

**CLEAN**<sup>MP</sup>



COMPREHENSIVE LIVESTOCK  
ENVIRONMENTAL  
ASSESSMENT & NUTRIENT  
management plan WEST

AWMP 11241  
Cond. appn. 8/2011

**NUTRIENT MANAGEMENT PLAN  
FOR**



**Contact: John Gobershock**

**1790 Safari Road  
Winston, OR 97496  
(541) 679-6761**

**Prepared By:**

**Bruce D. Wilson  
H&R Engineering LLC  
1975 Rock Ledge Dr. NE  
Keizer, OR 97303-1841  
(866) 493-3243**

**June 25, 2010**



Taxonomic name	Beginning			Births	Acquisitions	Deaths	Dispositions	Ending		
	Status							Status		
<b>Bufo marinus</b> Giant Marine Toad	0.	0.	1	.	.	.	.	0.	0.	1
<b>Geochelone sulcata</b> African Spurred Tortoise	1.	0.	0	.	.	.	.	1.	0.	0
<b>Gopherus agassizii</b> Desert Tortoise	1.	1.	0	.	.	.	.	1.	1.	0
<b>Testudo horsfieldii horsfieldii</b> Central Asian Tortoise	0.	1.	0	.	.	.	.	0.	1.	0
<b>Pogona mitchelli</b> Mitchell's Bearded Dragon	3.	0.	0	.	.	.	.	3.	0.	0
<b>Tupinambis rufescens</b> Red Tegu Lizard	1.	0.	0	.	.	.	.	1.	0.	0
<b>Boa constrictor ortonii</b> Red-tailed Boa	2.	1.	0	.	.	.	.	2.	1.	0
<b>Corallus hortulanus</b> Garden Tree Boa	0.	0.	1	.	.	.	.	0.	0.	1
<b>Python molurus bivittatus</b> Burmese Rock Python	1.	0.	0	.	.	.	.	1.	0.	0
<b>Python regius</b> Royal/ball Python	2.	1.	0	.	.	.	.	2.	1.	0
<b>Elaphe guttata</b> Cornsnake/red Ratsnake	0.	1.	0	.	.	.	.	0.	1.	0
<b>Alligator mississippiensis</b> American Alligator	2.	0.	0	.	.	.	.	2.	0.	0
<b>Struthio camelus</b> Common Ostrich	1.	2.	0	.	.	.	.	1.	2.	0
<b>Rhea americana</b> Greater Rhea	6.	3.	7	.	.	.	.	6.	3.	7
<b>Dromaius novaehollandiae</b> Emu	5.	3.	0	.	.	.	.	5.	3.	0
<b>Pavo cristatus</b> Common Peafowl	3.	1.	0	.	.	.	.	3.	1.	0
<b>Anser anser domestic brown_chinese</b> Brown Chinese Goose	1.	1.	0	.	.	.	.	1.	1.	0
<b>Branta sandvicensis</b> Ne-ne	1.	1.	0	.	.	.	.	1.	1.	0
<b>Cygnus atratus</b> Black Swan	2.	1.	0	.	.	.	.	2.	1.	0
<b>Alopochen aegyptiaca</b> Egyptian Goose	0.	2.	81	.	.	.	.	0.	2.	81
<b>Anas platyrhynchos domestic</b> Domestic Duck, Breed Unspecified	1.	2.		.	.	.	.	1.	1.	2
<b>Phoenicopterus chilensis</b> Chilean Flamingo	4.	2.	0	.	.	.	.	4.	2.	0
<b>Buteo jamaicensis calurus</b> Western Red-tailed Hawk	0.	1.	0	.	.	.	.	0.	1.	0
<b>Haliaeetus leucocephalus</b> Bald Eagle	1.	0.	0	.	.	.	.	1.	0.	0
<b>Balearica regulorum gibbericeps</b> East African Grey-crowned Crane	0.	0.		.	.	.	.	2.	0.	0
<b>Grus antigone antigone</b> Indian Sarus Crane	1.	0.	0	.	.	.	.	1.	0.	0
<b>Ara ararauna</b> Blue-and-yellow Macaw	0.	2.	0	.	.	.	.	0.	2.	0
<b>Ara macao</b> Scarlet Macaw	1.	0.	0	.	.	.	.	1.	0.	0
<b>Aratinga jandaya</b> Jandaya Conure	1.	0.	0	.	.	.	.	1.	0.	0
<b>Amazona oratrix</b> Yellow-headed Amazon	1.	0.	0	.	.	.	.	1.	0.	0
<b>Cacatua moluccensis</b> Salmon-crested Cockatoo	0.	1.	0	.	.	.	.	0.	1.	0
<b>Nymphicus hollandicus</b> Cockatiel	0.	0.	2	.	.	.	.	0.	0.	2
<b>Bubo virginianus</b> Great Horned Owl	0.	1.	0	.	.	.	.	0.	1.	0

0 2 4

1958

1958



Taxonomic name	Beginning			Births	Acquisitions	Deaths	Dispositions	Ending		
	Status							Status		
<b>Megascops asio</b> Eastern Screech Owl	0.	1.	0	.	.	.	.	0.	1.	0
<b>Tockus erythrorhynchus</b> Red-billed Hornbill	1.	0.	0	.	.	.	.	1.	0.	0
<b>Poephila guttata</b> Zebra Finch	0.	2.	0	.	.	.	.	0.	2.	0
<b>Petaurus breviceps</b> Sugar Glider	0.	2.	0	.	.	.	.	0.	2.	0
<b>Macropus robustus</b> Hill Wallaroo	1.	0.	0	.	.	.	.	1.	0.	0
<b>Loxodonta africana</b> African Elephant	1.	1.	0	.	.	.	.	1.	1.	0
<b>Chaetophractus vellerosus</b> Screaming Hairy Armadillo	1.	0.	0	.	.	.	.	1.	0.	0
<b>Lemur catta</b> Ring-tailed Lemur	2.	0.	0	.	.	.	.	2.	0.	0
<b>Varecia rubra</b> Red Ruffed Lemur	2.	4.	0	.	.	.	.	2.	4.	0
<b>Saguinus oedipus</b> Cotton-top Tamarin	1.	2.	0	.	.	.	.	1.	2.	0
<b>Aotus nancymae</b> Nancy Ma's Douroucoul	1.	2.	0	.	.	.	.	1.	2.	0
<b>Hylobates lar</b> Lar Gibbon	1.	1.	0	.	.	.	.	1.	1.	0
<b>Nomascus leucogenys</b> White-cheeked Gibbon	1.	1.	0	.	.	.	.	1.	1.	0
<b>Symphalangus syndactylus</b> Siamang	1.	0.	0	.	.	.	.	1.	0.	0
<b>Glaucomys sabrinus</b> Northern Flying Squirrel	1.	0.	0	.	.	.	.	1.	0.	0
<b>Rattus norvegicus</b> Norway Rat	0.	3.	0	.	.	.	.	0.	3.	0
<b>Hystrix indica</b> Indian Crested Porcupine	0.	1.	0	.	.	.	.	0.	1.	0
<b>Coendou prehensilis</b> Prehensile-tailed Porcupine	1.	0.	0	.	.	.	.	1.	0.	0
<b>Chinchilla lanigera</b> Long-tailed Chinchilla	1.	0.	0	.	.	.	.	1.	0.	0
<b>Hydrochaeris hydrochaeris</b> Capybara	1.	1.	0	.	.	.	.	1.	1.	0
<b>Oryctolagus cuniculus</b> European Rabbit	1.	1.	0	.	.	.	.	1.	1.	0
<b>Erinaceinae</b> Hedgehog	1.	1.	0	.	.	.	.	1.	1.	0
<b>Acinonyx jubatus</b> Cheetah	5.	3.	0	.	.	.	.	5.	3.	0
<b>Acinonyx jubatus jubatus</b> Cheetah	2.	5.	0	.	.	.	.	2.	5.	0
<b>Lynx rufus</b> Bobcat	1.	0.	0	.	.	.	.	1.	0.	0
<b>Puma concolor concolor</b> Puma	0.	1.	0	.	.	.	.	0.	1.	0
<b>Panthera leo</b> Lion	1.	1.	0	.	.	.	.	1.	1.	0
<b>Panthera leo krugeri</b> African Lion	1.	1.	0	.	.	.	.	1.	1.	0
<b>Panthera tigris</b> Tiger	1.	1.	0	.	.	.	.	1.	1.	0
<b>Canis lupus familiaris anatolia shepherd</b> Anatolian Shepherd Dog	0.	1.	0	.	.	.	.	0.	1.	0
<b>Chrysocyon brachyurus</b> Maned Wolf	1.	1.	0	.	.	.	.	1.	1.	0
<b>Ursus americanus</b> North American Black Bear	4.	2.	0	.	.	.	.	4.	2.	0
<b>Ursus arctos</b> Brown Bear	3.	2.	0	.	.	.	.	3.	2.	0



Taxonomic name	Beginning			Births	Acquisitions	Deaths	Dispositions	Ending		
	Status							Status		
<b>Mustela putorius furo</b> Domestic Polecat	3.	0.	0	.	.	.	.	3.	0.	0
<b>Nasua narica</b> White-nosed Coati	1.	2.	0	.	.	.	.	1.	2.	0
<b>Equus asinus asinus burro</b> Burro	1.	0.	0	.	.	.	.	1.	0.	0
<b>Equus burchellii antiquorum</b> Damara Zebra	2.	7.	0	.	.	.	.	2.	7.	0
<b>Equus caballus caballus american_miniature</b> American Miniature Horse	1.	1.	0	.	.	.	.	1.	1.	0
<b>Ceratotherium simum simum</b> Southern White Rhinoceros	1.	1.	0	.	.	.	.	1.	1.	0
<b>Hippopotamus amphibius</b> Hippopotamus	1.	0.	0	.	.	.	.	1.	0.	0
<b>Camelus bactrianus</b> Bactrian Camel	1.	1.	0	.	.	.	.	1.	1.	0
<b>Lama glama</b> Llama	2.	4.	0	.	.	.	.	2.	4.	0
<b>Lama guanicoe</b> Guanaco	2.	6.	0	.	.	.	.	2.	6.	0
<b>Odocoileus hemionus columbianus</b> Mule Deer/black-tailed Deer	0.	1.	0	.	.	.	.	0.	1.	0
<b>Cervus elaphus roosevelti</b> Synonym Of Cervus Elaphus Canadensis, American Elk	9.	10.	0	.	.	.	.	9.	10.	0
<b>Cervus nippon</b> Sika Deer	3.	51.	0	.	.	.	.	3.	51.	0
<b>Dama dama</b> Fallow Deer	3.	30.	0	.	.	.	.	3.	30.	0
<b>Giraffa camelopardalis</b> Giraffe	1.	0.	0	.	.	.	.	1.	0.	0
<b>Giraffa camelopardalis reticulata</b> Reticulated Giraffe	1.	0.	0	.	.	.	.	1.	0.	0
<b>Giraffa camelopardalis rothschildi</b> Baringo Giraffe	2.	0.	0	.	.	.	.	2.	0.	0
<b>Connochaetes taurinus albojubatus</b> Eastern White-bearded Wildebeest	2.	0.	0	.	.	.	.	2.	0.	0
<b>Antelope cervicapra</b> Blackbuck	3.	5.	0	.	.	.	.	3.	5.	0
<b>Madoqua kirkii</b> Kirk's Dik-dik	1.	0.	0	.	.	.	.	1.	0.	0
<b>Madoqua kirkii cavendishi</b> Kirk's Dik-dik	0.	1.	0	.	.	.	.	0.	1.	0
<b>Bison bison</b> American Bison	13.	21.	0	.	.	.	.	13.	21.	0
<b>Bos grunniens</b> Yak	5.	11.	0	.	.	.	.	5.	11.	0
<b>Bos taurus taurus watusi</b> Watusi Cow	5.	6.	0	.	.	.	.	5.	6.	0
<b>Boselaphus tragocamelus</b> Nilgai	1.	6.	0	.	.	.	.	1.	6.	0
<b>Taurotragus oryx oryx</b> Cape Eland	6.	12.	0	.	.	.	.	6.	12.	0
<b>Ammotragus lervia</b> Barbary Sheep	8.	13.	0	.	.	.	.	8.	13.	0
<b>Capra hircus hircus american_pygmy</b> American Pygmy Goat	5.	3.	0	.	.	.	.	5.	3.	0
<b>Kobus ellipsiprymnus ellipsiprymnus</b> Common Waterbuck	1.	0.	0	.	.	.	.	1.	0.	0
<b>TOTAL</b>	166.	262.	94	0.	0.	0	0.	0.	0.	0

527

Heavy Use Area Protection (Ac)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 7.3 Acres**

**Description:** Travel and confinement areas shown on the Operation Area Map are stabilized with suitable materials to control soil erosion, improve air and water quality, improve aesthetics and improve animal health.

**Operation and Maintenance:** Periodically inspect concrete and asphalt slabs and curbs and repair or replace broken sections as needed. Prevent manure from building up next to the curbs or over topping them.

Do not allow livestock access to open water courses and drainageways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

**Specification: NA**

Irr.Pipeline-High-pressure, Underground, Plastic (Ft)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 845 Feet**

**Planned**

**Units: 200 feet**

**Description:** Existing high pressure underground PVC Pipelines convey water to water and sediment control basins used for animal habitat and convey washwater to the City of Winston sewage treatment plant. Additional high pressure underground pipelines are planned to convey washwater to planned collection tanks and from the collection tanks to distribution systems.

**Operation and Maintenance:** Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: To be developed for planned pipelines.**

**Comment [DAB1]:** Is this necessary if we are doing garden hose?

Manure Transfer (No)

Field(s): Facilities, Village

Status: Existing Units: 6- Catch Basins

- 1- Washwater Transfer Pipeline
- 1- Tractor with Front End Loader
- 2- Dump Trucks
- 1- Tractor with Solids Spreader

Planned Units: 34- Washwater Transfer Pipelines

43- Application Systems

Comment [DAB2]: Is the fourth the new vet clinic?

Description: Currently washwater from enclosure cleaning operations is directed to catch basins which drain to pipelines that discharge the washwater to grass treatment areas or to the City of Winston sewage treatment plant. It is planned to install collection tanks and waste transfer pipelines to be able to apply washwater to grass treatment areas with sprinkler systems or some other controlled means for enclosure areas that do not drain to the City of Winston sewage treatment plant.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. This washwater is then applied to exhibits as a fertigation via 100ft hose and sprinkler system. This hose is moved throughout 4 exhibit area and can be spread into larger grassland area adjacent to exhibits. Applications are recorded to approximate amount and date of application. This system needs to be updated with higher pressure pump and applicatons system.

Two additional systems are at Brown Bears and Tiger holding facilities. 1000 gal storage tank will provide approximately 30 day storage. A small sprinkler irrigation system are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour. Application would be through a 100 ft hose and small sprinkler into surround exhibit areas. Applications will be recorded to amounts and times.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

Lions Have Tank  
Need to Distribute  
Rhino Tank  
(FootBath)

Comment [DAB3]:

Solids collected from enclosure and other cleaning operations is transferred by truck to the

Do not mow or burn for weed control during the nesting season (normally May through July) to protect ground-nesting wildlife. In place of mowing, consider other vegetative management techniques, such as using "wickbar" herbicide applicators or prescribed burning in areas with adequate moisture.

Lightly disk the field border on a 2 or 3 year cycle to promote the growth of native vegetation.

**Specification: NA**

Irr.Pipeline-High-pressure, Underground, Plastic (Ft)

**Field(s): Natural Areas 1 and 2**

**Status: Existing**

**Units: 2,480 Feet**

**Description:** The existing high-pressure underground PVC pipeline at the location shown on the Area Map conveys water to intermittent drainageways and water and sediment control basins in an efficient manner to reduce water loss.

**Operation and Maintenance:** Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: NA**

Irrigation System-Sprinkler (No-Ac)

**Field(s): Africa, Asia, Cheetah, and The Americas**

**Status: Planned**

**Units: 6 System- 1.5 Acres**

**Description:** Small sprinkler irrigation systems are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour.

Completion of these systems is dependent on available funding. Funding these systems could be

part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016, [

Comment [DAB4]:

**Operation and Maintenance:** Maintain sprinklers in accordance with the manufacturer's recommendations to help ensure trouble free operation. Prevent animal access to equipment during operation.

Clean plugged nozzles and replace if worn or defective.

Promptly repair all leaks by replacing valves, fittings, gaskets, worn or damaged parts.

**Specification: To be developed.**

**Nutrient Management (Ac)**

**Field(s): Africa, Asia, Cheetah, and The Americas**

**Status: Planned                      Units: 205.4 Acres**

**Description:** The site vulnerability rating for phosphorus movement off the listed fields is based on the Western Oregon Phosphorus Index. The Africa area has a low vulnerability rating which allows manure, bedding and washwater from the waste storage facilities to be applied on a nitrogen basis. The Asia, Cheetah and The Americas area have a medium site vulnerability rating which allows manure, bedding and wastewater from the waste storage facilities to be applied on a nitrogen basis. Phosphorus will be monitored on all fields using soil tests and if soil phosphorus concentrations significantly increase, manure applications will be reduced which may result in some of the manure and washwater to be exported off farm. It is estimated that 732 cubic feet or 5,475 gallons of washwater and 15,342 cubic feet or 276 tons of composted solids will be applied annually to the pasture land areas. The total nutrients applied to the pasture land areas are 22,130 pounds of nitrogen, 16,948 pounds of phosphate, and 26,848 pounds of potash with 22,815 pounds of nitrogen, 8,281 pounds of phosphate and 27,894 pounds of potash removed in the plant biomass.

The sprinkler systems will be calibrated to apply washwater from the collection tanks at the rate needed to meet the nitrogen requirements of the vegetated treatment areas. The calculated nutrient concentrations in the collection tanks used in developing this plan are 21.2 pounds per 1,000 gallons (lbs/th Gal) of Nitrogen, 9.2 lbs/th Gal of Phosphate and 24.9 lbs/th Gal of Potash. The measured nutrient concentrations for the composted solids are 43.4 lbs/Ton of Nitrogen, 8.7 lbs/Ton of Phosphate and 46.7 lbs/Ton of Potash. No manure applications are to be made to the 35 foot field buffer shown on the Area Map. The emergency application area shown on the Farm Fields Map was selected based on topography, soil type, proximity to open water courses, and risk of flooding. This area will always have a growing crop on it during the fall and winter months in case weather conditions force emergency applications of liquids and solids to draw down storage facilities.

The protocol for soil and manure testing, fall soil nitrate testing, guidance for making emergency applications, protocol and schedule for calibrating application equipment, and the months manure will be applied are contained in the specification.

**CLEANmp WEST  
Nutrient Management Plan (NMP)  
Signature Page**

**Farm Contact Information:** John Gobershock  
1790 Safari Road  
Winston, OR 97496  
(541) 679-6761

**Plan Period:** Oct 2010 - Sep 2014

**NMP Plan Approval**

I certify that I have reviewed this NMP for technical adequacy and that the elements of the documents are technically compatible, reasonable and can be implemented.

Signature: Bruce D. Wilson Date: 06/25/2010  
Name: Bruce D. Wilson  
Title: Individual TSP Number: TSP-05-4719

**Owner/Operator**

As the owner/operator of this NMP, I, as the decision maker, have been involved in the planning process and agree that the items/practices listed in each element of the NMP are needed. I understand that I am responsible for keeping all the necessary records associated with the implementation of this NMP. It is my intention to implement/accomplish this NMP in a timely manner as described in the plan.

Signature: [Signature] Date: 9.21.10  
Name: Dan Van Slyke, Executive Director

**From:** "Dan Brands" <curator@wildlifesafari.net>  
**Subject:** 1 of 2  
**Date:** June 9, 2011 9:15:06 AM PDT  
**To:** <canderso@oda.state.or.us>  
▶ 1 Attachment, 10.9 MB

Good Morning Chris,

After preparing the files to mail to you I discovered that they were small enough to email to you after it was converted to a PDF file. I am e-mailing the files as two e-mails as a precaution. If this doesn't work I can mail the CD later today.

Dan Brands  
General Curator  
Wildlife Safari  
www.wildlifesafari.net

(541) 679-6761 ext.201  
(541) 679-4365 Fax



[Wildlife Safar...df \(10.9 MB\)](#)

## **Table of Contents**

### **Section 1. Background and Site Information**

- 1.1 Objectives
- 1.2 General Site Information
- 1.3 Applicable Permits or Certifications
- 1.4 Location Map
- 1.5 Farm Fields Overview Map
- 1.6 Topographic Map
- 1.7 Resource Concerns

### **Section 2. Production Information (Manure and Wastewater Handling and Storage)**

- 2.1 Animal and Manure Resources
- 2.2 Operation Area Map(s)
- 2.3 Production Area Conservation Practices
- 2.4 Storage Period Worksheet 10A-7
- 2.5 Livestock Manure Storage Assessment Worksheet
- 2.6 Livestock Yard Assessment Worksheet
- 2.7 Mortality Management

### **Section 3. Farmstead Safety and Security**

- 3.1 Emergency Response Plan
- 3.2 Safety
- 3.3 Biosecurity Measures
- 3.4 Catastrophic Mortality Management
- 3.5 Chemical and Petroleum Handling, Use and Storage

### **Section 4. Land Application Site Information (Land Treatment)**

- 4.1 Land Inventory
- 4.2 Environmental Inventory (Sensitive Areas)
- 4.3 Land Treatment Area Map(s)
- 4.4 Land Treatment Practices
- 4.5 Odors

### **Section 5. Soil and Risk Assessment Analysis**

- 5.1 Soils
- 5.2 Soil Map(s)
- 5.3 Soil Reports
- 5.4 Soil Loss
- 5.5 Highly Erodible Lands
- 5.6 Risk Assessment- Phosphorus Index
- 5.7 Risk Assessment- Leaching Index

## **Section 6. Nutrient Management**

- 6.1 Soil Tests
- 6.2 Manure Nutrient Content
- 6.3 Soil Test pH Map
- 6.4 Soil Test P Map
- 6.5 Soil Test K Map
- 6.6 Cropping System
- 6.7 Realistic Yield Goals
- 6.8 Nutrient Application Plans
- 6.9 Land Application Strategy
- 6.10 Nutrient Balance

## **Section 7. Feed Management**

## **Section 8. Other Utilization Options**

## **Section 9. Operation, Maintenance, and Recordkeeping**

## **Section 10. References**

### **Appendices**

- A Permits
- B Facility Engineering Drawings
- C Lease/Spreading Agreements
- D RUSLE2 Calculations
- E Phosphorus Index Calculations
- F Soil Test Results
- G Manure Tests
- H Oregon State University and Pacific Northwest Extension Publications



## List of Tables

- 1-1. Geographic Location
- 2-1. Animal Inventory
- 2-2. Manure Storage
- 2-3. Manure Exports Off the Farm
- 2-4. Manure Imports Onto the Farm
- 2-5. Internal Transfer of Manure
- 3-1. Department/Agency Phone Numbers
- 3-2. Available Equipment/Supplies for Responding to an Emergency
- 3.3. Contacts to be made by Owner or Operator within 24 hours of a Manure Spill, Leak or Facility Failure.
- 3-4. Catastrophic Mortality Management Contacts
- 4-1. Field Information
- 5-1. Soils Information
- 5-2. Predicted Soil Erosion
- 5-3. OR Phosphorus Index
- 5-4. Soil Leaching Index
- 6-1. Soil Test Data
- 6-2. Manure Nutrient Analysis
- 6-3. Planned Crops and Fertilizer Recommendations
- 6-4. Manure Application Setback Distances
- 6-5. Manure Application Planning Calendar
- 6-6. Planned Nutrient Applications
- 6-7. Field Nutrient Balance
- 6-8. Projected P and K Levels
- 6-9. Whole-Farm Nutrient Balance (Spreadable Acres)
- 6-10. Manure Inventory Annual Summary
- 9-1. Crop Records
- 9-2. Manure Application Records
- 9-3. Commercial Fertilizer and Irrigation Water Application Records
- 9-4. Manure Export Records
- 9-5. Manure Import Records
- 9-6. Internal Transfers of Manure Records
- 9-7. Inspection/Monitoring Records

## **List of Maps**

- Section 1.4 Farm Location Map
- Section 1.5 Farm Fields Overview Map
- Section 1.6 Topographic Map
- Section 2.2 Operation Area Map(s)
- Section 4.3 Land Treatment Area Map(s)
- Section 5.2 Soil Map(s)
- Section 6.3 Soil Test pH Map
- Section 6.4 Soil Test P Map
- Section 6.5 Soil Test K Map

Plan # 11241

Received 6-8-11

From: "Dan Brands" <curator@wildlifesafari.net>  
Subject: **CAFO Changes**  
Date: June 8, 2011 3:49:24 PM PDT  
To: <canderso@oda.state.or.us>  
▶ 1 Attachment, 18.4 KB

Entered: 7-11  
Cza

Chris,

Here are the changes we have made to the Waste Management Plan for the Wildlife Safari. It's just a small file with the changes. I will make these changes official and burn the entire file to a CD and get that in the mail to you no later than tomorrow morning.

Dan Brands  
General Curator  
Wildlife Safari  
www.wildlifesafari.net

(541) 679-6761 ext.201  
(541) 679-4365 Fax



[CAFO Chang...ocx \(18.4 KB\)](#)

The electronic NMP from  
Bruce Wilson is on the server.

MPK

Heavy Use Area Protection (Ac)

Field(s): Facilities, Village

Status: Existing

Units: 7.3 Acres

**Description:** Travel and confinement areas shown on the Operation Area Map are stabilized with suitable materials to control soil erosion, improve air and water quality, improve aesthetics and improve animal health.

**Operation and Maintenance:** Periodically inspect concrete and asphalt slabs and curbs and repair or replace broken sections as needed. Prevent manure from building up next to the curbs or over topping them.

Do not allow livestock access to open water courses and drainageways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

Specification: NA

Irr.Pipeline-High-pressure, Underground, Plastic (Ft)

Field(s): Facilities, Village

Status: Existing

Units: 845 Feet

Planned

Units: 300 feet

**Description:** Existing high pressure underground PVC Pipelines convey water to water and sediment control basins used for animal habitat and convey washwater to the City of Winston sewage treatment plant. Additional high pressure underground pipelines are planned to convey washwater to planned collection tanks and from the collection tanks to distribution systems.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. This washwater is then applied to exhibits as a fertigation via 100ft hose and sprinkler system. This hose is moved throughout 4 exhibit area and can be spread into larger grassland area adjacent to exhibits. Applications are recorded to approximate amount and date of applicaton. This system needs to be updated with higher pressure pump and applicatons system.

Two additional systems are at Brown Bears and Tiger holding facilities. A small sprinkler irrigation system are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. A third

Dan Brands 6/8/11 3:43 PM

Comment [1]: Is this necessary if we are doing garden hose?

sprinkler system will be install into existing 1000gal holding tanks and the septic system disconnected.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour. Application would be through a 100 ft hose and small sprinkler into surround exhibit areas. Applications will be recorded to amounts and times.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

**Operation and Maintenance:** Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: To be developed for planned pipelines.**

Manure Transfer (No)
----------------------

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 6- Catch Basins**

**1- Washwater Transfer Pipeline**

**1- Tractor with Front End Loader**

**2- Dump Trucks**

**1- Tractor with Solids Spreader**

**Planned**

**Units: 4- Washwater Transfer Pipelines**

**4- Application Systems**

**Description:** Currently washwater from enclosure cleaning operations is directed to catch basins which drain to pipelines that discharge the washwater to grass treatment areas or to the City of Winston sewage treatment plant. It is planned to install collection tanks and waste transfer pipelines to be able to apply washwater to grass treatment areas with sprinkler systems or some

other controlled means for enclosure areas that do not drain to the City of Winston sewage treatment plant.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. This washwater is then applied to exhibits as a fertigation via 100ft hose and sprinkler system. This hose is moved throughout 4 exhibit area and can be spread into larger grassland area adjacent to exhibits. Applications are recorded to approximate amount and date of application. This system needs to be updated with higher pressure pump and application system.

Two additional systems are at Brown Bears and Tiger holding facilities. 1000 gal storage tank will provide approximately 30 day storage. A small sprinkler irrigation system are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

A third sprinkler system will be installed at Lions. Currently a 1000gal septic system already exists and will be disconnected and then applied.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour. Application would be through a 100 ft hose and small sprinkler into surround exhibit areas. Applications will be recorded to amounts and times.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

A catch basin already exists at rhino boma. This basin is designed as a footbath for treating hoof issues. This basin has a valve and is drained into a well designed to hold a five gallon bucket. Rain water will be distributed into grass areas. Medicated water will be disposed of at the elephant barn and put directly into drains connected to city sewer.

Solids collected from enclosure and other cleaning operations is transferred by truck to the solids storage/composting facility. Once the solids have been composted they are exported to local gardeners and nurseries for use as a soil amendment and nutrient source. Solids that are not exported are applied to flowerbeds and pasture land fields for utilization as a soil amendment and nutrient source using a tractor with front end loader, dump trucks, and a tractor pulled solids spreader.

**Operation and Maintenance:** Remove debris and sediment from catch basin grates as needed. Annually inspect catch basin grates and receiving structures and repair or replace as necessary.

Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Dan Brands 6/8/11 3:43 PM  
Comment [2]:

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: To be developed for planned pipelines and application systems**

---

Irrigation System-Sprinkler (No-Ac)

**Field(s):** Africa, Asia, Cheetah, and The Americas

**Status:** Planned

**Units:** 6 System- 1.5 Acres

**Description:** Small sprinkler irrigation systems are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour.

Three sprinkler systems will be installed at Lions, Tigers, and Brown Bear huts. Improvements will be made to the cougar system. Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

Dan Brands 6/8/11 3:44 PM

Comment [3]:

**Operation and Maintenance:** Maintain sprinklers in accordance with the manufacturer's recommendations to help ensure trouble free operation. Prevent animal access to equipment during operation.

Clean plugged nozzles and replace if worn or defective.

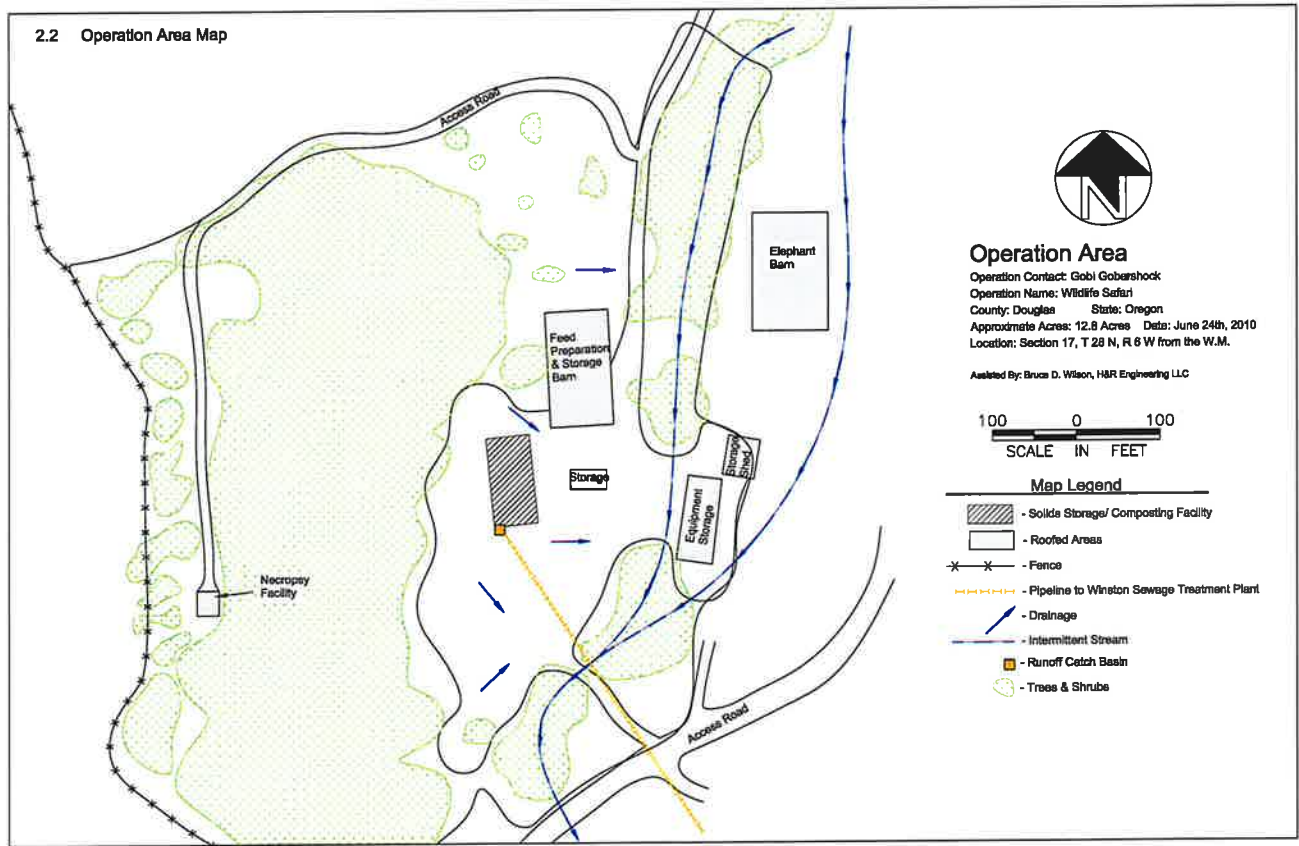
Promptly repair all leaks by replacing valves, fittings, gaskets, worn or damaged parts.

**Specification:** To be developed.

From: "Dan Brands" <curator@wildlifesafari.net>  
 Subject: 2 of 2  
 Date: June 9, 2011 9:15:06 AM PDT  
 To: <canderso@oda.state.or.us>  
 2 Attachments, 10.9 MB

Dan Brands  
 General Curator  
 Wildlife Safari  
 www.wildlifesafari.net

(541) 679-6761 ext.201  
 (541) 679-4365 Fax



**CLEANmp WEST  
 Nutrient Management Plan (NMP)**


## Signature Page

**Farm Contact Information:** John Gobershock  
1790 Safari Road  
Winston, OR 97496  
(541) 679-6761

**Plan Period:** Oct 2010 - Sep 2014

### NMP Plan Approval

I certify that I have reviewed this NMP for technical adequacy and that the elements of the documents are technically compatible, reasonable and can be implemented.

Signature:  Date: 06/25/2010  
Name: Bruce D. Wilson  
Title: Individual TSP Number: TSP-05-4719

### Owner/Operator

As the owner/operator of this NMP, I, as the decision maker, have been involved in the planning process and agree that the items/practices listed in each element of the NMP are needed. I understand that I am responsible for keeping all the necessary records associated with the implementation of this NMP. It is my intention to implement/accomplish this NMP in a timely manner as described in the plan.

Signature:  Date: 9.21.10  
Name: Dan Van Slyke, Executive Director

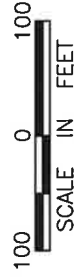
## 2.2 Operation Area Map



### Operation Area

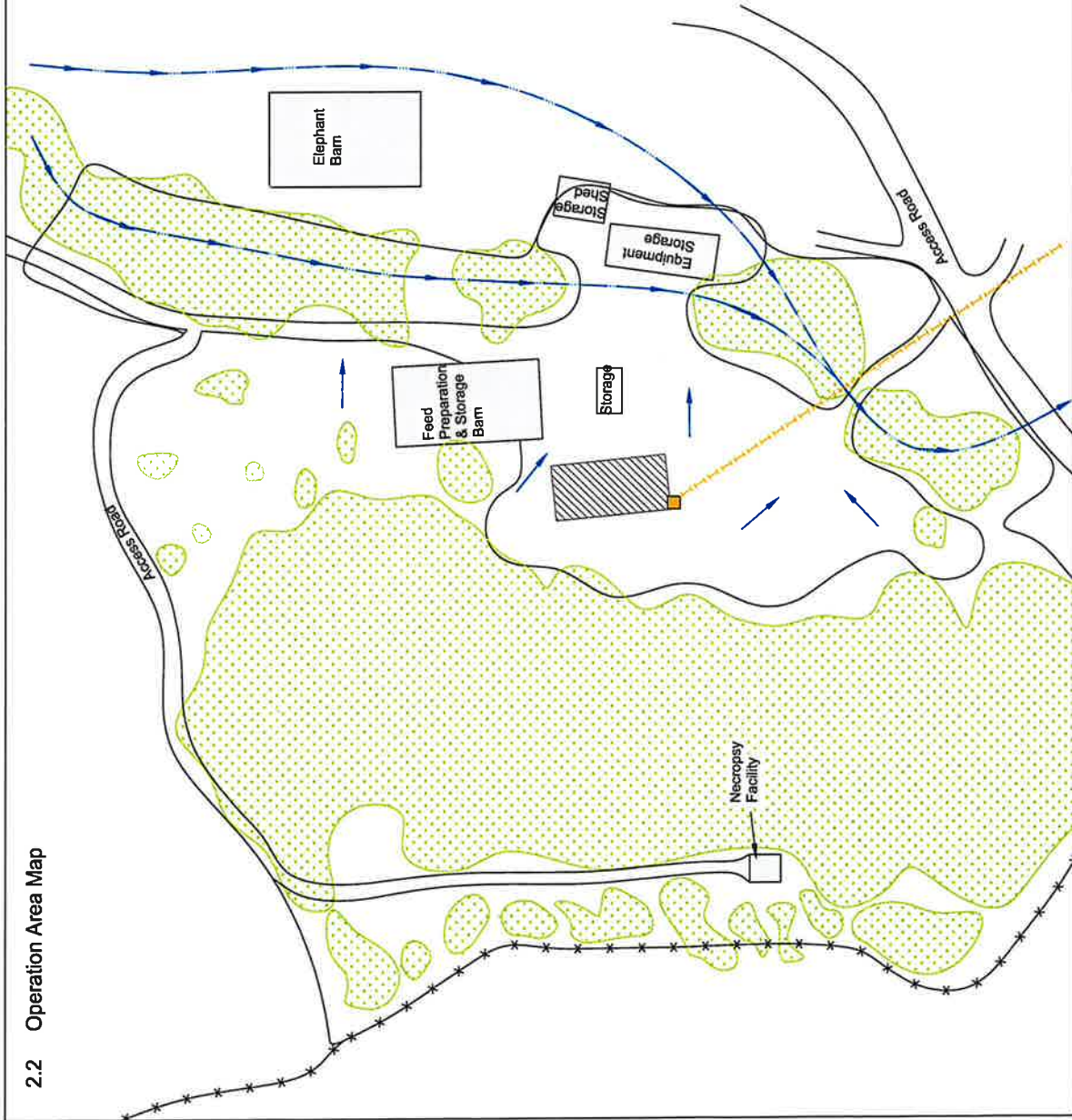
Operation Contact: Gobi Gobershock  
 Operation Name: Wildlife Safari  
 County: Douglas State: Oregon  
 Approximate Acres: 12.8 Acres Date: June 24th, 2010  
 Location: Section 17, T 28 N, R 6 W from the W.M.

Assisted By: Bruce D. Wilson, H&R Engineering LLC



#### Map Legend

- Solids Storage/ Composting Facility
- Roofed Areas
- Fence
- Pipeline to Winston Sewage Treatment Plant
- Drainage
- Intermittent Stream
- Runoff Catch Basin
- Trees & Shrubs



## **Section 1. Background and Site Information**

This Nutrient Management Plan (NMP) is an important part of the conservation management system (CMS) for your Animal Feeding Operation (AFO). This NMP documents the planning decisions and operation and maintenance for the animal feeding operation. It includes background information and provides guidance, reference information and Web-based sites where up-to-date information can be obtained.

### **1.1 Objectives**

The Wildlife Safari has the following objectives:

1. Dedicated to conservation, education and research of native and exotic wildlife.
2. Operate the park in a socially and environmentally acceptable manner that supports the Wildlife Safari operations..

### **1.2 General Site Information**

The Wildlife Safari is located near Winston, Oregon approximately 1.75 miles northwest along Safari Road in Douglas County, Oregon. It is located in the Umpqua River region of western Oregon at an elevation of approximately 650 feet above mean sea level. The annual precipitation varies from 32 to 36 inches of which 70% falls within a 6 month period from November through April and less than 10% falls from June through August. Total average annual snowfall depth is less than 1 inch. Winds are generally moderate from the west with an average annual wind speed of 9 mph. There is approximately 160 to 235 frost free days and the average annual mean temperature is 54 degrees Fahrenheit. Soils vary from deep to moderately deep clay, silty clay loam, and sandy silts that are poor to well drained.

Wildlife Safari is a exotic animal drive through park owned and operated by the Wildlife Safari foundation. As of December of 2009 there were 478 animals of 89 different animal species being care for at the park. Animals cared for at the park range for small frogs and birds up to large African Elephants. The maximum number of animals that can currently be cared for at the park is approximately 550. Most of the smaller animals at the Wildlife Safari are kept in enclosures in the Village area. The larger animals are in large enclosures or out on pastures in the Asia, Africa and The Americas areas of the park.

All of the solid manure and wasted bedding cleaned from the enclosures is transferred to the solids storage/composting facility shown on the Operation Map except for the solids collected from the carnivore and primate enclosures which is transferred to a local landfill. The solids are composted and most of the compost is sold and exported to local gardeners and nurseries. A small amount of compost is used in flower beds around the village area and in pasture areas as needed. All washwater generated in the Village area is routed to the City of Winston sewage treatment plant using underground pipelines. Washwater generated from cleaning enclosures for the large animals is spread on grass areas to filter out any solids and utilize any nutrients and organics. The park is collecting washwater volume data so that it can apply for grants to construct collection tanks and sprinkler distribution systems for washwater generated from cleaning the enclosures where it is not feasible to route the washwater to the City of Winston sewage treatment plant. Any excess accumulations of manure solids in pasture areas is also



collected and transferred to the solids storage/composting area.

Any livestock mortality that occurs during the year on the farm are disposed of by two different methods. Most mortalities are transferred to the necropsy area shown on the Farm Fields Map where veterinarians dissect the animal carcass for training and research purposes. After the necropsy has been completed the animal carcass is buried outside of the animal use areas in accordance with state law or transferred to the local landfill. If an animal mortality qualifies for feeding out, it is butchered and fed to the carnivore animals onsite and all waste from the butchering process is transferred to a local landfill.

The park uses 230 acres of the 600 acres it owns for exotic and native wildlife habitat that is broken into 5 main management areas. The Village area contains small animal enclosures, shops and restrooms for guests of the park. The Asia, Africa, The Americas and Cheetah areas all consist of grass pasture areas grown for habitat and forage for the animals. Any composted manure applied to the grass pasture areas is done by employees of the park in the spring or fall. Rainfall runoff from all of the areas is routed through water and sediment control basins also used for animal habitat and intermittent drainageways to the Wetland area. The Wetland area consists of a constructed surface water wetland which filters out sediments, organics, and bacteria and utilizes soluble nutrients in the runoff water. When natural stream flows subside in during dry periods, water is pumped from the South Umpqua River to maintain water levels in the water and sediment control basins used for animal habitat and to sustain wetland plant growth. The pastures are drug as necessary to breakup and spread manure accumulations in the pasture areas. Where possible the pasture fields are also mowed to keep grasses in a growth stage to improve forage production and help with management of the animal herds. There is no expansion of the park planned anytime soon but there are 370 acres it could expand into in the future.

The soil concentration of phosphorus is very low in The Americas area, low in the Africa area and medium in Asia and Cheetah areas. The phosphorus index ratings for the planning period are projected to be low for The Americas and Africa areas and medium for the Asia and Cheetah areas. With compost, washwater applications and exporting composted manure solids as planned the phosphorus index ratings are projected to be low for the Asia and Wetlands areas and medium for The Americas, Africa, and Cheetah areas. Since the phosphorus index ratings are low to medium the applications of washwater and composted solids are nitrogen based for the planning period.

The Wildlife Safari property boundaries makeup the upper end of the Applegate Creek watershed that drains to Lookingglass Creek approximately 4,600 feet downstream from the southernmost boundary of the park. Lookingglass Creek drains to the South Umpqua River approximately 1,700 feet downstream from the confluence of Applegate Creek and Lookingglass Creek.

