWABLE LOSSES CONSIDER USING **WELL DRAINED SOIL.**
NUTRIENTS ARE MINERIALIZED CONSIDERING CONTINUAL YEARLY APPLICATION.

THERE IS 20531.52 POUNDS OF AVAIL. NITROGEN AFTER ALL LOSSES ARE CONSIDERED.
THERE IS 5109.27 POUNDS OF AVAIL. PHOSPHORUS AFTER ALL LOSSES ARE CONSIDERED.
THERE IS 18977.28 POUNDS OF AVAIL. POTASSIUM AFTER ALL LOSSES ARE CONSIDERED.

NEED 3.2 ACRES FOR NITROGEN APPLICATION FROM CONFINED PERIOD SOLID STORAGE.
NEED 25.2 ACRES FOR NITROGEN APPLICATION FROM CONFINED PERIOD LIQUID STORAGE.

NUMBER OF ACRES NEEDED FOR NITROGEN APPLICATION IS: 56.5. AC.AVAIL.= 73.8 .
NUMBER OF ACRES NEEDED FOR PHOSPHORUS APPLICATION IS: 116.1. AC. PASTURE
NUMBER OF ACRES NEEDED FOR POTASSIUM APPLICATION IS: 83.5.

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE APPLICATION CALCULATIONS

DAIRY: Dan Leuthold (liquid only)
ASSIST.BY: Kent Perkins
DATE: April 4, 1995

GIVEN:
CROP - ALL PASTURE ACRES:66.42 TONS: 8

VOLUME OF WASTE WATER APPLIED ANNUALLY:
398.3 C.F. X 365 DAYS = 145,38Ø CUBIC FEET

AVAILABLE WATER HOLDING CAPACITY OF THE SOIL:
Ø.2 IN./IN. X 3Ø" RT.DP.= 6.Ø INCHES

ALLOWABLE ANNUAL DEPTH OF APPLICATION:
TOTAL VOL*YEARLY N NEED*12IN/FT/4356Ø*YEARLY N PRODUCED=
145379 C.F. X 363.2 # *12/4356Ø* 18478.37 # N = Ø.79 INCHES/ACRE

SINCE Ø.79 IN. < 6.Ø INCHES ONLY ONE APP. IS NEEDED

NOTE: IT IS THE POLICY OF NRCS-TILLAMOOK TO HAVE WASTE APPLIED IN A MINIMUM OF 2 APPLICATIONS.

DEPTH OF UNIFORM APPLICATION OVER ALL ACRES:
145379 CF*12 / 66.42 ACRES*4356Ø= Ø.6Ø IN/ACRE
Ø.6Ø IN/AC = 278.2 # N/ACRE

N BALANCE = -85.Ø # N / ACRE

ALLOWABLE RECOMMENDED APPLICATION:
Ø.79 IN. / 2 = Ø.39 INCHES

WEATHER AND SOIL APPLICATION TIMING:
FIND AMOUNT OF SOIL DEPTH TO HOLD REQUIRED APPLICATION:
Ø.39 IN. / Ø.2 IN/IN = 1.97 " DEPTH

FIND TIME REQUIRED FOR WATER TO MOVE OUT OF THE SOIL PROFILE
USING OSU SAFETY FACTOR AND DRAINAGE COEFF. =
Ø.25 IN + Ø.39 / Ø.25 " / HR.= 2.6 HRS.OF NO RAIN BEFORE APP.

THERE SHOULD BE NO RESTRICTIVE PERIODS TO SAFELY APPLY WASTE
PER SOIL AND PRECIP. PROBABLY
THE WORST RAINY PERIOD IS FEB. 16-28

TIME REQUIRED TO EMPTY LIQUID TANK =
51959 C.F.* 7.5 GAL/CF/25Ø GPM PUMP AVE * 6ØMIN/HR * 24 HR/DAY =
= 1.Ø8 DAYS

NOTE: PER THIS INFOMATION NO SCHEDULE IS REQUIRED TO ASSURE RUNOFF AND LEACHING IS NOT LIKELY TO BE A CONCERN

MONTH TO APPLY = ALL YEAR

UNITED STATES DEPARTMENT of AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
TILLAMOOK FIELD OFFICE
ANIMAL WASTE APPLICATION CALCULATIONS

DAIRY: Dan Leuthold
ASSIST.BY: Kent Perkins
DATE: April 4, 1995

GIVEN:
CROP - ALL PASTURE ACRES: 73.8 TONS: 8

VOLUME OF WASTE WATER APPLIED ANNUALLY:
434.9 C.F. X 365 DAYS = 158,739 CUBIC FEET

AVAILABLE WATER HOLDING CAPACITY OF THE SOIL:
Ø.2 IN./IN. X 3Ø" RT.DP.= 6.Ø INCHES

ALLOWABLE ANNUAL DEPTH OF APPLICATION:
TOTAL VOL*YEARLY N NEED*12IN/FT/4356Ø*YEARLY N PRODUCED=
158738 C.F. X 363.2 # *12/4356Ø* 2Ø531.52 # N = Ø.77 INCHES/ACRE

SINCE Ø.77 IN. < 6.Ø INCHES ONLY ONE APP. IS NEEDED

NOTE: IT IS THE POLICY OF NRCS-TILLAMOOK TO HAVE WASTE APPLIED IN A MINIMUM OF 2 APPLICATIONS.