The Umpqua River drains an expansive network of valleys west of the Cascade Range and south of the Willamette Valley. It is one of only two Oregon rivers (the Rogue is the other one) that begin in the Cascades and cut through the Coast Range to the Pacific Ocean. The Umpqua Basin is a timber-producing area, and 90% of the basin is federal, state and private forestland. "Umpqua" is the native name for the country around the river and it became used as a word for both the river and local Indian tribes. The river provides habitat for a number of species of endangered anadromous fish, including coho salmon, fall and spring



chinook salmon, summer and winter steelhead, and seagoing and resident cutthroat trout. Temperature and fecal coliform bacteria are the primary water quality problems on the Umpqua River. High stream temperatures typically occur during mid to late summer. The removal of streamside vegetation in some areas contributes to warmer temperatures. In addition, stream flow has been modified by straightening, diking, and constriction due to management and diversion structures. Studies by the Oregon Department of Environmental Quality indicate that sources of fecal coliform bacteria in the Umpqua may include wildlife, livestock wastes, failing residential septic systems, wastewater treatment plant malfunctions, and stormwater runoff.

### 1.3 Applicable Permits or Certifications

The Wildlife Safari is required by Oregon state law to have confined animal feeding operation permit from the Oregon Department of Agriculture and the Oregon Department of Environmental Quality to operate. The Wildlife Safari is covered by the Oregon Confined Animal Feeding Operation National Pollutant Discharge Elimination System General Permit Number 01-2009. A copy of recent inspection reports, the Notice of Registration and Oregon Confined animal Feeding Operation (CAFO) General Permit Summary and the Oregon Confined Animal Feeding Operation National Pollutant Discharge Elimination System General Permit is located in Appendix A.

Table 1-1 provides the general location information for the Wildlife Safari farm.

**Table 1-1. Geographic Location**

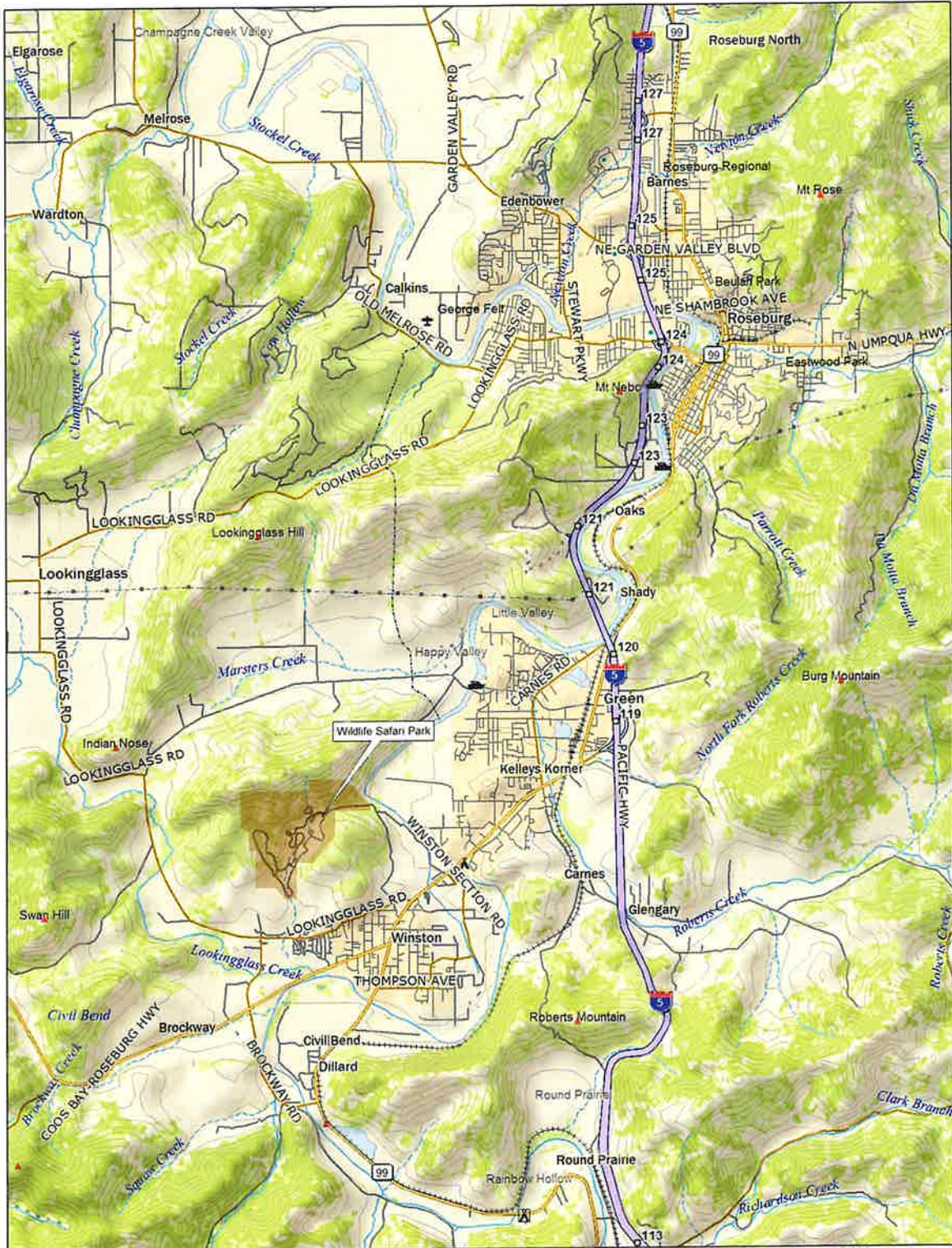
Farm	County, State	FSA Tract Number	Legal Description (S-T-R)	UTM Coordinates
Wildlife Safari	Douglas, OR	NA	Section 17, T28S, R6W from the W.M.	UTM Zone 10 UTM Projection: x- 0465330 y- 4776410

#### Driving Instructions: (See Location Map)

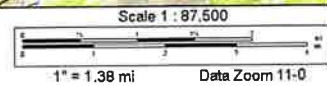
From Exit 125 on Interstate 5 near Roseburg, Oregon travel south 1.5 miles on Interstate 5 to and keep right onto exit 127. Travel 9.6 miles on Pacific Highway 99 (State Road 138) to Helweg Road. Turn right onto Helweg Road and travel 1.1 miles to Wildlife Safari Road. Turn right onto Wildlife Safari Road and travel 0.6 miles to the Wildlife Safari entrance.



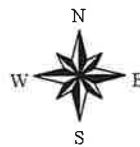
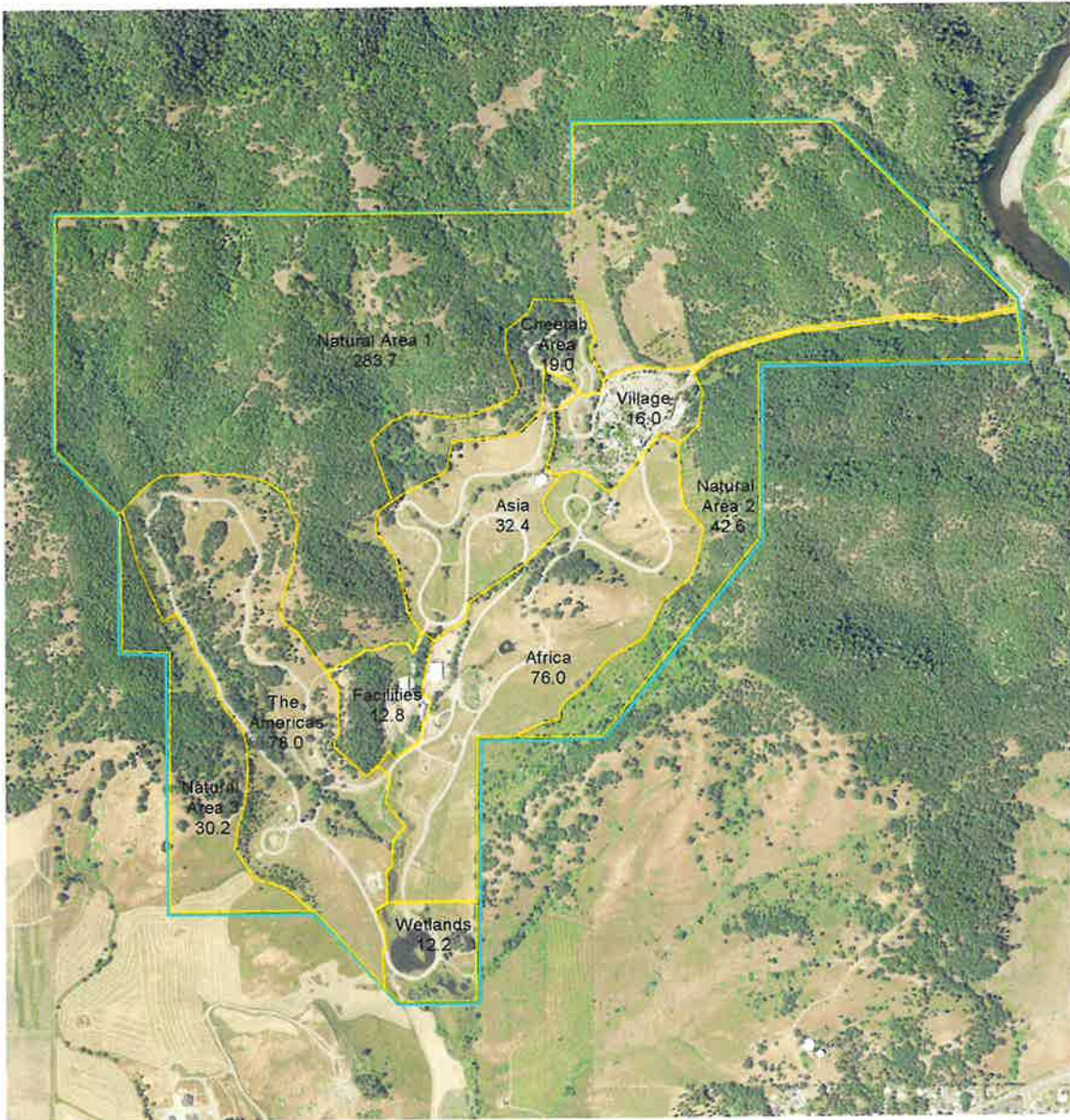
# 1.4 Location Map for Wildlife Safari



Data use subject to license.  
 © DeLorme, Topo USA® B.  
 www.delorme.com



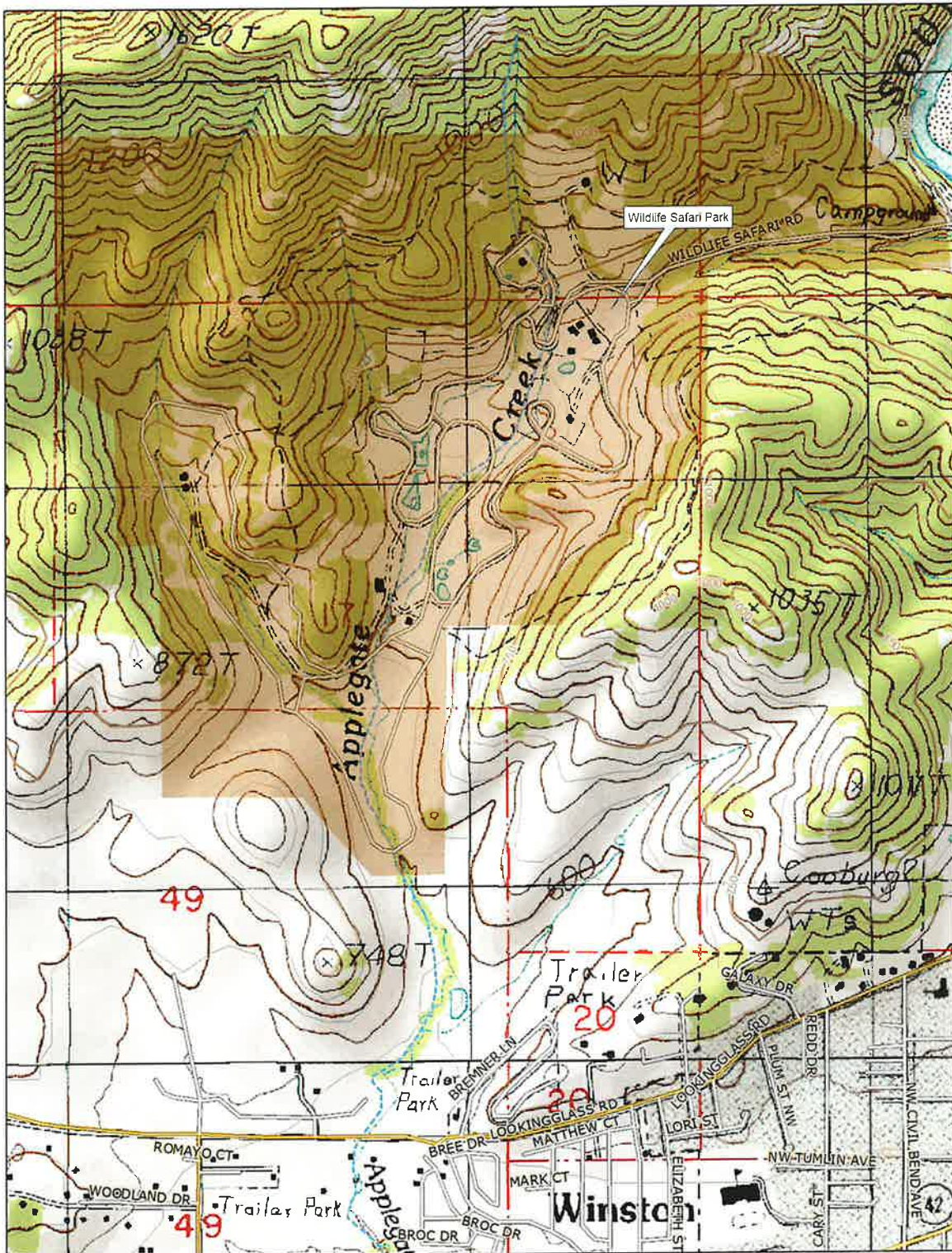
# 1.5 Wildlife Safari Park Areas Overview Map



Field Name  
 Subfield Name (Optional)  
 Acres  
 Spreadable Acres



1.6 Topographic Map for Wildlife Safari



Data use subject to license.  
 © DeLorme, Topo USA® 8.  
 www.delorme.com

Scale 1 : 12,800  
 1" = 1,066.7 ft Data Zoom 13-6



## 1.7 Resource Concerns

The following resource concerns are addressed by the conservation practices listed in Section 2.3, "Production Area Conservation Practices" and in Section 4.4, "Land Treatment Conservation Practices":

### Soil Quality Concerns

	<i>Soil Quality Concern</i>	<i>Fields</i>
	Ephemeral Gully Erosion	Africa, Asia, The Americas, Cheetah Area, Natural Area 1-3 and Wetlands
	Gully Erosion	None
	Sheet and Rill Erosion	Africa, Asia, The Americas, Cheetah Area, Natural Area 1-3 and Wetlands
	Stream/Ditchbank Erosion	Africa, Asia, The Americas, Cheetah Area, Natural Area 1-3 and Wetlands
	Wind Erosion	None

### Water Quality Concerns

	<i>Water Quality Concern</i>	<i>Fields</i>
	Facility Wastewater Runoff	Facilities, Village
	Manure Runoff (Field Application)	Africa, Asia, The Americas, Cheetah Area, and Wetlands
	Manure Runoff (From Facilities)	Facilities, Village
	Nutrients in Groundwater	Africa, Asia, The Americas, Cheetah Area, and Wetlands
	Nutrients in Surface Water	Africa, Asia, The Americas, Cheetah Area, and Wetlands
	Silage Leachate	None
	Excessive Soil Test Phosphorus	None
	Tile-Drained Fields	None

### Other Concerns Addressed

<i>Other Concern</i>	<i>Fields</i>
Acres Available for Manure Application	Africa, Asia, The Americas, Cheetah Area, and Wetlands
Aesthetics	Africa, Asia, The Americas, Village and Wetlands
Maximize Nutrient Utilization	Africa, Asia, The Americas, Cheetah Area, Village and Wetlands
Minimize Nutrient Costs	Africa, Asia, The Americas, Cheetah Area, Village and Wetlands
Neighbor Relations	Village and Wetlands
Profitability	None
Regulations	Africa, Asia, The Americas, Cheetah Area, Facilities, Village and Wetlands
Soil Compaction	Africa, Asia, The Americas, and Cheetah Area
Time Available for Manure Application	Africa, Asia, The Americas
Odors	Africa, Asia, The Americas, Cheetah Area, Facilities, Village and Wetlands
Air Quality	Africa, Asia, The Americas, Cheetah Area, Facilities, Village and Wetlands
Biosecurity	Africa, Asia, The Americas, Cheetah Area, Facilities, Village and Wetlands



## **Section 2. Production Information (Manure and Wastewater Handling and Storage)**

### **2.1 Animal and Manure Resources**

The Wildlife Safari is currently being operated by employees of the park who are currently caring for a variety of exotice animals that are available for public viewing. The smaller animals weighing 10 pounds or less are on display at the Village area in enclosures. The larger animals are on display in the Africa, Asia, and The Americas areas that visitors can view from their cars by driving through on access roads. Some of the larger animals are allowed to roam free in the Africa, Asia and The Americas areas and graze the pastures. The Cheetah Area is use exclusively for Cheetah habitat and is not open for public viewing.

This plan was written based on the Wildlife Safari having a maximum of 600 exotic animals of various sizes at the park that are summarized in Table 2-1. The table on page 11 shows an inventory of the animals at the park as of December 16, 2009. The Wildlife Safari will use the land base described in this plan for producing forage and utilizing the manure and organic by-products produced from the animals as an organic and nutrient soil amendment.

It is estimated that 110,968 cubic feet or 2,210 tons of manure, bedding and wasted feed will be collected from cleanup activities and another 82,869 cubic feet or 2,569 tons of animal manure directly applied to the pasture areas annually from the Wildlife Safari. Of the total amount of manure, bedding and wasted feed collected from cleanup activities, 15,064 cubic feet or 112,679 gallons will be collected as a liquid and 95,904 cubic feet or 1,726 tons will be collected as a solid. Since all rainfall coming into contact with animal manure is routed to the City of Winston sewage treatment plant and there will be no rainfall runoff from exposed areas collected annually. Most rainfall runoff from roofs is collected using gutters and downspouts and directed to drainage ditches using underground pipelines. It is estimated that 732 cubic feet or 5,475 gallons of washwater used to clean enclosures will be generated from the Wildlife Safari annually. In addition there will be approximately

The solids storage/composting facility shown on the Operation Map is a 50 foot by 100 foot open reinforced concrete slab with 5 foot high walls on 3 sides where the solids collected from enclosures and other areas can be stored and composted. Solids can be stacked to a height of 8 feet which provides 32,500 cubic feet and 240 days of storage capacity which exceeds the NRCS recommended minimum storage period of 154 days computed using Worksheet OR10A-7 located on page 37. The solids storage/composting facility was constructed in accordance with the NRCS Waste Storage Facility practice standard 313 (PS313). Based on observation the waste storage facility is serving as intended and will continue to do so as long as operation and management guidelines are followed.

Washwater storage facilities are currently being developed for the different enclosure areas where water is used to wash and sanitize the enclosure floors and walls. It is planned to construct tanks to capture the washwater and then use sprinkler systems to distribute the washwater onto vegetated treatment areas to filter bacteria and solids and utilize nutrients. Washwater volumes for each enclosure are currently being determine so the proper size of tank can be constructed to collect and store the washwater until it can be applied to the vegetated treatment areas without causing ruoff or excessive infiltration. An estimate of 732 cubic feet or 5,475 gallons of annual



washwater production was used to develop this plan. Any runoff from the vegetated treatment areas or pasture areas is routed to water and sediment control basins and then to a 7.5 acre constructed wetland area to remove any sediments and filter out any manure solids and bacteria that may be contained in the runoff. During dry periods water is pumped from the South Umpqua River at an approximate rate of 150 gallons per minute to maintain water levels in the water and sediment control basins used for animal habitat and to sustain plant growth in the wetlands.

Washwater generated by the Wildlife Safari is planned to be applied to vegetated treatment areas as a nutrient and irrigation water source using sprinkler systems which will apply the washwater at an estimated rate of 5 to 10 gallons per minute at a wetted diameter of 15 feet. Most of the composted solids produced from the Wildlife Safari are exported and sold to local gardeners and nurseries in the Winston area. Any composted solids applied to the pasture areas are applied using a small tractor pulled box spreader with an estimated capacity of 110 cubic feet or 2 tons is used to apply solids to the fields as a source of nutrients and organic soil amendment. The tractor pulled box spreader can apply solids at a minimum rate of 1 ton per acre up to a maximum of 33 tons per acre.

Table 2-1. **Animal Inventory**

Animal Group	Type or Production Phase	Number of Animals	Average Weight (Lbs)	Confinement Period	Manure Collected (%)	Storage Where Manure Will Be Stored
0-10lb Animals S	Small Exotic Animals	122	4	Jan Early - Dec Late	75	Compost Facility
0-10lb Animals L	Small Exotic Animals	122	4	Jan Early - Dec Late	25	Tanks
10-100lb Animals S	Medium Exotic Animals	100	60	Jan Early - Dec Late	52	Compost Facility
10-100lb Animals L	Medium Exotic Animals	100	60	Jan Early - Dec Late	6	Tanks
10-100lb Animals G	Medium Exotic Animals	100	60	Jan Early - Dec Late	42	Pasture
100-500lb Animals S	Large Exotic Animals	171	220	Jan Early - Dec Late	36	Compost Facility
100-500lb Animals L	Large Exotic Animals	171	220	Jan Early - Dec Late	4	Tanks
100-500lb Animals G	Large Exotic Animals	171	220	Jan Early - Dec Late	60	Pasture
>500lb Animals S	XLarge Exotic Animals	153	2,200	Jan Early - Dec Late	36	Compost Facility
>500lb Animals L	XLarge Exotic Animals	153	2,200	Jan Early - Dec Late	4	Tanks
>500lb Animals G	XLarge Exotic Animals	153	2,200	Jan Early - Dec Late	60	Pasture

(1) Number of Animals is the average number of animals that are present in the production facility at any one time.

(2) If Manure Collected is less than 100%, this indicates that the animals spend a portion of the day outside of the production facility or that the production facility is unoccupied one or more times during the confinement period.



**Animal Inventory as of May 31, 2011**

Species	Scientific Name	Full Count M.F.Y*	Average Weight
<b>AVES</b>			
Ostrich	Struthio camelus	1.2	300 lbs.
Rhea	Rhea americana	6.3.7	F-40 lbs. M-60 lbs.
Emu	Dromaius novaehollandiae	5.3	80 lbs.
Sarus Crane	Grus antigone antigone	1.0	15 lbs.
African Crown Crane	Balearica regulorum gibbericeps	2.0	8 lbs.
Black Swan	Cygnus atratus	2.1.	15 lbs.
Peafowl	Pavo cristatus	3.1	10 lbs.
Red Tailed Hawk	Buteo jamaicensis calurus	0.1	3.0 lbs.
Screech Owl	Otus asio	0.1	160 g
Bald Eagle	Haliaeetus leucocephalus	1.0	7 lbs.
Great Horned Owl	Bubo virginianus	0.1	2.8 lbs.
Flamingo	Phoenicopterus chilensis	4.2	8 lbs.
Ne-Ne Geese	Branta sandvicensis	1.1	3 lbs.
Egyptian Geese	Alopochen aegyptiacus	0.2.24	3 lbs.
Domestic Ducks	Anas platyrhynchos domestic	1.1.2	3 lbs.
Chinese Brown Geese	Anser cygnoides	2.2	8 lbs.
Salmon-Crested Cockatoo	Cacatua moluccensis	0.1	760 g
Cockatiel	Nymphicus hollandicus	2.0	120 g
Yellow-Headed Amazon	Amazona oratrix	1.0	550 g
Blue-and-Yellow Macaw	Ara ararauna	0.1	1,000 g
Scarlet Macaw	Ara macao	1.0	1,100 g
Jandaya Conure	Aratinga jandaya	1.0	120 g
Red-Billed Hornbill	Tockus erythrorhynchus	1.0	180 g
Zebra Finch	Poephila guttata	0.1	50 g
<b>BOVIDAE</b>			
White-Bearded Wildebeest	Connochaetes taurinus albojubatus	2.2	F-400 lbs. M-500 lbs.
Blackbuck	Antilope cervicapra	3.5	60 lbs.
Kirks Dik-Dik	Madoqua kirkii	1.1	10 lbs.
Bison	Bison bison	13.21	F-900 lbs M-2,000 lbs.
Tibetan Yak	Bos grunniens	5.11	F-900 lbs. M-2,000 lbs.
Watusi Cattle	Bos taurus taurus watusi	5.6	F- 1,000 lbs. M-1,500 lbs.
Nilgai	Boselaphus tragocamelus	1.6	500 lbs.
Cape Eland	Taurotragus oryx oryx	6.12	F-1,200 lbs. M-2,000 lbs.
Aoudad	Ammotragus levia	7.12	F-200 lbs. M-350 lbs.
American Pygmy Goat	Capra hircus hircus american pygmy	5.3	F-40 lbs. M-70 lbs.



Species	Scientific Name	Full Count M.F.Y*	Average Weight
Waterbuck	Kobus ellipsiprymnus ellipsiprymnus	1.0	500 lbs.
<b>CAMELIDAE</b>			
Bactrian Camel	Camelus bactrianus	1.1	2,000 lbs.
Guanaco	Lama guanicoe	2.6.0	300 lbs.
Llama	Lama glama	2.4	300 lbs.
<b>CARNIVORA</b>			
Anatolian Shepherd Dog	Canis lupus familiaris anatolia_shepherd	0.1	100 lbs.
Maned Wolves	Chrysocyon brachyurus	1.1	F-26.6kg M-19.2 kg
North American Black Bear	Ursus americanus	4.2	F-300 lbs. M-450 lbs.
Brown Bear	Ursus arctos	3.2	F-700 lbs. M-800 lbs.
White-Nosed Coati	Nasua narica	1.2	5.0 kg
Domestic Ferret	Mustela putorius furo	3.0	1.2 kg
Cheetah	Acinonyx jubatus	7.8	100 lbs.
Bobcat	Lynx rufus	1.0	15 kg
Cougar	Puma concolor concolor	0.1	120 lbs.
Lions	Panthera leo	2.2	F-350 lbs. M-500 lbs.
Tigers	Panthera tigris	1.1	F-300 lbs. M-550 lbs.
<b>CERVIDS</b>			
Sika Deer	Cervus nippon	3.51	150 lbs.
White Fallow Deer	Dama dama	3.29	150 lbs.
Roosevelt Elk	Cervus elaphus roosevelti	9.10	F-600 lbs. M-1,000 lbs.
Black-Tailed Deer	Odocoileus hemionus columbianus	0.1	100 lbs.
<b>DASYPODIDAE</b>			
Screaming Armadillo	Chaetophractus vellerosus	1.0	1325 g
<b>DIDELPHIDAE</b>			
Sugar Glider	Petaurus breviceps	0.2	100 g
Wallaroo	Macropus robustus	1.0	F-13 Kg M-19 Kg
<b>EQUIDAE</b>			
Damara Zebra	Equus burchellii antiquorum	2.7	F-570 lbs. M-700 lbs.
Miniature Horse	Equus caballus caballus	1.1	F-200 lbs. M-250 lbs.
Donkey	Equus asinus asinus	1.0	300 lbs.
<b>ERINACEIDAE</b>			
Hedgehog	Erinaceinae	1.1	480 g
<b>GIRAFFIDAE</b>			
Giraffe	Giraffa camelopardalis	4.0	2,500 lbs.

Species	Scientific Name	Full Count M.F.Y*	Average Weight
<b>HIPPOPOTAMIDAE</b>			
Hippopotamus	Hippopotamus amphibius	1.0	5,000 lbs.
<b>LOXODONTA</b>			
African Elephant	Loxodonta africana	1.1	F-8,000 lbs M-12,600 lbs
<b>PRIMATES</b>			
Ring-Tailed Lemur	Lemur catta	2.0	F-7 lbs. M-9lbs.
Red-Ruffed Lemur	Varecia variegata rubra	2.4	8 lbs.
Cotton Topped Tamarin	Saguinus oedipus	1.2	1.0 lbs.
Owl Monkey	Aotus nancymae	1.2	2 lbs.
White Handed Gibbon	Hylobates lar	1.1	24 lbs.
White Cheeked Gibbon	Hylobates leucogenys	1.1	10 lbs.
Siamang	Hylobates syndactylus	1.0	F-9.3 kg M-9.1 kg
<b>REPTILIA</b>			
African Spurred Tortoise	Geochelone sulcata	1.0	70 lbs.
California Desert Tortoise	Gopherus agassizii	1.1	3 kg
American Alligator	Alligator mississippiensis	2.0	10-60 lbs.
Mitchell's Bearded Dragon	Pogona mitchelli	3.0	400 g
Tegu Lizards	Tupinambis	1.0	5 lbs.
Red Tail Boa	Boa constrictor ortoni	2.1	10 kg
Tree Boa	Corallus hortulanus	0.0.1	90 g
Burmese Python	Python molurus bivittatus	1.0	90 lbs.
Ball Python	Python regius	2.1	1650 g
Corn Snake	Elaphe guttata	0.1	650 g
<b>RHINOCEROTIDAE</b>			
White Rhino	Ceratotherium simum simum	1.1	6,000 lbs.
<b>RODENTIA</b>			
Flying Squirrels	Glaucomys sabrinus	1.0	130 g
Rabbit	Oryctolagus cuniculus	1.1	2 Kg
Norway Rat	Rattus norvegicus	0.3	200 g
Indian Crested Porcupine	Hystrix indica	0.1	23 kg
Prehensile Tailed Porcupine	Coendou prehensilis	1.0	6 kg
Chinchilla	Chinchilla lanigera	1.0	580 g
Capybara	Hydrochoerus hydrochaeris	1.1	F-43 kg M-60 kg

\* M- Male, F- Female, Y- Young





## 2.2 Operation Area Map(s)



## 2.3 Operation Area Practices

Following are practices that the Wildlife Safari has implemented or plans to implement that address resource concerns for the Production Area identified in Section 1.4:

### Access Control (Ac)

**Field(s):** Facilities, Village

**Status:** Existing                      **Units:** 28.8 Acres

**Description:** Fences and walls are used to control animal and human access to the operation areas and animal enclosures.

**Operation and Maintenance:** Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

**Specification:** NA

### Access Road (Ft)

**Field(s):** Facilities, Village

**Status:** Existing                      **Units:** 8,310 Feet

**Description:** Existing roadways allow access to operation facilities and enclosures to perform needed management operations.

**Operation and Maintenance:** Maintain road, parking lot and pathway surfaces in good condition, which includes periodic grading and addition of surface material when necessary. Prevent surface ponding by localized grading or addition of surface materials to remove depressions. Road base-course rock may be required to stabilize the road and parking lot foundations. If so, remove unstable materials and rebuild travelway. Limit traffic and animal access with fencing or barriers, where needed.

Remove debris, litter or blockages from roads, parking lots and walkways. Also remove debris and maintain capacity of associated drainage ditches, drop inlets, culverts, bridges, waterways and storm water outlets.

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

Immediately repair any vandalism, vehicular, or livestock damage to earthfills, side slopes, drainage facilities, water ways and storm water outlets or other appurtenances. Maintain good vegetative cover, mulches, and other covering installed for erosion protection.

**Specification:** NA

## Animal Mortality Facility (No)

### Field(s): Facilities, Village

Status: Existing

Units: 1 Facility

**Description:** A covered necropsy area is used to dissect animal carcasses before they are disposed of by burying, feeding to carnivores or taken to a landfill.

**Operation and Maintenance:** Refer to Section 3 for guidance on what steps to take for a catastrophic animal mortality event.

Having dead animals sent to an acceptable disposal site is the best method to deal with animal mortalities. A list of landfills and phone numbers can be found on the internet at <http://www.deq.state.or.us/lq/sw/disposal/permittedfacilities.html>. If a local landfill is not permitted to accept animal carcasses, the Oregon Department of Environmental Quality (DEQ) may grant an exception. Phone numbers to local DEQ offices can be found in most phone books or on the internet at <http://www.deq.state.or.us/about/locations.html>.

Under no circumstances are animal mortalities to be disposed of in any type of liquid manure storage facility.

Currently animal mortalities for this operation are being disposed of by burial or by taking to landfill.

Various acceptable methods for disposing of animal mortalities are:

**Composting-** Composting animal mortalities requires a composting plan be prepared and submitted to the Oregon Department of Agriculture, Natural Resources Division. A composting plan consists of a site plan drawing of the composting facility, a description of how any runoff from the facility will be contained, a description of the composting process to be used and how the compost will be used. The composting facility for animal mortalities must have a concrete floor or similar impervious surface to prevent nutrient leaching. A roof covering the animal mortality composting facility is recommended to control moisture added by rainfall and rainfall runoff. Assistance to develop a composting plan is available from the Natural Resources Division of the Oregon Department of Agriculture, (503) 986-4700. A permit is also needed from the Department of Environmental Quality (DEQ) if animal mortalities will be imported from other farms for composting.

Rapid composting of dead animals occurs when the carbon to nitrogen (C:N) ratio of the compost mix ranges between 10 and 20 to 1. To achieve the recommended C:N ratio, build the initial compost pile by placing 18 inches of sawdust or other bulking agent on the floor of the composting area. The bulking agent should extend beyond the perimeter of the animal to be composted by at least 2 feet. If using a compost bin the bulking material should extend at least 1 foot beyond the perimeter of the animal being composted. Using a bulking agent such as sawdust will absorb any liquids as the animal decomposes during the composting process.

Once the bulking agent has been placed on the floor of the composting area, place the animal carcass on top. To decrease composting time and prevent bloating the body cavity should be cut open. Cover the carcass with 1 to 3 feet of separated manure solids or other material that has a

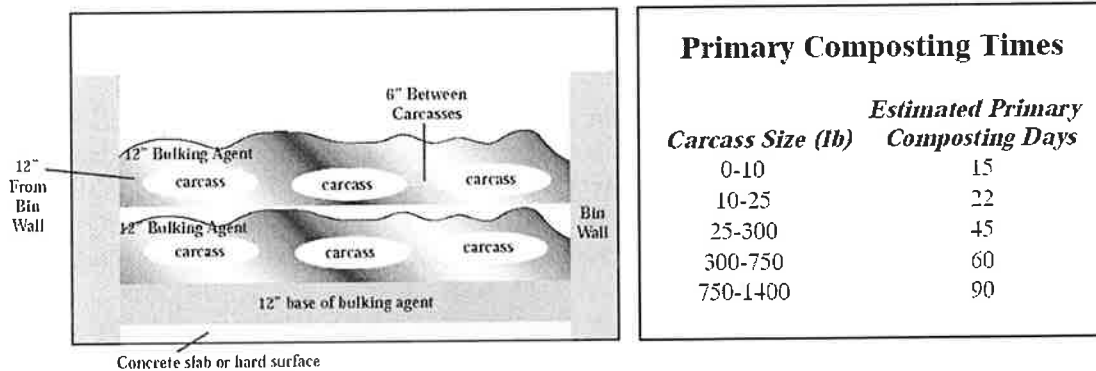


moisture content between 30 to 60 percent and a C:N ratio of not more than 30 to 1. Use 1 foot of material for small carcasses and 3 feet for large carcasses such as cattle. Be careful not to add material that is too wet as it will hinder the composting process and cause odors. Small animals can be layered in a compost pile by placing 12 inches of the bulking agent between layers as shown in the figure below. Be sure the total height of the compost pile does not exceed 7 feet in height as it may spontaneously combust causing a fire.

The first heating or primary composting cycle will take approximately 15 to 90 days depending on the size of the animal being composted. Refer to the table below for estimated primary composting times. Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at multiple points around the compost pile and at a point approximately 3 feet into the pile. The temperature of the compost pile should reach 130 degrees Fahrenheit (F) within a few days. Temperatures should peak between 130 and 150 degrees F in 3 to 4 days. When the temperature of the compost pile falls below 130 degrees F, the compost needs to be aerated by turning or other means. Be sure carcasses remain covered with the bulking agent after being aerated. It is important to maintain a temperature above 130 degrees F for at least 7 days during the primary composting cycle as failure to do so may result in the incomplete destruction of pathogens and can cause fly and odor problems. After aerating the compost pile, the secondary composting times will be similar to the first.

**CAUTION:** It is unclear whether prions that are the proteins that cause Bovine Spongiform Encephalitis (BSE or Mad Cow Disease) are destroyed in the composting process. Animals showing signs of Mad Cow Disease and those with anthrax should not be composted and must be reported to the Oregon Department of Agriculture, Animal Health and Identification Division at (503) 986-4680 for guidance on disposal.

After aerating the compost pile by turning or other means, be sure to check the moisture content and add water if necessary being careful not to add too much water. The compost pile should feel moist to the touch but you should not be able to squeeze any water out of it.



Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost pile.

After the composting process is finished, it may be used as a bulking agent for a new compost pile. A rule of thumb is to use 50 percent of the composted material for a bulking agent but you may want to use more or less depending on how degraded the bulking agent is in the finished compost. Using finished compost in a new compost pile reduces the amount of bulking agent

needed for the new pile and provides microbial inoculants to get the composting process started.

Finished compost can also be applied to crop and pasture land fields for utilization of the nutrients and organics in the composted material. Compost from animal mortalities should not be applied to crops that will be consumed directly by humans. The nutrient content of the composted material should be determined and application equipment calibrated to ensure nutrients contained in the composted material are not over applied.

**Natural Disposal-** To allow nature to take its course the dead animal needs to be transported to a location at least ½ mile from any off-farm dwelling and at least ¼ mile from any water way in accordance with ORS 601.140. Once this criteria is met the carcass can be left to degrade naturally with the help of scavengers. This method is not an acceptable means of disposal for a large number of animal mortalities or for byproducts generated during butchering.

**Landfill-** Dead animals may be transported to a permitted landfill that accepts animal carcasses for disposal. Be sure to call the chosen landfill first to insure a landfill will accept your animal carcasses. Refer to the website given previously for permitted landfills to call. Contact the landfill operator and the DEQ at (800) 452-4011 if the landfill you would like to use is not a permitted facility to see if an exception may be granted for the disposal of animal carcasses.

**Incineration-** Dead animals may be burned as a method of disposal and as a method to control diseases. The economics of incineration and availability of incineration units usually make this option undesirable. A permit is needed from the Oregon Department of Environmental Quality (DEQ) Air Quality program to operate an incineration unit. Contact your DEQ at (800) 452-4011 for guidance on incineration of animal carcasses.

**Burial-** Dead animals may be buried in accordance with ORS 601.090(7) as a method of disposal. Large animals such as an adult cow will require a hole approximately 2 feet by 7 feet by 8 feet deep. Be sure to select a site that doesn't have a water table to insure the bottom of the hole will be dry. The animal carcass should be covered with hydrated lime and covered with at least 4 feet of soil mounded 2 feet above the natural ground line to allow for settling as the carcass decomposes. Burial sites should be located at least 500 feet down slope from surface waters or wells.

Burial is not an acceptable method of disposal for animal byproducts generated from butchering. Burial of large numbers of animal mortalities is not acceptable unless performed in accordance with a Catastrophic Animal Mortality Management Plan. Burial of imported animal mortalities is subject to disposal regulations and the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Agriculture (ODA) and the local land use planning authority should be contacted.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Immediately move any animal mortalities and refuse from outside of the facility and place them back in the facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

**Specification: NA**

## Composting Facility (No)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 1 facility**

**Description:** The composting facility for the Wildlife Safari will be used to store and compost manure solids, wasted feed, and straw used for bedding. All of the feedstocks for the composting process will be generated from the Wildlife Safari facility. The composted material will be exported and sold to local gardeners and nurseries or used as a soil amendment for nutrients and organics in flowerbeds and on the pasture areas. It is estimated that 191,778 cubic feet or 3,452 tons of manure, bedding and wasted feed will be composted annually producing 95,889 cubic feet or 1,726 tons of compost.

Only employees of the Wildlife Safari or authorized personnel will be allowed access to the composting facility. The composting facility will only be operated by John Gobershock or employees of the Wildlife Safari operation. All of the feedstocks for the composting process will be handled by farm equipment and not handled directly by employees of the Wildlife Safari.

**Operation and Maintenance:** The composting facility shown on the facility map has a design capacity of 32,500 cubic feet or 585 tons to store and treat solids for compost until they can be exported off from the operation or applied to the pasture land fields. Emptying of the compost facility should begin as soon as possible in the spring after the composting process has been completed and the compost has been allowed to complete the curing process. Emptying should continue throughout the spring and summer months exporting and applying the composted solids to the pasture land fields in accordance with the guidance given the Nutrient Management Specification located in Section 4.2. To function properly and have the greatest management flexibility, the compost facility must be as empty as possible in October before the fall and winter rainy season begins.

The composting process will normally use static piles which are turned for aeration on a regular basis.

Take a representative sample of the raw compost mixture and have a laboratory determine the moisture content, pH, and the carbon and nitrogen content.

The carbon to nitrogen ratio should range between 25 and 40 to 1. Make adjustments as needed to the ingredients of the raw compost mixture as necessary to achieve a carbon to nitrogen ratio within the acceptable range.

The moisture content should be between 40 and 60 percent. Add water or drier material to adjust the moisture content. Care must be taken to see that the carbon to nitrogen ratio of the mix is still in the 25 – 40 to 1 range after adjusting the moisture content.

The pH preferably should range between 6.5 and 8 however composting may be achieved between a pH of 5.5 and 9.0.

Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at a point one-third the distance from the outside of the pile to the center of the mass. Initially it will take approximately 2 to 3 days for the compost to get above 105 degrees F. Compost temperatures should peak between 130 and 140 degrees F in 5 to 7 days. When the



temperature of the compost material falls below 110 degrees F the compost needs to be aerated by turning or other means. Failure to achieve the desired temperatures may result in the incomplete destruction of pathogens and weed seeds and can cause fly and odor problems.

Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost material.

For a well managed windrow or static pile composting operation, the composting time during the summer months should range from 14 days to a month. To ensure a finished compost, observe that the composted material has little or no trace of the original raw material and has little odor. The material should be black to brown in color. Particle size should be consistent and soil-like in texture.

All materials that are not considered feedstocks for the composting process (i.e. plastic ear tags, plastic gloves, etc...) are to be collected and transported to a permitted landfill by a garbage collection service or other means. It is anticipated that there will be no other material that will require offsite disposal.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of composted material from outside of the storage area and place them back in the composting facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

**Specification: NA**

Fence (Ft)
------------

**Field(s): Facilities, Village**

**Status: Planned**

**Units: 4,910 Feet**

**Description:** Fences are installed to control the movement and access of animals and humans.

**Operation and Maintenance:** Limit livestock access to open water courses and drainageways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

**Specification: NA**

Heavy Use Area Protection (Ac)

**Field(s):** Facilities, Village

**Status:** Existing

**Units:** 7.3 Acres

**Description:** Travel and confinement areas shown on the Operation Area Map are stabilized with suitable materials to control soil erosion, improve air and water quality, improve aesthetics and improve animal health.

**Operation and Maintenance:** Periodically inspect concrete and asphalt slabs and curbs and repair or replace broken sections as needed. Prevent manure from building up next to the curbs or over topping them.

Do not allow livestock access to open water courses and drainageways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

**Specification:** NA

Irr.Pipeline-High-pressure, Underground, Plastic (Ft)

**Field(s):** Facilities, Village

**Status:** Existing

**Units:** 845 Feet

**Planned**

**Units:** 300 feet

**Description:** Existing high pressure underground PVC Pipelines convey water to water and sediment control basins used for animal habitat and convey washwater to the City of Winston sewage treatment plant. Additional high pressure underground pipelines are planned to convey washwater to planned collection tanks and from the collection tanks to distribution systems.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. This washwater is then applied to exhibits as a fertigation via 100ft hose and sprinkler system. This hose is moved throughout 4 exhibit area and can be spread into larger grassland area adjacent to exhibits. Applications are recorded to approximate amount and date of applicaton. This system needs to be updated with higher pressure pump and applicatons system.

Two additional systems are at Brown Bears and Tiger holding facilities. A small sprinkler irrigation system are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. A third sprinkler system will be install into existing 1000gal holding tanks and the septic system disconnected.



The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour. Application would be through a 100 ft hose and small sprinkler into surround exhibit areas. Applications will be recorded to amounts and times.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

**Operation and Maintenance:** Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: To be developed for planned pipelines.**

Manure Transfer (No)
----------------------

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 6- Catch Basins**

**1- Washwater Transfer Pipeline**

**1- Tractor with Front End Loader**

**2- Dump Trucks**

**1- Tractor with Solids Spreader**

**Planned**

**Units: 4- Washwater Transfer Pipelines**

**4- Application Systems**

**Description:** Currently washwater from enclosure cleaning operations is directed to catch basins which drain to pipelines that discharge the washwater to grass treatment areas or to the City of Winston sewage treatment plant. It is planned to install collection tanks and waste transfer pipelines to be able to apply washwater to grass treatment areas with sprinkler systems or some other controlled means for enclosure areas that do not drain to the City of Winston sewage treatment plant.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. This washwater is then applied to exhibits as a fertigation via 100ft hose and sprinkler system.



This hose is moved throughout 4 exhibit area and can be spread into larger grassland area adjacent to exhibits. Applications are recorded to approximate amount and date of application. This system needs to be updated with higher pressure pump and application system.

Two additional systems are at Brown Bears and Tiger holding facilities. 1000 gal storage tank will provide approximately 30 day storage. A small sprinkler irrigation system are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

A third sprinkler system will be installed at Lions. Currently a 1000gal septic system already exists and will be disconnected and then applied.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour. Application would be through a 100 ft hose and small sprinkler into surround exhibit areas. Applications will be recorded to amounts and times.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

A catch basin already exists at rhino boma. This basin is designed as a footbath for treating hoof issues. This basin has a valve and is drained into a well designed to hold a five gallon bucket. Rain water will be distributed into grass areas. Medicated water will be disposed of at the elephant barn and put directly into drains connected to city sewer.

Solids collected from enclosure and other cleaning operations is transferred by truck to the solids storage/composting facility. Once the solids have been composted they are exported to local gardeners and nurseries for use as a soil amendment and nutrient source. Solids that are not exported are applied to flowerbeds and pasture land fields for utilization as a soil amendment and nutrient source using a tractor with front end loader, dump trucks, and a tractor pulled solids spreader.

**Operation and Maintenance:** Remove debris and sediment from catch basin grates as needed. Annually inspect catch basin grates and receiving structures and repair or replace as necessary.

Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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



**Specification: To be developed for planned pipelines and application systems**

Pipeline (Ft)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 3,020 Feet**

**Description:** Pipelines are installed to convey water from a source to the place of use to provide water for animals and washwater.

**Operation and Maintenance:** Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

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

**Specification: NA**

Roof Runoff Structure (No)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 25 Gutters with downspouts**

**Description:** Gutters and downspouts are installed on the facility buildings and animal enclosures to collect, control and transport rainfall runoff to suitable outlets.

**Operation and Maintenance:** Annually inspect rain gutters, downspouts, pipelines, trash guards, pumps, structures and appurtenances for proper operation. Keep them free of all foreign material, weeds and sediment. Repair or replace any damaged component as needed.

Keep downspouts and outlets free flowing. Repair or replace broken rodent guards as needed. If the hydraulic capacity is insufficient, replace gutters (and downspouts if needed) or make provisions for the waste management system to handle the extra water.

Protect downspouts from damage by animals and equipment and repair any damaged components as needed.

**Specification: NA**

Underground Outlet (Ft)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 680 Feet**

**Description:** Underground PVC pipelines convey water from downspouts connected to gutters on the facility buildings and animal enclosures to intermittent drainageways.

**Operation and Maintenance:** Annually inspect underground outlets for proper operation. Check fields for signs of positive pressure (blow holes) or negative pressure (sink holes) in underground pipelines. Repair or replace damaged or broken pipelines as needed maintaining designed depth of cover.

Keep outlets free of vegetation and sediment. Correct and prevent erosion at outlets by installing rock riprap or other measures. Repair or replace damaged or broken rodent guards as needed.

Avoid travel over underground pipelines with heavy equipment when the soil is saturated except at crossings designed for this purpose.

Eradicate or otherwise remove all rodents and/or burrowing animals that have or can potentially damage any part of the system. Immediately repair any damage caused by their activity.

Immediately repair any damage due to vandalism, vehicular or animals.

**Specification: NA**

Waste Storage Facility (No)

**Field(s): Facilities, Village**

**Status: Existing**

**Units: 1- 50 foot by 100 foot Reinforced Concrete Solids  
Storage/Composting Facility**

1- Washwater Collection Tank

**Planned**

**Units: 4- Washwater Collection Tanks**

**Description:** A collection tank exists in the Village area for collecting washwater generated from cleaning an animal enclosure. An additional 4 collection tanks are planned to capture washwater from animal enclosures that do not drain to the City of Winston sewage treatment plant.

Within the Village area a 1000 gal tank is installed to collect waste water from NA Exhibits. Two additional systems are at Brown Bears and Tiger holding facilities. 1000 gal storage tank will provide approximately 30 day storage.

Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to

complete these projects by December 31, 2016.

It is estimated that 110,968 cubic feet or 2,210 tons of manure, bedding and wasted feed will be collected from cleanup activities and another 82,869 cubic feet or 2,569 tons of animal manure directly applied to the pasture areas annually from the Wildlife Safari. It is estimated that 191,778 cubic feet or 3,452 tons of manure, bedding and wasted feed will be composted annually producing 95,889 cubic feet or 1,726 tons of compost. The solids storage/composting facility is estimated to provide 240 days of storage which exceeds the NRCS recommended storage period of 154 days computed using Worksheet 10A-7 located on page 37.

Table 2-2. **Manure Storage**

Storage ID	Type of Storage	Pumpable or Spreadable Capacity	Annual Manure Collected	Maximum Days of Storage
Compost Facility	Dry stack	585 Tons	1,726 Tons	240
Tanks	Outside tank, covered	55,988 Gal	112,170 Gal	182
Pasture	Daily scrape & haul (liquid)	619,860 Gal	619,860 Gal	365

Table 2-3. **Planned Manure Exports off the Farm**

Month-Year	Manure Source	Amount	Receiving Operation	Location
Oct 2010	Tanks	9,397 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Nov 2010	Tanks	1,804 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Dec 2010	Tanks	2,530 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jan 2011	Tanks	1,839 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Feb 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Feb 2011	Tanks	1,833 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Mar 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Mar 2011	Tanks	1,833 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Apr 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Apr 2011	Tanks	1,839 Gal	Winston Sewage Treatment Plant	Winston, Oregon
May 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
May 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jun 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jun 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon



Month-Year	Manure Source	Amount	Receiving Operation	Location
Jul 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jul 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Aug 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Aug 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Sep 2011	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Sep 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Oct 2011	Compost Facility	100 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Oct 2011	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Nov 2011	Tanks	1,804 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Dec 2011	Tanks	1,815 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jan 2012	Tanks	1,828 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Feb 2012	Compost Facility	200 Tons	Local Gardners and Nurseries	Winston and Surrounding Area
Feb 2012	Tanks	1,812 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Mar 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Areas
Mar 2012	Tanks	1,812 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Apr 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Apr 2012	Tanks	1,812 Gal	Winston Sewage Treatment Plant	Winston, Oregon
May 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Areas
May 2012	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jun 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Areas
Jun 2012	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jul 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	
Jul 2012	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Aug 2012	Compost Facility	100 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Aug 2012	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Sep 2012	Compost Facility	100 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Sep 2012	Tanks	1,827 Gal	Winston Sewage Treatment Plant	Winston, Oregon



Month-Year	Manure Source	Amount	Receiving Operation	Location
Oct 2012	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Oct 2012	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Nov 2012	Tanks	1,804 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Dec 2012	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jan 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Feb 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Feb 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Mar 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Mar 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Apr 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Apr 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
May 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
May 2013	Tanks	1,932 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jun 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jun 2013	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jul 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jul 2013	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Aug 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Aug 2013	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Sep 2013	Compost Facility	100 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Sep 2013	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Oct 2013	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Oct 2013	Tanks	1,931 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Nov 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Dec 2013	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jan 2014	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Feb 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area



Month-Year	Manure Source	Amount	Receiving Operation	Location
Feb 2014	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Mar 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Mar 2014	Tanks	1,884 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Apr 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Apr 2014	Tanks	1,804 Gal	Winston Sewage Treatment Plant	Winston, Oregon
May 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
May 2014	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jun 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jun 2014	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Jul 2014	Compost Facility	200 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Jul 2014	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Aug 2014	Compost Facility	150 Tons	Local Gardeners and Nurseries	Winston and Surrounding Area
Aug 2014	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon
Sep 2014	Compost Facility	100 Tons	Local Gardeners and Nurseries	Winston and Surrounding Areas
Sep 2014	Tanks	1,927 Gal	Winston Sewage Treatment Plant	Winston, Oregon

**Table 2-4. Planned Manure Imports onto the Farm**

Month-Year	Manure's Animal Type	Amount	Originating Operation	Location
------------	----------------------	--------	-----------------------	----------

(None)

**Table 2-5. Planned Internal Transfers of Manure**

Month-Year	Manure Source	Amount	Manure Destination
------------	---------------	--------	--------------------

(None)

**Operation and Maintenance:**

**WASHWATER STORAGE TANKS-**

The existing and planned washwater storage tanks will have adequate capacity to store washwater until it can be safely applied to grass treatment areas. To function properly and have the greatest management flexibility, the wastewater storage tanks must be emptied as soon as possible.



Do not allow equipment that exceeds the design limit of the tanks on or within twenty feet of the structure. Keep pumps, agitators, piping, valves and all other electrical and mechanical equipment in good condition by following the manufacturer's recommendations. Maintain grounding rods and wiring for all electrical equipment in good condition.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances. Maintain lids, grates and shields on openings.

Immediately remove all foreign debris within the structure that may cause damage to pumps or agitators.

Pump the washwater storage tanks completely empty annually and cleanout any debris and other solid materials that may have accumulated in the tanks.

**Provide proper ventilation before entering the tank, for any reason what so ever. Provide and use self - contained breathing apparatus (scuba) equipment when entering a tank. No persons should enter the tank unless safety ropes are used and someone else capable of providing rescue assistance is outside the tank.**

**Do not assume any storage tank, including open top storage tanks, are well ventilated.**

#### **SOLIDS STORAGE/COMPOSTING FACILITY-**

The solids storage/composting facility shown on the Operation Map has a design capacity of 32,500 cubic feet or 585 tons to store and compost manure, bedding and other organic waste for a period of 240 days.

The solids storage/composting facility will serve as the primary storage facility for manure, bedding and other organic waste produced from the operation. Emptying of the solids storage facility should begin as early as possible in the spring. Emptying should continue through the spring and summer months as weather conditions permit exporting and applying solids in accordance with the guidance given the Nutrient Specification in Section 11. To function properly and have the greatest management flexibility, the solids storage/composting facility must be as empty as possible in October before the fall and winter rainy season begins.

The solids storage facility is designed with 5 foot high walls which will allow the solids to be stacked to a height of 8 feet. At no time should the solids be stacked higher than 8 feet or allowed to over top the walls of the structure.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of manure and organics from outside of the solids storage area and place them back in the solids storage facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

#### **BUILDING ROOFS-**

Inspect building roofs annually as a minimum. Repair and/or replace all rusted sections and secure loose sections as needed. Immediately replace all broken trusses, rafters, beams, poles as needed. Immediately determining the cause and necessary modification(s) to prevent reoccurring structural failure is essential.

**Specification: To be developed for planned collection tanks.**

Water and Sediment Control Basin (No)

**Field(s): Village**

**Status: Existing**

**Units: 3 Basins**

**Description:** Existing water and sediment control basins control water in drainageways, trap sediments and organics and provide habitat for ducks, geese, swans, flamingos and other native and exotic animals.

**Operation and Maintenance:** Periodically inspect the spillways and control gates for proper functioning for their ability to maintain the water level to design elevations. Immediately remove any blockage or obstructions in spillways.

Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization, and application of herbicides when necessary. Fertilize the established stand with at least 200 lbs of 21-0-0 per acre or equivalent annually or as needed to maintain a uniform vigorous stand. Periodic mowing may also be needed to control height.

If fences are installed, they shall be maintained to prevent unauthorized or animal entry.

Immediately repair any vandalism, vehicular, or livestock damage to any earthfills, spillways, outlets or other appurtenance.

Removal of debris that may accumulate at the Water and Sediment Control Basin and immediately upstream or downstream from the Basin.

Make sure all structure drains are functional and soil is not being transported through the drainage system. The screens and/or rodent guards shall also be kept in place.

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

**Specification: NA**

## Watering Facility (No)

### Field(s): Facilities, Village

**Status:** Existing

**Units:** 135

**Description:** Watering facilities are installed in the enclosures to provide drinking water to animals.

**Operation and Maintenance:** Check all above ground connections, valves, gates, rodent guards, inlets and outlets to make sure they are functioning properly. Check troughs and tanks for leaks or cracks and repair or replace immediately, if necessary.

Make certain the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems. Check periodically to see if debris has fallen into the trough or tank which may restrict inflow or planned functions of the outflow system.

Clean the entire system periodically and remove moss, algae growth, and/or sludge. Chemicals such as copper sulfate and chlorine can be used to prevent moss and algae growth. Local rules and regulations are to be followed when using chemicals to make sure they are safe for animals.

Where necessary maintain coverings and insulation to prevent-damage by freezing.

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

Immediately repair any vandalism, vehicular or damage by animals.

**Specification:** NA

## 2.4 Storage Period Worksheet 10A-7

### OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

6/25/2010

Version 3.7

CLIENT: Wildlife Safari  
 ASSISTED BY: Bruce Wilson, H&R Engineering

#### Worksheet OR10A-7--Waste storage period determination

Basic Storage Period, SPb = 213 Days

Enter average monthly Evapotranspiration(ET) from OSU Extension Publication 8530,  
 Oregon Crop Water Use and Irrigation Requirements, and Precipitation(Ppt) Data from

Climatic Station- WINCHESTER

Day of Year	MONTH	Crop ET, Inches	Accum ET, Inches	Ppt, Inches
1-31	January	0.59	0.59	5.13
32-59	February	0.71	1.30	4.47
60-90	March	1.97	3.27	3.97
91-120	April	3.23	6.50	2.94
121-151	May	4.49	10.99	1.99
152-181	June	5.28	16.27	0.98
182-212	July	6.65	22.92	0.41
213-243	August	5.59	28.51	0.65
244-273	September	4.33	32.84	1.14
274-304	October	2.80	35.64	2.41
305-334	November	0.63	36.27	5.89
335-365	December	0.51	36.78	5.81

a. Determine last day for the month of the year when 3/4 of Annual ET is exceeded-

$$3/4 \text{ of Annual ET} = 0.75 \times 36.78 = 27.59 \text{ Inches}$$

L = Last Day for Month Accum ET exceeds 3/4 of Annual ET

$$L = 243 \text{ Days}$$

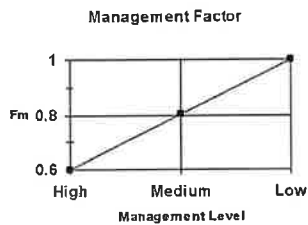
b. Determine first day for the month of the year when ET >= Ppt-

E = First Day of Month ET >= Ppt

$$E = 91 \text{ Days}$$

$$c. SPb = 365 - (L - E) = 365 - (243 - 91) = 213 \text{ Days}$$

Management Factor, Fm = 0.8



Low Level, Fm = 1.0  
 ..The operator does not utilize a waste management plan.  
 ..Proper operation and maintenance may not be performed

Medium Level, Fm = 0.8  
 ..The operator utilizes an up-to-date waste management plan.  
 ..Manure application equipment is calibrated for nutrient applications  
 ..Maintains adequate soil moisture for crop growth.  
 ..Agronomic treatments which would maximize crop nutrient uptake are not fully utilized  
 ..Proper operation and maintenance is planned.

High Level, Fm = 0.6  
 ..The operator utilizes an up-to-date waste management plan  
 ..Soil fertility testing is performed annually.  
 ..Manure in storage is tested for nutrient concentrations  
 ..Records of time, rate and location of manure applications are maintained  
 ..Manure application equipment is calibrated for nutrient applications  
 ..Irrigation water management techniques are practiced.  
 ..Crop nutrient uptake is maximized with appropriate agronomic treatments such as residue management, conservation crop rotation, crop variety selection, prescribed grazing, and pest management.  
 ..Proper operation and maintenance is planned.





OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

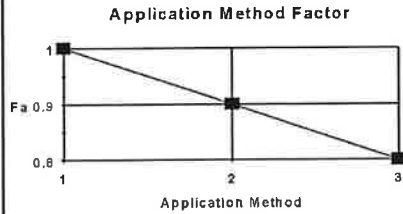
6/25/2010

Version 3.7

CLIENT: Wildlife Safari  
 ASSISTED BY: Bruce Wilson, II&R Engineering

Worksheet OR10A-7--Waste storage period determination

Application Method Factor:  $F_{aLIQUID} = 0.90$   $F_{aSOLID} = 1.00$



Method 1 - Surface applied solid manure, no incorporation.  
 Method 2 - Surface applied liquid manure, no incorporation.  
 Method 3 - Injection or immediate incorporation.

Adjusted Storage Period:  $ASP_{LIQUID} = 138$  Days  $ASP_{SOLID} = 119$  Days

$ASP = SP_b \times F_m \times F_s \times F_l \times F_n \times F_a$

$ASP_{LIQUID} = 213 \times 0.8 \times 0.9 \times 1 \times 1 \times 0.9$

$ASP_{SOLID} = 213 \times 0.8 \times 0.7 \times 1 \times 1 \times 1$

Adjusted earliest Day of Year for application,  $E_a = ASP - (365 - L)$

$E_{aLIQUID} = 16$

$E_{aSOLID} = -3$

Storage Period:  $SP_{LIQUID} = 154$  Days  $SP_{SOLID} = 154$  Days

The storage period must span the seasonal flooding conditions and must also span frozen ground and snow conditions where the land slope exceeds 5% and a buffer strip of less than 100 feet exists next to open water courses that affect the application area-

a. Enter L from Sheet 1 and determine the Day of Year  $L_r$  when seasonal frozen ground, snow or flooding conditions are first anticipated for the application area-

$L = 243$  Days  $L_r = 365$  Days

If  $L_r$  comes before L then  $L_{sp} = L_r$

If  $L_r$  comes after L or there is no seasonal frozen ground, snow or flooding then  $L_{sp} = L$

$L_{sp} = 243$  Days

b. Determine the Day of Year  $E_r$  when seasonal frozen ground, snow or flooded conditions are no longer anticipated for the application area-

$E_r = 32$  Days

If  $E_r$  comes after  $E_s$  then  $E_{sp} = E_r$

If  $E_r$  comes before  $E_s$  or there is no seasonal frozen ground, snow or flooding then  $E_{sp} = E_s$

$E_{spLIQUID} = 32$  Days  $E_{spSOLID} = 32$  Days

c.  $SP_{LIQUID} = 365 - (L_{sp} - E_{spLIQUID}) = 154$  Days

$SP_{SOLID} = 365 - (L_{sp} - E_{spSOLID}) = 154$  Days

d. Earliest date ( $E_{sp}$ ) for manure application (month-day):

$E_{spLIQUID} =$  February 4

$E_{spSOLID} =$  February 1

e. Latest date ( $L_{sp}$ ) for manure application (month-day) = September 31



**OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)**

6/25/2010

Version 3.7

CLIENT: **Wildlife Safari**  
 ASSISTED BY: **Bruce Wilson, H&R Engineering**

**Worksheet OR10A-7--Waste storage period determination**

<b>Day of Year Calendar</b>												
Day of month	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	32	60	91	121	152	182	213	244	274	305	335
2	2	33	61	92	122	153	183	214	245	275	306	336
3	3	34	62	93	123	154	184	215	246	276	307	337
4	4	35	63	94	124	155	185	216	247	277	308	338
5	5	36	64	95	125	156	186	217	248	278	309	339
6	6	37	65	96	126	157	187	218	249	279	310	340
7	7	38	66	97	127	158	188	219	250	280	311	341
8	8	39	67	98	128	159	189	220	251	281	312	342
9	9	40	68	99	129	160	190	221	252	282	313	343
10	10	41	69	100	130	161	191	222	253	283	314	344
11	11	42	70	101	131	162	192	223	254	284	315	345
12	12	43	71	102	132	163	193	224	255	285	316	346
13	13	44	72	103	133	164	194	225	256	286	317	347
14	14	45	73	104	134	165	195	226	257	287	318	348
15	15	46	74	105	135	166	196	227	258	288	319	349
16	16	47	75	106	136	167	197	228	259	289	320	350
17	17	48	76	107	137	168	198	229	260	290	321	351
18	18	49	77	108	138	169	199	230	261	291	322	352
19	19	50	78	109	139	170	200	231	262	292	323	353
20	20	51	79	110	140	171	201	232	263	293	324	354
21	21	52	80	111	141	172	202	233	264	294	325	355
22	22	53	81	112	142	173	203	234	265	295	326	356
23	23	54	82	113	143	174	204	235	266	296	327	357
24	24	55	83	114	144	175	205	236	267	297	328	358
25	25	56	84	115	145	176	206	237	268	298	329	359
26	26	57	85	116	146	177	207	238	269	299	330	360
27	27	58	86	117	147	178	208	239	270	300	331	361
28	28	59	87	118	148	179	209	240	271	301	332	362
29	29		88	119	149	180	210	241	272	302	333	363
30	30		89	120	150	181	211	242	273	303	334	364
31	31		90		151		212	243		304		365



## 2.5 Livestock Manure Storage Assessment Worksheet

Ground & Surface Water Contaminants - Nutrients, Organics & Pathogens					
Rating Item	Low Risk 4 Points	Low-Mod Risk 3 Points	Mod-High Risk 2 Points	High Risk 1 Point	Score
1. No on-farm storage facilities	Wastes hauled off farm for proper storage and disposal			Daily spreading of livestock wastes	NA
2. On-farm storage Manure stack  and/or  Liquid/Slurry storage	Manure stack covered; on impermeable surface; rainfall and runoff diverted; built to NRCS standards.  Concrete, clay lined, or other liquid tight design; designed and built to NRCS standards; properly maintained; no cracks and leaks.	Manure covered; on low permeable soil; rainfall and runoff diverted.  Earthen structure built to NRCS standards and properly maintained.	Manure partially covered; on slightly permeable soils; some runoff collected.  Not designed to NRCS standards; on slightly permeable soils; poorly maintained, some evidence of cracks and leaks.	Manure not covered; runoff not collected.  Not designed to NRCS standards; on permeable soils; not maintained; leaks and cracks.	4  4
3. Storage volume	Not full at end of rainy season; if liquid/slurry adequate capacity to hold 25-year, 24-hour storm; solids removed to avoid loss of storage capacity.	Not full at end of rainy season; if liquid/slurry not adequate capacity to hold 25-year, 24-hour storm.	Storage facility requires occasional emptying during the rainy season; if liquid/slurry not adequate capacity to hold 25-year, 24-hour storm.	Storage facility requires regular emptying during the rainy season; if liquid/slurry not adequate capacity to hold 25-year, 24-hour storm.	2
4. Storage location	Manure stack or earthen pond located more than 500 feet from well, stream, pond, or drainageway.  Or Liquid/slurry storage located more than 200 feet from well, stream, pond, or drainageway or has emergency containment dike for accidental spills or leaks.	Manure stack or earthen pond located between 250-500 feet from well, stream, pond, or drainageway.  Or Liquid/slurry storage located between 100-200 feet from well, stream, pond, or drainageway	Manure stack or earthen pond located less than 250 feet downslope from well, stream, pond, or drainageway.  Or Liquid/slurry storage located more than 100 feet downslope from well, stream, pond, or drainageway	Manure stack or earthen pond located less than 250 feet upslope from well, stream, pond, or drainageway.  Or Liquid/slurry storage located 100 feet from upslope well, stream, pond, or drainageway	1
Livestock Waste Storage Rating for Ground & Surface Waters	Accumulative Score (sum of above ratings)				11.00
	Average Score (sum of ratings / number of items rated)				2.75
<b>Overall Risk Rating-</b>		<b>Low to Moderate Risk</b>			

Ratings: 3.6-4=Low risk, 2.6-3.5=Low to moderate risk, 1.6-2.5=Moderate to high risk, 1-1.5=High Risk

Source: Modification of Oregon Home\*A\*Syst, EM 8546, Worksheet #7, Livestock Waste Storage

## 2.6 Livestock Yard Management Assessment Worksheet

Ground & Surface Water Contaminants – Nutrients, Organics & Pathogens					
Rating Item	Low Risk 4 Points	Low-Moderate Risk 3 Points	Mod-High Risk 2 Points	High Risk 1 Point	Score
1. Location	More than 200 feet from well and more than 500 feet from stream, pond, or drainageway	Between 100-200 feet of well and between 250-500 feet from stream, pond, or drainageway	Between 50-100 feet of well and between 100-250 feet from stream, pond, or drainageway	Less than 50 feet of well and less than 100 feet from stream, pond, or drainageway	1
2. Livestock water source	Stock water in troughs, with overflow diverted to wastewater system	Stock water in troughs with overflow diverted from lot area. Stock excluded from streams or ditches.	Live water fenced, with stock water provided in water gap.	Stock water provided by live stream or irrigation ditch.	3
3. Surface water diversion	All upslope and roof water diverted. Diversion and gutters well maintained.	Most upslope surface and roof water diverted. Diversions and gutters occasionally maintained.	No surface water diverted. Some roof water collected and redirected. Gutters and diversions not maintained.	All water (surface and roof water) runs through the yard.	3
4. Lot runoff control system	No yard runoff. Fully covered area or runoff from surfaced lot directed to waste storage facility.	All runoff collected from compacted, earthen lot. Solids mounded and collected or stored.	Most of lot runoff diverted to filter strip and collected. Some solids removed.	Lot runoff uncontrolled. Solids rarely collected.	2
5. Yard cleaning and scraping	No yard (animals confined)	Every month or two lot smoothed, leveled, and regularly shaped.	Quarterly. Lot rough and irregular in shape.	Rarely. Lot poorly sited and developed for cleaning and scraping.	3
6. Dairy cow concentration on yard	No yard. Confined to barn, roofed yard or pasture.	75 sf/a or more on fenced, curbed concrete pad and/or 400 sf/a on graded earthen surface. More than 1800 sf/a in exercise area.	50 sf/a or more on concrete pad and/or 200-300 sf/a on earthen surface. More than 1200 sf/a in exercise area.	Some concrete, less than 50 sf/a and less than 200 sf/a on earthen surface.	NA
7. Dairy replacements concentration	No yard. Confined to barn, roofed yard, or pasture.	More than 40 sf/a on fenced, curbed concrete pad and/or more than 150 sf/a on earthen yard.	40-20 sf/a on concrete and/or 75-150 sf/a on earthen surface.	Less than 75 sf/a on earth.	NA

<b>Ground &amp; Surface Water Contaminants – Nutrients, Organics &amp; Pathogens</b>					
<b>Rating Item</b>	<b>Low Risk 4 Points</b>	<b>Low-Moderate Risk 3 Points</b>	<b>Mod-High Risk 2 Points</b>	<b>High Risk 1 Point</b>	<b>Score</b>
8. Beef feeder concentrations	No yard. Confined to barn.	Barn and/or paved lot more than 50 sf/a. Earthen lot with mound more than 300 sf/a, or without mound more than 500 sf/a.	No shelter. Paved lot with 30-50 sf/a. Earthen lot with mound 150-300 sf/a or earthen without mound 250-500 sf/a.	Paved less than 30 sf/a. Earthen less than 250 sf/a.	NA
9. Beef cows/heifers concentrations	Barn, roofed yard, or pasture.	Barn with paved lot more than 60 sf/a. Earthen with mound 400 sf/a or without mound 600 sf/a.	Paved lot more than 30 sf/a. Earthen with mound 200-400 sf/a or without mound 300-600 sf/a.	Paved less than 30 sf/a. Earthen without mound less than 200 sf/a.	NA
10. Sheep/ewes concentrations	No yard. Confined to barn, roofed yard, or pasture.	Barn and paved lot more than 20 sf/a. Earthen more than 40 sf/a.	Barn and paved lot 15-20 sf/a. Earthen 25-40 sf/a.	Barn and paved lot less than 15 sf/a. Earthen less than 25 sf/a.	NA
11. Feeder lambs concentrations	No yard. Confined to barn, roofed yard, or pasture.	Barn and paved lot more than 10 sf/a. Earthen more than 25 sf/a.	Barn and paved lot 5-10 sf/a. Earthen 10-25 sf/a.	Barn and paved lot less than 5 sf/a. Earthen less than 10 sf/a.	NA
12. Hogs/sows Concentrations	No yard. Confined to barn.	Shed and paved lot more than 30 sf/a.	Shed and earthen lot more than 10 sf/a	Shed and earthen lot less than 10 sf/a.	NA
13. Horses concentrations	No yard. Confined to barn, roofed yard, or pasture.	Earthen exercise lot more than 2,500 sf/a.	Earthen exercise lot 1,000-2,500 sf/a.	Earthen exercise lot less than 1,000 sf/a	NA
14. Poultry concentrations	No lot. In building.		Earthen lot of more than 4 sf/a.	Earthen lot of less than 4 sf/a.	NA
15. Exotic Animal concentrations	No yard. Confined to barn, roofed yard, or pasture.	Barn and paved lot more than 10 sf/a. Earthen more than 25 sf/a.	Barn and paved lot 5-10 sf/a. Earthen 10-25 sf/a.	Barn and paved lot less than 5 sf/a. Earthen less than 10 sf/a.	4
Livestock Yard Rating		Accumulative Score (sum of above ratings)			<b>16.00</b>
		Average Score (sum of ratings / number of items rated)			<b>2.67</b>
<b>Overall Rating-</b>		<b>Low to Moderate Risk</b>			

Ratings: 3.6-4=Low risk, 2.6-3.6=Low to moderate risk, 1.6-2.5=Moderate to high risk, 1-1.5=High Risk

Note: sf/a = square feet per animal

Source: Modification of Oregon Home\*A\*Sys, EM 8546, Worksheet #8, Livestock Yards Management



## 2.7 Mortality Management

Currently animal mortalities for this operation are being disposed of by burial and if appropriate, feeding to carnivores cared for at the park.

Having dead animals sent to an acceptable disposal site is the best method to deal with animal mortalities. A list of landfills and phone numbers can be found on the internet at <http://www.deq.state.or.us/lq/sw/disposal/permittedfacilities.html>. If a local landfill is not permitted to accept animal carcasses, the Oregon Department of Environmental Quality (DEQ) may grant an exception. Phone numbers to local DEQ offices can be found in most phone books or on the internet at <http://www.deq.state.or.us/about/locations.html>.

Under no circumstances are animal mortalities to be disposed of in any type of liquid manure storage facility.

Refer to Section 3 for guidance on steps to take for a catastrophic animal mortality event.

Some alternative methods that can be used for composting animal mortalities are:

**Composting-** Components of this plan are considered adequate to meet the requirement for having a composting plan for the Oregon Department of Agriculture, Natural Resources Division. The composting facility for animal mortalities must have a concrete floor or similar impervious surface to prevent nutrient leaching. A roof covering the animal mortality composting facility is recommended to control moisture added by rainfall and rainfall runoff. A permit is also needed from the Department of Environmental Quality (DEQ) if animal mortalities will be imported from other farms for composting.

Rapid composting of dead animals occurs when the carbon to nitrogen (C:N) ratio of the compost mix ranges between 10 and 20 to 1. To achieve the recommended C:N ratio, build the initial compost pile by placing 18 inches of sawdust or other bulking agent on the floor of the composting area. The bulking agent should extend beyond the perimeter of the animal to be composted by at least 2 feet. If using a compost bin the bulking material should extend at least 1 foot beyond the perimeter of the animal being composted. Using a bulking agent such as sawdust will absorb any liquids as the animal decomposes during the composting process.

Once the bulking agent has been placed on the floor of the composting area, place the animal carcass on top. To decrease composting time and prevent bloating the body cavity should be cut open. Cover the carcass with 1 to 3 feet of separated manure solids or other material that has a moisture content between 30 to 60 percent and a C:N ratio of not more than 30 to 1. Use 1 foot of material for small carcasses and 3 feet for large carcasses such as cattle. Be careful not to add material that is too wet as it will hinder the composting process and cause odors. Small animals can be layered in a compost pile by placing 12 inches of the bulking agent between layers as shown in the figure below. Be sure the total height of the compost pile does not exceed 7 feet in height as it may spontaneously combust causing a fire.

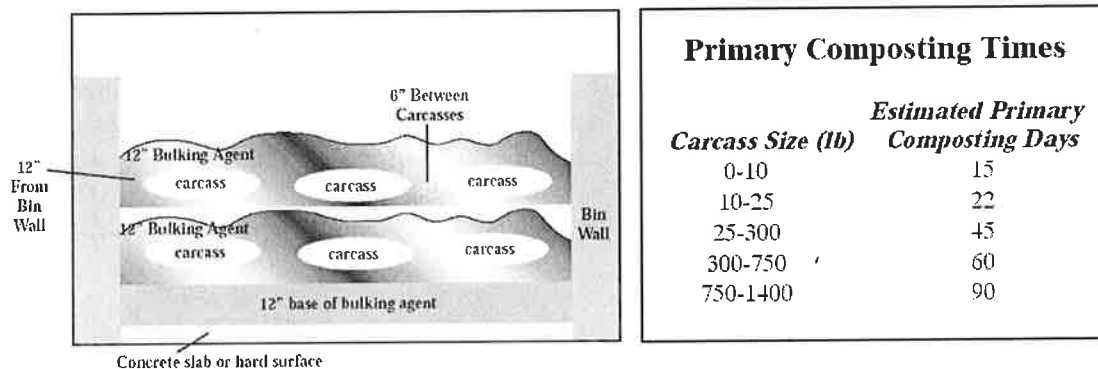
The first heating or primary composting cycle will take approximately 15 to 90 days depending on the size of the animal being composted. Refer to the table below for estimated primary composting times. Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at multiple points around the compost pile and at a point approximately 3 feet into the pile. The temperature of the compost pile should reach 130 degrees Fahrenheit (F) within a few days. Temperatures should peak between 130 and 150 degrees F in 3



to 4 days. When the temperature of the compost pile falls below 130 degrees F, the compost needs to be aerated by turning or other means. Be sure carcasses remain covered with the bulking agent after being aerated. It is important to maintain a temperature above 130 degrees F for at least 7 days during the primary composting cycle as failure to do so may result in the incomplete destruction of pathogens and can cause fly and odor problems. After aerating the compost pile, the secondary composting times will be similar to the first.

**CAUTION:** It is unclear whether prions that are the proteins that cause Bovine Spongiform Encephalitis (BSE or Mad Cow Disease) are destroyed in the composting process. Animals showing signs of Mad Cow Disease and those with anthrax should not be composted and must be reported to the Oregon Department of Agriculture, Animal Health and Identification Division at (503) 986-4680 for guidance on disposal.

After aerating the compost pile by turning or other means, be sure to check the moisture content and add water if necessary being careful not to add too much water. The compost pile should feel moist to the touch but you should not be able to squeeze any water out of it.



Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost pile.

After the composting process is finished, it may be used as a bulking agent for a new compost pile. A rule of thumb is to use 50 percent of the composted material for a bulking agent but you may want to use more or less depending on how degraded the bulking agent is in the finished compost. Using finished compost in a new compost pile reduces the amount of bulking agent needed for the new pile and provides microbial inoculants to get the composting process started.

Finished compost can also be applied to crop and pasture land fields for utilization of the nutrients and organics in the composted material. Compost from animal mortalities should not be applied to crops that will be consumed directly by humans. The nutrient content of the composted material should be determined and application equipment calibrated to ensure nutrients contained in the composted material are not over applied.

**Natural Disposal-** To allow nature to take its course the dead animal needs to be transported to a location at least ½ mile from any off-farm dwelling and at least ¼ mile from any water way in accordance with ORS 601.140. Once this criteria is met the carcass can be left to degrade naturally with the help of scavengers. This method is not an acceptable means of disposal for a large number of animal mortalities or for byproducts generated during butchering.

**Landfill-** Dead animals may be transported to a permitted landfill that accepts animal carcasses

for disposal. Be sure to call the chosen landfill first to insure a landfill will accept your animal carcasses. Refer to the website given previously for permitted landfills to call. Contact the landfill operator and the DEQ at (800) 452-4011 if the landfill you would like to use is not a permitted facility to see if an exception may be granted for the disposal of animal carcasses.

**Incineration-** Dead animals may be burned as a method of disposal and as a method to control diseases. The economics of incineration and availability of incineration units usually make this option undesirable. A permit is needed from the Oregon Department of Environmental Quality (DEQ) Air Quality program to operate an incineration unit. Contact your DEQ at (800) 452-4011 for guidance on incineration of animal carcasses.

**Burial-** Dead animals may be buried in accordance with ORS 601.090(7) as a method of disposal. Large animals such as an adult cow will require a hole approximately 2 feet by 7 feet by 8 feet deep. Be sure to select a site that doesn't have a water table to insure the bottom of the hole will be dry. The animal carcass should be covered with hydrated lime and covered with at least 4 feet of soil mounded 2 feet above the natural ground line to allow for settling as the carcass decomposes. Burial sites should be located at least 500 feet down slope from surface waters or wells.

Burial is not an acceptable method of disposal for animal byproducts generated from butchering. Burial of large numbers of animal mortalities is not acceptable unless performed in accordance with a Catastrophic Animal Mortality Management Plan. Burial of imported animal mortalities is subject to disposal regulations and the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Agriculture (ODA) and the local land use planning authority should be contacted.

## Section 3. Farmstead Safety and Security

### 3.1 Emergency Response Plan

#### **In Case of an Catastrophic Animal Mortality Event**

**Implement the following steps:**

- a. Remove animal mortality from the livestock production area and place in an area designated for mortality storage.
- b. Contact a veterinarian if animal death is suspicious or animal displayed unusual symptoms before death.
- c. If it is determined that a disease outbreak is eminent, implement procedures as directed by the State Veterinarian. This may include killing exposed animals, burning their carcasses and burial of their ashes in a predetermined catastrophic mortality burial area.

#### **In Case of an Emergency Storage Facility Spill, Leak or Failure**

**Implement the following steps:**

- a. Stop all other activities to address the spill.
- b. Stop all flow into the facility.
- c. If the storage facility is at maximum capacity or overtopping, draw the waste level in the facility down by making an application to the emergency application area shown on the Farm Fields Map.
- d. Assess the extent of the emergency and determine how much help is needed to correct the problem.
- e. Call for help (See Table 3.1 and 3.2) and excavator if needed.
- f. If possible, use a skid loader or tractor with blade to contain or divert spill or leak away from environmentally sensitive areas.
- g. If containment material is needed, excavate soil from appropriate areas away from the storage facility.
- h. Complete the clean-up and repair the necessary components.
- i. Assess the extent of the emergency and request additional help if needed.
- j. If a Discharge to ground or surface waters occurs, the Oregon Department of Agriculture is to be Notified within 24 hours (See Table 3.3) and a Written Report is to be made by the Owner or Operator to Oregon Department of Agriculture within 5 Days that contains the following information:
  - (1) A description and cause of the discharge.
  - (2) The period of discharge including exact dates, times and duration of discharge.
  - (3) An estimate of discharge volume.
  - (4) Name or location of receiving water.
  - (5) Corrective steps taken, if appropriate, to reduce, eliminate or prevent reoccurrence of the discharge.

**In Case of an Emergency Spill, Leak or Failure During Transport or Land Application**

**Implement the following first containment steps:**

- a. Stop all other activities to deal with the emergency.
- b. Call sheriff's office (See Table 3.1) if manure is spilled on road for traffic control and clean the spill immediately from the road and roadside if needed.
- c. Contain the spill or runoff from entering surface waters using straw bales, saw dust, soil or other appropriate materials.
- d. If flow is coming from a tile, plug the tile with a tile plug immediately.
- e. Assess the extent of the emergency and request additional help if needed.
- k. If a Discharge to ground or surface waters occurs, the Oregon Department of Agriculture is to be Notified within 24 hours (See Table 3.3) and a Written Report is to be made by the Owner or Operator to Oregon Department of Agriculture within 5 Days that contains the following information:
  - (1) A description and cause of the discharge.
  - (2) The period of discharge including exact dates, times and duration of discharge.
  - (3) An estimate of discharge volume.
  - (4) Name or location of receiving water.
  - (5) Corrective steps taken, if appropriate, to reduce, eliminate or prevent reoccurrence of the discharge.

The land application equipment will be constantly monitored by the person conducting the land application of manure. In order to prevent an accident or spill during land application, operator should complete an inspection of the land application equipment to ensure proper function prior to performing land application. In addition, weather conditions (wind speed and direction, precipitation, etc.) and field conditions (proper setbacks noted, soil moisture, etc.) should be verified prior to land application.

**Table 3-1. Department/Agency Phone Numbers**

Department / Agency	Phone Number
Fire Emergency	911
Fire Non-Emergency	(541) 679-8721
Ambulance	911
Sheriff Emergency	911
Sheriff Non-Emergency	(541) 440-4450

**Table 3-2. Available equipment/supplies for responding to emergency**

Equipment Type	Contact Person	Phone Number
Nearest excavation equipment		



**Table 3-3. Contacts to be made by the Owner or Operator within 24 hours of Manure Spill, Leak or Facility Failure.**

<b>Organization</b>	<b>Phone Number</b>
Oregon Department of Agriculture Confined Animal Feeding Program 635 Capitol Street N.E. Salem, OR 97301-2532	(503) 986-4700 TTD (503) 986-4762
Oregon Emergency Response System (ORES)	(800) 452-0311
County Environmental Health Department	(541) 440-3578

**Be prepared to provide the following information:**

- a. Your name and contact information.
- b. Farm location and other pertinent identification information.
- c. Description of the emergency.
- d. Estimate of the amounts, area covered, and distance traveled.
- e. Whether manure has reached surface waters or major field drains.
- f. Whether there is any obvious damage; i.e., employee injury, fish kill, or property damage.
- g. Current status of containment efforts.

**3.2 Safety**

Waste collection and management facilities should be kept in a state of good repair and safe operating condition at all times. Warning signs, ladders, ropes, bars, rails, and other safety devices should be provided, as appropriate, to help insure the safety of humans and livestock. Each device should be structurally adequate to support anticipated loads. (A rope may be adequate sight warning, but inappropriate to support a person who accidentally slips on wet concrete.)

At least four noxious gasses are generated when organic waste is subject to anaerobic processes. They are: Methane (CH<sub>4</sub>), Hydrogen Sulfide (H<sub>2</sub>S), Ammonia (NH<sub>3</sub>) and Carbon Dioxide (CO<sub>2</sub>). In high enough concentrations, all can be lethal through lack of oxygen or poisoning. (Three gases are heavier than air and will exclude oxygen from depressed areas.) All but carbon dioxide can be explosive. Ventilation and warning signs must be provided for enclosed waste holding structures to help prevent explosions, poisoning or asphyxiation. Pipelines from an enclosed tank(s) in a building should be provided with a water - sealed trap and vent to prevent gas entry into the building.