DEPTH OF UNIFORM APPLICATION OVER ALL ACRES:
158738 CF*12 / 73.8 ACRES*4356Ø= Ø.59 IN/ACRE
Ø.59 IN/AC = 278.2 # N/ACRE

N BALANCE = -85.Ø # N / ACRE

ALLOWABLE RECOMMENDED APPLICATION:
Ø.77 IN. / 2 = Ø.39 INCHES

WEATHER AND SOIL APPLICATION TIMING:
FIND AMOUNT OF SOIL DEPTH TO HOLD REQUIRED APPLICATION:
Ø.39 IN. / Ø.2 IN/IN = 1.93 " DEPTH

FIND TIME REQUIRED FOR WATER TO MOVE OUT OF THE SOIL PROFILE
USING OSU SAFETY FACTOR AND DRAINAGE COEFF. =
Ø.25 IN + Ø.39 / Ø.25 " / HR.= 2.5 HRS.OF NO RAIN BEFORE APP.

THERE SHOULD BE NO RESTRICTIVE PERIODS TO SAFELY APPLY WASTE
PER SOIL AND PRECIP. PROBABLY
THE WORST RAINY PERIOD IS FEB. 16-28

TIME REQUIRED TO EMPTY LIQUID TANK =
51960 C.F.* 7.5 GAL/CF/25Ø GPM PUMP AVE * 6ØMIN/HR * 24 HR/DAY =
= 1.Ø8 DAYS

NOTE: PER THIS INFOMATION NO SCHEDULE IS REQUIRED TO ASSURE RUNOFF AND LEACHING IS NOT LIKELY TO BE A CONCERN

MONTH TO APPLY = ALL YEAR

USDA SOIL CONSERVATION SER E
TILLAMOOK FIELD OFFICE
TILLAMOOK, OREGON 97141

TRAVELING SPRINKLER SYSTEMS

BY: S. RYCHETSKY
DATE: FEB.1994

DEPTH OF WATER APPLIED BY TRAVELING SPRINKLERS, INCHES

G.P.M.	Spacing Between Travel Lanes, Ft.	Travel Speed, Feet Per Minute							
		0.4	0.5	1	2	4	6	8	10
100	165	2.43	1.95	0.97	0.49	0.24	0.16	0.12	0.10
200	180	4.46	3.57	1.78	0.89	0.45	0.30	0.22	0.18
	200	4.01	3.21	1.61	0.81	0.40	0.27	0.20	0.16
300	200	6.02	4.82	2.41	1.20	0.60	0.40	0.30	0.24
	270	4.46	3.57	1.78	0.89	0.45	0.30	0.22	0.18
400	240	6.69	5.35	2.68	1.34	0.67	0.45	0.33	0.27
	300	5.35	4.28	2.14	1.07	0.54	0.36	0.27	0.21
500	270	7.43	5.94	2.97	1.49	0.74	0.50	0.37	0.30
	330	6.08	4.86	2.43	1.22	0.61	0.41	0.30	0.24
600	270	8.92	7.13	3.57	1.80	0.89	0.59	0.45	0.36
	330	7.30	5.84	2.92	1.46	0.73	0.49	0.36	0.29

FORMULA:

$$\text{Average Water Depth Applied, Inches} = \frac{1.605 \times \text{Sprinkler G.P.M.}}{\text{Lane Spacing, Ft.} \times \text{Travel Speed, Ft./Min.}}$$

IRRIGATION RATE FOR TRAVELING SPRINKLERS

Travel Speed Ft./Min.	Acres Irrigated per Hour — Travel Lane Spacing, Ft.								Hours Req'd for 1/4 Mile Travel
	165	200	240	270	300	330	360	400	
0.4	0.09	0.10	0.13	0.15	0.16	0.18	0.20	0.22	55.0
0.5	0.11	0.14	0.16	0.19	0.21	0.23	0.25	0.28	44.0
1	0.22	0.27	0.33	0.37	0.41	0.45	0.49	0.55	22.0
2	0.45	0.54	0.66	0.75	0.82	0.9	0.99	1.10	11.0
4	0.90	1.10	1.32	1.49	1.65	1.81	1.98	2.20	5.50
6	1.36	1.65	1.98	2.23	2.48	2.72	2.98	3.30	3.67
8	1.81	2.20	2.64	2.97	3.30	3.63	3.96	4.40	2.75
10	2.27	2.75	3.30	3.72	4.13	4.54	4.95	5.50	2.20
Acres Irrig. in 1/4 mile Travel	5.0	6.1	7.3	8.2	9.1	10.0	10.9	12.1	

FORMULA:

$$\text{Acres Irrigated per Hour} = \frac{\text{Travel Speed, Ft./Min.} \times \text{Spacing Between Runs, Ft.}}{726}$$

$$\text{Acres Irrigated per 1/4 Mile travel} = \frac{\text{Spacing, Ft.}}{33}$$

$$\text{Hours Required Per 1/4 Mile Travel} = \frac{22}{\text{Travel Speed, Ft./Min.}}$$

NEW PLAN

DAN LEUT. OLD

5" x 4" Hydrant NTS 1-14-95