**Entry into pits, ponds or tanks should not be allowed but if entry cannot be avoided the following procedures should be adhered to:**

- 1) **Ventilate the facility before and during occupancy and use a self-contained breathing apparatus. Do not assume any storage tank, including open top storage tanks, are well ventilated.**
- 2) **Attach a tether or lead capable of supporting the weight of the person entering the facility and have a person outside the facility at all times tend the tether or lead.**



**When inspecting or working on machinery, the following procedures should be adhered to:**

- 1) Disconnect all power connections and provide lockouts whenever possible.**
- 2) Use blocks in front and behind rolling equipment to prevent movement.**

**Obey all warning signs posted around manure storage structures.**

**Beware of vehicle traffic and avoid travel paths of rapidly moving equipment.**

**Beware of slip, trip and fall hazards such as extension cords, wet or manure coated floors, and rotted wood or loose boards.**

**Avoid equipment without proper safe guards such as tractor power take offs, grain augers, feed grinders, mowers and ventilation fans.**

**Wear a dust mask in dusty environments both indoors and outdoors.**

**Stay away from any loose electrical wiring or electrical fence wiring unless power has been turned off.**

### **3.3 Biosecurity Measures**

In order to reduce or prevent the spread of disease causing organisms (pathogens) a few simple guidelines should be followed:

1. Ask visitors to give advance notice before visiting the farm and be prepared to provide biosecurity practices they will have to follow during their visit. As a minimum it is recommended that visitors to the farm that will be entering the production area wash and disinfect their vehicle and boots prior to their visit. It is also a good idea to have visitors wait 24 hours before visiting the farm if they plan to visit other farms just prior to their scheduled visit.
2. If at all possible have visitors avoid livestock housing and feed storage areas. If visitors must enter livestock housing and feed storage areas make sure their boots are washed and disinfected before entering or have disposable boots on and are wearing clean clothes or disposable overalls.
3. Do not allow visitors to drive their vehicles through livestock housing and feed storage areas after driving through areas containing animal manure.
4. If potential visitors have visited a farm with Foot-and-Mouth Disease (FMD) make sure they disinfect all clothing and personal items and make them wait at least five days before visiting your farm.

### 3.4 Catastrophic Mortality Management

<b>Catastrophic Animal Mortality Event</b>
--

- a. Remove animal mortality from the livestock production area and place in an area designated for mortality storage.
- b. Contact a veterinarian if animal death is suspicious or animal displayed unusual symptoms before death.
- c. If it is determined that a disease outbreak is eminent, implement procedures as directed by the State Veterinarian. This may include killing exposed animals, burning there carcasses and burial of their ashes in a predetermined catastrophic mortality burial area.

**Table 3-4. Catastrophic Mortality Management Contacts**

<b>Organization</b>	<b>Phone Number</b>
<b>Oregon Department of Agriculture Natural Resources Division 635 Capitol St. N.E. Salem, OR 97301-2532</b>	<b>(503) 986-4700 TTD (503) 986- 4762</b>
Oregon Emergency Response (System ORES)	(800) 452-0311
County Environmental Health Department	
Veterinarian	

**Be prepared to provide the following information:**

1. Your Name and phone number.
2. Farm Identification (See Above).
3. Cause of catastrophic animal mortality event.
4. Estimate of the number of current and projected animal mortalities.
5. What is currently in progress to deal with the situation?

### 3.5 Chemical and Petroleum Handling, Use and Storage

The Wildlife Safari plans to use a minimal amount of herbicides to manage noxious and unwanted weed species at the park. These herbicides are stored in their original labeled containers from the manufacturer in an enclosed storage shed in the maintenance area of the Village area. It is planned that no more than 1 gallon of each product will be stored at anytime. The most sensitive area in the Village area are the intermittent drainageways and water and sediment control basins. Potential for herbicide release (spill) that would contaminate the intermittent drainageways and water and sediment control basins is low due to the distance from the storage area to these facilities. Empty containers are rinsed and disposed of according to the requirements on the product label.

Gasoline and diesel is also stored in the maintenance area in 500 gallon tanks.

The maintenance storage areas for gasoline, diesel and herbicides do not contain provisions for secondary containment and the maintenance section does not have material safety data sheets (MSDS) for these hazardous materials. It is recommended that secondary containment be considered for the maintenance area where gasoline, diesel and herbicides are stored as well as obtaining MSDS sheets and maintaining them in a location known to and accessible by all employees of the park that could come into contact with these chemicals and petroleum products.

The risk of petroleum products or other hazardous chemicals reaching sensitive areas is low due to the distance from the storage areas for these products to drainageways and water and sediment control basins.

The following measures shall be taken to prevent chemicals from contaminating process water or storm water storage and treatment systems:

1. Make sure all chemicals are stored in proper containers. Expired chemicals and empty containers are to be properly disposed of in accordance with state and federal regulations. Pesticides and associate refuse are to be disposed of in accordance with the FIFRA label.
2. Chemical storage areas are to be self-contained with no drains or other pathways that will allow spilled chemicals to exit the storage area.
3. Chemical storage areas are to be covered to prevent chemical contact with rain or snow.
4. Emergency procedures and equipment are to be in place to contain and clean up chemical spills.
5. Chemical handling and equipment wash areas are to be designed and constructed to prevent contamination of surface waters, waste water, and storm water storage and treatment systems.

## Section 4. Land Application Site Information (Land Treatment)

### 4.1 Land Inventory

There are approximately 203 acres of pasture land area available on the Wildlife Safari park for utilization of manure and organics produced from park operations. The amount of spreadable acres for utilization of the nutrients and organics contained in the washwater and solids produced from the Wildlife Safari are shown in the following table:

**Table 4-1. Field Information**

Field ID	Sub-field ID	Total Acres	Spreadable Acres	FSA Farm	FSA Tract	FSA Field	County	Predominant Soil Type	Slope (%)
Village	NA	16.0	16.0	NA	NA	NA	Douglas	48C (Curtin C)	12.0
The Americas	NA	78.0	78.0	NA	NA	NA	Douglas	48C (Curtin C)	12.0
Africa	NA	76.0	76.0	NA	NA	NA	Douglas	188D (Pengra SIL)	10.0
Asia	NA	32.4	32.4	NA	NA	NA	Douglas	48C (Curtin C)	12.0
Wetlands	NA	12.2	7.5	NA	NA	NA	Douglas	44A (Conser SICL)	3.0
Facilities	NA	12.8	12.8	NA	NA	NA	Douglas	189E (Philomath SIC)	8.0
Natural Area 1	NA	283.7	283.7	NA	NA	NA	Douglas	189E (Philomath SIC)	16.0
Natural Area 2	NA	42.6	42.6	NA	NA	NA	Douglas	188E (Pengra SIL)	25.0
Natural Area 3	NA	30.2	30.2	NA	NA	NA	Douglas	189E (Philomath SIC)	16.0
Cheetah Area	NA	19.0	19.0	NA	NA	NA	Douglas	48C (Curtin C)	12.0

The land application fields and spreadable acres are shown on the Area Map in this section.

## 4.2 Environmental Inventory (Sensitive Areas)

The Wildlife Safari is located in the South Umpqua River watershed having an eight-digit Hydrologic Unit Code (HUC) of 17100302. All rainfall runoff from the Wildlife Safari will be captured by intermittent drainageways and Applegate Creek that flow to the South Umpqua River. The Area Map located in this section shows all surface water bodies that would receive rainfall runoff from the Wildlife Safari and the Topographic Map located in Section 1 shows the park boundary location and watershed(s).

Applegate Creek is an intermittent stream that has limited beneficial uses for fish habitat due to inconsistent streamflows and barriers to fish migration. It does provide habitat for birds and animals. Any polluted runoff entering Applegate Creek will eventually impact the South Umpqua River. The South Umpqua River provides habitat for a number of species of endangered anadromous fish, including coho salmon, fall and spring chinook salmon, summer and winter steelhead, and seagoing and resident cutthroat trout. The Area Map and Topography map located in Section 1 show the boundaries of the Wildlife Safari park and its relation to Applegate Creek and the South Umpqua River. The Oregon Confined Animal Feeding Operation National Pollution Discharge Elimination System General Permit Number 01-2009 requires a minimum setback of 35 feet from any water course to prevent pollution of surface waters from polluted runoff due to land application of manure and runoff from park facilities. Minimum manure application setback distances from water features are shown on page 72 and in Table 6-4. Managers of the Wildlife Safari are planning to maintain setbacks to reduce the risk of polluted runoff from the land application and park facility areas from reaching Applegate Creek.

### 4.3 Land Treatment Area Map(s)





#### 4.4 Land Treatment Practices

Following are practices that the Wildlife Safari has implemented or plans to implement that address resource concerns for the park areas shown on the Area Map in Section 4.3:

##### Access Road (Ft)

**Field(s):** Africa, Asia, Cheetah, The Americas, Wetlands and Natural Areas 1 and 2

**Status:** Existing

**Units:** 30,060 Feet

**Description:** Existing roadways allow access to fields to perform needed management operations.

**Operation and Maintenance:** Maintain road and pathway surfaces in good condition, which includes periodic grading and addition of surface material when necessary. Prevent surface ponding by localized grading or addition of surface materials to remove depressions. Road base-course rock may be required to stabilize the road. If so, remove unstable materials and rebuild travelway. Limit traffic and animal access with fencing or barriers, where needed.

Remove debris, litter or blockages from roads and walkways. Also remove debris and maintain capacity of associated drainage ditches, drop inlets, culverts, bridges, waterways and storm water outlets.

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

Immediately repair any vandalism, vehicular, or animal damage to earthfills, side slopes, drainage facilities, water ways and storm water outlets or other appurtenances.

Maintain good vegetative cover, mulches, and other covering installed for erosion protection.

**Specification:** NA

##### Field Border (Ft)

**Field(s):** Africa, Asia, Cheetah, The Americas, and Wetlands

**Status:** Existing

**Units:** 20,278 Feet

**Description:** A strip of permanent vegetation consisting of grasses, forbs, shrubs and trees exists along the edge of intermittent drainageways and Applegate Creek as shown on the Area Map to protect water quality, control pests, sequester carbon in biomass and soils, and provide food and shelter for wildlife.

**Operation and Maintenance:** Do not apply washwater or solids to field border areas shown on the Area Map. Grazing of field border areas should be limited to ensure a good stand of vegetation (3 to 4 inches) is present in October before the fall and winter season begins.

Inspect and repair field borders after storms to fill in gullies, remove sediment accumulations, reseed disturbed areas, and perform other maintenance activities as needed to ensure the effectiveness of the border.



Do not mow or burn for weed control during the nesting season (normally May through July) to protect ground-nesting wildlife. In place of mowing, consider other vegetative management techniques, such as using "wickbar" herbicide applicators or prescribed burning in areas with adequate moisture.

Lightly disk the field border on a 2 or 3 year cycle to promote the growth of native vegetation.

**Specification: NA**

Irr.Pipeline-High-pressure, Underground, Plastic (Ft)

**Field(s): Natural Areas 1 and 2**

**Status: Existing**

**Units: 2,480 Feet**

**Description:** The existing high-pressure underground PVC pipeline at the location shown on the Area Map conveys water to intermittent drainageways and water and sediment control basins in an efficient manner to reduce water loss.

**Operation and Maintenance:** Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

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

**Specification: NA**

Irrigation System-Sprinkler (No-Ac)

**Field(s): Africa, Asia, Cheetah, and The Americas**

**Status: Planned**

**Units: 6 System- 1.5 Acres**

**Description:** Small sprinkler irrigation systems are planned to apply washwater generated from animal enclosure cleaning operations to grass treatment areas to filter solids and bacteria and utilize nutrients. The irrigation systems will be designed to apply washwater in an efficient manner to the treatment areas to manage soil moisture and apply nutrients and organics to promote plant growth without causing excessive runoff and leaching.

The sprinkler irrigation systems have are planned to produce 5-10 gallons per minute at an operating pressure between 40 and 60 pounds per square inch and will have an estimated application rate of 0.25 inches per hour.

Three sprinkler systems will be installed at Lions, Tigers, and Brown Bear huts. Improvements

will be made to the cougar system. Completion of these systems is dependent on available funding. Funding these systems could be part of a larger educational opportunity to educate the public about reusing washwater for irrigation purposes. Such education could be educational graphics and educational programs that could be incorporated into already existing wetland presentations. The goal would be to complete these projects by December 31, 2016.

**Operation and Maintenance:** Maintain sprinklers in accordance with the manufacturer's recommendations to help ensure trouble free operation. Prevent animal access to equipment during operation.

Clean plugged nozzles and replace if worn or defective.

Promptly repair all leaks by replacing valves, fittings, gaskets, worn or damaged parts.

**Specification: To be developed.**

Nutrient Management (Ac)
--------------------------

**Field(s): Africa, Asia, Cheetah, and The Americas**

**Status: Planned**

**Units: 205.4 Acres**

**Description:** The site vulnerability rating for phosphorus movement off the listed fields is based on the Western Oregon Phosphorus Index. The Africa area has a low vulnerability rating which allows manure, bedding and washwater from the waste storage facilities to be applied on a nitrogen basis. The Asia, Cheetah and The Americas area have a medium site vulnerability rating which allows manure, bedding and wastewater from the waste storage facilities to be applied on a nitrogen basis. Phosphorus will be monitored on all fields using soil tests and if soil phosphorus concentrations significantly increase, manure applications will be reduced which may result in some of the manure and washwater to be exported off farm. It is estimated that 732 cubic feet or 5,475 gallons of washwater and 15,342 cubic feet or 276 tons of composted solids will be applied annually to the pasture land areas. The total nutrients applied to the pasture land areas are 22,130 pounds of nitrogen, 16,948 pounds of phosphate, and 26,848 pounds of potash with 22,815 pounds of nitrogen, 8,281 pounds of phosphate and 27,894 pounds of potash removed in the plant biomass.

The sprinkler systems will be calibrated to apply washwater from the collection tanks at the rate needed to meet the nitrogen requirements of the vegetated treatment areas. The calculated nutrient concentrations in the collection tanks used in developing this plan are 21.2 pounds per 1,000 gallons (lbs/th Gal) of Nitrogen, 9.2 lbs/th Gal of Phosphate and 24.9 lbs/th Gal of Potash. The measured nutrient concentrations for the composted solids are 43.4 lbs/Ton of Nitrogen, 8.7 lbs/Ton of Phosphate and 46.7 lbs/Ton of Potash. No manure applications are to be made to the 35 foot field buffer shown on the Area Map. The emergency application area shown on the Farm Fields Map was selected based on topography, soil type, proximity to open water courses, and risk of flooding. This area will always have a growing crop on it during the fall and winter months in case weather conditions force emergency applications of liquids and solids to draw down storage facilities.

The protocol for soil and manure testing, fall soil nitrate testing, guidance for making emergency applications, protocol and schedule for calibrating application equipment, and the months



manure will be applied are contained in the specification.

**Operation and Maintenance:**

**Phosphorus:** Many streams and rivers are polluted with excessively high phosphorus levels. This phosphorus causes algae blooms, which cause dissolved oxygen levels and pH to fluctuate greatly, thus harming fish and other aquatic organisms. Most crops do not respond to phosphorus fertilizer unless soil test P levels are low (below 50 ppm P).

Phosphorus fertilizer comes from mines. There is a limited supply of high quality phosphorus ores to make phosphorus fertilizer (a consideration for future generations of farmers).

**Nitrogen:** Nitrogen loss reduces profits. Nitrogen runoff to streams from cropland, however, is usually not a major environmental issue, except where manure is applied at a high rate or ammonium type fertilizers are applied between May 1 to October 31 and excessive irrigation water washes them into the stream. Well and moderately well drained soils have a moderate to high risk of nitrate leaching. Poorly and somewhat poorly drained soils have a very low to low risk of nitrate leaching.

Excessive N fertilization can increase de-nitrification, which produces nitrous oxide (a greenhouse gas). Due to the local climate, most soil nitrogen in the nitrate form going into winter will be lost from the field and not be available for crop uptake. Nitrogen fertilizer is manufactured by the Haber process, which involves burning natural gas (a non-renewable resource).

Always perform the following tasks annually before making manure applications:

- Review nutrient management component of this plan annually and make adjustments when needed. Nutrient applications must be based on soil and/or tissue tests and a nutrient budget prepared before application begins.
- N applications must be based on OSU recommendations or N nutrient uptake in harvested portion of crop.
- P applications must be based on OSU recommendations or P uptake in harvested portion of crop if P index is high or very high.
- Credit must be taken for N supplied by previous legume crops, manure applications and sludge applications.
- Accurate records of rate, analysis and date of nutrient applications must be kept and maintained.

**Specification:**

**SCHEDULE FOR SAMPLING AND ANALYSIS**

In order to effectively implement nutrient management and waste utilization samples of feed, soils, crops, irrigation water, manure, wastewater, and solids need to be obtained and analyzed in accordance with the following criteria:

SAMPLE	NUMBER	NOTES
Solid Manure	2	Sample solids during applications in early spring and late summer if possible and have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH <sub>4</sub> -N), Phosphorus (P) and Potassium (K) plus percent moisture. Ask lab to report results in pounds per ton.
Washwater	2	Sample washwater during applications in early spring and late summer if possible and have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH <sub>4</sub> -N), Phosphorus (P) and Potassium (K) plus percent moisture. Ask lab to report results in pounds per thousand gallons.
Normal soil tests	All Fields within a 4 year period	Collect soil samples from fields and have them analyzed for P, K, pH, SMP (optional: test for B, Ca, Mg and % Organic Matter) in accordance with Oregon State University Extension publication PNW570-E, "Monitoring Soil Nutrients Using a Management Unit Approach" located in Appendix H of the NMP. This test can be done during any month. Ask lab to report results in parts per million (ppm).
Fall nitrate soil tests	All Manured Fields within a 4 year period	Collect soil samples from the manure application areas every fall (September 15-October 15) in accordance with Oregon State University Extension publication EM8832-E, "Post Harvest Soil Nitrate Testing" located in Appendix H of the NMP. Have soil samples analyzed for Nitrates (NO <sub>3</sub> -N), Phosphorus (P) and Potassium (K). Ask lab to report results in parts per million (ppm).

**SAMPLING LIQUID MANURE**

Liquid manure samples submitted for analysis should meet the following requirements:

- Manure samples submitted to a laboratory should represent the average composition of the material that will be applied to the field.
- Place sample in a sealed, clean plastic container with about a 1-pint volume. Glass is not suitable because it is breakable and may contain contaminants.
- Leave at least 1 inch of air space in the plastic container to allow for expansion caused by the release of gas from the manure material.
- Refrigerate or freeze samples that cannot be shipped on the day they are collected, minimizing chemical reactions and pressure buildup from gases.

Following are guidelines for obtaining liquid manure samples:

**Wastewater:** Premixing the surface liquid in the storage structure is not needed, provided it is the only component that is being pumped. Operators with multistage systems should draw samples from the storage structure they intend to pump for application to crops.

Samples should be collected using a clean, plastic container similar to the one shown in figure for liquid manure sampling on the next page. One pint of material should be taken from at least eight sites around the storage structure and then mixed in the larger clean, plastic container. Effluent should be collected at least 6 feet from the storage structure's edge at a depth of about a foot. Shallower samples from storage structure may be less representative than deep samples



because oxygen transfer near the surface sometimes alters the chemistry of the solution. Floating debris and scum should be avoided.

One pint of mixed material should be sent to the lab. Galvanized containers should never be used for collection, mixing, or storage due to the risk of contamination from metals like zinc in the container. These recommendations are adequate for making applications that draw the liquid level in the storage structure down a few feet. If an entire storage structure is to be emptied, more frequent sampling with many more sampling points is recommended.

**Slurry:** Manure materials applied as a slurry from a storage structure should be mixed prior to sampling. A liquid sampling device can be used to obtain a sample from agitated storage structure. If you wish to sample a storage structure without agitation, you must use a composite sampling device as the one shown in the figure on the next page.

Samples should be collected from approximately eight areas around the storage structure and mixed thoroughly in a clean, plastic container. An 8- to 10-foot section of 0.5- to 0.75-inch plastic pipe can also be used: extend the pipe into the pit with ball plug open, pull up the ball plug (or press your thumb over the end to form an air lock), and remove the pipe from the manure, releasing the air lock to deposit the manure in the plastic container.

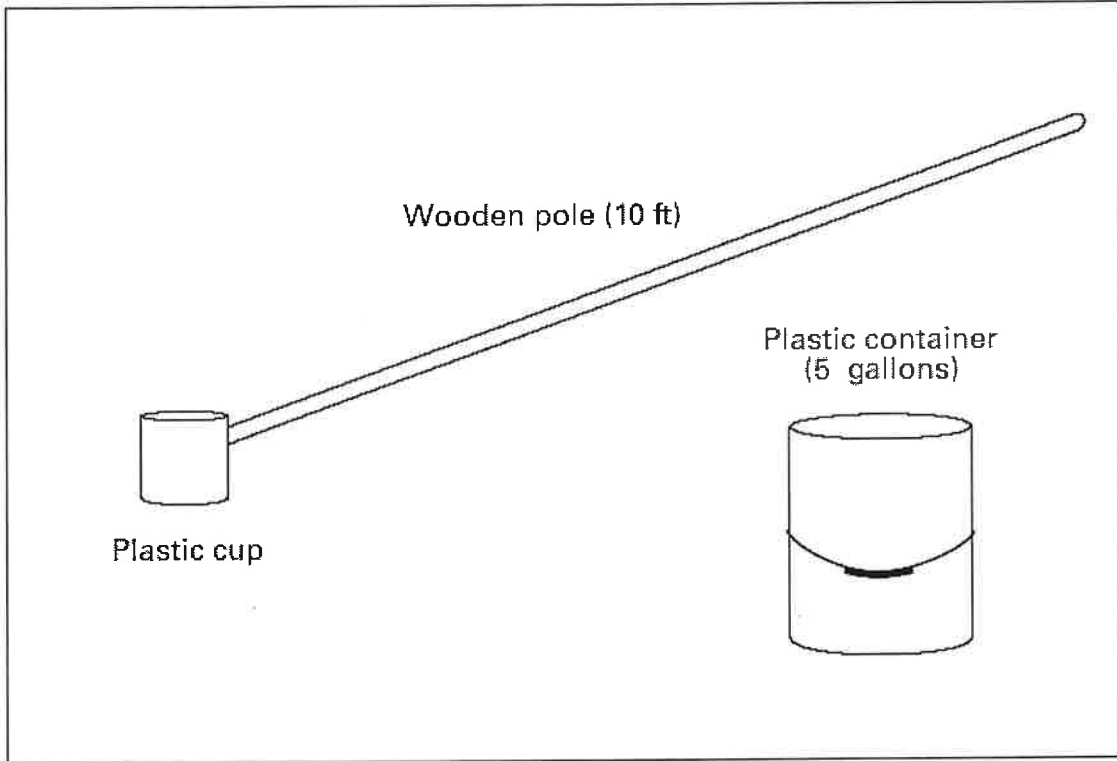
One pint of mixed material should be sent to the lab. Galvanized containers should never be used for collection, mixing, or storage due to the risk of contamination from metals like zinc in the container.

**Sludge:** Sludge is somewhat more difficult to obtain a representative sample. Two common methods are used.

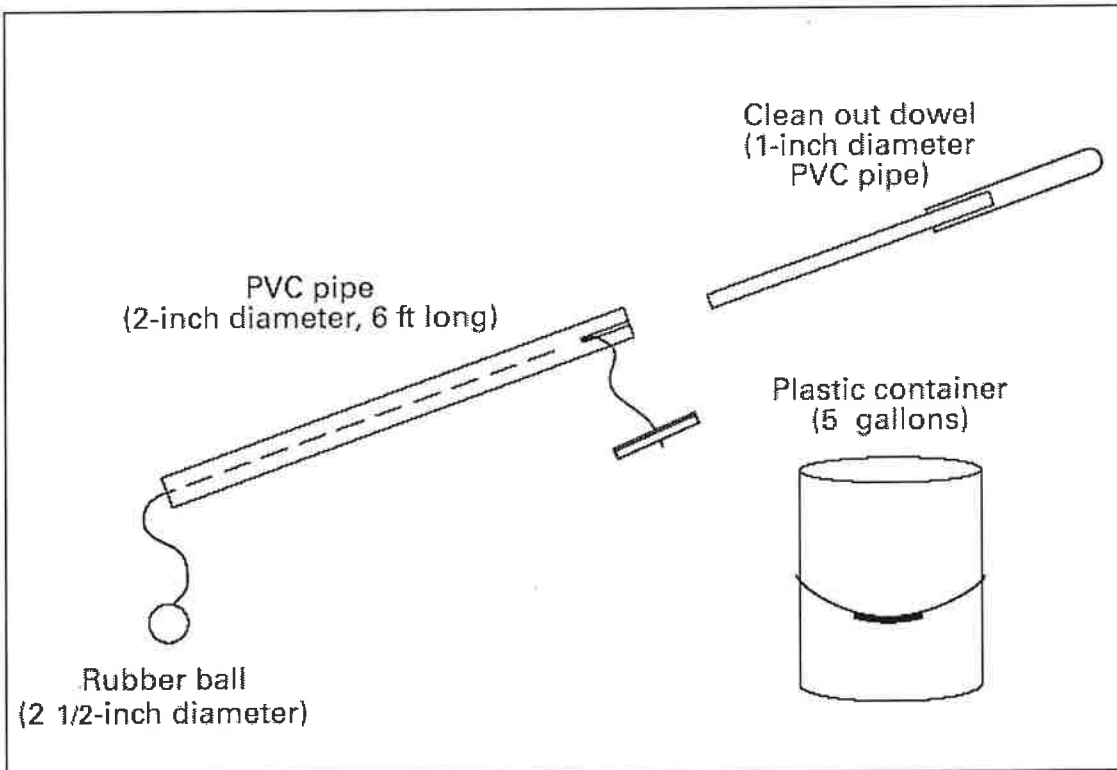
One method requires pumping the storage structure down to the sludge layers. Then, during sludge agitation, a composite sampling device as shown in the figure on the next page can be used to obtain a sample.

The other method requires insertion of a probe to the bottom of the storage structure to obtain a column of material. The sludge component of this column is then released into a clean plastic bucket, and several (12-20) other sampling points around the storage structure are likewise collected to obtain a composite, representative sample.

For analysis, most labs require at least 1 pint of material in a plastic container. The sample should not be rinsed into the container because doing so dilutes the mixture and distorts nutrient evaluations. However, if water is typically added to the manure prior to land application, a proportionate quantity of water should be added to the sample.



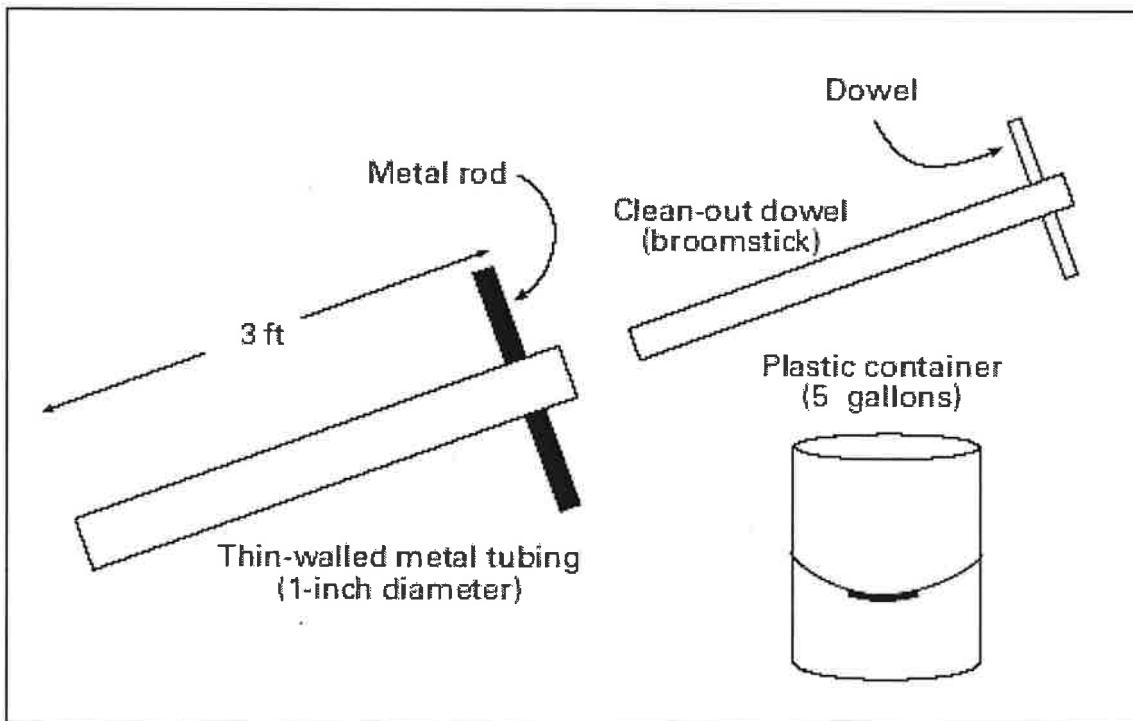
Typical Sampling Equipment for Liquids



Typical Sampling Equipment for Obtaining Composite Samples

### SAMPLING SOLID MANURE

Solid manure samples should represent the manure's average moisture content. A 1-quart sample is adequate for analysis. Samples should be taken from approximately eight different areas in the manure pile at a depth of 18 inches, placed in a clean plastic container, and thoroughly mixed. Approximately 1 quart of the mixed sample should be placed in a plastic bag, sealed, and shipped directly to the lab. It is recommended to ship the samples early in the week so it doesn't sit in a post office or shipping area of the laboratory for several days. Samples stored for more than two days should be refrigerated. The figure below shows a device that can be constructed and used for sampling solid manure.



Typical Solids Sampling Equipment

### APPLICATION EQUIPMENT CALIBRATION

The worksheets on the following pages can be used to calibrate manure application equipment so that manure is applied at the proper rate to achieve the planned application rates.

## SPREADER EQUIPMENT CALIBRATION (Using Bucket, Pan or Tarp)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

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
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:					



## SPREADER EQUIPMENT CALIBRATION (Using a Full Spreader Load)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Perform the following operations to calibrate the solids spreader equipment:					
✓ Determine the weight of the waste material loaded in the spreader by using truck scales to weigh the spreader equipment when it is empty and full.					
✓ Spread the loaded spreader on the field using consistent speed and spreader settings to cover the field uniformly. Spread in a rectangular pattern so the area calculation will be simple. Record engine rpm and gear settings used.					
✓ Measure the length and width covered by the full load and compute the application rate in tons per acre using this worksheet.					
Data and Calculations:					
Steps	ID of Calibration Test				
	A	B	C	D	E
1. Date of calibration test-					
2. Engine RPM during spreading -					
3. Gear selected during spreading -					
4. Weight of empty spreader (lb) =					
5. Weight of loaded spreader (lb) =					
6. Weight of Waste in spreader (lb) - line 5 – line 4 =					
7. Length of spreading area (ft) =					
8. Width of spreading area (ft) =					
9. Area spread (sq ft) - line 7 x line 8 =					
10. Waste applied (lb/sq ft) – line 6 ÷ line 9=					
11. Convert to tons per acre - Line 10 x 21.78=					
12. Average Application Rate (tons per acre) – Sum of values in cells A11 through F11 divided by the total number of calibrations completed =					
Additional Notes:					



## TANK EQUIPMENT CALIBRATION (Using a Full Tank Load)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

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:					
	<b>ID of Calibration Test</b>				
<b>Steps</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
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:					



## TRAVELING BIG GUN SPRINKLER CALIBRATION

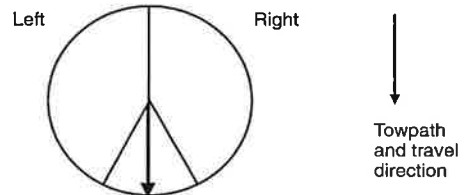
Name: \_\_\_\_\_ Date: \_\_\_\_\_

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

**Catch Can Calibration:**

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

Your Catch        1 inch = \_\_\_\_\_ Cups  
       Cans:         1 cup = \_\_\_\_\_ Inches



**Travel Rate Setting During Test:**

**Data and Calculations:**

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



## APPLICATIONS

Always perform the following tasks annually to make solid manure and wastewater applications:

- Review the Planned Crops and Fertilizer Recommendations table on page 74 to determine how much manure to apply.
- Inspect and repair manure hauling and application equipment to minimize potential of accidental spillage.
- Avoid unnecessary exposure to manure and wastewater and wear protective clothing when necessary.
- Be aware of the location of sensitive areas, concerns of neighbors or concerns of the public, which require special application procedures. To reduce odor problems, apply manure and wastewater 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.
- Calibrate application equipment to ensure uniform distribution and accurate application rates in accordance with guidance given in the nutrient budget for the field applying to. Refer to the following pages for calibration worksheets and make copies as necessary to document the calibration of application equipment.
- Apply manure in accordance with the recommendations given on the nitrogen and phosphorus application worksheets located on the following pages. The example application rate calculations on the worksheets are based on the original nutrient budgets and estimated equipment calibrations done to prepare this plan. Use copies of the worksheets or other tools to document calculations made to determine new application rates based on revised nutrient budgets or calibrations of application equipment.
- Apply manure and wastewater 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/hay land it is best to apply waste 7 days after harvesting forage by haying or grazing.
- When applying manure and wastewater, maintain a **100 foot** setback from down-gradient surface waters, open tile line intake structures, sinkholes, well heads or other sensitive areas to prevent a prohibited discharge of manure and wastewater.
- Record manure and wastewater applications on the appropriate form in Section 9 of the Nutrient Management Plan and maintain them for at least 5 years.
- Clean up residual materials from equipment and dispose of properly.

**March 15<sup>th</sup> – August 30<sup>th</sup>:** Apply manure at agronomic rates shown on the Planned Crops and Fertilizer Recommendations table on page 73 using the following guidelines:

- Apply to land being prepared for crops. Till manure into soil within 3 days of application if possible or apply to actively growing crops such as grass, clover or alfalfa after cutting.
- Do not apply manure within the setback areas shown on the Wildlife Safari Area Map and described on page 97 and in Table 6-4 of Section 6, Nutrient Management.



**September 1<sup>st</sup> – October 31<sup>st</sup>:** Apply manure at minimum rates, using the following guidelines:

- Apply to land with actively growing crops such as grass, clover or alfalfa.
- Do not apply within the setback areas shown on the Wildlife Safari Area Map and described on page 97 and in Table 6-4 of Section 6, Nutrient Management.

**November 1<sup>st</sup> – March 15<sup>th</sup>:** Avoid application of manure. If manure application is needed because of an emergency situation during this period, use the following guidelines. ***NOTE: THE FOLLOWING GUIDELINES ARE GOOD IDEAS, BUT SPREADING MANURE DURING THIS PERIOD MAY STILL VIOLATE STATE AND FEDERAL LAW:***

- Call the ODA CAFO Program at (503) 986-4700 and report why an emergency application is needed and where the application will be made if different than the emergency application area identified on the Wildlife Safari Area Map in Section 4.2.
- Apply it only to actively growing crops such as grass, clover or alfalfa.
- Minimize application rates by using the maximum travel rates for the application equipment.
- Do not apply within 100 feet of open water courses, seeps, ditches, tile inlets or wetlands.
- Do not apply within the setback areas shown on the Wildlife Safari Area Map and described on page 97 and in Table 6-4 of Section 6, Nutrient Management.
- Do not apply during rainfall events.
- Do not apply to saturated or flooded soils.
- Refer to the Oregon Manure Spreading Index (MSI) located at <http://oda.state.or.us/nrd/fb/msi/msi.htm> to see if a manure application is advisable.
- Maintain records of emergency applications and do not apply manure or commercial fertilizer to fields receiving emergency applications unless soil tests indicate to do so.

Fields that are subsurface (TILE) drained require additional precautions when manure is applied. Manure applied to these fields can follow soil macropores directly to the tile drains creating a surface water pollution hazard from direct tile discharge. Tillage prior to manure application that can disrupt/close (using horizontal fracturing) the preferential flow paths (worm holes, cracks, root channels) in the soil will reduce the risk of a manure discharge to surface waters. Any pre-application tillage should leave as much residue as possible on the soil surface. Water control structures installed in subsurface drainage systems should be managed to prevent discharge of manure and wastewater during periods of application.

The timing and frequency of manure applications for utilization by crops shown in the Planned Crops and Fertilizer Recommendations table on page 73 are based on information provided in Oregon State University Extension publications located in Appendix H.

Since the management areas have received applications of manure in the past they will have a certain amount of nitrogen available in the current year based on the mineralization of the organic matter applied in previous years. The planned applications shown on the following pages assume that the amount of nitrogen unavailable to the plant from the organic fraction of the manure analysis will be supplied by the organic fraction of manure applied in previous years that will mineralize into a plant available form of nitrogen (PAN) for the current year. Some of the nitrogen applied in the manure for the current year will be lost due to environmental conditions (e.g. evaporation, denitrification) so some adjustments to the planned manure applications have been made to account for these losses.

The following table shows the amount of wastewater and solid manure that would have to be applied to supply the given amount of nitrogen and phosphorus based on the manure nutrient analysis and application losses shown in the additional tables on the next page:

Pounds of Nutrient to be applied	Application amount is based on 25% of the Nitrogen being lost and no Phosphorus being lost to environmental factors-					
	Washwater Application			Composted Solids Application		
	Nitrogen (N)		Phosphorus (P2O5)	Nitrogen (N)		Phosphorus (P2O5)
50	Inches/Acre	Gallons/Acre	Inches/Acre	Gallons/Acre	Tons/Acre	Tons/Acre
100	0.12	3,145	0.20	5,435	1.54	5.75
150	0.23	6,289	0.40	10,870	3.07	11.49
200	0.35	9,434	0.60	16,304	4.61	17.24
	0.46	12,579	0.80	21,739	6.14	22.99



### Manure Nutrient Analysis

Manure Source	Dry Matter (%)	Total N	NH <sub>4</sub> -N	Total P <sub>2</sub> O <sub>5</sub>	Total K <sub>2</sub> O	Avail. P <sub>2</sub> O <sub>5</sub>	Avail. K <sub>2</sub> O	Units	Analysis Source and Date
Compost Facility	50.0	43.4	15.8	8.7	46.7	8.7	46.7	Lb/Ton	2010 A&L Western Agricultural Laboratory Analysis
Tanks	99.0	21.2	5.9	9.2	24.9	9.2	24.9	Lb/1000Gal	MMP Estimate
Pasture	85.0	32.0	8.8	12.5	35.3	12.5	35.3	Lb/1000Gal	MMP Estimate

(1) Entered analysis may be the average of several individual analyses.

(2) Oregon assumes that 100% of manure phosphorus and 100% of manure potassium is crop available. First-year per-acre nitrogen availability for individual manure applications is given in the Planned Nutrient Applications table. For more information about nitrogen availability in Oregon, see Waste Utilization Jobsheet 633 OR-JS, Oregon USDA-NRCS, May 2003 (<http://efotg.nrcs.usda.gov/references/public/OR/633js.doc>).

### Typical Nutrient Retention After Application Losses

Application Method	Percent of original nutrient content of manure retained after application losses		
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
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%



### Planned Crops and Fertilizer Recommendations

Field	Crop Year	Planned Crop	Yield Goal (per Acre)	N Rec (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Rec (Lbs/A)	K <sub>2</sub> O Rec (Lbs/A)	N Removed (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Removed (Lbs/A)	K <sub>2</sub> O Removed (Lbs/A)	Custom Fert. Rec. Source
Village	2011	Other								
Village	2012	Other								
Village	2013	Other								
Village	2014	Other								
The Americas	2011	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2012	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2013	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2014	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2011	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2012	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2013	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2014	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Asia	2011	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2012	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2013	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2014	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Wetlands	2011	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2012	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2013	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2014	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Facilities	2011	Other								
Facilities	2012	Other								



Field	Crop Year	Planned Crop	Yield Goal (per Acre)	N Rec (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Rec (Lbs/A)	K <sub>2</sub> O Rec (Lbs/A)	N Removed (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Removed (Lbs/A)	K <sub>2</sub> O Removed (Lbs/A)	Custom Fert. Rec. Source
Facilities	2013	Other								
Facilities	2014	Other								
Natural Area 1	2011	Other								
Natural Area 1	2012	Other								
Natural Area 1	2013	Other								
Natural Area 1	2014	Other								
Natural Area 2	2011	Other								
Natural Area 2	2012	Other								
Natural Area 2	2013	Other								
Natural Area 2	2014	Other								
Natural Area 3	2011	Other								
Natural Area 3	2012	Other								
Natural Area 3	2013	Other								
Natural Area 3	2014	Other								
Cheetah Area	2011	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2012	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2013	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2014	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E

\* Unharvested cover crop or first crop in double-crop system.

<sup>a</sup> Custom fertilizer recommendation.



### Planned Nutrient Applications (Manure-spreadable Area)

Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	3.4 Lds	34 Gal	1.0	1	0	1
The Americas	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.5 Lds	20,670 Gal	78.0	6	3	9
The Americas	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	34 Gal	1030.7 Lds	20,613 Gal	606.3	1	0	1
The Americas	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033 Lds	20,660 Gal	78.0	6	3	9
The Americas	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	3
The Americas	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	261.7 Lds	2,617 Gal	67.1	1	0	1
The Americas	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	264.9 Lds	2,649 Gal	77.9	1	0	1
The Americas	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Oct 2012	Grass pasture, maint	Pasture	Sprinkler, Not incorporated	Custom	268 Gal	2086.2 Lds	20,862 Gal	77.8	6	3	9
The Americas	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	35 Gal	261.7 Lds	2,617 Gal	74.8	1	0	1
The Americas	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	0
The Americas	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	0
The Americas	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
Africa	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Mar 2012	Grass pasture, maint	Pasture	Sprinkler, Not incorporated	Custom	268 Gal	2034.5 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	0
Africa	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	280.4 Lds	2,804 Gal	82.5	1	0	1
Africa	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Asia	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	35 Gal	113.5 Lds	1,135 Gal	32.4	1	0	1
Asia	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Nov 2011	Grass pasture, maint	Tanks	Grazing Animals, Not incorporated	Custom	34 Gal	55.1 Lds	1,102 Gal	32.4	1	0	1
Asia	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	335.3 Lds	6,706 Gal	31.9	5	3	7
Asia	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	101.7 Lds	1,017 Gal	29.9	1	0	1
Asia	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	335.3 Lds	6,706 Gal	31.9	5	3	7
Asia	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	24 Gal	102.2 Lds	1,022 Gal	42.6	0	0	1
Asia	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	329.8 Lds	6,596 Gal	31.4	5	3	7
Asia	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	3
Asia	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Wetlands	Oct 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Apr 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Apr 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jul 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Aug 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2011	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Sep 2011	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Sep 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Feb 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2012	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Apr 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2012	Other	Pasture	Drainageway	Custom	134 Gal	7 Min	1,035 Gal	7.7	3	2	5
Wetlands	May 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Jun 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Jul 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Sep 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Nov 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2013	Other	Tanks	Sprinkler, Not incorporated	Custom	25 Gal	18.8 Lds	188 Gal	7.5	0	0	1
Wetlands	Jan 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Feb 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jul 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2013	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Sep 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2013	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Oct 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Feb 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,036 Gal	7.5	3	2	5
Wetlands	Feb 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Apr 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	0	0	1
Wetlands	Jun 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2014	Other	Pasture	Drainageway	Custom	134 Gal	7 Min	1,033 Gal	7.7	3	2	5
Wetlands	Jul 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Sep 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Cheetah Area	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.6 Lds	2,531 Gal	18.6	3	2	5
Cheetah Area	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.4 Lds	2,529 Gal	18.6	3	2	5
Cheetah Area	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	129.3 Lds	2,586 Gal	19.0	3	2	5
Cheetah Area	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	1.6 Lds	16 Gal	0.4	1	0	1
Cheetah Area	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.6 Lds	2,531 Gal	18.6	3	2	5
Cheetah Area	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.8 Lds	2,537 Gal	18.7	3	2	5
Cheetah Area	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.8 Lds	748 Gal	19.2	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.8 Lds	748 Gal	19.2	1	0	1
Cheetah Area	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.8 Lds	2,537 Gal	18.7	3	2	5
Cheetah Area	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.6 Lds	2,531 Gal	18.9	3	2	5
Cheetah Area	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.6 Lds	2,531 Gal	18.9	3	2	5
Cheetah Area	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	74.2 Lds	742 Gal	21.8	1	0	1
Cheetah Area	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	5
Cheetah Area	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	127.3 Lds	2,546 Gal	19.0	3	2	5
Cheetah Area	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.7 Lds	2,594 Gal	19.4	3	2	5
Cheetah Area	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	72.6 Lds	726 Gal	18.6	1	0	1
Cheetah Area	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5
Cheetah Area	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,587 Gal	19.3	3	2	5
Cheetah Area	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5
Cheetah Area	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	126.3 Lds	2,526 Gal	18.3	3	2	5
Cheetah Area	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	133.3 Lds	2,665 Gal	19.9	3	2	5
Cheetah Area	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	74.2 Lds	742 Gal	21.8	1	0	1
Cheetah Area	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	133.1 Lds	2,662 Gal	19.9	3	2	5
Cheetah Area	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	132.6 Lds	2,652 Gal	19.8	3	2	5
Cheetah Area	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2013	Grass pasture, maint	Pasture	Drainageway	Custom	134 Gal	18 Min	2,626 Gal	19.6	3	2	5
Cheetah Area	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	131.3 Lds	2,626 Gal	19.0	3	2	5
Cheetah Area	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	25 Gal	74.2 Lds	742 Gal	29.7	0	0	1
Cheetah Area	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	73.8 Lds	738 Gal	18.9	1	0	1
Cheetah Area	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,638 Gal	19.7	3	2	5
Cheetah Area	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	138.8 Lds	2,775 Gal	20.7	3	2	5
Cheetah Area	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	128.3 Lds	2,565 Gal	19.1	3	2	5
Cheetah Area	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.4 Lds	2,628 Gal	19.6	3	2	5
Cheetah Area	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.4 Lds	2,628 Gal	19.6	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	127.6 Lds	2,552 Gal	19.0	3	2	5
Cheetah Area	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1

The worksheets and charts on the following pages can be used to develop other application rates for different manure analyses

### Manure Application Setback Distances

#### Setback Requirements: CAFO

Feature	Setback Criteria	Setback Distance (Feet)
Lakes and ponds	Applied upgradient, permanent vegetated setback >=35 feet	35
Impounding reservoirs	Applied upgradient, permanent vegetated setback >=35 feet	35
Wells	Applied upgradient, permanent vegetated setback >=35 feet	35
Rivers and canals	Applied upgradient, permanent vegetated setback >=35 feet	35
Streams and creeks	Applied upgradient, permanent vegetated setback >=35 feet	35
Estuaries	Applied upgradient, permanent vegetated setback >=35 feet	35
Pacific Ocean	Applied upgradient, permanent vegetated setback >=35 feet	35
All other bodies of surface water, natural or artificial	Applied upgradient, permanent vegetated setback >=35 feet	35
Other conduits to surface waters	Applied upgradient, permanent vegetated setback >=35 feet	35
Open tile line intake	Applied upgradient, permanent vegetated setback >=35 feet	35
Sinkholes	Applied upgradient, permanent vegetated setback >=35 feet	35

Source: CAFO General Permit #1 ([http://oregon.gov/ODA/NRD/docs/pdf/cafo\\_gnlpmt.pdf](http://oregon.gov/ODA/NRD/docs/pdf/cafo_gnlpmt.pdf))

#### Setback Requirements: NRCS Standard

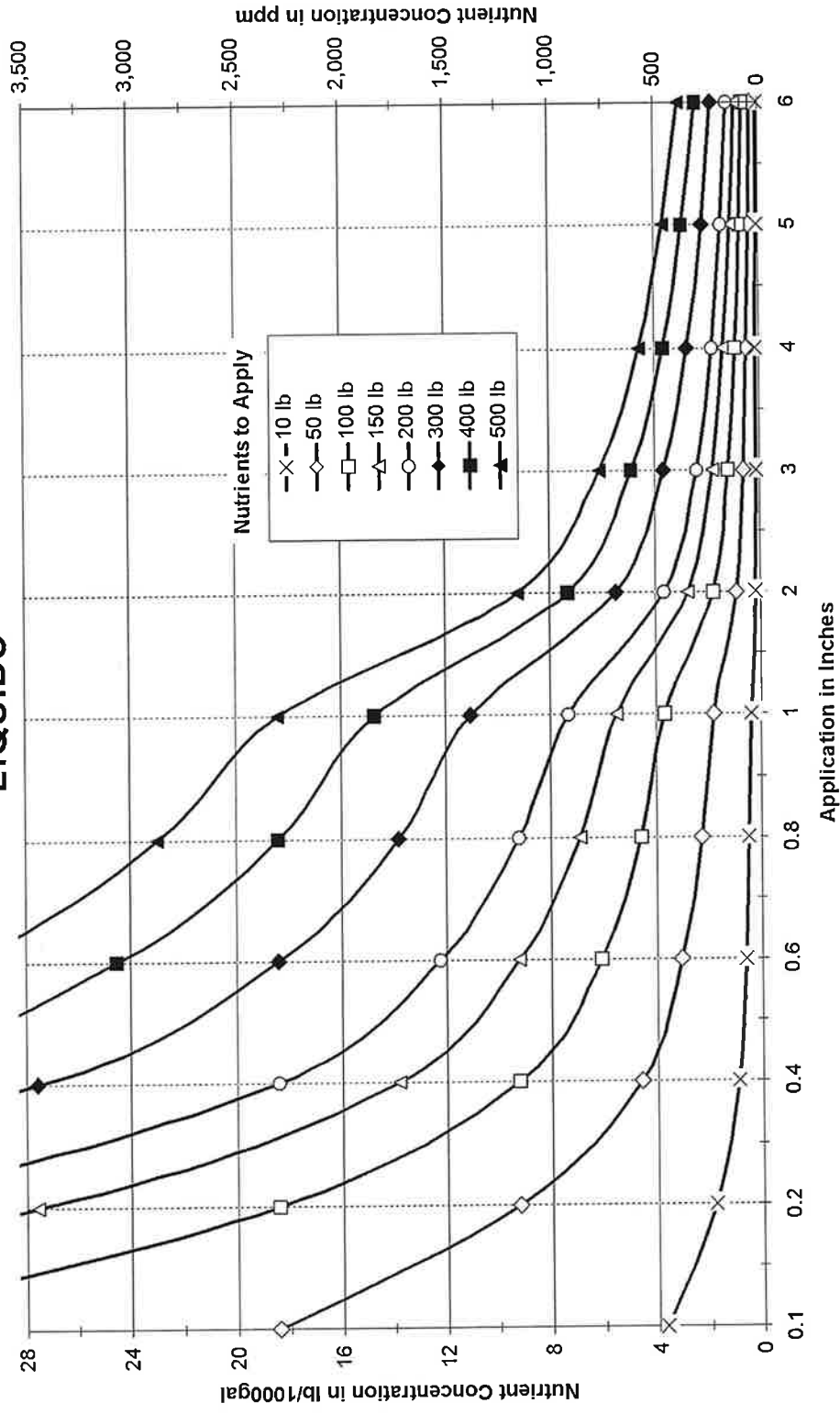
Feature	Setback Criteria	Setback Distance (Feet)
Open water courses	Application June through September	25
Open water courses	Application October through May	50

Source: Waste Utilization 633 Operation and Maintenance Worksheet (<http://efotg.nrcs.usda.gov/references/public/OR/633om.doc>)

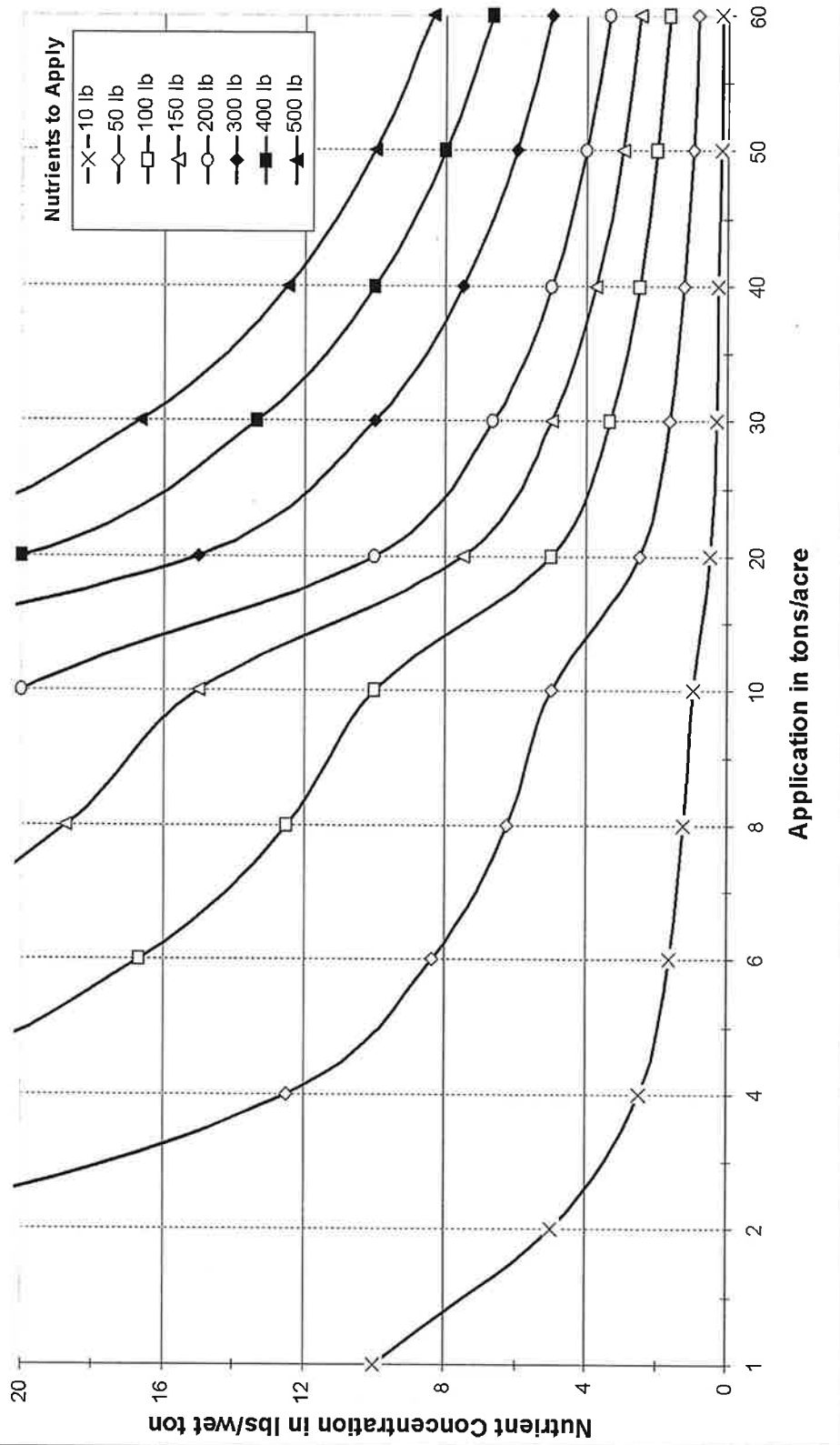




# NUTRIENT APPLICATION CHART for LIQUIDS



# NUTRIENT APPLICATION CHART for SOLIDS



## RECORD KEEPING

- Record keeping forms in Section 9 of the Wildlife Safari NMP or other may be used document manure and fertilizer applications.
- The following information is to be recorded and kept in Section 9 of the Wildlife Safari NMP:
  - Nutrient and manure application records including soil, water plant and organic by-product test results.
  - Documentation showing date, crop, amount, rate, form and application method of nutrients applied.
  - Calibration records for manure application equipment.
  - Annual review of nutrient management including adjustments made.

## Pasture & Hay Land Planting (Ac)

**Field(s):** Africa, Asia, Cheetah, and The Americas

**Status:** Planned

**Units:** 205.4 Acres

**Description:** As hay land fields need renovating, adapted and compatible species, varieties, or cultivars will be established in the fields as shown on the Farm Fields Map to provide forage and hay for livestock.

**Operation and Maintenance:** Evaluate pasture and hay land fields annually to determine what fields need to be reseeded. Generally if the pasture or hay lands are below a fair condition rating and the yields from the previous grazing or haying season were less than 50 percent of yield goals, the pasture or hay land field should be reseeded.

Take a soil sample of the top 6 inches of soil and have it analyzed for pH, Lime requirement(SMP), Phosphorus(P), Potassium(K), Calcium(Ca), and Magnesium(Mg) prior to seed bed preparation. See Oregon State University (OSU) Extension Publication PNW 570-E, Monitoring Soil Nutrients Using a Management Unit Approach, in Appendix H of the the Wildlife Safari NMP for more guidance on soil sampling.

Prior to October 15th: Prepare seed bed (including weed control and tillage) and add fertilizer and other amendments according to soil test recommendations.

Prior to October 15th: Seed pastures. It is best to seed a pasture or hay land between September 1st and October 15<sup>th</sup> so no irrigation will be needed.

### **Specification:**

#### **PLANTING PLAN-**

**Fertilizer:** Refer to OSU Fertilizer Guide, FG 63, for pastures and soil test recommendations for the amounts of fertilizer and other amendments to add while preparing the seed bed.

**Seedbed Preparation:** Till the soil lightly with a disk and harrow to prepare for seeding the pasture or hay land. *The seedbed should be very firm (your foot should not sink into the soil more than 1/2 inch), weed-free and free of ruts.* Small clods are okay (they help prevent erosion).



**Weed Control:** The tillage will probably be sufficient weed control, however application of a labeled herbicide is optional if weeds remain.

**Seeding dates:** It is generally best to seed the pasture or hay land between September 1 and October 15 to ensure adequate grass establishment before the winter erosion period. Seedings can be made during other times when the soil is suitable for tillage operations but the new seeding will have to be irrigated to insure good germination and establishment.

**Seed depth:** Generally seeding depths should be 0.75 – 1.5 inch however actual seeding depths should be determined for the variety and species of the seed being planted.

**Seeding method:** Broadcast or use a grain drill and harrow lightly after seeding.

**SEED-**

Contact the local OSU Extension Service for recommendations on what varieties of grass to plant based on forage production goals and site conditions for the pasture or hay land.

**Note:** Be sure to use seed that is at least 72% Pure Live Seed (PLS). PLS is calculated by multiplying % Germination X % Purity. For example, seed that is 90% Pure and has 70% Germination has  $PLS = 90\% \times 70\% = 63\%$ . This seed would be considered too low in quality to produce adequate forage for pasture or hay land.

**PASTURE AND HAY LAND ESTABLISHMENT:**

Allow the pasture or hay land planting to grow throughout the rainy season and defer grazing of the new seeding until it is well established.

Control growth of volunteer plants and shading to reduce competition to the pasture or hay land.

Control weeds and volunteer plants in the pasture or hay land by mowing or by using herbicides. Do not allow noxious weeds to go to seed. Information on noxious weeds can be obtained from the Oregon Department of Agriculture website: [http://egov.oregon.gov/ODA/PLANT/WEEDS/county\\_events.shtml](http://egov.oregon.gov/ODA/PLANT/WEEDS/county_events.shtml) or by calling (503) 986-4621.

Pumping Plant (No)

**Field(s):** South Umpqua River

**Status:** Existing

**Units:** 1

**Description:** The pumping plants shown on the Area Map is used to transfer fresh water or wastewater at a planned rate and operating pressure to supply water to the water and sediment control basins used for animal habitat and to maintain plant growth during dry periods in the wetlands..

**Operation and Maintenance:** Operate and maintain pumps in accordance with good judgment and manufacture’s manuals and recommendations.

Drain liquid manure and irrigation water from pumps during cold weather to prevent freezing. If parts of the system cannot be drained, a non-toxic antifreeze solution may be added.

Inspect pumps periodically and remove debris wrapped around shafts and impellers. Maintain foot valves and check valves for proper operation.



For proper operation of electric motors and controls, maintain lubrication for all bearings, keep electric panel free from obstructions and debris. Maintain electrical safety devices, assure all electrical contacts are tight, and lock main electrical switch to "OFF" position during non-use season. Maintain adequate shade and ventilation for pump motors.

For proper operation of pumps, maintain lubrication for all bearings and pump shafts, assure belts are adjusted properly, maintain safety covering devices on open shafts and belt drives, check to make sure all safety valves and devices are set at proper operating conditions so they may provide protection to the pump and power unit. For centrifugal pumps, periodically measure tolerance between pump impeller and pump casing (i.e. wearing) and replace wear ring as needed to help restore new pump operating characteristics.

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

Replace, tighten, or repair broken or loose connections and lines as needed.

**Specification: NA**

#### Stream Crossing (No)

**Field(s): Africa, Asia, Cheetah, The Americas, and Wetlands**

**Status: Existing**

**Units: 22 Stream Crossings**

**Description:** Stream crossings provide designated travel ways for people, livestock and vehicles to cross streams minimizing negative environmental impacts to the stream corridor.

**Operation and Maintenance:** The stream crossing, appurtenances, and associated fence should be inspected after each major storm event and repairs made as needed.

**Specification: NA**

#### Watering Facility (No)

**Field(s): Africa, Asia, Cheetah, and The Americas**

**Status: Existing**

**Units: 10 Watering Facilities**

**Description:** Watering facilities provide drinking water to animals on pastured areas and in enclosures.

**Operation and Maintenance:** Check all above ground connections, valves, gates, rodent guards, inlets and outlets to make sure they are functioning properly. Check troughs and tanks for leaks or cracks and repair or replace immediately, if necessary.

Make certain the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems. Check periodically to see if debris has fallen into the trough or tank which may restrict inflow or planned functions of the outflow system.

Clean the entire system periodically and remove moss, algae growth, and/or sludge. Chemicals such as copper sulfate and chlorine can be used to prevent moss and algae growth. Local rules and regulations are to be followed when using chemicals to make sure they are safe for animals.

Where necessary maintain coverings and insulation to prevent-damage by freezing.

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

Immediately repair any vandalism, vehicular or livestock damage.

**Specification: NA**

Water and Sediment Control Basin (No)
---------------------------------------

**Field(s): Africa, Asia, Cheetah, The Americas, and Wetlands**

**Status: Existing**

**Units: 8 Basins**

**Description:** Existing water and sediment control basins control water in drainageways, trap sediments and organics and provide habitat for ducks, geese, and other native and exotic animals.

**Operation and Maintenance:** Periodically inspect the spillways and control gates for proper functioning for their ability to maintain the water level to design elevations. Immediately remove any blockage or obstructions in spillways.

Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization, and application of herbicides when necessary. Fertilize the established stand with at least 200 lbs of 21-0-0 per acre or equivalent annually or as needed to maintain a uniform vigorous stand. Periodic mowing may also be needed to control height.

If fences are installed, they shall be maintained to prevent unauthorized or animal entry.

Immediately repair any vandalism, vehicular, or livestock damage to any earthfills, spillways, outlets or other appurtenance.

Removal of debris that may accumulate at the Water and Sediment Control Basin and immediately upstream or downstream from the Basin.

Make sure all structure drains are functional and soil is not being transported through the drainage system. The screens and/or rodent guards shall also be kept in place.

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

**Specification: NA**

Constructed Wetland (No)

**Field(s): Wetlands**

**Status: Existing**

**Units: 1 Wetland**

**Description:** The existing wetland was constructed to simulate a shallow water ecosystem to reduce pollutants in runoff from pasture areas.

**Operation and Maintenance:** Periodically inspect the spillways and control gates for proper functioning for their ability to maintain the water level to design elevations. Immediately remove any blockage or obstructions in spillways.

Maintain vigorous growth of vegetative coverings on earthfills. This includes reseeding, fertilization, and application of herbicides when necessary. Fertilize the established stand with at least 200 lbs of 21-0-0 per acre or equivalent annually or as needed to maintain a uniform vigorous stand. Periodic mowing may also be needed to control height.

Replace wetland vegetation as needed to maintain the performance of the wetland and provide animal habitat.

If fences are installed, they shall be maintained to prevent unauthorized or animal entry.

Immediately repair any vandalism, vehicular, or livestock damage to any earthfills, spillways, outlets or other appurtenance.

Removal of debris that may accumulate at the inlet and outlet of the wetland cells.

Make sure all structure drains are functional and soil is not being transported through the drainage system. The screens and/or rodent guards shall also be kept in place.

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

**Specification: NA**

#### 4.5 Odors

The major source of odor from the Wildlife Safari will be the result of processing solid manure into compost at the solids storage/composting facility and from the animals themselves that are out on pastures and in enclosures. Once the manure solids have been composted the amount of odors produced at the solids storage/composting facility will be significantly reduced. Since the Wildlife Safari is located in a rural watershed with few residences nearby, odor production and impact on nearby rural residences is somewhat unknown. The closest rural residences that may be impacted negatively by odor are within 1,500 to 1,600 feet of the southern most boundaries of the Wildlife Safari property. The prevailing winds during the winter months are from the south and southwest and during the summer months from the west and northwest. There are no known complaints related to odors being generated from the Wildlife Safari and negatively impacting nearby residences.

## Section 5. Soil and Risk Assessment Analysis

### 5.1 Soils

The predominate soil types located in the fields for the Wildlife Safari are shown in the following table.

**Table 5.1. Soil Information**

Field	Soil Survey	Map Unit	Soil Component Name	Surface Texture	Slope Range (%)	OM Range (%)	Bedrock Depth (in.)	Drainage	Annual Flooding	Hydro-logic Group
Village	649	48C	Curtin	C	3-12%	3-5%		S Poor	None	D
The Americas	649	48C	Curtin	C	3-12%	3-5%		S Poor	None	D
Africa	649	188D	Pengra	SIL	2-20%	4-6%		S Poor	None	C
Asia	649	48C	Curtin	C	3-12%	3-5%		S Poor	None	D
Wetlands	649	44A	Conser	SICL	0-3%	4-8%		Poor	None	D
Facilities	649	189E	Philomath	SIC	3-30%	2-4%	16	Well	None	D
Natural Area 1	649	189E	Philomath	SIC	3-30%	2-4%	16	Well	None	D
Natural Area 2	649	188E	Pengra	SIL	20-30%	4-6%		S Poor	None	C
Natural Area 3	649	189E	Philomath	SIC	3-30%	2-4%	16	Well	None	D
Cheetah Area	649	48C	Curtin	C	3-12%	3-5%		S Poor	None	D



## 5.2 Soils Map



### 5.3 Soil Reports

Following are descriptions and rating tables for agricultural uses of the soils.

#### General Description of the Soil Map Units:

##### Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

#### Report—Map Unit Description (Brief, Generated)

##### Douglas County Area, Oregon

**Map Unit:** 41E—Climax clay, 12 to 30 percent slopes

**Component:** Climax (85%)

The Climax component makes up 85 percent of the map unit. Slopes are 12 to 30 percent. This component is on hills, hills. The parent material consists of colluvium derived from basalt. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded: A seasonal zone of water saturation is at 27 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

**Map Unit:** 44A—Conser silty clay loam, 0 to 3 percent slopes

**Component:** Conser (90%)

The Conser component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on stream terraces. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is



high. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 3w. This soil meets hydric criteria.

**Component:** Waldo (1%)

Generated brief soil descriptions are created for major components. The Waldo soil is a minor component.

**Map Unit:** 48C—Curtin clay, 3 to 12 percent slopes

**Component:** Curtin (75%)

The Curtin component makes up 75 percent of the map unit. Slopes are 3 to 12 percent. This component is on alluvial fans. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

**Component:** Bashaw (4%)

Generated brief soil descriptions are created for major components. The Bashaw soil is a minor component.

**Map Unit:** 48D—Curtin clay, 12 to 20 percent slopes

**Component:** Curtin (75%)

The Curtin component makes up 75 percent of the map unit. Slopes are 12 to 20 percent. This component is on hills, alluvial fans, hills. The parent material consists of clayey alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

**Component:** Dixonville, north (75%)

The Dixonville, north component makes up 75 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from basalt. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

**Map Unit:** 149F—McMullin-Reston complex, 30 to 75 percent slopes

**Component:** McMullin (40%)

The McMullin component makes up 40 percent of the map unit. Slopes are 30 to 75 percent. This component is on mountains, hills, mountains, hills. The parent material consists of colluvium and residuum derived from metamorphic rock. Depth to a root restrictive layer, bedrock, lithic, is 12 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e.



This soil does not meet hydric criteria.

**Component: Reston (35%)**

The Reston component makes up 35 percent of the map unit. Slopes are 30 to 75 percent. This component is on hills, mountains, mountains, hills. The parent material consists of colluvium and residuum derived from metamorphic rock. Depth to a root restrictive layer, bedrock, lithic, is 5 to 10 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

**Component: Pengra, 20-30% slopes (3%)**

Generated brief soil descriptions are created for major components. The Pengra soil is a minor component.

**Map Unit: 169F—Nonpareil-Oakland complex, 30 to 60 percent slopes**

**Component: Nonpareil (45%)**

The Nonpareil component makes up 45 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from sandstone and siltstone. Depth to a root restrictive layer, bedrock, paralithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

**Component: Oakland (30%)**

The Oakland component makes up 30 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from sandstone and siltstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

**Map Unit: 170E—Oakland silt loam, 20 to 30 percent slopes**

**Component: Oakland (75%)**

The Oakland component makes up 75 percent of the map unit. Slopes are 20 to 30 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from sandstone and siltstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

**Component: Panther (2%)**

Generated brief soil descriptions are created for major components. The Panther soil is a minor component.

**Component: Pengra, 2-20% slopes (2%)**



Generated brief soil descriptions are created for major components. The Pengra soil is a minor component.

**Map Unit:** 188D—Pengra silt loam, 2 to 20 percent slopes

**Component:** Pengra (75%)

The Pengra component makes up 75 percent of the map unit. Slopes are 2 to 20 percent. This component is on alluvial fans, hills, hills. The parent material consists of alluvium and colluvium derived from sandstone and siltstone over residuum weathered from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 15 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 3w. Irrigated land capability classification is 4w. This soil meets hydric criteria.

**Component:** Panther (2%)

Generated brief soil descriptions are created for major components. The Panther soil is a minor component.

**Component:** Pengra, 20-30% slopes (2%)

Generated brief soil descriptions are created for major components. The Pengra soil is a minor component.

**Map Unit:** 188E—Pengra silt loam, 20 to 30 percent slopes

**Component:** Pengra (75%)

The Pengra component makes up 75 percent of the map unit. Slopes are 20 to 30 percent. This component is on hills, hills. The parent material consists of alluvium and colluvium derived from sandstone and siltstone over residuum weathered from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 15 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 5 percent. Nonirrigated land capability classification is 4w. Irrigated land capability classification is 4w. This soil meets hydric criteria.

**Component:** Panther (2%)

Generated brief soil descriptions are created for major components. The Panther soil is a minor component.

**Component:** Pengra, 2-20% slopes (2%)

Generated brief soil descriptions are created for major components. The Pengra soil is a minor component.

**Map Unit:** 189E—Philomath-Dixonville complex, 3 to 30 percent slopes

**Component:** Philomath (55%)

The Philomath component makes up 55 percent of the map unit. Slopes are 3 to 30 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from basalt. Depth to a root restrictive layer, bedrock, paralithic, is 12 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.



**Component: Dixonville (30%)**

The Dixonville component makes up 30 percent of the map unit. Slopes are 3 to 30 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from basalt. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

**Component: Aquolls (1%)**

Generated brief soil descriptions are created for major components. The Aquolls soil is a minor component.

**Map Unit: 190F—Philomath-Edenbower complex, 30 to 60 percent slopes**

**Component: Philomath (50%)**

The Philomath component makes up 50 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from basalt. Depth to a root restrictive layer, bedrock, paralithic, is 12 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

**Component: Edenbower (35%)**

The Edenbower component makes up 35 percent of the map unit. Slopes are 30 to 60 percent. This component is on hills, hills. The parent material consists of colluvium and residuum derived from basalt. Depth to a root restrictive layer, bedrock, lithic, is 4 to 10 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

**Map Unit: 214A—Roseburg loam, 0 to 3 percent slopes**

**Component: Roseburg (85%)**

The Roseburg component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains. The parent material consists of alluvium derived from mixed sources. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 1. Irrigated land capability classification is 1 This soil does not meet hydric criteria.

**Component: Conser (2%)**

Generated brief soil descriptions are created for major components. The Conser soil is a minor component.

**Component: Aquolls (1%)**

Generated brief soil descriptions are created for major components. The Aquolls soil is a minor component.



## Data Source Information

Soil Survey Area: Douglas County Area, Oregon  
Survey Area Data: Version 9, Feb 9, 2010

## Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge Ratings:

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

This table shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include saturated hydraulic conductivity (Ksat), depth to a water



table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include K<sub>sat</sub>, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

## Report—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge— Douglas County Area, Oregon					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
149F—McMullin-Reston complex, 30 to 75 percent slopes					
McMullin	40	Very limited			
		Too steep	1.00		
		Depth to bedrock	1.00		
		Droughty	1.00		
		Runoff	0.40		
		Too acid	0.11		
Reston					
	35	Very limited			
		Too steep	1.00		
		Depth to bedrock	1.00		
		Droughty	1.00		
		Runoff	0.40		
		Too acid	0.32		
189F—Nonpareil-Oakland complex, 30 to 60 percent slopes					
Nonpareil	45	Very limited			
		Too steep	1.00		
		Depth to bedrock	1.00		
		Droughty	1.00		
		Too acid	0.62		
		Runoff	0.40		
Oakland					
	30	Very limited			
		Too steep	1.00		
		Depth to bedrock	0.65		
		Slow water movement	0.41		
		Droughty	0.13		
		Too acid	0.03		



Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge— Douglas County Area, Oregon					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
170E—Oakland silt loam, 20 to 30 percent slopes					
Oakland	75	Very limited			
		Too steep	1.00		
		Depth to bedrock	0.65		
		Slow water movement	0.41		
		Droughty	0.13		
		Too acid	0.03		
186D—Pengra silt loam, 2 to 20 percent slopes					
Pengra	75	Very limited			
		Slow water movement	1.00		
		Depth to saturated zone	1.00		
		Slope	0.37		
		Too acid	0.03		
188E—Pengra silt loam, 20 to 30 percent slopes					
Pengra	75	Very limited			
		Too steep	1.00		
		Slow water movement	1.00		
		Depth to saturated zone	1.00		
		Too acid	0.03		
189E—Philomath-Dixonville complex, 3 to 30 percent slopes					
Philomath	55	Very limited			
		Droughty	1.00		
		Slow water movement	1.00		
		Depth to bedrock	1.00		
		Too steep	1.00		
		Runoff	0.40		
Dixonville	30	Very limited			
		Slow water movement	1.00		
		Too steep	1.00		
		Depth to bedrock	0.35		
		Droughty	0.16		
		Too acid	0.03		



Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge— Douglas County Area, Oregon					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
190F—Philomath-Edenbower complex, 30 to 60 percent slopes					
Philomath	50	Very limited			
		Too steep	1.00		
		Droughty	1.00		
		Slow water movement	1.00		
		Depth to bedrock	1.00		
		Runoff	0.40		
Edenbower	35	Very limited			
		Too steep	1.00		
		Depth to bedrock	1.00		
		Droughty	1.00		
		Slow water movement	1.00		
		Runoff	0.40		
214A—Roseburg loam, 0 to 3 percent slopes					
Roseburg	85	Somewhat limited			
		Too acid	0.11		
		No filtering capacity limitation	0.01		
41E—Climax clay, 12 to 30 percent slopes					
Climax	85	Very limited			
		Slow water movement	1.00		
		Too steep	1.00		
		Depth to saturated zone	0.95		
		Runoff	0.40		
		Droughty	0.35		
44A—Conser silty clay loam, 0 to 3 percent slopes					
Conser	90	Very limited			
		Depth to saturated zone	1.00		
		Slow water movement	1.00		
		Ponding	1.00		
		Runoff	0.40		
		Too acid	0.03		



Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge– Douglas County Area, Oregon					
Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
48C—Curtin clay, 3 to 12 percent slopes					
Curtin	75	Very limited			
		Slow water movement	1.00		
		Depth to saturated zone	1.00		
		Runoff	0.40		
		Slope	0.01		
48D—Curtin clay, 12 to 20 percent slopes					
Curtin	75	Very limited			
		Slow water movement	1.00		
		Depth to saturated zone	1.00		
		Too steep	1.00		
		Runoff	0.40		
62F—Dixonville silty clay loam, 30 to 60 percent north slopes					
Dixonville, north	75	Very limited			
		Too steep	1.00		
		Slow water movement	1.00		
		Depth to bedrock	0.35		
		Droughty	0.16		
		Too acid	0.03		

### Data Source Information

Soil Survey Area: Douglas County Area, Oregon  
 Survey Area Data: Version 9, Feb 9, 2010



## Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Sand* as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (*K<sub>sat</sub>*), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity (K<sub>sat</sub>)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (*K<sub>sat</sub>*) is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is



reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor ( $K_w$  and  $K_f$ ) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and  $K_{sat}$ . Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor  $K_w$*  indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor  $K_f$*  indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service.  
National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)



# Report—Physical Soil Properties

Physical Soil Properties— Douglas County Area, Oregon														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
41E—Climax clay, 12 to 30 percent slopes														
Climax	0-39	-10-	-25-	60-65- 70	1.30-1.60	0.00-0.42	0.09-0.14	6.0-8.9	3.0-5.0	.20	.20	3	4	86
	39-49	—	—	—	—	—	—	—	—					
44A—Conser silty clay loam, 0 to 3 percent slopes														
Conser	0-4	-20-	-49-	27-31- 35	1.20-1.40	4.00-14.00	0.19-0.21	3.0-5.9	4.0-8.0	.28	.28	5	7	38
	4-63	-22-	-28-	40-50- 60	1.20-1.40	0.42-1.41	0.14-0.16	6.0-8.9	0.5-4.0	.37	.37			
48C—Curtin clay, 3 to 12 percent slopes														
Curtin	0-21	-10-	-25-	60-65- 70	1.30-1.45	0.42-1.41	0.11-0.14	6.0-8.9	3.0-5.0	.17	.17	5	4	86
	21-60	-10-	-25-	60-65- 70	1.30-1.65	0.00-0.42	0.10-0.12	6.0-8.9	0.2-3.0	.17	.17			
48D—Curtin clay, 12 to 20 percent slopes														
Curtin	0-21	-10-	-25-	60-65- 70	1.30-1.45	0.42-1.41	0.11-0.14	6.0-8.9	3.0-5.0	.17	.17	5	4	86
	21-60	-10-	-25-	60-65- 70	1.30-1.65	0.00-0.42	0.10-0.12	6.0-8.9	0.2-3.0	.17	.17			



Physical Soil Properties— Douglas County Area, Oregon

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
62F—Dixonville silty clay loam, 30 to 60 percent north slopes														
Dixonville, north	0-8	-19-	-48-	27-34-40	1.30-1.50	4.00-14.00	0.18-0.21	3.0-5.9	3.0-6.0	.32	.37	3	7	38
	8-31	-22-	-28-	40-50-60	1.30-1.60	0.42-1.41	0.12-0.17	6.0-8.9	1.0-3.0	.24	.32			
	31-41	—	—	—	—	—	—	—	—	—	—	—	—	—
149F—McMullin-Reston complex, 30 to 75 percent slopes														
McMullin	0-4	-42-	-38-	15-20-25	1.35-1.55	4.00-14.00	0.15-0.18	0.0-2.9	1.0-3.0	.20	.20	1	6	48
	4-19	-37-	-36-	20-27-35	1.30-1.50	4.00-14.00	0.10-0.17	0.0-2.9	0.5-1.0	.20	.37			
	19-29	—	—	—	—	—	—	—	—	—	—	—	—	—
Reston	0-2	-44-	-41-	12-15-18	1.40-1.50	4.00-14.00	0.15-0.17	0.0-2.9	2.0-4.0	.28	.28	1	5	56
	2-7	-40-	-38-	18-23-27	1.40-1.50	4.00-14.00	0.13-0.17	0.0-2.9	1.0-2.0	.24	.28			
	7-11	—	—	—	—	—	—	—	—	—	—	—	—	—



Physical Soil Properties—Douglas County Area, Oregon

Map symbol and soil name	Depth In	Sand Pct	Silt Pct	Clay Pct	Moist bulk density g/cc	Saturated hydraulic conductivity micro m/sec	Available water capacity In/in	Linear extensibility Pct	Organic matter Pct	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
169F— Nonpareil- Oakland complex, 30 to 60 percent slopes														
Nonpareil	0-4	-39-	-37-	20-24- 27	1.40-1.55	4.00-14.00	0.15-0.18	0.0-2.9	2.0-3.0	.32	.32	2	6	48
	4-17	-37-	-36-	20-27- 35	1.40-1.55	4.00-14.00	0.13-0.21	3.0-5.9	1.0-2.0	.37	.37			
	17-27	—	—	—	—	—	—	—	—	—	—	—	—	—
Oakland	0-5	-25-	-52-	20-24- 27	1.35-1.45	1.41-4.23	0.19-0.21	0.0-2.9	2.0-5.0	.43	.43	3	6	48
	5-24	- 7-	-54-	35-39- 45	1.45-1.55	1.41-4.23	0.17-0.20	3.0-5.9	0.5-2.0	.37	.37			
	24-28	- 8-	-49-	40-43- 45	1.45-1.55	1.41-4.23	0.12-0.15	3.0-5.9	0.3-0.7	.32	.37			
	28-38	—	—	—	—	—	—	—	—	—	—	—	—	—
170E—Oakland, silt loam, 20 to 30 percent slopes														
Oakland	0-5	-25-	-52-	20-24- 27	1.35-1.45	1.41-4.23	0.19-0.21	0.0-2.9	2.0-5.0	.43	.43	3	6	48
	5-24	- 7-	-54-	35-39- 45	1.45-1.55	1.41-4.23	0.17-0.20	3.0-5.9	0.5-2.0	.37	.37			
	24-28	- 8-	-49-	40-43- 45	1.45-1.55	1.41-4.23	0.12-0.15	3.0-5.9	0.3-0.7	.32	.37			
	28-38	—	—	—	—	—	—	—	—	—	—	—	—	—
188D—Pengra silt loam, 2 to 20 percent slopes														
Pengra	0-7	- 9-	-67-	20-24- 27	1.30-1.40	1.41-4.23	0.19-0.21	0.0-2.9	4.0-6.0	.28	.28	5	6	48
	7-16	- 7-	-62-	27-31- 35	1.30-1.40	1.41-4.23	0.19-0.21	3.0-5.9	1.0-2.0	.28	.28			
	16-60	-10-	-25-	60-65- 70	1.30-1.35	0.00-0.42	0.10-0.12	6.0-8.9	0.1-1.0	.24	.24			



Physical Soil Properties— Douglas County Area, Oregon														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
188E—Pengra silt loam, 20 to 30 percent slopes	in	Pct	Pct	Pct	g/cc	micro m/sec	in/in	Pct	Pct					
Pengra	0-7	-9-	-67-	20-24-27	1.30-1.40	1.41-4.23	0.19-0.21	0.0-2.9	4.0-6.0	.28	.28	5	6	48
	7-16	-7-	-62-	27-31-35	1.30-1.40	1.41-4.23	0.19-0.21	3.0-5.9	1.0-2.0	.28	.28			
	16-60	-10-	-25-	60-65-70	1.30-1.35	0.00-0.42	0.10-0.12	6.0-8.9	0.1-1.0	.24	.24			
189E—Philomath-Dixonville complex, 3 to 30 percent slopes														
Philomath	0-4	-6-	-47-	40-48-55	1.30-1.40	4.00-14.00	0.18-0.21	6.0-8.9	2.0-4.0	.32	.32	2	4	86
	4-16	-22-	-28-	40-50-60	1.30-1.40	0.42-1.41	0.14-0.16	6.0-8.9	1.0-2.0	.24	.37			
	16-26	—	—	—	—	—	—	—	—	—	—			
Dixonville	0-8	-19-	-48-	27-34-40	1.30-1.50	4.00-14.00	0.18-0.21	3.0-5.9	3.0-6.0	.32	.37	3	7	38
	8-31	-22-	-28-	40-50-60	1.30-1.60	0.42-1.41	0.12-0.17	6.0-8.9	1.0-3.0	.24	.32			
	31-41	—	—	—	—	—	—	—	—	—	—			



Physical Soil Properties-- Douglas County Area, Oregon														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
190F— Philomath-Edenbower complex, 30 to 60 percent slopes	In	Pct	Pct	Pct	g/cc	micro m/sec	In/in	Pct	Pct					
	0-4	-6-	-47-	40-48-55	1.30-1.40	4.00-14.00	0.18-0.21	6.0-8.9	2.0-4.0	.32	.32	2	4	86
	4-16	-22-	-28-	40-50-60	1.30-1.40	0.42-1.41	0.14-0.16	6.0-8.9	1.0-2.0	.24	.37			
	16-26	—	—	—	—	—	—	—	—	—	—	—	—	—
Edenbower	0-2	-18-	-29-	45-53-60	1.40-1.50	0.42-1.41	0.14-0.16	6.0-8.9	1.0-3.0	.20	.20	1	4	86
	2-8	-18-	-29-	45-53-60	1.40-1.50	0.42-1.41	0.14-0.16	6.0-8.9	1.0-3.0	.20	.20			
	8-12	—	—	—	—	—	—	—	—	—	—	—	—	—
214A— Roseburg loam, 0 to 3 percent slopes														
Roseburg	0-10	-40-	-38-	18-23-27	1.40-1.50	4.00-14.00	0.14-0.18	0.0-2.9	2.0-4.0	.28	.32	5	6	48
	10-41	-34-	-37-	25-30-35	1.45-1.60	4.00-14.00	0.16-0.21	0.0-2.9	0.5-2.0	.28	.32			
	41-64	-67-	-19-	10-14-18	1.45-1.60	14.11-42.34	0.11-0.16	0.0-2.9	0.0-0.5	.24	.28			

## Data Source Information

Soil Survey Area: Douglas County Area, Oregon  
 Survey Area Data: Version 9, Feb 9, 2010



## Soil Water Features:

The following table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

*Group A.* Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

*Group B.* Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

*Group C.* Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

*Group D.* Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

*Surface runoff* refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (upper limit) and base (lower limit) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates surface water depth and the duration and frequency of ponding. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. None means that ponding is not probable; rare that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); occasional that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and frequent that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding,



and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration and frequency* are estimated. Duration is expressed as extremely brief if 0.1 hour to 4 hours, very brief if 4 hours to 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent:

*None* means that flooding is not probable; very rare that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year).

*Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year).

*Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year).

*Frequent* means that flooding is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year).

*Very frequent* means that flooding is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

# Report—Water Features

Water Features—Douglas County Area, Oregon											
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Surface depth	Ponding		Flooding		
				Upper limit	Lower limit		Duration	Frequency	Duration	Frequency	
				Ft	Ft	Ft					
41E—Climax clay, 12 to 30 percent slopes											
Climax	D	—	January	1.5-3.0	1.6-3.3	—	—	None	—	None	
	D	—	February	1.5-3.0	1.6-3.3	—	—	None	—	None	
	D	—	March	1.5-3.0	1.6-3.3	—	—	None	—	None	
	D	—	April	1.5-3.0	1.6-3.3	—	—	None	—	None	
	D	—	December	1.5-3.0	1.6-3.3	—	—	None	—	None	
44A—Conser silty clay loam, 0 to 3 percent slopes											
Conser	D	—	January	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	February	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	March	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	April	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	May	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	November	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	
	D	—	December	0.0	>6.0	0.0-0.5	Long	Frequent	—	None	



Water Features— Douglas County Area, Oregon											
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Surface depth	Ponding		Flooding		
				Upper limit	Lower limit		Duration	Frequency	Duration	Frequency	
				Ft	Ft	Ft					
48C—Curtin clay, 3 to 12 percent slopes											
Curtin	D	—	January	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	February	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	March	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	April	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	December	0.5-1.5	>6.0	—	—	None	—	None	
48D—Curtin clay, 12 to 20 percent slopes											
Curtin	D	—	January	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	February	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	March	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	April	0.5-1.5	>6.0	—	—	None	—	None	
	D	—	December	0.5-1.5	>6.0	—	—	None	—	None	
62F—Dixonville silty clay loam, 30 to 60 percent north slopes											
Dixonville, north	C	—	Jan-Dec	—	—	—	—	None	—	—	
149F—McMullin-Reston complex, 30 to 75 percent slopes											
McMullin	D	—	Jan-Dec	—	—	—	—	None	—	—	
Reston	D	—	Jan-Dec	—	—	—	—	None	—	—	



Water Features— Douglas County Area, Oregon										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Surface depth	Ponding		Flooding	
				Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
169F—Nonpareil-Oakland complex, 30 to 60 percent slopes				ft	ft	ft				
Nonpareil	D	—	Jan-Dec	—	—	—	—	—	None	—
Oakland	C	—	Jan-Dec	—	—	—	—	—	None	—
170E—Oakland silt loam, 20 to 30 percent slopes										
Oakland	C	—	Jan-Dec	—	—	—	—	—	None	—
188D—Pengra silt loam, 2 to 20 percent slopes										
Pengra	C	—	January	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	February	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	March	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	April	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	May	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	November	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	December	0.0-2.5	1.7-2.5	—	—	—	None	None
188E—Pengra silt loam, 20 to 30 percent slopes										
Pengra	C	—	January	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	February	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	March	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	April	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	May	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	November	0.0-2.5	1.7-2.5	—	—	—	None	None
	C	—	December	0.0-2.5	1.7-2.5	—	—	—	None	None



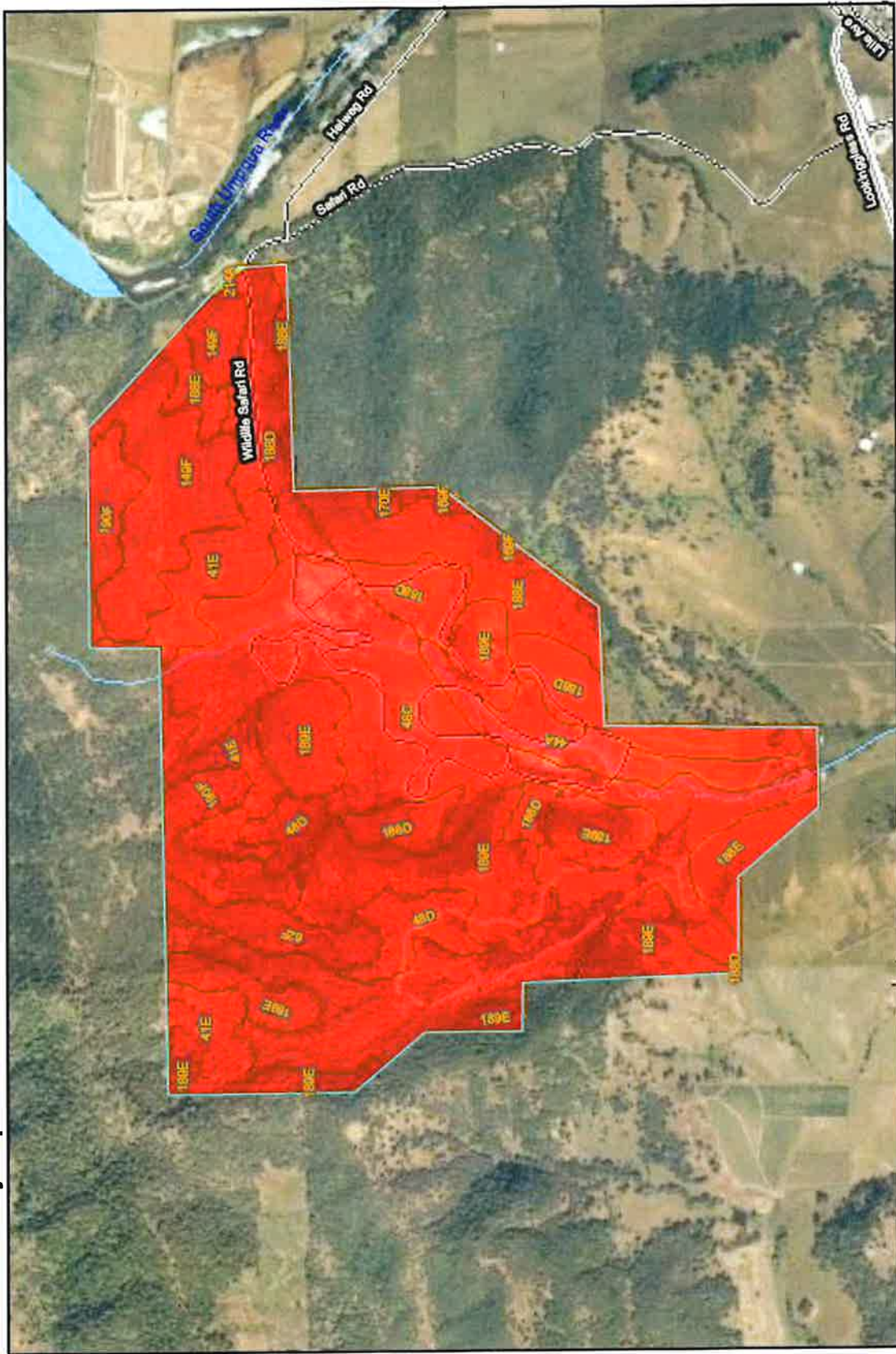
Water Features— Douglas County Area, Oregon										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Surface depth	Ponding		Flooding	
				Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
189E—Philomath-Dixonville complex, 3 to 30 percent slopes										
Philomath	D	—	Jan-Dec	—	—	—	—	—	None	—
Dixonville	C	—	Jan-Dec	—	—	—	—	—	None	—
190F—Philomath-Edenbower complex, 30 to 60 percent slopes										
Philomath	D	—	Jan-Dec	—	—	—	—	—	None	—
Edenbower	D	—	Jan-Dec	—	—	—	—	—	None	—
214A—Roseburg loam, 0 to 3 percent slopes										
Roseburg	B	—	January	—	—	—	—	—	None	Rare
	B	—	February	—	—	—	—	—	None	Rare
	B	—	March	—	—	—	—	—	None	Rare
	B	—	April	—	—	—	—	—	None	Rare
	B	—	May	—	—	—	—	—	None	Rare
	B	—	June	—	—	—	—	—	None	Rare
	B	—	October	—	—	—	—	—	None	Rare
	B	—	November	—	—	—	—	—	None	Rare
	B	—	December	—	—	—	—	—	None	Rare

## Data Source Information

Soil Survey Area: Douglas County Area, Oregon  
 Survey Area Data: Version 9, Feb 9, 2010




Flood Boundary Map



## Flood Boundary Map Legend and Information







### MAP LEGEND

#### Area of Interest (AOI)

 Area of Interest (AOI)



#### Soils

##### Soil Ratings




-  None
-  Very Rare
-  Rare
-  Occasional
-  Frequent
-  Very Frequent

#### Political Features

##### Municipalities

-  Cities
-  Urban Areas




#### Water Features

-  Water
-  Oceans
-  Streams and Canals

#### Transportation

-  Rails

#### Roads

-  Interstate Highways
-  US Routes
-  State Highways
-  Local Roads
-  Other Roads

### MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: UTM Zone 10N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Date(s) aerial images were photographed: 5/23/1994; 6/20/1994

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Irrigated and Nonirrigated Yields by Map Unit Component:

The average yields per acre that can be expected of the principal crops under a high level of management are shown in this table. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

If yields of irrigated crops are given, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

Pasture yields are expressed in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

The land capability classification of map units in the survey area is shown in this table. This classification shows, in a general way, the suitability of soils for most kinds of field crops (United States Department of Agriculture, Soil Conservation Service, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, e, w, s, or c, to the class numeral, for example, 2e. The letter e shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by w, s, or c because the soils in class 5 are subject to little or no erosion.



*Capability units* are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

Reference:

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

# Report—Irrigated and Nonirrigated Yields by Map Unit Component

Map symbol and soil name	Irrigated and Nonirrigated Yields by Map Unit Component— Douglas County Area, Oregon										
	Land capability		Grass hay		Grass-legume hay		Pasture				
	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	
41E—Climax clay, 12 to 30 percent slopes											
Climax	—	4e	—	—	—	2.50	—	—	—	—	5.5
44A—Conser silty clay loam, 0 to 3 percent slopes											
Conser	3w	3w	—	—	5.00	3.00	—	11.0	—	—	7.0
48C—Curtin clay, 3 to 12 percent slopes											
Curtin	—	3w	—	—	—	2.50	—	—	—	—	6.0
48D—Curtin clay, 12 to 20 percent slopes											
Curtin	—	3e	—	—	—	2.50	—	—	—	—	6.0
62F—Dixonville silty clay loam, 30 to 60 percent north slopes											
Dixonville, north	—	6e	—	—	—	—	—	—	—	—	5.0
149F—McMullin-Reston complex, 30 to 75 percent slopes											
McMullin	—	6e	—	—	—	—	—	—	—	—	—
Reston	—	7e	—	—	—	—	—	—	—	—	—
169F—Nonpareil-Oakland complex, 30 to 60 percent slopes											
Nonpareil	—	6e	—	—	—	—	—	—	—	—	—
Oakland	—	6e	—	—	—	—	—	—	—	—	4.0



Irrigated and Nonirrigated Yields by Map Unit Component-- Douglas County Area, Oregon										
Map symbol and soil name	Land capability		Grass hay		Grass-legume hay		Pasture		AUM	
	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated	Irrigated	Nonirrigated
170E—Oakland silt loam, 20 to 30 percent slopes										
Oakland	—	4e	—	—	—	2.50	—	—	—	6.0
188D—Pengra silt loam, 2 to 20 percent slopes										
Pengra	4w	3w	—	—	6.00	3.00	13.0	—	—	7.0
188E—Pengra silt loam, 20 to 30 percent slopes										
Pengra	4w	4w	—	—	—	3.00	—	—	—	7.0
189E—Philomath-Dixonville complex, 3 to 30 percent slopes										
Philomath	—	6e	—	—	—	—	—	—	—	—
Dixonville	—	4e	—	—	—	2.50	—	—	—	6.0
190F—Philomath-Edenbower complex, 30 to 60 percent slopes										
Philomath	—	6e	—	—	—	—	—	—	—	—
Edenbower	—	7s	—	—	—	—	—	—	—	—
214A—Roseburg loam, 0 to 3 percent slopes										
Roseburg	1	1	—	—	7.00	5.00	16.0	—	—	11.0

## Data Source Information

Soil Survey Area: Douglas County Area, Oregon  
 Survey Area Data: Version 9, Feb 9, 2010



## 5.4 Soil Loss

**Table 5.2 Predicted Soil Erosion**

Field	Predominant Soil Type	Slope (%)	Water (Ton/Ac/Yr)	Wind (Ton/Ac/Yr)	Irrigation (Ton/Ac/Yr)	Gully (Ton/Ac/Yr)	Ephemeral (Ton/Ac/Yr)	Total (Ton/Ac/Yr)
Village	48C (Curtin C)	12.0	0.3	0	0	0	0.0	0.3
The Americas	48C (Curtin C)	12.0	0.3	0	0	0	2.0	2.3
Africa	188D (Pengra SIL)	10.0	0.5	0	0	0	1.5	2.0
Asia	48C (Curtin C)	12.0	0.3	0	0	0	1.5	1.8
Wetlands	44A (Conser SICL)	3.0	0.1	0	0	0	0.5	0.6
Facilities	189E (Philomath SIC)	8.0	0.4	0	0	0	1.0	1.4
Natural Area 1	189E (Philomath SIC)	16.0	0.9	0	0	0	2.0	2.9
Natural Area 2	188E (Pengra SIL)	25.0	1.3	0	0	0	2.0	3.3
Natural Area 3	189E (Philomath SIC)	16.0	0.9	0	0	0	2.0	2.9
Cheetah Area	48C (Curtin C)	12.0	0.3	0	0	0	1.0	1.3



## 5.5 Highly Erodible Lands

The following table shows the highly erodible land (HEL) class for each field:

Field	Soil Survey	Map Unit	Soil Component Name	Surface Texture	Slope Range (%)	Drainage	HEL Class
Village	649	48C	Curtin	C	3-12%	SPoor	2 – Potentially Highly Erodible
The Americas	649	48C	Curtin	C	3-12%	SPoor	2 – Potentially Highly Erodible
Africa	649	188D	Pengra	SIL	2-20%	SPoor	2 – Potentially Highly Erodible
Asia	649	48C	Curtin	C	3-12%	SPoor	2 – Potentially Highly Erodible
Wetlands	649	44A	Conser	SICL	0-3%	Poor	3 – Not Highly Erodible
Facilities	649	189E	Philomath	SIC	3-30%	Well	2 – Potentially Highly Erodible
Natural Area 1	649	189E	Philomath	SIC	3-30%	Well	2 – Potentially Highly Erodible
Natural Area 2	649	188E	Pengra	SIL	20-30%	SPoor	2 – Potentially Highly Erodible
Natural Area 3	649	189E	Philomath	SIC	3-30%	Well	2 – Potentially Highly Erodible
Cheetah Area	649	48C	Curtin	C	3-12%	SPoor	2 – Potentially Highly Erodible

The Wetlands are classified as **Non-Highly Erodible Land (NHEL)** due to flat s (0-3%) slopes. All of the other areas are classed as **Potentially Highly Erodible Land (PHEL)** due to the slope range which is moderately steep to steep. The erosion potential is high for sheet and rill erosion to occur above the soil loss tolerance (T) value for the soils on the potentially highly erodible areas if residue cover or adequate growing vegetation is not present on the soil surface prior to the fall and winter rainfall/runoff period.

The Revised Universal Soil Loss Equation ver. 2.0 (RUSLE2) calculations are located in Appendix D and the estimated sheet and rill erosion is shown in Table 5-2. The estimated sheet and rill erosion for the average annual soil loss is less than the tolerable soil loss which ranges from 2 to 5 tons per acre per year for the predominate soils in the management areas.

There is some minor ephemeral erosion occurring in the management areas due to animal traffic and road cut slopes. These areas should be filled in and seeded with a native grass seed that will minimize the potential for this type of erosion to occur.

It is also recommended to never till up and down the slope when replanting pastures to prevent excess erosion. Tilling cross slope in strips when replanting pastures will significantly reduce potential soil erosion. This will result in the replanting of a pasture stand taking more than one year but the reduction in potential soil erosion will be significant.

Care should also be taken when constructing any new all weather access roads to make sure the location of the road minimizes erosion potential and features such as water bars and other erosion control measures are implemented.

## 5.6 Risk Assessment-Phosphorus Index

The CLEANmp West program, the Oregon Department of Agriculture Confined Animal Feeding Program, and the Oregon Natural Resources Conservation Service (NRCS) Nutrient Management conservation practice standard 590 all require that a phosphorus (P) index be prepared to determine the potential for phosphorus transport off of the fields used for manure application.

The P index ratings for all fields are show in Table 5-3 and are based on the western Oregon phosphorus index described in Appendix E. The P index ratings indicate that there is currently a low risk of phosphorus transport from all of the management areas if no additional manure is applied over the next 4 years. Based on the application plan for manure over the next 4 years, the P index ratings indicate that there is currently a low risk of phosphorus transport from the Africa and Wetlands area and a medium risk risk of phosphorus transport from the rest of the management.

The RUSLE2 calculations indicate that the erosion in the fields where manure will be applied is within the average annual soil loss tolerance (T) therefore erosion will not contribute significantly to phosphorus transport.

According to the Oregon NRCS Nutrient Management conservation practice standard 590, fields ranked in the medium or low risk category may receive organic (manure) or inorganic (commercial fertilizer) applications at nitrogen-based rates (Table 4-4).

**Table 5-3. Oregon Phosphorus Index (West)**

Field	Crop Year	Transport Factor Sum	Source Factor Sum	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
Village	2011	<i>Unable to calculate P Index. See notes for details.</i>				
Village	2012	<i>Unable to calculate P Index. See notes for details.</i>				
Village	2013	<i>Unable to calculate P Index. See notes for details.</i>				
Village	2014	<i>Unable to calculate P Index. See notes for details.</i>				
The Americas	2011	8.00	8.73	8.00	16.73	Medium
The Americas	2012	8.00	8.79	8.00	16.79	Medium
The Americas	2013	8.00	8.79	8.00	16.79	Medium
The Americas	2014	8.00	8.73	8.00	16.73	Medium
Africa	2011	4.00	8.79	4.00	12.79	Low
Africa	2012	4.00	8.79	4.00	12.79	Low
Africa	2013	4.00	8.79	4.00	12.79	Low
Africa	2014	4.00	8.73	4.00	12.73	Low
Asia	2011	8.00	8.89	8.00	16.89	Medium
Asia	2012	8.00	8.89	8.00	16.89	Medium
Asia	2013	8.00	8.88	8.00	16.88	Medium
Asia	2014	8.00	8.82	8.00	16.82	Medium
Wetlands	2011	2.75	8.44	2.75	11.19	Low
Wetlands	2012	2.75	8.48	2.75	11.23	Low
Wetlands	2013	2.75	8.48	2.75	11.23	Low
Wetlands	2014	2.75	8.48	2.75	11.23	Low
Facilities	2011	<i>Unable to calculate P Index. See notes for details.</i>				
Facilities	2012	<i>Unable to calculate P Index. See notes for details.</i>				
Facilities	2013	<i>Unable to calculate P Index. See notes for details.</i>				
Facilities	2014	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 1	2011	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 1	2012	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 1	2013	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 1	2014	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 2	2011	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 2	2012	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 2	2013	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 2	2014	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 3	2011	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 3	2012	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 3	2013	<i>Unable to calculate P Index. See notes for details.</i>				
Natural Area 3	2014	<i>Unable to calculate P Index. See notes for details.</i>				
Cheetah Area	2011	8.75	8.48	8.75	17.23	Medium
Cheetah Area	2012	8.75	8.48	8.75	17.23	Medium
Cheetah Area	2013	8.75	8.49	8.75	17.24	Medium
Cheetah Area	2014	8.75	8.45	8.75	17.20	Medium



**Notes:**

Field Village:

Error: Soil test P not entered; cannot calculate P Index.

Field Wetlands:

Warning: Field is irrigated, but no irrigation erosion entered.

Field Facilities:

Error: Soil test P not entered; cannot calculate P Index.

Field Natural Area 1:

Error: Soil test P not entered; cannot calculate P Index.

Field Natural Area 2:

Error: Soil test P not entered; cannot calculate P Index.

Field Natural Area 3:

Error: Soil test P not entered; cannot calculate P Index.

**Oregon Phosphorus Index (West) Risk Interpretation**

P Index rating	Interpretation	Recommended Nutrient Limitation
PI Score <13	Low potential for P movement from this site given current management practices and site characteristics. There is a low probability of an adverse impact to surface waters from P losses on this site. Soil test P and P losses are likely to increase in future due to N-based nutrient management from animal manure.	Nitrogen
PI Score 13-25	Medium potential for P movement from this site given current management practices and site characteristics. Practices should be introduced to reduce P losses by surface runoff, subsurface flow, and erosion. Soil test P and P losses are likely to increase in future due to N-based nutrient management from animal manure.	Nitrogen
PI Score >25-50	High potential for P movement from this site given current management practices and site characteristics. All practicable management practices to reduce P losses through surface runoff, subsurface flow, or erosion should be implemented.	Phosphorus
PI Score >50	Very high potential for P movement from this site given current management practices and site characteristics. Active remediation techniques should be implemented in an effort to reduce the P loss potential from this site.	No manure



## 5.7 Leaching Index

Water that moves through soils can contain soluble nutrients that can degrade groundwater sources. The leaching index provides a way to determine if soils in a management area or field are susceptible to leaching nutrients to groundwater sources. The methodology for the Oregon leaching index was based on research done by J.R. Williams and D.E. Kissel which is published in the book "Managing Nitrogen for Groundwater Quality and Farm Profitability" edited by R.F. Follet. Appropriate management considerations and land treatment practices should be established based on the leaching index rating to limit the amount of soluble nutrients that could be leached to groundwater in a management area or field.

The leaching index ratings shown in Table 5-4 indicate the soils in the fields where manure will be applied from the Wildlife Safari have a medium potential for leaching soluble nutrients. To minimize the leaching potential of soluble nutrients intensive nutrient management should be practiced on these fields. In addition adequate vegetation should be to capture excess soluble nutrients contained in the soils.

**Table 5-4. Soil Information**

Field	Soil Survey	Map Unit	Soil Component Name	Surface Texture	Drainage	Hydro-logic Group	Leaching Index
Village	649	48C	Curtin	C	SPoor	D	4
The Americas	649	48C	Curtin	C	SPoor	D	4
Africa	649	188D	Pengra	SIL	SPoor	C	8
Asia	649	48C	Curtin	C	SPoor	D	4
Wetlands	649	44A	Conser	SICL	Poor	D	4
Facilities	649	189E	Philomath	SIC	Well	D	4
Natural Area 1	649	189E	Philomath	SIC	Well	D	4
Natural Area 2	649	188E	Pengra	SIL	SPoor	C	8
Natural Area 3	649	189E	Philomath	SIC	Well	D	4
Cheetah Area	649	48C	Curtin	C	SPoor	D	4

### Leaching Index Interpretation

Rating	Interpretation
Low (<2)	Soils have a low potential to leach mobile nutrients below the root zone unless irrigation applications are not managed properly.
Medium (2 to 10)	Soils may leach mobile nutrients below the root zone. Irrigation water management should be practiced on these soils if crops are irrigated and land treatments to minimize the potential for leaching losses should be considered.
High (>10)	Soils have a high potential to leach mobile nutrients below the root zone. Intensive irrigation water management should be practiced on these soils if crops are irrigated. Intensive nutrient management should also be practiced on these soils with special considerations for the method, rate, and timing of nutrient applications to reduce the potential of nutrient losses to ground water. Land treatments to minimize the potential for leaching losses should also be considered.

## Section 6. Nutrient Management

### 6.1 Soil Tests

Soil sampling shall be done in accordance with Pacific Northwest Land Grant University (PNLGU) guidance or industry practice if recognized by the PNLGU to monitor phosphorus, potassium, calcium, magnesium, pH, organic matter and the cation exchange capacity (CEC) levels. Guidance for soil sampling can be found in Pacific Northwest (PNW) Extension publication 570-E, "Monitoring Soil Nutrients Using a Management Unit Approach" which is located in Appendix H. If no significant changes have occurred in the manure and wastewater production, storage, collection, transport, or utilization systems for the farm, current soil tests are those that are less than 4 years old. The Oregon State University Extension publication EC1478, "Soil Test Interpretation Guide" located in Appendix H provides guidance on how to determine soil nutrient concentrations levels and how to adjust soil pH to improve nutrient availability. Nutrient application rates shall be reduced where soil nutrient concentration levels are determined to be high to excessive which may cause manure to be exported off farm if the availability of acreage for manure applications is limited.

Dates of when soil samples were taken and analytical results are shown in Table 6-1. The original laboratory soil test reports are located in Appendix F.

A map showing soil pH levels in all of the management areas is located on page 149 and show that pH levels are low. Fields with low pH levels should have soil samples taken and analyzed for pH levels every other year to insure adequate nutrient availability from applied nutrients.

A map showing soil concentrations of phosphorus for all fields is located on page 150 and show that soil concentrations of phosphorus are very low to medium for the management areas. Soil samples should be taken and analyzed for soil concentrations of phosphorus every 4 years on all fields to insure phosphorus concentrations do not become high and restrict manure applications.

A map showing soil concentrations of potassium for all fields is located on page 151 and show that soil concentrations of potassium are low to high for the management areas. Soil samples should be taken and analyzed for soil concentrations of potassium every 4 years on all fields to insure soil concentrations of potassium adequate for pasture production do not become excessive and negatively affect animal health.

Refer to the nutrient management specification located on page 61 in Section 4.4 for guidance on when to take soil samples and what to have the samples analyzed for. The nutrient management specification also provides guidance on taking soil tests at specific times of the year to address if additional nutrient applications are needed for the crop being grown and if nutrient applications made did not supply enough or too much nutrients for the targeted crop yields.

### 6.2 Manure Nutrient Content

Dates, source of manure samples and analytical results are shown in Table 6-2. The original laboratory manure test reports are located in Appendix G.

Normally manure tests are taken in early fall and spring to provide a representative assessment of nutrient concentrations in the manure to be used in determining the amount of manure to be applied. Refer to the nutrient management specification on page 61 in Section 4.4 for guidance on when to take manure samples and what to have the samples analyzed for.



**Table 6-1. Soil Test Data**

Field	Test Year	OM (%)	P Test Used	P	K	Mg	Ca	Na	Units	Soil pH	Buffer pH	CEC (meq/100g)	NO <sub>3</sub> -N (ppm)	EC (mmhos/cm)
Village									ppm					
The Americas	2010	6.5	Bray P1	9	246	649	1,988	19	ppm	6.0	6.6	18.8	17.0	
Africa	2010	6.6	Bray P1	10	174	513	1,986	26	ppm	5.9	6.4	17.7	17.0	
Asia	2010	12.8	Bray P1	27	383	627	2,492	13	ppm	6.0	6.4	21.9	20.0	
Wetlands	2010	6.6	Bray P1	10	174	513	1,986	26	ppm	5.9	6.4	17.7	17.0	
Facilities									ppm					
Natural Area 1									ppm					
Natural Area 2									ppm					
Natural Area 3									ppm					
Cheetah Area	2010	12.8	Bray P1	27	383	627	2,492	13	ppm	6.0	6.4	21.9	20.0	

**Table 6-2. Manure Nutrient Analysis**

Manure Source	Dry Matter (%)	Total N	NH <sub>4</sub> -N	Total P <sub>2</sub> O <sub>5</sub>	Total K <sub>2</sub> O	Avail. P <sub>2</sub> O <sub>5</sub>	Avail. K <sub>2</sub> O	Units	Analysis Source and Date
Compost Facility	50.0	43.4	15.8	8.7	46.7	8.7	46.7	Lb/Ton	2010 A&L Western Agricultural Laboratory Analysis
Tanks	99.0	21.2	5.9	9.2	24.9	9.2	24.9	Lb/1000Gal	MMP Estimate
Pasture	85.0	32.0	8.8	12.5	35.3	12.5	35.3	Lb/1000Gal	MMP Estimate

(1) Entered analysis may be the average of several individual analyses.

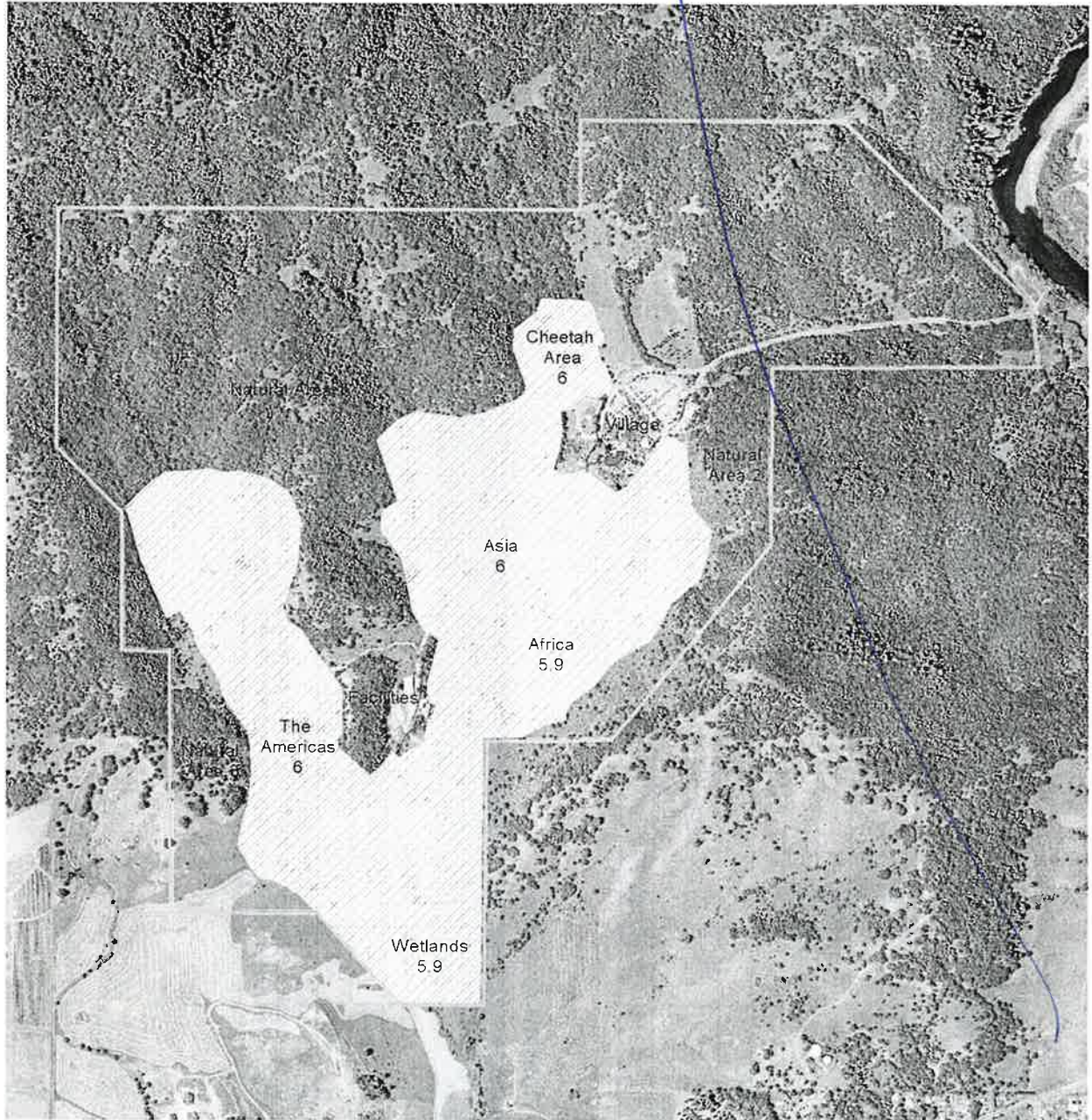
(2) Oregon assumes that 100% of manure phosphorus and 100% of manure potassium is crop available. First-year per-acre nitrogen availability for individual manure applications is given in the Planned Nutrient Applications table. For more information about nitrogen availability in Oregon, see Waste Utilization Jobsheet 633 OR-JS, Oregon USDA-NRCS, May 2003 (<http://efotg.nrcs.usda.gov/references/public/OR/633js.doc>).



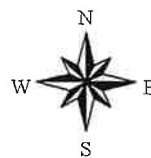
6.3 Wildlife Safari Soil Test pH (Water) Map

# Wildlife Safari, Year:2010

*Secret Copy*



## Soil Test: pH

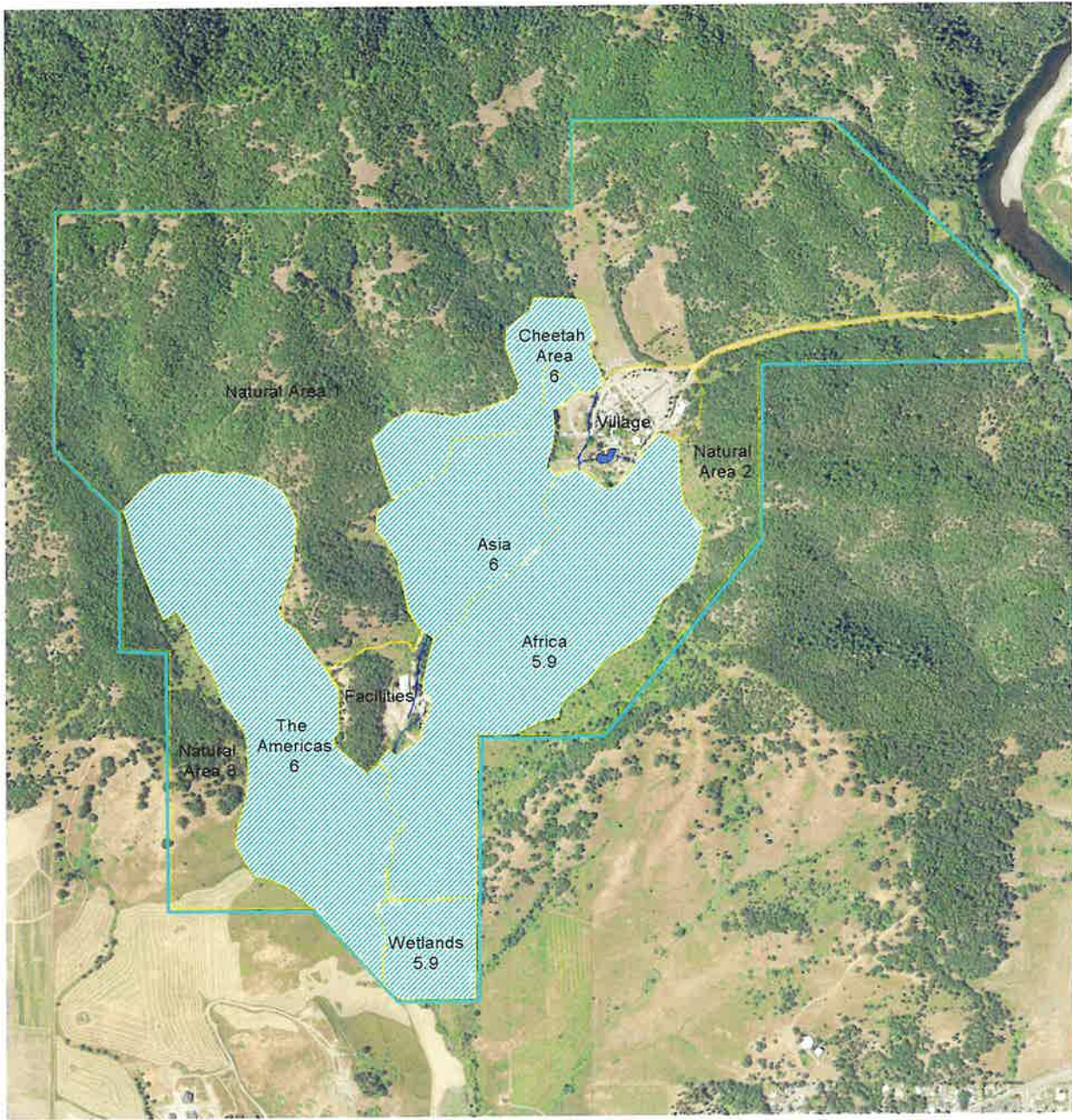


- Current Fields
- Very Low
  - Low
  - Medium
  - High
  - Very High
  - Excessive
  - None

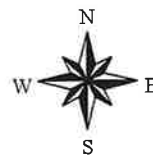


6.3 Wildlife Safari Soil Test pH (Water) Map

# Wildlife Safari, Year:2010



Soil Test: pH

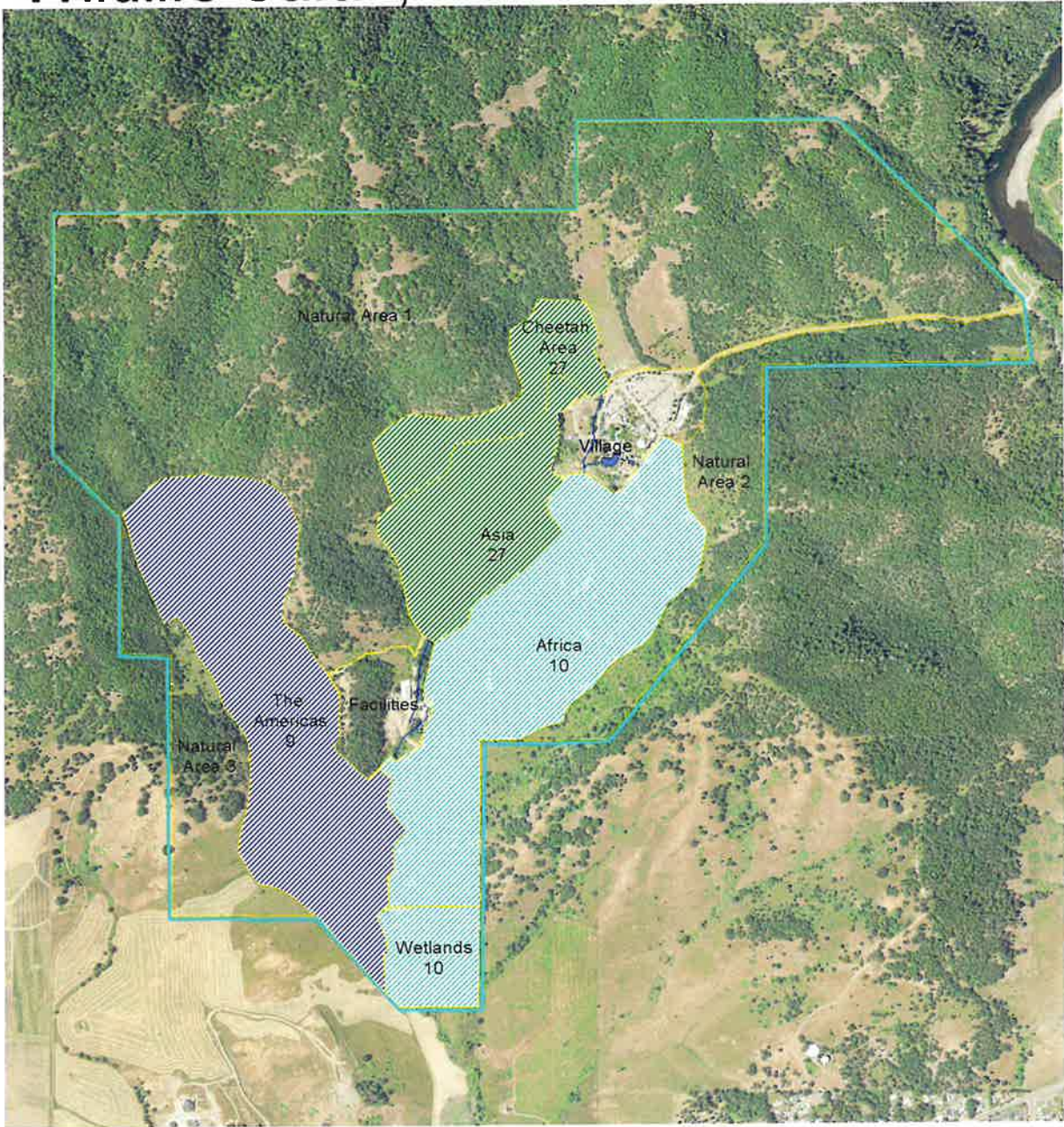


- Current Fields
- Very Low
  - Low
  - Medium
  - High
  - Very High
  - Excessive
  - None

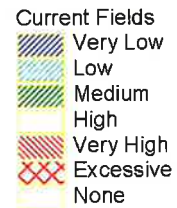
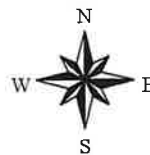


6.4 Wildlife Safari Soil Test P (ppm) Map

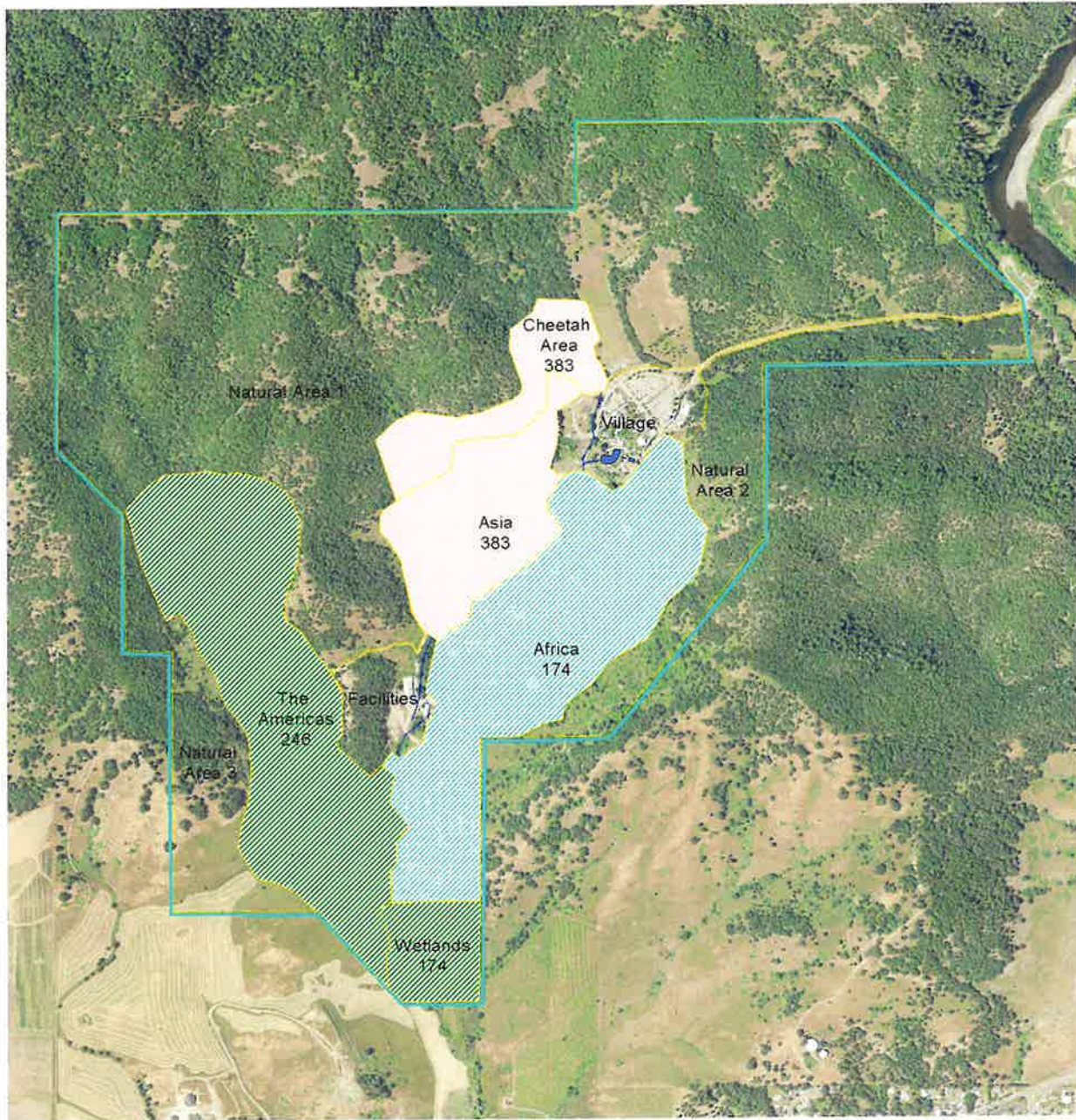
# Wildlife Safari, Year:2010



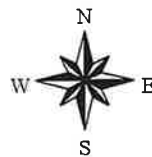
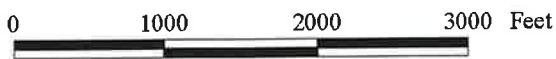
Soil Test: Bray P1 Phosphorus (ppm)



# Wildlife Safari, Year:2010



Soil Test: Potassium (ppm)



- Current Fields
- Very Low
- Low
- Medium
- High
- Very High
- Excessive
- None



## **6.6 Cropping System**

All of the management areas are in permanent pasture and grazed by the animals year round. Since the management areas are not irrigated, forage production in late summer and early fall suffers and additional feed must be supplied to animals. The application of washwater to small areas of the pastures is beneficial but these areas are small and do not impact overall forage production to any great degree. Some composted manure is applied that provides nutrients for plant growth but applications are sporadic and do not meet the requirements of the pasture. No commercial fertilizer applications are made to the management areas due to the cost and difficulty of making uniform applications on steep slopes.

## **6.7 Realistic Yield Goals**

Wildlife Safari staff do not maintain yield records for the management areas so there is no historical yield data for the pastures grown in these areas. Yield data taken from the Douglas County Area soil survey indicates that the predominate soils in the management areas should produce 2 to 3 tons per acre of hay and 6 to 7 AUMs for nonirrigated hay and pasture land. Yield values of 2.5 to 3 tons per acre for nonirrigated pasture were used in the development of this plan which are in agreement with the yield values presented in the soil survey for predominant soils in the management areas.

## **6.8 Nutrient Application Plans**

Where appropriate, the Oregon State University Extension fertilizer guides for the crops grown were used in conjunction with the nutrient analysis of the manure to determine the recommended application rates of the manure. Where the fertilizer guides were not appropriate to use, nutrient uptake guidelines taken from Oregon State University Extension publications or chapter 6 of the Natural Resource Conservation Service Agricultural Waste Management Field Handbook were used to determine the recommended application rates of manure. Based on the estimated amounts of nutrients that the manure applied from washwater, composted solids and grazing animals will supply, it is anticipated that no additional commercial fertilizer will be needed to meet the nutrient requirements of the pastures grown in the management areas. The recommended manure application rates for the Wildlife Safari management areas are given in the nutrient management specification located on page 61 in Section 4.4.

The following sections of this plan described the nutrient requirements, additional amendments and timing of manure applications to meet the yield expectations for the crops being grown. Tables 6-5 through 6-7 summarize the manure application recommendations by field and crop year for the four-year planning cycle.

## **6.9 Land Application Strategy**

Use the information in Tables 6-3, 6-4, 6-5 and 6-6 and the guidance in the Nutrient Management practice located in Section 4.4 for making applications of manure generated by the Wildlife Safari.

## 6.10 Nutrient Balance

The low and medium site vulnerability class for phosphorus movement off of the pastures in the management areas are based on the Western Oregon Phosphorus Index which allows manure, bedding and runoff from the waste storage facility to be applied on nitrogen based rates. Soil tests will be used to monitor phosphorus levels in the soils where manure is applied. If the soil tests show significant increases in soil phosphorus concentrations, manure applications may have to be made on a phosphorus basis which may require some additional manure to be exported off farm. If manure applications are made on a phosphorus basis, supplemental commercial fertilizer applications may be needed in order to maintain a nutrient balance for nitrogen and potassium to meet crop yield expectations See Table 6-7 for the planned nutrient balance based on recommended manure applications and Table 6-8 for projected soil concentration values of phosphorus and potassium at the end of the planning period. See Table 6-6 for planned manure applications.

**Table 6-3. Planned Crops and Fertilizer Recommendations**

Field	Crop Year	Planned Crop	Yield Goal (per Acre)	N Rec (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Rec (Lbs/A)	K <sub>2</sub> O Rec (Lbs/A)	N Removed (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Removed (Lbs/A)	K <sub>2</sub> O Removed (Lbs/A)	Custom Fert. Rec. Source
Village	2011	Other								
Village	2012	Other								
Village	2013	Other								
Village	2014	Other								
The Americas	2011	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2012	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2013	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
The Americas	2014	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2011	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2012	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2013	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Africa	2014	Grass pasture, maint	3.0 Ton	114 <sup>a</sup>	41	137 <sup>a</sup>	118	28	144	OSU Extension Publication EM8585-E
Asia	2011	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2012	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2013	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Asia	2014	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Wetlands	2011	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2012	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2013	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Wetlands	2014	Other	1.5	50 <sup>a</sup>	22 <sup>a</sup>	114 <sup>a</sup>				NRCS National Engineering Handbook Part 637
Facilities	2011	Other								



Field	Crop Year	Planned Crop	Yield Goal (per Acre)	N Rec (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Rec (Lbs/A)	K <sub>2</sub> O Rec (Lbs/A)	N Removed (Lbs/A)	P <sub>2</sub> O <sub>5</sub> Removed (Lbs/A)	K <sub>2</sub> O Removed (Lbs/A)	Custom Fert. Rec. Source
Facilities	2012	Other								
Facilities	2013	Other								
Facilities	2014	Other								
Natural Area 1	2011	Other								
Natural Area 1	2012	Other								
Natural Area 1	2013	Other								
Natural Area 1	2014	Other								
Natural Area 2	2011	Other								
Natural Area 2	2012	Other								
Natural Area 2	2013	Other								
Natural Area 2	2014	Other								
Natural Area 3	2011	Other								
Natural Area 3	2012	Other								
Natural Area 3	2013	Other								
Natural Area 3	2014	Other								
Cheetah Area	2011	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2012	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2013	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E
Cheetah Area	2014	Grass pasture, maint	2.5 Ton	95	34 <sup>a</sup>	114 <sup>a</sup>	99	23	120	OSU Extension Publication EM8585-E

\* Unharvested cover crop or first crop in double-crop system.

<sup>a</sup> Custom fertilizer recommendation.



**Table 6-4. Manure Application Setback Distances**

Setback Requirements: CAFO

Feature	Setback Criteria	Setback Distance (Feet)
Lakes and ponds	Applied upgradient, permanent vegetated setback >=35 feet	35
Impounding reservoirs	Applied upgradient, permanent vegetated setback >=35 feet	35
Wells	Applied upgradient, permanent vegetated setback >=35 feet	35
Rivers and canals	Applied upgradient, permanent vegetated setback >=35 feet	35
Streams and creeks	Applied upgradient, permanent vegetated setback >=35 feet	35
Estuaries	Applied upgradient, permanent vegetated setback >=35 feet	35
Pacific Ocean	Applied upgradient, permanent vegetated setback >=35 feet	35
All other bodies of surface water, natural or artificial	Applied upgradient, permanent vegetated setback >=35 feet	35
Other conduits to surface waters	Applied upgradient, permanent vegetated setback >=35 feet	35
Open tile line intake	Applied upgradient, permanent vegetated setback >=35 feet	35
Sinkholes	Applied upgradient, permanent vegetated setback >=35 feet	35

Source: CAFO General Permit #1 ([http://oregon.gov/ODA/NRD/docs/pdf/cafo\\_gnlbmt.pdf](http://oregon.gov/ODA/NRD/docs/pdf/cafo_gnlbmt.pdf))

**Setback Requirements: NRCS Standard**

Feature	Setback Criteria	Setback Distance (Feet)
Open water courses	Application June through September	25
Open water courses	Application October through May	50

Source: Waste Utilization 633 Operation and Maintenance Worksheet (<http://efotg.nrcs.usda.gov/references/public/OR/633om.doc>)



**Table 6-5. Manure Application Planning Calendar – October 2010 through September 2011**

Field	Total Acres	Spread Acres	Predominant Soil Type	Primary 2011 Crop (Prev. Primary Crop)	Oct '10	Nov '10	Dec '10	Jan '11	Feb '11	Mar '11	Apr '11	May '11	Jun '11	Jul '11	Aug '11	Sep '11
Village	16.0	0.0	Curtin C (48C 3-12%)	Other (Other)												
The Americas	78.0	78.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	1.29 8.7	1.29 5.9	1.29 4.8	1.29 4.8	1.29 4.8	1.29 4.7	1.29 4.8	1.31 0.8	1.29 4.8	1.29 4.8	1.29 4.8	1.29 4.8
Africa	76.0	76.0	Pengra SIL (188D 2-20%)	Grass pasture, maint (Grass pasture, maint)	1.28 8.2	1.28 8.2	1.28 8.2	1.28 8.2	1.28 8.2	1.28 8.2	1.28 8.2	1.30 3.7	1.28 7.4	1.28 7.4	1.28 7.7	1.28 7.7
Asia	32.4	32.4	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	471 5	471 5	471 5	471 5	471 5	471 5	471 5	489 8	473 8	473 8	473 8	473 8
Wetlands	12.2	7.5	Conser SICL (44A 0-3%)	Other (Other)	X	X	X	X	X	X	X	X	X	X	X	51.8 X
Facilities	12.8	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Natural Area 1	283.7	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Natural Area 2	42.6	0.0	Pengra SIL (188E 20-30%)	Other (Other)												
Natural Area 3	30.2	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Cheetah Area	19.0	19.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	200 6	130 9	200 8	201 6	201 6	201 6	201 1	200 5	200 8	200 8	200 5	200 5
<b>Total</b>	602.9	212.9			X	3,25 9.0	3,18 6.5	3,25 5.6	3,25 6.1	3,25 6.1	3,25 5.5	3,30 4.8	3,25 6.8	3,25 6.8	3,30 8.6	3,30 8.6

Crop in field

No. indicates total loads  
"X" indicates other manure apps



**Manure Application Planning Calendar – October 2011 through September 2012**

Field	Total Acres	Spread Acres	Predominant Soil Type	Primary 2012 Crop (Prev. Primary Crop)	Oct '11	Nov '11	Dec '11	Jan '12	Feb '12	Mar '12	Apr '12	May '12	Jun '12	Jul '12	Aug '12	Sep '12	
Village	16.0	0.0	Curtin C (48C 3-12%)	Other (Other)													
The Americas	78.0	78.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	1.29 4.8	1.30 8.3	1.30 6.2	1.30 6.5	1.30 6.5	1.30 6.5	1.30 6.5	1.32 0.8	1.30 4.8	1.30 4.8	1.30 4.8	1.30 4.8	1.30 4.8
Africa	76.0	76.0	Pengra SIL (188D 2-20%)	Grass pasture, maint (Grass pasture, maint)	1.28 7.7	1.29 8.5	1.29 7.7	1.29 7.7	1.29 7.7	1.29 4.9	1.29 7.7	1.31 3.7	1.29 7.7	1.29 7.7	1.29 7.7	1.29 7.7	1.29 7.7
Asia	32.4	32.4	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	473 8	395 4	450 5	450 5	450 5	450 5	450 5	469 8	453 8	453 8	453 8	453 8	453 8
Wetlands	12.2	7.5	Conser SICL (44A 0-3%)	Other (Other)	X	X	X	X	X	51.8 X	X	X	X	X	X	X	X
Facilities	12.8	0.0	Philomath SIC (189E 3-30%)	Other (Other)													
Natural Area 1	283.7	0.0	Philomath SIC (189E 3-30%)	Other (Other)													
Natural Area 2	42.6	0.0	Pengra SIL (188E 20-30%)	Other (Other)													
Natural Area 3	30.2	0.0	Philomath SIC (189E 3-30%)	Other (Other)													
Cheetah Area	19.0	19.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	200 5	201 5	203 9	202 0	203 6	203 6	203 6	200 5	200 6	200 6	200 6	200 6	200 5
Total	602.9	212.9			3.25 6.8 X	3.20 3.7 X	3.25 8.3 X	3.25 6.7 X	3.25 8.3 X	4.32 7.3 X	3.25 8.3 X	3.30 4.8 X	3.25 6.9 X	3.25 6.9 X	3.25 6.9 X	3.25 6.8 X	3.25 6.8 X

Crop in field

No. indicates total loads  
"X" indicates other manure apps



**Manure Application Planning Calendar – October 2012 through September 2013**

Field	Total Acres	Spread. Acres	Predominant Soil Type	Primary 2013 Crop (Prev. Primary Crop)	Oct '12	Nov '12	Dec '12	Jan '13	Feb '13	Mar '13	Apr '13	May '13	Jun '13	Jul '13	Aug '13	Sep '13
Village	16.0	0.0	Curtin C (48C 3-12%)	Other (Other)												
The Americas	78.0	78.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	2,34 7.9	1,30 6.5	1,30 6.5	1,30 6.5	1,30 6.5	1,30 6.5	1,30 6.5	1,32 0.8	1,30 4.8	1,30 4.8	1,30 4.8	1,30 4.8
Africa	76.0	76.0	Pengra SIL (188D 2-20%)	Grass pasture, maint (Grass pasture, maint)	1,29 7.7	1,29 9.6	1,29 9.6	1,29 9.6	1,29 9.6	1,29 9.6	1,29 8.5	1,31 3.7	1,29 7.7	1,29 7.7	1,29 7.7	1,29 7.7
Asia	32.4	32.4	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	438 8	445 5	438 8	438 8	438 8	438 8	438 8	453 0	438 8	438 8	443 8	443 8
Wetlands	12.2	7.5	Conser SICL (44A 0-3%)	Other (Other)	X	X	X	18,8 X	X	X	X	X	X	X	51,8 X	51,8 X
Facilities	12.8	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Natural Area 1	283.7	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Natural Area 2	42.6	0.0	Pengra SIL (188E 20-30%)	Other (Other)												
Natural Area 3	30.2	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Cheetah Area	19.0	19.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	205 5	207 5	206 1	206 1	206 1	206 1	207 3	206 8	74,2 X	205 5	200 5	200 5
<b>Total</b>	<b>602.9</b>	<b>212.9</b>			<b>4,28 9.9 X</b>	<b>3,25 9.1 X</b>	<b>3,25 1.0 X</b>	<b>3,26 9.8 X</b>	<b>3,25 1.0 X</b>	<b>3,25 1.0 X</b>	<b>3,25 1.1 X</b>	<b>3,29 4.3 X</b>	<b>3,11 5.5 X</b>	<b>3,24 6.8 X</b>	<b>3,29 8.6 X</b>	<b>3,29 8.6 X</b>

Crop in field

No. indicates total loads  
"X" indicates other manure apps



### Manure Application Planning Calendar – October 2013 through September 2014

Field	Total Acres	Spread Acres	Predominant Soil Type	Primary 2014 Crop (Prev. Primary Crop)	Oct '13	Nov '13	Dec '13	Jan '14	Feb '14	Mar '14	Apr '14	May '14	Jun '14	Jul '14	Aug '14	Sep '14
Village	16.0	0.0	Curtin C (48C 3-12%)	Other (Other)	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
The Americas	78.0	78.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	4.8	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Africa	76.0	76.0	Pengra SIL (188D 2-20%)	Grass pasture, maint (Grass pasture, maint)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.31	1.29	1.29	1.29	1.29
Asia	32.4	32.4	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	4.43	4.43	4.43	4.43	4.38	4.32	4.50	4.54	4.38	4.38	4.38	4.42
Wetlands	12.2	7.5	Conser SICL (44A 0-3%)	Other (Other)	8	8	8	8	8	0	5	8	8	8	8	5
Facilities	12.8	0.0	Philomath SIC (189E 3-30%)	Other (Other)	X	X	X	X	X	X	X	X	X	X	X	X
Natural Area 1	283.7	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Natural Area 2	42.6	0.0	Pengra SIL (188E 20-30%)	Other (Other)												
Natural Area 3	30.2	0.0	Philomath SIC (189E 3-30%)	Other (Other)												
Cheetah Area	19.0	19.0	Curtin C (48C 3-12%)	Grass pasture, maint (Grass pasture, maint)	200	201	201	201	206	213	202	205	205	205	205	201
<b>Total</b>	<b>602.9</b>	<b>212.9</b>			<b>3,24</b>	<b>3,25</b>	<b>3,25</b>	<b>3,25</b>	<b>3,25</b>	<b>3,25</b>	<b>3,25</b>	<b>3,29</b>	<b>3,24</b>	<b>3,24</b>	<b>3,24</b>	<b>3,24</b>
					<b>6.4</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.1</b>	<b>9.1</b>	<b>4.8</b>	<b>6.8</b>	<b>6.9</b>	<b>6.9</b>	<b>6.8</b>
					<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

Crop in field

No. indicates total loads  
"X" indicates other manure apps



**Table 6-6. Planned Nutrient Applications (Manure-spreadable Area)**

Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	3.4 Lds	34 Gal	1.0	1	0	1
The Americas	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.5 Lds	20,670 Gal	78.0	6	3	9
The Americas	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	34 Gal	1030.7 Lds	20,613 Gal	606.3	1	0	1
The Americas	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033 Lds	20,660 Gal	78.0	6	3	9
The Americas	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	261.7 Lds	2,617 Gal	67.1	1	0	1
The Americas	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1033.1 Lds	20,662 Gal	78.0	6	3	9
The Americas	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	264.9 Lds	2,649 Gal	77.9	1	0	1
The Americas	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Oct 2012	Grass pasture, maint	Pasture	Sprinkler, Not incorporated	Custom	268 Gal	2086.2 Lds	20,862 Gal	77.8	6	3	9
The Americas	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	35 Gal	261.7 Lds	2,617 Gal	74.8	1	0	1
The Americas	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Speeds, Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
The Americas	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1041.3 Lds	20,826 Gal	78.0	6	3	9
The Americas	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	265.2 Lds	2,652 Gal	78.0	1	0	1
The Americas	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
The Americas	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
The Americas	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	261.7 Lds	2,617 Gal	77.0	1	0	1
The Americas	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	267 Gal	1043.1 Lds	20,862 Gal	78.1	6	3	9
Africa	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007 Lds	20,140 Gal	76.0	6	3	9
Africa	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9
Africa	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	265 Gal	1007.3 Lds	20,145 Gal	76.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Mar 2012	Grass pasture, maint	Pasture	Sprinkler, Not incorporated	Custom	268 Gal	2034.5 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	280.4 Lds	2,804 Gal	82.5	1	0	1
Africa	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9
Africa	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	281.2 Lds	2,812 Gal	76.0	1	0	1
Africa	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1018.4 Lds	20,368 Gal	76.0	6	3	9



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Africa	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Africa	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Africa	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	268 Gal	1017.3 Lds	20,345 Gal	75.9	6	3	9
Africa	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	37 Gal	280.4 Lds	2,804 Gal	75.8	1	0	1
Asia	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	35 Gal	113.5 Lds	1,135 Gal	32.4	1	0	1
Asia	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.3 Lds	7,226 Gal	32.4	5	3	8
Asia	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	May 2011	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	223 Gal	361.6 Lds	7,232 Gal	32.4	5	3	8
Asia	Nov 2011	Grass pasture, maint	Tanks	Grazing Animals, Not incorporated	Custom	34 Gal	55.1 Lds	1,102 Gal	32.4	1	0	1
Asia	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	May 2012	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	112.2 Lds	1,122 Gal	33.0	1	0	1
Asia	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	335.3 Lds	6,706 Gal	31.9	5	3	7
Asia	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	101.7 Lds	1,017 Gal	29.9	1	0	1
Asia	May 2013	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	335.3 Lds	6,706 Gal	31.9	5	3	7
Asia	Jun 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed of Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	24 Gal	102.2 Lds	1,022 Gal	42.6	0	0	1
Asia	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	341.6 Lds	6,832 Gal	32.5	5	3	7
Asia	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	329.8 Lds	6,596 Gal	31.4	5	3	7
Asia	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	110.2 Lds	1,102 Gal	32.4	1	0	1
Asia	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	May 2014	Grass pasture, maint	Compost Facility	Solids Spreader, Not incorporated	Custom	2 Ton	16 Lds	32 Ton	16.0	61	17	93
Asia	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Asia	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Asia	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	336.6 Lds	6,732 Gal	32.1	5	3	7
Asia	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	210 Gal	340.3 Lds	6,806 Gal	32.4	5	3	7
Asia	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	102.2 Lds	1,022 Gal	30.1	1	0	1
Wetlands	Oct 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2010	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2010	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Apr 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Apr 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jul 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Aug 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2011	Other	Pasture	Drainageway	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Sep 2011	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Sep 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2011	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Dec 2011	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Feb 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2012	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Apr 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2012	Other	Pasture	Drainageway	Custom	134 Gal	7 Min	1,035 Gal	7.7	3	2	5
Wetlands	May 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Jun 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Jul 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Sep 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Oct 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2012	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Dec 2012	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2013	Other	Tanks	Sprinkler, Not incorporated	Custom	25 Gal	18.8 Lds	188 Gal	7.5	0	0	1
Wetlands	Jan 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Feb 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Feb 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Mar 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jun 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jul 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2013	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Sep 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2013	Other	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	51.8 Lds	1,036 Gal	7.5	3	2	5
Wetlands	Oct 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Oct 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Nov 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Nov 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2013	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Dec 2013	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jan 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jan 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Feb 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,036 Gal	7.5	3	2	5
Wetlands	Feb 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Mar 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Wetlands	Apr 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Apr 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	May 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	May 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Wetlands	Jun 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Jul 2014	Other	Pasture	Drainageway	Custom	134 Gal	7 Min	1,033 Gal	7.7	3	2	5
Wetlands	Jul 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Aug 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,033 Gal	7.5	3	2	5
Wetlands	Sep 2014	Other	Tanks	Drainageway	Custom	25 Gal	1 Min	188 Gal	7.5	0	0	1
Wetlands	Sep 2014	Other	Pasture	Drainageway	Custom	138 Gal	7 Min	1,035 Gal	7.5	3	2	5
Cheetah Area	Oct 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Oct 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.6 Lds	2,531 Gal	18.6	3	2	5
Cheetah Area	Nov 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.4 Lds	2,529 Gal	18.6	3	2	5
Cheetah Area	Nov 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2010	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	129.3 Lds	2,586 Gal	19.0	3	2	5
Cheetah Area	Dec 2010	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	1.6 Lds	16 Gal	0.4	1	0	1
Cheetah Area	Jan 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.6 Lds	2,531 Gal	18.6	3	2	5
Cheetah Area	Jan 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.8 Lds	2,537 Gal	18.7	3	2	5
Cheetah Area	Feb 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.8 Lds	748 Gal	19.2	1	0	1
Cheetah Area	Mar 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.8 Lds	748 Gal	19.2	1	0	1
Cheetah Area	Mar 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	136 Gal	126.8 Lds	2,537 Gal	18.7	3	2	5
Cheetah Area	Apr 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Apr 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	May 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Jun 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.6 Lds	2,531 Gal	18.9	3	2	5
Cheetah Area	Jul 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.6 Lds	2,531 Gal	18.9	3	2	5
Cheetah Area	Aug 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Sep 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	74.2 Lds	742 Gal	21.8	1	0	1
Cheetah Area	Sep 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Oct 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Oct 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Nov 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	127.3 Lds	2,546 Gal	19.0	3	2	5
Cheetah Area	Nov 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2011	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2011	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.7 Lds	2,594 Gal	19.4	3	2	5
Cheetah Area	Jan 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5
Cheetah Area	Jan 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	72.6 Lds	726 Gal	18.6	1	0	1
Cheetah Area	Feb 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Mar 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,587 Gal	19.3	3	2	5
Cheetah Area	Apr 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	129.4 Lds	2,588 Gal	19.3	3	2	5
Cheetah Area	Apr 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	126.3 Lds	2,526 Gal	18.3	3	2	5
Cheetah Area	May 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Jul 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Aug 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.4 Lds	2,528 Gal	18.9	3	2	5
Cheetah Area	Aug 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Oct 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	Oct 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Nov 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	133.3 Lds	2,665 Gal	19.9	3	2	5
Cheetah Area	Nov 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2012	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Dec 2012	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	34 Gal	74.2 Lds	742 Gal	21.8	1	0	1
Cheetah Area	Jan 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Jan 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Feb 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,639 Gal	19.7	3	2	5
Cheetah Area	Mar 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Apr 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	133.1 Lds	2,662 Gal	19.9	3	2	5
Cheetah Area	Apr 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	132.6 Lds	2,652 Gal	19.8	3	2	5
Cheetah Area	May 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2013	Grass pasture, maint	Pasture	Drainageway	Custom	134 Gal	18 Min	2,626 Gal	19.6	3	2	5
Cheetah Area	Jun 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jul 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	138 Gal	131.3 Lds	2,626 Gal	19.0	3	2	5
Cheetah Area	Jul 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Aug 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Sep 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,525 Gal	18.8	3	2	5
Cheetah Area	Sep 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	25 Gal	74.2 Lds	742 Gal	29.7	0	0	1
Cheetah Area	Oct 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.3 Lds	2,526 Gal	18.9	3	2	5
Cheetah Area	Oct 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	73.8 Lds	738 Gal	18.9	1	0	1
Cheetah Area	Nov 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Nov 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1



Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P <sub>2</sub> O <sub>5</sub> (Lbs/A)	Avail K <sub>2</sub> O (Lbs/A)
Cheetah Area	Dec 2013	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Dec 2013	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Jan 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jan 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	126.9 Lds	2,539 Gal	18.9	3	2	5
Cheetah Area	Feb 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Feb 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.9 Lds	2,638 Gal	19.7	3	2	5
Cheetah Area	Mar 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Mar 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	138.8 Lds	2,775 Gal	20.7	3	2	5
Cheetah Area	Apr 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	128.3 Lds	2,565 Gal	19.1	3	2	5
Cheetah Area	Apr 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	May 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	May 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Jun 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.3 Lds	2,626 Gal	19.6	3	2	5
Cheetah Area	Jul 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.4 Lds	2,628 Gal	19.6	3	2	5
Cheetah Area	Jul 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1
Cheetah Area	Aug 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	131.4 Lds	2,628 Gal	19.6	3	2	5
Cheetah Area	Sep 2014	Grass pasture, maint	Pasture	Grazing Animals, Not incorporated	Custom	134 Gal	127.6 Lds	2,552 Gal	19.0	3	2	5
Cheetah Area	Sep 2014	Grass pasture, maint	Tanks	Sprinkler, Not incorporated	Custom	39 Gal	74.2 Lds	742 Gal	19.0	1	0	1



Table 6-7. Field Nutrient Balance (Manure-spreadable Area)

Year	Field	Size Acres	Crop	Yield Goal /Acre	Fertilizer Recs <sup>1</sup>			Nutrients Applied <sup>2</sup>			Balance After Recs <sup>3</sup>			Balance After Removal <sup>4</sup>		
					N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A
2011	The Americas	78.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	98	36	138	-16	-5	1	8	-6	
2012	The Americas	78.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	96	39	139	-18	-2	3	19	-5	
2013	The Americas	78.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	97	39	139	-17	-2	5	30	-5	
2014	The Americas	78.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	90	36	129	-24	-5	-3	38	-15	
<b>Total</b>	<b>The Americas</b>				<b>456</b>	<b>164</b>	<b>548</b>	<b>381</b>	<b>150</b>	<b>545</b>						
2011	Africa	76.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	97	40	140	-17	-1	3	12	-4	
2012	Africa	76.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	97	40	140	-17	-1	6	24	-4	
2013	Africa	76.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	97	40	139	-17	-1	8	36	-5	
2014	Africa	76.0	Grass pasture, maint	3	114 <sup>±</sup>	41 <sup>±</sup>	137 <sup>±</sup>	90	37	130	-24	-4	1	45	-14	
<b>Total</b>	<b>Africa</b>				<b>456</b>	<b>164</b>	<b>548</b>	<b>381</b>	<b>157</b>	<b>549</b>						
2011	Asia	32.4	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	102	44	154	7	10	40	21	34	
2012	Asia	32.4	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	102	44	142	7	20	68	42	56	
2013	Asia	32.4	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	101	44	141	6	30	95	63	77	
2014	Asia	32.4	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	94	41	133	-1	37	114	81	90	
<b>Total</b>	<b>Asia</b>				<b>380</b>	<b>136</b>	<b>456</b>	<b>399</b>	<b>173</b>	<b>570</b>						
2011	Wetlands	7.5	Other	1.5	50 <sup>±</sup>	22 <sup>±</sup>	114 <sup>±</sup>	32	22	67	-18	0	-47			
2012	Wetlands	7.5	Other	1.5	50 <sup>±</sup>	22 <sup>±</sup>	114 <sup>±</sup>	35	24	74	-15	2	-40			
2013	Wetlands	7.5	Other	1.5	50 <sup>±</sup>	22 <sup>±</sup>	114 <sup>±</sup>	35	24	74	-15	4	-40			
2014	Wetlands	7.5	Other	1.5	50 <sup>±</sup>	22 <sup>±</sup>	114 <sup>±</sup>	35	24	74	-15	6	-40			
<b>Total</b>	<b>Wetlands</b>				<b>200</b>	<b>88</b>	<b>456</b>	<b>137</b>	<b>94</b>	<b>289</b>						
2011	Cheetah Area	19.0	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	47	24	70	-48	-10	-44	1	-50	
2012	Cheetah Area	19.0	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	48	24	72	-47	-10	-42	2	-48	
2013	Cheetah Area	19.0	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	48	25	74	-47	-9	-40	4	-46	
2014	Cheetah Area	19.0	Grass pasture, maint	2.5	95 <sup>±</sup>	34 <sup>±</sup>	114 <sup>±</sup>	45	22	67	-50	-12	-47	3	-53	
<b>Total</b>	<b>Cheetah Area</b>				<b>380</b>	<b>136</b>	<b>456</b>	<b>188</b>	<b>95</b>	<b>283</b>						



### Field Nutrient Balance (Non-manure-spreadable Area)

Year	Field	Size Acres	Crop	Yield Goal /Acre	Fertilizer Recs <sup>1</sup>			Nutrients Applied <sup>2</sup>			Balance After Recs <sup>3</sup>			Balance After Removal <sup>4</sup>		
					N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	
2011	Village	16.0	Other					0	0	0						
2012	Village	16.0	Other					0	0	0						
2013	Village	16.0	Other					0	0	0						
2014	Village	16.0	Other					0	0	0						
<b>Total</b>	<b>Village</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2011	Wetlands	4.7	Other	1.5	50 <sup>lb</sup>	22 <sup>lb</sup>	114 <sup>lb</sup>	0	0	0	-50	-22	-114			
2012	Wetlands	4.7	Other	1.5	50 <sup>lb</sup>	22 <sup>lb</sup>	114 <sup>lb</sup>	0	0	0	-50	-22	-114			
2013	Wetlands	4.7	Other	1.5	50 <sup>lb</sup>	22 <sup>lb</sup>	114 <sup>lb</sup>	0	0	0	-50	-22	-114			
2014	Wetlands	4.7	Other	1.5	50 <sup>lb</sup>	22 <sup>lb</sup>	114 <sup>lb</sup>	0	0	0	-50	-22	-114			
<b>Total</b>	<b>Wetlands</b>				<b>200</b>	<b>88</b>	<b>456</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2011	Facilities	12.8	Other					0	0	0						
2012	Facilities	12.8	Other					0	0	0						
2013	Facilities	12.8	Other					0	0	0						
2014	Facilities	12.8	Other					0	0	0						
<b>Total</b>	<b>Facilities</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2011	Natural Area 1	283.7	Other					0	0	0						
2012	Natural Area 1	283.7	Other					0	0	0						
2013	Natural Area 1	283.7	Other					0	0	0						
2014	Natural Area 1	283.7	Other					0	0	0						
<b>Total</b>	<b>Natural Area 1</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2011	Natural Area 2	42.6	Other					0	0	0						
2012	Natural Area 2	42.6	Other					0	0	0						
2013	Natural Area 2	42.6	Other					0	0	0						
2014	Natural Area 2	42.6	Other					0	0	0						
<b>Total</b>	<b>Natural Area 2</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						
2011	Natural Area 3	30.2	Other					0	0	0						
2012	Natural Area 3	30.2	Other					0	0	0						
2013	Natural Area 3	30.2	Other					0	0	0						



Year	Field	Size Acres	Crop	Yield Goal /Acre	Fertilizer Recs <sup>1</sup>			Nutrients Applied <sup>2</sup>			Balance After Recs <sup>3</sup>			Balance After Removal <sup>4</sup>		
					N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	N Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	P <sub>2</sub> O <sub>5</sub> Lb/A	K <sub>2</sub> O Lb/A	
2014	Natural Area 3	30.2	Other				0	0	0							
<b>Total</b>	<b>Natural Area 3</b>						<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>						

- 1 Fertilizer Recs are the crop fertilizer recommendations. The N rec accounts for any N credit from previous legume crop.
- 2 Nutrients Applied are the nutrients expected to be available to the crop from that year's manure applications plus nutrients from that year's commercial fertilizer applications and nitrates from irrigation water. With a double-crop year, the total nutrients applied for both crops and the year's balances are listed on the second crop's line.
- 3 For N, Nutrients Applied minus Fertilizer Recs for indicated crop year. Also includes amount of residual N expected to become available that year from prior years' manure applications. For P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, Nutrients Applied minus Fertilizer Recs *through* the indicated crop year, with positive balances carried forward to subsequent years. Negative values indicate a potential need to apply additional nutrients.
- 4 Nutrients Applied minus amount removed by harvested portion of crop through the indicated year. Positive balances are carried forward to subsequent years.
  - ‡ Indicates a custom fertilizer recommendation in the Fertilizer Recs column.
  - ‡ Indicates in the Balance After Recs N column that the legume crop is assumed to utilize some or all of the supplied N.
  - † Indicates in the Balance After Recs N column that the value includes residual N expected to become available that year from prior years' manure applications.



**Table 6-8. Projected P and K Levels\***

Field ID	P Level at Start of Plan (ppm)	Excess P <sub>2</sub> O <sub>5</sub> Applied (lbs)	P Level at End of Plan (ppm)	K Level at Start of Plan (ppm)	Excess K <sub>2</sub> O Applied (lbs)	K Level at End of Plan (ppm)
Village	0	0	0	0	0	0
The Americas	9	-14	8	246	-3	246
Africa	10	-7	10	174	1	174
Asia	27	37	29	383	14	385
Wetlands	10	6	10	174	-167	153
Facilities	0	0	0	0	0	0
Natural Area 1	0	0	0	0	0	0
Natural Area 2	0	0	0	0	0	0
Natural Area 3	0	0	0	0	0	0
Cheetah Area	27	-41	25	383	-173	361

\*The projected levels are based on manure applications with no commercial fertilizer applications.

**Table 6-9. Whole-farm Nutrient Balance (Manure-spreadable Area)**

	N (Lbs)	P <sub>2</sub> O <sub>5</sub> (Lbs)	K <sub>2</sub> O (Lbs)
Total Manure Nutrients on Hand at Start of Plan <sup>1</sup>	410	107	451
Total Manure Nutrients Collected <sup>2</sup>	388,488	95,186	421,113
Total Manure Nutrients Imported <sup>3</sup>	0	0	0
Total Manure Nutrients Exported <sup>4</sup>	282,000	57,013	303,646
Total Manure Nutrients on Hand at End of Plan <sup>5</sup>	3,475	724	3,746
Total Manure Nutrients Applied <sup>6</sup>	107,250	32,416	112,029
Available Manure Nutrients Applied <sup>7</sup>	77,429	32,416	112,029
Commercial Fertilizer Nutrients Applied <sup>8</sup>	0	0	0
Available Nutrients Applied <sup>9</sup>	77,429	32,416	112,029
Nutrient Utilization Potential <sup>10</sup>	91,256	32,906	116,796
Nutrient Balance of Spreadable Acres <sup>11*</sup>	-13,827	-490	-4,767
Average Nutrient Balance per Spreadable Acre per Year <sup>12*</sup>	-16	-1	-6

1. Values indicate total manure nutrients present in storage(s) at the beginning of the plan.

2. Values indicate total manure nutrients collected on the farm.

3. Values indicate total manure nutrients imported onto the farm.

4. Values indicate total manure nutrients exported from the farm to an external operation.

5. Values indicate total manure nutrients present in storage(s) at the end of plan.

6. Values indicate total nutrients present in land-applied manure. Losses due to rate, timing and method of application are not included in these values.

7. Values indicate available manure nutrients applied on the farm based on rate, time and method of application. These values are based on the total manure nutrients applied (row 6) after accounting for state-specific nutrient losses due to rate, time and method of application.

8. Values indicate nutrients applied as commercial fertilizers and nitrates contained in irrigation water.

9. Values are the sum of available manure nutrients applied (row 7) and commercial fertilizer nutrients applied (row 8).

10. Values indicate nutrient utilization potential of crops grown. For N the value generally is based on crop N recommendation for non-legume crops and crop N uptake or other state-imposed limit for N application rates for legumes. P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O values generally are based on fertilizer recommendations or crop removal (whichever is greatest).

11. Values indicate available nutrients applied (row 9) minus crop nutrient utilization potential (row 10). Negative values



indicate additional nutrient utilization potential and positive values indicate over-application.  
 12. Values indicate average per acre nutrient balance. Values are calculated by dividing nutrient balance of spreadable acres (row 11) by the number of spreadable acres in plan and by the length of the plan in years. Negative values indicate additional average per acre nutrient utilization potential and positive values indicate average per acre over-application.

\* Non-trivial, positive values for N indicate that the plan was not properly developed. Negative values for N indicate additional nutrient utilization potential which may or may not be intentional. For example, plans that include legume crops often will not utilize the full N utilization potential for legume crops if manure can be applied to non-legume crops that require N for optimum yield. Positive values for P<sub>2</sub>O<sub>5</sub> and/or K<sub>2</sub>O do not necessarily indicate that the plan was not developed properly. For example, producers may be allowed to apply N-based application rates of manure to fields with low soil test P values or fields with a low potential P-loss risk based on the risk assessment tool used by the state. Negative values for P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O indicate that planned applications to some fields are less than crop removal rates.

**Whole-farm Nutrient Balance (Non-manure-spreadable Area)**

	N (Lbs)	P <sub>2</sub> O <sub>5</sub> (Lbs)	K <sub>2</sub> O (Lbs)
Commercial Fertilizer Nutrients Applied <sup>1</sup>	0	0	0
Nutrient Utilization Potential <sup>2</sup>	940	414	2,143
Nutrient Balance of Non-spreadable Acres <sup>3*</sup>	-940	-414	-2,143
Average Nutrient Balance per Non-spreadable Acre per Year <sup>4*</sup>	-1	0	-1

1. Values indicate nutrients applied as commercial fertilizers and nitrates contained in irrigation water.
2. Values indicate nutrient utilization potential of crops grown based on crop fertilizer recommendations.
3. Values indicate commercial fertilizer nutrients applied (row 1) minus crop nutrient utilization potential (row 2). Negative values indicate additional nutrient utilization potential and positive values indicate over-application.
4. Values indicate average per acre nutrient balance. Values are calculated by dividing nutrient balance of non-spreadable acres (row 3) by number of non-spreadable acres in plan. Negative values indicate additional average per acre nutrient utilization potential and positive values indicate average per acre over-application.

\* Non-trivial, positive values for N indicate that the plan was not properly developed. Negative values for N indicate additional nutrient utilization potential which may or may not be intentional. Positive values for P<sub>2</sub>O<sub>5</sub> and/or K<sub>2</sub>O do not necessarily indicate that the plan was not developed properly. For example, multiple year applications may have been planned during the final plan year(s) and these nutrients will not be utilized by crops in the current plan. Negative values for P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O indicate that applications to some fields may have been delayed to allow the producer to apply the nutrients in accordance with their fertilization schedule.



**Table 6-10. Manure Inventory Annual Summary**

Manure Source	Plan Period	On Hand at Start of Period	Total Generated	Total Imported	Total Transferred In	Total Applied	Total Exported	Total Transferred Out	On Hand at End of Period	Units
Compost Facility	Oct '10 - Sep '11	7	1,726	0	0	96	1,600	0	37	Ton
Tanks	Oct '10 - Sep '11	5,000	112,170	0	0	86,390	30,210	0	570	Gal
Pasture	Oct '10 - Sep '11	0	619,860	0	0	619,200	0	0	660	Gal
<b>All Sources (liquid)</b>	<b>Oct '10 - Sep '11</b>	<b>5,000</b>	<b>732,030</b>	<b>0</b>	<b>0</b>	<b>705,590</b>	<b>30,210</b>	<b>0</b>	<b>1,230</b>	<b>Gal</b>
<b>All Sources (solid)</b>	<b>Oct '10 - Sep '11</b>	<b>7</b>	<b>1,726</b>	<b>0</b>	<b>0</b>	<b>96</b>	<b>1,600</b>	<b>0</b>	<b>37</b>	<b>Ton</b>
Compost Facility	Oct '11 - Sep '12	37	1,726	0	0	96	1,500	0	167	Ton
Tanks	Oct '11 - Sep '12	570	112,170	0	0	89,755	21,845	0	1,140	Gal
Pasture	Oct '11 - Sep '12	660	619,860	0	0	619,200	0	0	1,320	Gal
<b>All Sources (liquid)</b>	<b>Oct '11 - Sep '12</b>	<b>1,230</b>	<b>732,030</b>	<b>0</b>	<b>0</b>	<b>708,955</b>	<b>21,845</b>	<b>0</b>	<b>2,460</b>	<b>Gal</b>
<b>All Sources (solid)</b>	<b>Oct '11 - Sep '12</b>	<b>37</b>	<b>1,726</b>	<b>0</b>	<b>0</b>	<b>96</b>	<b>1,500</b>	<b>0</b>	<b>167</b>	<b>Ton</b>
Compost Facility	Oct '12 - Sep '13	167	1,726	0	0	96	1,700	0	97	Ton
Tanks	Oct '12 - Sep '13	1,140	112,170	0	0	88,809	22,791	0	1,710	Gal
Pasture	Oct '12 - Sep '13	1,320	619,860	0	0	619,200	0	0	1,980	Gal
<b>All Sources (liquid)</b>	<b>Oct '12 - Sep '13</b>	<b>2,460</b>	<b>732,030</b>	<b>0</b>	<b>0</b>	<b>708,009</b>	<b>22,791</b>	<b>0</b>	<b>3,690</b>	<b>Gal</b>
<b>All Sources (solid)</b>	<b>Oct '12 - Sep '13</b>	<b>167</b>	<b>1,726</b>	<b>0</b>	<b>0</b>	<b>96</b>	<b>1,700</b>	<b>0</b>	<b>97</b>	<b>Ton</b>
Compost Facility	Oct '13 - Sep '14	97	1,726	0	0	96	1,650	0	77	Ton
Tanks	Oct '13 - Sep '14	1,710	112,170	0	0	88,810	22,790	0	2,280	Gal
Pasture	Oct '13 - Sep '14	1,980	619,860	0	0	619,200	0	0	2,640	Gal
<b>All Sources (liquid)</b>	<b>Oct '13 - Sep '14</b>	<b>3,690</b>	<b>732,030</b>	<b>0</b>	<b>0</b>	<b>708,010</b>	<b>22,790</b>	<b>0</b>	<b>4,920</b>	<b>Gal</b>
<b>All Sources (solid)</b>	<b>Oct '13 - Sep '14</b>	<b>97</b>	<b>1,726</b>	<b>0</b>	<b>0</b>	<b>96</b>	<b>1,650</b>	<b>0</b>	<b>77</b>	<b>Ton</b>



## Section 7. Feed Management

An imbalance of a whole-farm nutrient balance can lead to a lack of nutrients to meet production goals or an excess of nutrients that can contribute to a degradation of water and air resources. Developing a good feed management program can help to minimize the effects from a lack or excess of nutrients being available to meet production goals.

Usually animal diets are formulated to feed enough nutrients to meet the animal's needs with a little extra thrown in just to make sure their needs are met. Adjusting the diets of animals to more closely meet their needs can reduce nitrogen and phosphorus excreted from the animal by 5 to 30%. One way to adjust animal diets is to group animals by age class and weight so diets can be formulated for each animal group rather than using one formulation for all age and weight classes which can lead to excess nutrients being excreted from most of the animals. Other ways to reduce excess nutrients from being excreted from animals is to adjust dietary formulations for climatic conditions, minimize feed waste and process feeds so the animal can absorb and retain more of the nutrients being fed.

A competent feed management specialist should be consulted before any changes to dietary formulations are made. A feed management specialist can help analyze the nutrient content of dietary formulations and suggest ways to minimize over feeding nutrients and assess the effects of any changes made to dietary formulations.

Contact your local Oregon State University (OSU) Extension office for help in locating a feed management specialist to consult with in determining what changes can be made to dietary formulations for your operation.





## Section 8. Other Utilization Options

The Wildlife Safari does not anticipate any expansion of park operations but would like to improve the washwater handling system used for cleaning the animal enclosures. Currently staff is monitoring washwater use for enclosures to determine the amount of water being used so that the volume of collection tank needed for each enclosure can be determined. Once the volume of collection tanks needed is determined grant applications will be submitted whenever possible to obtain funding to install the collection tanks along with a sprinkler application system. The sprinkler application system will be designed to apply the washwater collected in the collection tank to vegetated treatment areas design to utilize the nutrients and organics in the washwater. Installing this type of system to dispose of washwater will greatly reduce the risk for surface water contamination by washwater runoff.





## Section 9. Operation, Maintenance, and Recordkeeping

This plan should be reviewed annually to insure it accurately describes the Wildlife Safari operation and will need revision if any of the following conditions occur:

1. Additions or changes to land application areas not described in this plan,
2. Any changes to maximum annual manure application rates,
3. Any changes to the maximum amount of nitrogen and phosphorus applied to the crop land fields,
4. Any changes in the crops grown on the fields where manure applied,
5. Any changes to the manure handling system not described in this plan,
6. Any changes that are likely to increase the risk of nitrogen and phosphorus transport to surface or ground waters.

Soil sampling of all fields shall be conducted a minimum of once every four years according to this state's guidance. Any laboratory certified by the state shall be used to analyze the soil samples. Nutrient values of manure shall be determined annually by laboratory testing prior to land application.

Whenever the manure storage capacity is less than the required amount, manure removal and land application shall be initiated and conducted on all days suitable for land application. Manure shall not be applied to saturated, frozen, or snow-covered ground unless the potential risk for runoff is minimized as described above. Liquid manure shall not be applied at rates that exceed the infiltration rate of the soil, and the amount being applied shall not exceed the moisture-holding capacity of the soil profile at the time of application.

Records will be maintained by documenting the actual rate at which nutrients were applied compared to the recommended and planned rates. The records will indicate the reasons for difference in application rates. Records will include:

- Soil test results and recommendations for nutrient applications.
- Quantities, analysis and sources of all nutrients applied.
- Dates and methods of nutrient applications.
- Crops planted, planting and harvest dates, yields, and crop residues removed.
- Results of water, plant, and organic by-product analysis.
- Dates of review and person performing review, and recommendations that resulted from review.

Prior to transferring manure, litter or process wastewater to other persons, the operation shall provide the recipient of the manure, litter or process wastewater with the most current nutrient analysis. The operation shall analyze their manure at least annually. Records of transfers shall include the date, recipient name and address, and approximate amount of manure, litter or process wastewater that is transferred to another person. Records shall be maintained for five years. Example record-keeping forms for land application can be found at the end of this section.

Equipment for application of nutrients will be calibrated on an annual basis. Manure and fertilizer will be uniformly applied to soils. Manure and fertilizer application equipment will be calibrated to deliver within 10 percent of the planned rate. Calibration of the solid manure box spreader should follow the procedures outlined in the nutrient management specification on page 61 in Section 4.4.

Fertilizer and organic by-product storage facilities shall be protected from weather and accidental leakage or spillage. Employees shall be protected from and avoid unnecessary contact with chemical fertilizer and organic by-products. Protection should include the use of personal protective equipment



when working with nutrients. Extra caution must be taken when handling ammonia sources of nutrients, or when dealing with organic wastes stored in unventilated enclosures.

The proper disposal of material generated by cleaning nutrient application equipment shall be accomplished. Excess material should be collected and stored or field-applied in an appropriate manner. Excess material should not be applied on areas of high potential risk for runoff or leaching.

**See Section 4.5 for Operation and Maintenance guidance for individual practices.**



**Table 9-2. Manure Application Records**

App. #	Field	Date	Manure Source	Equipment	Days to Incorpor.	Rate/A Gal or Ton	Loads	Total Applied Gal or Ton	Acres Cov.
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

**Custom Application Records**

App. #	Hauler's Name (1)	Ground Cover % (2)	Soil Condition (3)	Air Temp. (4)	Wind Speed (5)	Wind Dir. (6)	Weather (7)	Rain Before (8)	Rain After (9)	Notes/Comments
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

- (1) Name or initials of the person who applied the manure.
- (2) Percent residue or ground cover at time of application.
- (3) Soil condition at time of application: Dry, Firm, Wet, Muddy, Snow-Covered, Frozen.
- (4) Air temperature at time of application.
- (5) Wind speed at time of application: Calm (0-2 mph), Light (2-5 mph), Breezy (5-15 mph), Windy (>15 mph).
- (6) Wind direction at time of application: N, NE, E, SE, S, SW, W, NW.
- (7) Weather condition at time of application: Sunny, Partly Cloudy, Cloudy, Rain, Snow.
- (8) Amount of rainfall during the 24 hours prior to application.
- (9) Amount of rainfall during the 24 hours after application.















Issuance Date: June 29, 2009  
Expiration Date: May 31, 2014

OREGON CONFINED ANIMAL FEEDING OPERATION  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
GENERAL PERMIT NUMBER 01-2009

State of Oregon  
Department of Agriculture  
Natural Resources Division  
and  
Department of Environmental Quality  
Water Quality Division

In compliance with the provisions of Oregon Revised Statutes (ORS) Chapter 468B,  
Oregon Administrative Rules (OAR) Chapter 603, Division 74,  
the Federal Water Pollution Control Act as amended (The Clean Water Act),  
Title 33 United States Code, Section 1251 et seq., and  
the National Pollutant Discharge Elimination System (NPDES) program.

Until this permit expires, is modified, or revoked, permittees who have properly obtained coverage under this permit are authorized to discharge to waters of the state in accordance with the special and general conditions that follow.



Ray Jaich  
Administrator  
Natural Resources Division  
Oregon Department of Agriculture



Neil Mullane  
Administrator  
Water Quality Division  
Oregon Department of Environmental Quality

**TABLE OF CONTENTS**

**DEFINITIONS..... 3**

**S1. PERMIT COVERAGE ..... 5**

S1.A. When is a Permit Required?..... 5

S1.B. Election of Permit Coverage ..... 6

S1.C. Requirements and Schedule to Obtain Permit Coverage..... 6

S1.D. General Permit Coverage ..... 6

S1.E. Request for Cancellation ..... 7

S1.F. Individual Permit Coverage..... 7

S1.G. Request for Confidentiality ..... 7

S1.H. Public Notice and Participation Requirement ..... 7

**S2. DISCHARGE LIMITATIONS AND OPERATING REQUIREMENTS..... 9**

S2.A. Discharge Limitations ..... 9

S2.B. Production Area Limitations ..... 9

S2.C. Land Application Limitations..... 9

S2.D. Direct Access by Animals to Surface Waters of the State in the Production Area Prohibited ..... 10

S2.E. Waste Storage Facilities ..... 10

S2.F. Prevention of System Overloading..... 10

S2.G. Handling of Animal Mortalities ..... 10

S2.H. Proper Operation and Maintenance..... 10

S2.I. Maintaining Compliance if System Fails..... 10

S2.J. Setback Requirement..... 11

S2.K. Manure, Litter, or Process Waste Water Transfers ..... 11

S2.L. Proper Disposal of Other Wastes ..... 11

**S3. ANIMAL WASTE MANAGEMENT PLAN ..... 12**

S3.A. Animal Waste Management Plan (AWMP) Implementation and Compliance..... 12

S3.B. AWMP Submittal and Public Notice ..... 12

S3.C. AWMP Elements ..... 12

S3.D. AWMP Changes..... 13

**S4. MONITORING, INSPECTION, RECORDKEEPING, AND REPORTING REQUIREMENTS..... 16**

S4.A. Monitoring Requirements..... 16

S4.B. Inspection Requirements ..... 17

S4.C. Recordkeeping and Availability Requirements ..... 17

S4.D. Reporting Requirements..... 18

S4.E. Additional Monitoring..... 19

**GENERAL CONDITIONS**

G1. Noncompliance reporting requirements..... 20

G2. Additional reporting requirements [40 CFR §122.41(l)] ..... 20

G3. Duty to comply [40 CFR §122.41(a)]..... 21

G4. Compliance with other laws and statutes ..... 22

G5. Property rights [40 CFR §122.41(g)]..... 22

G6. Duty to reapply ..... 22

G7. Need to halt or reduce activity not a defense [40 CFR §122.41(c)]..... 22

G8. Duty to mitigate [40 CFR §122.41(d)] ..... 22

G9. Proper operation and maintenance [40 CFR §122.41(e)] ..... 22

G10. Permit actions ..... 22

G11. Change of ownership or control..... 22

G12. Duty to provide information [40 CFR §122.41(h)]..... 22

G13. Inspection and entry [40 CFR §122.41(i)] ..... 23

G14. Monitoring and records [40 CFR §122.41(j)]..... 23

G15. Signatory requirement [40 CFR §122.21(k)] ..... 23

G16. Bypass [40 CFR §122.41(m)]..... 23

G17. Upset [40 CFR §122.41(n)] ..... 24

## DEFINITIONS

1. "25-year, 24-hour rainfall event" means an event with a probable recurrence interval of once in twenty-five (25) years as defined by the National Weather Service in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States," May 1961, or equivalent regional or state rainfall probability information developed from this source.
2. "40 CFR" means Title 40 of the Code of Federal Regulations (2008).
3. "Animal waste management plan" or "AWMP" means a written document containing the minimum elements necessary to manage manure, litter, and process waste water from operations covered by this permit in accordance with the terms and conditions of this permit. See S3.C, p. 12, for specific plan elements.
4. "CAFO" or "Confined animal feeding operation" as defined in OAR 603-074-0010(3) and OAR 340-051-0010(2) means:
  - (a) The concentrated confined feeding or holding of animals or poultry, including but not limited to horse, cattle, sheep, or swine feeding areas, dairy confinement areas, slaughterhouse or shipping terminal holding pens, poultry and egg production facilities and fur farms;
    - (i) In buildings or in pens or lots where the surface has been prepared with concrete, rock or fibrous material to support animals in wet weather; or
    - (ii) That have waste water treatment works; or
    - (iii) That discharge any wastes into waters of the state; or
  - (b) An animal feeding operation that is subject to regulation as a concentrated animal feeding operation pursuant to 40 CFR §122.23.
5. "Director" means the directors of the State of Oregon Department of Environmental Quality and Department of Agriculture or their authorized designee(s).
6. "Discharge" when used without qualification means the "discharge of a pollutant." "Discharge of a pollutant" is defined at 40 CFR §122.2.
7. "Frozen soil" means soil that has a soil temperature of 32° F (or 0° C) or less in any three (3) continuous inches of the top twelve (12) inches of soil.
8. "Groundwater" means water in a saturated zone or stratum beneath the surface of land or below a surface water body.
9. "Manure" means manure or other material (e.g., bedding, compost, litter, feed waste, silage leachate, raw materials such as feed or silage) that comes into contact with manure.
10. "Medium confined animal feeding operation" means a confined animal feeding operation that meets the animal numbers specified in any of the following categories. A state medium confined animal feeding operation is only required to apply for this permit if it confines for more than four (4) months and has a waste water control facility or disposal system for wet *or* dry wastes. (See *Table 1: CAFOs Requiring Permit Coverage.*)
  - (a) 200 to 699 mature dairy cattle, whether milked or dry;
  - (b) 300 to 999 veal calves;
  - (c) 300 to 999 cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs;
  - (d) 750 to 2,499 swine each weighing 55 pounds or more;
  - (e) 3,000 to 9,999 swine each weighing less than 55 pounds;
  - (f) 150 to 499 horses;
  - (g) 3,000 to 9,999 sheep or lambs;
  - (h) 16,500 to 54,999 turkeys;
  - (i) 9,000 to 29,999 laying hens or broilers if the operation uses waste water control facilities for wet waste;
  - (j) 37,500 to 124,999 chickens (other than laying hens), if the operation uses waste water control facilities for wet waste;
  - (k) 25,000 to 81,999 laying hens if the operation does not use waste water control facilities for wet waste;
  - (l) 10,000 to 29,999 ducks if the operation does not use waste water control facilities for wet waste; or
  - (m) 1,500 to 4,999 ducks if the operation uses waste water control facilities for wet waste.
  - (n) For other animal types, ODA will determine the appropriate animal numbers by comparing the operation to the most similar animal type listed above.

11. "New source" means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants," the construction of which commenced after April 14, 2003.
12. "Overflow" means the discharge of manure or process waste water resulting from the filling of waste water or manure storage structures beyond the point at which no more manure, process waste water, or storm water can be contained by the structure.
13. "Person" is defined at OAR 603-074-0010(13).
14. "Point source" is defined at 40 CFR §122.2.
15. "Pollutant" is defined at 40 CFR §122.2.
16. "Pollution" or "water pollution" is defined at ORS 468B.005(5).
17. "Process waste water" or "process wastes" as defined at OAR 603-074-0010(17) and OAR 340-051-0010(2) means water directly or indirectly used in the operation of the CAFO for any or all of the following: spillage or overflow from animal or poultry watering systems; washing, cleaning or flushing pens, barns, manure pits, or other CAFO facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. Process waste water or process wastes also includes any water that comes into contact with any raw materials, products, or byproducts including manure, litter, feed, milk, eggs, or bedding.
18. "Production area" as defined at OAR 603-074-0010(18) and OAR 340-051-0010(3) means that part of a CAFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. The animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways, and stables. The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. The raw materials storage area includes but is not limited to feed silos, silage bunkers, and bedding materials. The waste containment areas include but are not limited to settling basins, and areas within berms and diversions that separate uncontaminated storm water. Also included in the definition of production area is any egg washing or egg processing facility and any area used in the storage, handling, treatment, or disposal of animal mortalities.
19. "Saturated soil" means soil with all available pore space filled that has reached its maximum retentive capacity as defined in "Qualitative Description of Soil Wetness" (Brady, N. and Weil, R., p. 201).
20. "Setback" as defined at 40 CFR §412.4(b)(1) means a specified distance from surface waters or potential conduits to surface waters where manure, litter, and process waste water may not be land applied. Examples of conduits to surface waters include but are not limited to: Open tile line intake structures, sinkholes, and agricultural well heads.
21. "Small confined animal feeding operation" means a confined animal feeding operation with animal numbers below the medium confined animal feeding operation levels that is not designated as a small concentrated animal feeding operation. A small confined animal feeding operation is only required to apply for this permit if it confines for more than four (4) months and has a waste water control facility or disposal system for wet wastes. (See *Table 1: CAFOs Requiring Permit Coverage.*)
22. "Vegetative buffer" as defined at 40 CFR §412.4(b)(2) means a narrow, permanent strip of dense perennial vegetation established parallel to the contours of and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching surface waters.
23. "Wastes" is defined at ORS 468B.005(9).
24. "Waste storage facilities" means the physical system used for the isolation and retention of process wastes on the confined animal feeding operation until their ultimate utilization.
25. "Waste water control facility" means a "disposal system" or "treatment works" defined at ORS 468B.005(8).
26. "Water" or "waters of the state" is defined at ORS 468B.005(10).
27. "Waters of the U.S." is defined at 40 CFR §122.2.

## SPECIAL CONDITIONS

### S1. PERMIT COVERAGE

#### S1.A. When is a Permit Required?

1. Pursuant to ORS 468B.200, it is the policy of the State of Oregon to protect the quality of groundwater and surface waters of Oregon by preventing animal wastes from discharging into waters of the state. To implement this policy, ORS 468B.050(1)(d) requires that any person who owns or operates a *confined animal feeding operation (CAFO)* listed in S1.A.2 below obtain a permit from ODA and DEQ. As a result, there is no state process to certify that a CAFO does not discharge or propose to discharge to waters of the state and permit coverage is required regardless of discharge status. Coverage under this general permit is required for all CAFOs listed in S1.A.2 unless application is made for an individual permit or an individual permit is required by ODA and DEQ.
  
2. Any person who owns or operates a CAFO defined as follows is required by ORS 468B.050(1)(d) to obtain coverage under this permit (see Table 1 below for more detail):
  - (a) *Small confined animal feeding operation* that confines animals for more than four (4) months and has a waste water control facility or disposal system for wet wastes.
  - (b) *Medium confined animal feeding operation* that confines animals for more than four (4) months and has a waste water control facility or disposal system for wet or dry wastes.
  - (c) *Small, medium, or large concentrated animal feeding operation* defined in 40 CFR §122.23(b).

**Table 1: CAFOs Requiring Permit Coverage**

Type of confined animal feeding operation requiring permit coverage	CONFINED		CONCENTRATED		
	• Confines more than one animal for more than 4 months on prepared surface		• Stabled or confined and fed or maintained for total of 45 days or more in any 12-month period • Crops, vegetation, forage growth, or post-harvest residues not sustained in normal growing season in lot or facility		
	<i>Small Confined</i> • Waste water control facility or disposal system for wet wastes	<i>Medium Confined</i> • Waste water control facility or disposal system for wet <u>or</u> dry wastes	<i>Small Concentrated</i> • Significant contributor of pollutants to waters of the U.S. • Designated by director [40CFR §122.23(b)(9)]	<i>Medium Concentrated</i> • Discharging pollutants to waters of the U.S. [40 CFR §122.23(b)(6)]	<i>Large Concentrated</i> [40 CFR §122.23(b)(4)]
mature dairy cows <sup>1</sup>	<200	200-699	<200	200-699	≥700
veal calves	<300	300-999	<300	300-999	≥1,000
cattle <sup>2</sup>	<300	300-999	<300	300-999	≥1,000
swine ≥ 55 lbs	<750	750-2,499	<750	750-2,499	≥2,500
swine < 55 lbs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
horses	<150	150-499	<150	150-499	≥500
sheep or lambs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
turkeys	<16,500	16,500-54,999	<16,500	16,500-54,999	≥55,000
chickens, including laying hens or broilers w/wet waste system	<9,000	9,000-29,999	<9,000	9,000-29,999	≥30,000
laying hens w/dry waste system	NA	25,000-81,999	<25,000	25,000-81,999	≥82,000
broiler chickens w/dry waste system	NA	37,500-124,999	<37,500	37,500-124,999	≥125,000
ducks w/other than wet waste system	<10,000	10,000-29,999	<10,000	10,000-29,999	≥30,000
ducks w/wet waste system	<1,500	1,500-4,999	<1,500	1,500-4,999	≥5,000
other animal type	As determined by ODA. <sup>3</sup>		Designated by director.	NA	NA

<sup>1</sup> Whether milked or dry.

<sup>2</sup> Other than mature dairy cows or veal calves; cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs.

<sup>3</sup> To determine the number of animals that require permit coverage, ODA will compare the operation to the most similar animal type in the table.

3. Any person not wishing to be covered by this permit may apply for an individual permit in accordance with OAR 340-045-0030.

Note: Failure to obtain coverage under this permit is a violation of ORS 468B.050 and 468B.215 except as provided in S1.F Individual Permit Coverage, p. 7.

#### **S1.B. Election of Permit Coverage**

Any person who owns or operates a CAFO who is not required to obtain coverage under this permit may elect to be covered by this permit. Any person making such an election is subject to all terms and conditions of the permit unless and until permit coverage is terminated.

#### **S1.C. Requirements and Schedule to Obtain Permit Coverage**

1. Application for Proposed CAFO

To obtain permit coverage, any person proposing a new CAFO that is regulated by this permit (see S1.A above) or electing to be covered by this permit must submit an *ODA Application to Register (ATR)* and Animal Waste Management Plan (AWMP) at least 180 days prior to the time that the operation commences. For information on AWMP requirements, see S3, p. 12.

2. Future Renewal of General Permit Coverage

To renew general permit coverage, the permittee must submit a renewal application by the date specified by ODA but no later than the expiration date of this permit.

3. ODA will notify the applicant in writing if permit coverage is approved or denied. Permit coverage does not begin until this written notice is provided by ODA to the applicant. Written notification will include an *ODA Notice of Registration* that will include the following:

- (a) The owner or operator's legal name;
- (b) Facility name and location;
- (c) Contact information, including mailing address and telephone number;
- (d) Effective date of permit coverage;
- (e) Maximum number of animals allowed at the facility; and
- (f) Regulatory status of the operation.
  - (i) ODA will use the following classifications for regulatory status:
    - (1) *Large concentrated animal feeding operation* as defined in 40 CFR §122.23(b)(4);
    - (2) *Medium concentrated animal feeding operation* as defined in 40 CFR §122.23(b)(6);
    - (3) *Small concentrated animal feeding operation* as defined in 40 CFR §122.23(b)(9) and designated by the director pursuant to OAR 603-074-0012;
    - (4) *Medium confined animal feeding operation* as defined in this permit (#10, p. 3); or
    - (5) *Small confined animal feeding operation* as defined in this permit (#21, p. 4).
  - (ii) A *small or medium confined animal feeding operation* will be categorized as *concentrated* if:
    - (1) A discharge to waters of the U.S. occurs that is not allowed by this general permit, and
    - (2) The operator does not or cannot make the change(s) necessary to prevent such discharge from recurring to the satisfaction of ODA.

4. Coverage under this permit will be cancelled upon the issuance of an individual permit.

#### **S1.D. General Permit Coverage**

1. Consistent with ORS 468B.200, ODA and DEQ developed this general permit to prohibit routine discharges of manure, litter, and process waste water from CAFO operations to waters of state. Discharges of manure, litter, or process waste water to waters of the state are only expected to occur under extreme weather conditions and as limited by the conditions of this general permit. Further, the general permit only authorizes the discharge of pollutants resulting from the processes, wastes, and operations that have been clearly identified in the permittee's AWMP approved by ODA.

2. This permit does not cover disposal of human wastes or waste water control systems that mix human and animal wastes. Any person owning or operating such a system must apply to DEQ for coverage under an individual or general permit issued pursuant to ORS 468B.050. This general permit for CAFOs may be used in addition to an individual or general permit issued by DEQ pursuant to ORS 468B.050.
3. Except for any toxic effluent standards and prohibitions imposed under section 307 of the federal Clean Water Act (CWA) and groundwater protection requirements established under OAR 340-040, a permittee in compliance with this permit during its term is considered to be in compliance, for purposes of enforcement, with state water quality laws and relevant sections of the CWA as provided in 40 CFR §122.5. The specific effect of permit compliance on enforcement authority is set out in OAR 340-045-0080.

**S1.E. Request for Cancellation**

1. Any permittee may request in writing to ODA that coverage under this permit be cancelled if:
  - (a) Conditions or standards have changed so that the CAFO no longer qualifies for or is required to have coverage under this permit; or
  - (b) The CAFO no longer has animals on site and all waste storage and control facilities have been decommissioned in accordance with Natural Resources Conservation Service (NRCS) conservation practice standard, code 360, entitled *Closure of Waste Impoundments (January 2006)*; and
  - (c) The permittee certifies that it will not commence operation of a CAFO regulated by this permit at the same location without making a new application for registration under this general permit and is granted coverage or applies for and is issued an individual permit.
2. ODA will respond to the request for cancellation by conducting a site inspection and review of the permittee's file. ODA will notify the permittee in writing of termination of coverage under this permit or deny the request with an explanation of why the request was denied.

**S1.F. Individual Permit Coverage**

1. When appropriate, the director may require any person to obtain an individual permit pursuant to OAR 340-045-0033(10). In such cases, the person will be notified in writing by the director. At a minimum, the written notice will include the reason why an individual permit is being required, an application form, the amount of the permit fee due at application, and application due date.
2. If coverage under this permit has been obtained prior to the requirement for an individual permit, this permit will remain effective until the individual permit is issued provided the application for individual permit was properly made.

**S1.G. Request for Confidentiality**

The name and address of an NPDES permit applicant or permittee, NPDES permit applications (e.g., *ODA ATRs*) and their attachments (e.g., *AWMPs*), NPDES permits, and NPDES permit discharge data cannot be kept confidential pursuant to 40 CFR §122.7(b) and (c). For other information, the permittee may request that the director evaluate claims of confidentiality according to the procedures established in ORS 468.095(2).

**S1.H. Public Notice and Participation Requirement**

1. Prior to approving new permit coverage, renewing permit coverage, or approving proposed substantial changes to an *AWMP*, ODA will provide public notice and participation as detailed in Table 2 below.
2. ODA may batch multiple notices as regionally appropriate.
3. Application and permit documents (e.g., *ODA ATR*, renewal application, *AWMP*) will be available for public review at ODA headquarters and appropriate field offices. If available, electronic copies of documents will be provided upon request.
4. Public hearings will be scheduled if written requests for public hearing are received during the comment period from at least ten persons or from an organization or organizations representing at least ten persons. If a hearing is scheduled, ODA will provide at least 30 days notice before the hearing is held. The public comment period will remain open for additional comments for at least 7 days after the public hearing.

**Table 2: CAFO Public Notice Requirements**

	All Operations		Small or Medium Confined	Small, Medium, or Large Concentrated
<b>Permit Action</b>	(a) Receipt of ODA ATR ( <i>Application to Register</i> ) for existing operation not under permit or new proposed operation	(b) Receipt of renewal application	(c) Receipt of proposed substantial change to <i>small or medium confined animal feeding operation's</i> AWMP (see S3.D.1, p. 13)	(d) Receipt of proposed substantial change to <i>small, medium, or large concentrated animal feeding operation's</i> AWMP (see S3.D.2, p. 14)
<b>Public Participation Process</b>	(i) Public notice of a comment period of at least 35 days provided as follows: <ul style="list-style-type: none"> <li>Published in regional newspaper;</li> <li>Posted on ODA and DEQ websites; and</li> <li>Emailed to interested parties list maintained by ODA.</li> </ul> (ii) Opportunity for public hearing. See S1.H.4, p. 7. (iii) A written response to relevant comments will be developed by ODA and made available to interested parties.	(i) Public notice of a comment period of at least 35 days provided as follows: <ul style="list-style-type: none"> <li>Posted on ODA and DEQ websites; and</li> <li>Emailed to interested parties list maintained by ODA.</li> </ul> (ii) Opportunity for public hearing. See S1.H.4, p. 7. (iii) A written response to relevant comments will be developed by ODA and made available to interested parties.	(i) Public notice of a comment period of at least 14 days provided as follows: <ul style="list-style-type: none"> <li>Posted on ODA and DEQ websites; and</li> <li>Emailed to interested parties list maintained by ODA.</li> </ul> (ii) Opportunity for public hearing. See S1.H.4, p. 7. (iii) A written response to relevant comments will be developed by ODA and made available to interested parties.	(i) Public notice of a comment period of at least 35 days provided as follows: <ul style="list-style-type: none"> <li>Posted on ODA and DEQ websites; and</li> <li>Emailed to interested parties list maintained by ODA.</li> </ul> (ii) Opportunity for public hearing. See S1.H.4, p. 7. (iii) A written response to relevant comments will be developed by ODA and made available to interested parties.
<b>Contents of Public Notice</b> Note: Access to the AWMP will also be provided for public review; however, not all AWMPs will be available electronically.	<ul style="list-style-type: none"> <li>Name of operation</li> <li>Name of operator or owner if different than operator, mailing address, and telephone number</li> <li>Physical address of operation</li> <li>Type of operation</li> <li>Number of animals proposed</li> <li>Land Use Compatibility Statement (LUCS)</li> <li>AWMP summary</li> </ul>	<ul style="list-style-type: none"> <li>Name of operation</li> <li>City, county, and zip code</li> <li>Permit registration number</li> <li>Type of operation</li> </ul>	<ul style="list-style-type: none"> <li>Name of operation</li> <li>City, county, and zip code</li> <li>Permit registration number</li> <li>Type of operation</li> <li>Overview of proposed substantial change</li> </ul>	<ul style="list-style-type: none"> <li>Name of operation</li> <li>City, county, and zip code</li> <li>Permit registration number</li> <li>Type of operation</li> <li>Overview of proposed substantial change</li> </ul>

## S2. DISCHARGE LIMITATIONS AND OPERATING REQUIREMENTS

### S2.A. Discharge Limitations

The permittee is prohibited from discharging manure, litter, or process waste water to surface waters and groundwaters of the state, except as allowed in S2.B and S2.C and provided the discharges allowed by S2.B and S2.C do not cause or contribute to a violation of state water quality standards. Discharges to surface waters due to upset or bypass are authorized only in accordance with applicable requirements in G16 Bypass [40 CFR §122.41(m)], p. 23 and G17 Upset [40 CFR §122.41(n)], p. 24.

Types of discharge that are prohibited include but are not limited to: contaminated runoff from confinement or waste accumulation areas; overflow or discharges from waste storage facilities; discharges due to improper land application activities from surface drainages or field tile outlets; discharges due to equipment failure; or leakage or seepage from facilities in the production area in excess of approved designs.

### S2.B. Production Area Limitations

1. For all *small and medium confined animal feeding operations and small, medium, and large concentrated animal feeding operations*, except new source swine, poultry, and veal *large concentrated animal feeding operations*:

The permittee is prohibited from discharging manure, litter, or process waste water to surface waters of the state from the production area, except when:

- (a) Rainfall events cause an overflow of waste management and storage facilities designed, constructed, operated, and maintained to contain all manure, litter, and process waste water including the contaminated runoff and direct precipitation from a 25-year, 24-hour rainfall event; and
- (b) The production area is operated in accordance with the applicable inspection, maintenance, recordkeeping, and reporting requirements of this permit.

2. For new source swine, poultry, and veal *large concentrated animal feeding operations*:

The permittee is prohibited from discharging manure, litter, or process waste water to surface waters of the state.

3. The permittee must properly land apply or otherwise handle authorized discharges from the production area in a way that minimizes impacts on surface water and groundwater of the state and complies with state water quality standards.
4. The permittee must not exceed the seepage design rates approved by ODA for waste storage or animal confinement facilities and seepage to groundwater from these facilities must not violate state groundwater quality protection standards.

### S2.C. Land Application Limitations

1. When applying manure, litter, or process waste water to lands, the permittee must apply at agronomic rates in accordance with the permittee's ODA-approved AWMP. Land application areas include land under the control of the permittee, whether it is owned, rented, or leased, to which manure, litter, or process waste water from the production area is or may be applied.
2. The permittee's discharges to groundwater due to seepage below the root zone of the crop or by other means must not violate state groundwater quality protection standards.
3. The permittee is allowed to apply manure, litter, or process waste water to frozen soil provided:
  - (a) Its AWMP addresses such applications [see S3.C.3(j)];
  - (b) Discharge to surface waters and groundwaters of the state will not occur, except as allowed in S2.B and S2.C; and
  - (c) Land applications do not cause or contribute to a violation of state water quality standards.

4. The permittee is prohibited from applying manure, litter, or process waste water to saturated soils or during rainfall events that are expected to result in saturated soils or surface runoff. When such an application is a desired alternative to allowing waste storage or waste water control facilities to overflow (e.g., land application to saturated soils to pond waste water onsite provides for greater protection of surface waters than a direct overflow of a waste storage tank to surface waters), the land application will be considered an upset condition and the permittee must comply with the provisions of G17 Upset [40 CFR §122.41(n)], p. 24.

**S2.D. Direct Access by Animals to Surface Waters of the State in the Production Area Prohibited**

The permittee must prevent direct animal contact with surface waters of the state in the production area of its CAFO. Direct animal contact means any situation where animals in the production area have free access and are allowed to loiter or drop waste in surface waters. Direct contact with surface waters by animals on pasture or rangeland is not, by itself, a violation of this permit.

**S2.E. Waste Storage Facilities**

1. The permittee must provide adequate storage capacity for solid and liquid wastes at all times so that land application occurs only during periods when soil and weather conditions allow for agronomic application and are in compliance with the Land Application Limitations in S2.C, p. 9 of this permit.
2. The permittee must site, design, construct, operate, and maintain all waste storage facilities consistent with the AWMP. New and modified construction of waste facilities must be approved in advance and prior to construction by ODA in conformance with ORS 468B.055 and OARs 340-051 and 603-074.
3. The permittee with a *large concentrated animal feeding operation* must also have depth markers in all surface liquid impoundments (e.g., lagoons, ponds, tanks) designed to clearly indicate the:
  - (a) Maximum design volume,
  - (b) Minimum capacity necessary to contain the 25-year, 24-hour rainfall event, including additional freeboard requirements, and
  - (c) Depth of manure and process waste water.

**S2.F. Prevention of System Overloading**

1. The permittee may not increase the number of animals over 10% or 25 animals, whichever is greater, of the maximum number assigned by ODA in the *Notice of Registration and General Permit Summary* until an updated plan is approved in writing by ODA (see S3.B AWMP Submittal, p. 12, and S3.D AWMP Changes, p. 13).
2. Animal numbers must not exceed the capacity of the waste storage facilities.

**S2.G. Handling of Animal Mortalities**

The permittee must not dispose of animal mortalities in liquid manure or waste water control facilities. Animal mortalities must be handled in such a way as to prevent discharge of pollutants to surface water or groundwater.

**S2.H. Proper Operation and Maintenance**

The permittee must at all times properly operate and maintain all facilities and systems used for process waste water collection, storage and utilization, and correct any deficiencies found as soon as possible.

**S2.I. Maintaining Compliance if System Fails**

The permittee must control all applications and discharges upon reduction, loss, or failure of the waste storage or utilization facilities until the facilities are restored or an alternative method of storage or utilization is provided.

**S2.J. Setback Requirement**

The permittee must develop a setback for any mechanical application of manure, litter, or process waste water occurring in the land application area(s) adjacent to any surface waters, open tile intake structures, sinkholes, well heads, or other conduits to surface or ground waters where manure, litter, and other process waste waters are prohibited. The setback distances must be included in the permittee's AWMP. For a *large concentrated animal feeding operation*, this setback area must be 100 feet or, as a compliance alternative and if demonstrated to the satisfaction of ODA in the AWMP, the permittee for the *large concentrated animal feeding operation* may:

1. Establish a 35-foot vegetated buffer where manure, litter, and other process waste waters are prohibited; or
2. Demonstrate that a setback or vegetated buffer is not necessary or may be reduced because implementation of alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions that would be achieved by the 100-foot setback.

**S2.K. Manure, Litter, or Process Waste Water Transfers**

1. The permittee retains responsibility of the manure, litter, or process waste water until the transfer or export is completed with the required documentation.
2. The permittee must maintain manure, litter, or process waste water transfer or export records as required by S4.C.2(d), p. 17.
3. Prior to transferring manure, litter, or process waste water to other persons, the permittee with a *large concentrated animal feeding operation* must provide the recipient of manure, litter, or process waste water with the a manure nutrient analysis conducted within the previous 12 months.

**S2.L. Proper Disposal of Other Wastes**

Chemicals, contaminants, and other wastes may not be disposed of in any treatment or storage system for contaminated storm water from the production area, manure, litter, or process waste water unless the system is designed to treat such chemicals, contaminants, or wastes and the chemical, contaminants, or other wastes are identified in the AWMP. In addition, chemicals, contaminants, and other wastes may not be disposed of in any system designed for diversion of uncontaminated storm water.

### S3. ANIMAL WASTE MANAGEMENT PLAN

#### S3.A. Animal Waste Management Plan (AWMP) Implementation and Compliance

1. Upon registration to this permit, the permittee must implement its current ODA-approved AWMP developed for its CAFO.
2. The permittee's ODA-approved AWMP is incorporated into this permit by reference. The permittee must comply with all terms and conditions of its ODA-approved AWMP. Failure to comply with the ODA-approved AWMP constitutes a violation of the terms and conditions of this permit.
3. Absence of an AWMP or absence of ODA approval of an AWMP does not allow the permittee to violate the provisions of S2 Discharge Limitations and Operating Requirements, p. 9, or other permit requirements.

#### S3.B. AWMP Submittal and Public Notice

1. The applicant proposing a new CAFO or electing coverage under this permit must submit its AWMP with the ODA ATR to ODA for review and approval according to the schedule provided in S1.C, p. 6.
2. If necessary to meet the AWMP requirements in this permit, the existing permittee with coverage under the previous version of this general permit must submit a revised or updated AWMP prior to renewing registration under this permit.
3. AWMPs are subject to public notice and participation requirements detailed in S1.H, p. 7.

#### S3.C. AWMP Elements

1. The permittee must ensure that its AWMP is adequate for the proposed or existing population of animals, reflective of the proposed or existing operation, and be prepared in accordance with the terms and conditions of this permit, OAR 340-051, and NRCS conservation practice standard guidance 590 for Oregon dated May 2008 entitled *Nutrient Management*.

Note: In the event of any inconsistency between the conditions of this permit and NRCS 590, the conditions of this permit apply.

2. The AWMP may include a schedule for improvement projects.
3. The AWMP must to the extent applicable include the following:
  - (a) Procedures to ensure collection, handling, and storage of contaminated storm water runoff from the production area, manure, litter, and process waste water in compliance with the requirements of S2. Discharge Limitation and Operating Requirements. Calculations used to determine that storage capacity exists must be provided, including a demonstration that facilities are at least designed and constructed to contain all manure, litter, process waste water, contaminated storm water runoff from the production area, and direct precipitation from a 25-year, 24-hour rainfall event.
  - (b) Procedures to ensure proper operation and maintenance of the storage facilities.
  - (c) Procedures for proper management of animal mortalities. Animal mortalities may not be disposed of in any storage or treatment system that is not specifically designed to treat animal mortalities.
  - (d) Procedures to ensure that clean water is diverted, as appropriate, from the production area.
  - (e) Procedures to prevent direct contact of confined animals with surface waters.
  - (f) Identification of appropriate site-specific conservation practices to be implemented, including buffers, setback areas, or equivalent practices, to control runoff of pollutants to surface water and groundwater.
  - (g) Protocols to land apply manure, litter, or process waste water in accordance with site specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter, or process waste water. The protocols must include the following:
    - (i) The NRCS Phosphorous Index, USDA/NRCS Oregon Agronomy Technical Note #26, revised June 2008, must be completed for all fields that receive manure, litter or process waste water to determine if nitrogen or phosphorous is the most limiting nutrient. The maximum nutrient

application rate must be calculated for the most limiting nutrient (from Technical Note #26) and must account for all other nitrogen and phosphorus sources.

- (ii) Expected crop yields.
- (iii) Calculations showing the total nitrogen and phosphorus to be applied annually to each field, including sources other than manure, litter, or process waste water.
- (iv) Annual manure application rates and an explanation of the basis for determining these rates. For *large concentrated animal feeding operations*, these rates must be based on actual test data. For other operations, data or "book values" from established reference sources (e.g., Oregon Animal Waste Management program) may be used instead of actual testing.
- (v) Method(s) used to apply manure, litter, or process waste water.
- (vi) Timing of manure, litter, and process waste water applications.
- (h) For all operations, protocols for soil testing. For *large concentrated animal feeding operations*, protocols for testing of manure, litter, and process waste water. For other operations that are not required to test manure, litter, or process waste water, test protocols are not required but the references that are used to characterize manure, litter, or process waste water must be included.
- (i) An Agricultural Compost Management Plan if required by OAR 340-096 for composting activities.
- (j) Frozen soil application procedures if applications of manure, litter, or process waste water will be made to frozen soil. At a minimum, the following must be provided:
  - (i) Description of the potential receiving field(s), estimates of waste amounts and types, and estimated timing of applications.
  - (ii) Aerial photo(s) identifying all areas and surface water bodies within 1,000 ft. of the boundaries of the receiving field(s).
  - (iii) Soil map(s) identifying soil types for receiving field(s).
  - (iv) Topographic map(s) for receiving field(s).
  - (v) Description of the structural practices in place to ensure that no discharges to surface water occur during application and after the soil thaws.
  - (vi) Description of the method used to determine when soil is frozen and management practices to be followed when planning an application and during and after an application to frozen soil.
  - (vii) Description of monitoring and reporting requirements to ensure that the permittee is in compliance with frozen soil application procedures.
- (k) Procedures for transfer or export of manure, litter, or process waste water.
- (l) Identification of specific records that will be maintained to document the implementation and management of the minimum elements described above.

### S3.D. AWMP Changes

1. Requirements for *small or medium confined animal feeding operations* (see Table 3, p. 15, for an overview)
  - (a) *Substantial changes.* The permittee must submit any proposal to make substantial changes to its AWMP to ODA for approval at least 45 days in advance of the proposed changes. ODA will public notice the proposal as described in S1.H, p. 7. ODA will notify the permittee of its final decision concerning the proposed changes after the public notice period ends. The permittee may not implement a proposed change until ODA has approved it. The following types of changes to an AWMP are considered substantial:
    - (i) A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP.
    - (ii) An increase in maximum allowed animal numbers such that the operation becomes defined as a *large concentrated animal feeding operation*.
  - (b) *Non-substantial changes.* Public notice of non-substantial changes (described below) to an AWMP is not required; however, the permittee must submit its proposal to make such a change to ODA for approval at least 45 days in advance of the proposed change unless a different timeframe is allowed by ODA. ODA will notify the permittee of its final decision concerning the proposed change after reviewing the proposal. The permittee may not implement a proposed change until ODA has approved it. The following changes to an AWMP are considered non-substantial provided they do not result in a substantial modification listed in paragraph (a) above:

- (i) An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers provided the increase does not change the operation into a large concentrated animal feeding operation.
  - (ii) When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process waste water beyond the scope of the current AWMP.
2. Requirements for small, medium, or large concentrated animal feeding operations (see Table 3, p. 15, for an overview)
- (a) *Substantial changes.* The permittee must submit any proposal to make substantial changes to its AWMP to ODA for approval at least 60 days in advance of the proposed changes. ODA will public notice the proposal as described in S1.H, p. 7. ODA will notify the permittee of its final decision concerning the proposed changes after the public notice period ends. The permittee may not implement a proposed change until ODA has approved it. The following types of changes to an AWMP are considered substantial:
    - (i) Addition of new land application areas not previously included in the AWMP, unless the land application area is covered by an existing AWMP that has already been incorporated into an existing NPDES permit and the application of manure, litter, or process waste water on the newly added land application area is in accordance with that existing NPDES permit.
    - (ii) Any changes to the field-specific maximum annual rates for land application.
    - (iii) Any changes to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop.
    - (iv) Addition of any crop or other uses not included in the AWMP and corresponding field-specific rates of application.
    - (v) A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWMP.
    - (vi) Any changes that are likely to increase the risk of nitrogen and phosphorus transport to surface waters or groundwaters.
  - (b) *Non-substantial changes.* Public notice of non-substantial changes (described below) to an AWMP is not required; however, the permittee must submit its proposal to make such a change to ODA for approval at least 60 days in advance of the proposed change unless a different timeframe is allowed by ODA. ODA will notify the permittee of its final decision concerning the proposed change after reviewing the proposal. The permittee may not implement a proposed change until ODA has approved it. The following changes to an AWMP are considered non-substantial provided they do not result in a substantial modification listed in paragraph (a) above:
    - (i) An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers.
    - (ii) When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process waste water beyond the scope of the current AWMP.

**Table 3: Overview of Requirements for Proposed Changes to AWWPs**

	SMALL OR MEDIUM CONFINED		SMALL, MEDIUM, OR LARGE CONCENTRATED	
	<i>Substantial Change</i>	<i>Non-Substantial Change</i>	<i>Substantial Change</i>	<i>Non-Substantial Change</i>
<b>Description of proposed change</b>	<ol style="list-style-type: none"> <li>1. A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWWP.</li> <li>2. An increase in maximum allowed animal numbers such that the operation becomes defined as a large concentrated animal feeding operation.</li> </ol>	<p>The following are considered non-substantial provided they do not result in a substantial change:</p> <ol style="list-style-type: none"> <li>1. An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers.</li> <li>2. When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process waste water beyond the scope of the current AWWP.</li> </ol>	<ol style="list-style-type: none"> <li>1. Addition of new land application areas not previously included in the AWWP, unless the land application area is covered by an existing AWWP that has already been incorporated into an existing NPDES permit and the application of manure, litter, or process waste water on the newly added land application area is in accordance with that existing NPDES permit.</li> <li>2. Any changes to the field-specific maximum annual rates for land application.</li> <li>3. Any changes to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop.</li> <li>4. Addition of any crop or other uses not included in the AWWP and corresponding field-specific rates of application.</li> <li>5. A change in the type of manure system including but not limited to switching from a dry to a liquid manure system, switching from a liquid to a dry manure system, or changing the manure system to accommodate an animal species or type of operation not included in the scope of the current AWWP.</li> <li>6. Any changes that are likely to increase the risk of nitrogen and phosphorus transport to surface waters or groundwaters.</li> </ol>	<p>The following are considered non-substantial provided they do not result in a substantial change:</p> <ol style="list-style-type: none"> <li>1. An increase in animal numbers greater than 10% of the registrant's maximum allowed animal numbers.</li> <li>2. When facility expansions, production increases, or process modifications will result in new or increased generation of waste, litter, or process waste water beyond the scope of the current AWWP.</li> </ol>
<b>Timeline to submit proposal to ODA</b>	Submit at least 45 days in advance of proposed change(s).	Submit at least 45 days in advance of proposed change(s) unless a different timeframe allowed by ODA.	Submit at least 60 days in advance of proposed change(s).	Submit at least 60 days in advance of proposed change(s) unless a different timeframe is allowed by ODA.
<b>Public notice process</b>	ODA will public notice as described in S1.H, p. 7.	Not required.	ODA will public notice as described in S1.H, p. 7.	Not required.
<b>ODA approval</b>	ODA will notify the permittee of its final decision concerning the proposed change(s) after the public notice period ends.	ODA will notify the permittee of its final decision concerning the proposed change(s) after reviewing the proposal.	ODA will notify the permittee of its final decision concerning the proposed change(s) after the public notice period ends.	ODA will notify the permittee of its final decision concerning the proposed change(s) after reviewing the proposal.

## S4. MONITORING, INSPECTION, RECORDKEEPING, AND REPORTING REQUIREMENTS

### S4.A. Monitoring Requirements

#### 1. Discharge Monitoring

If a discharge to surface water or groundwater occurs that is not allowed by S2.B or S2.C, p. 9, the permittee must record the following information:

- (a) A description and cause of the discharge;
- (b) The period of discharge including exact date(s), time(s), and duration of discharge;
- (c) An estimate of discharge volume;
- (d) Name or location of receiving water; and
- (e) Corrective steps taken, if appropriate, to reduce, eliminate, or prevent reoccurrence of the discharge.

#### 2. Analytical Monitoring

The permittee must conduct the following sampling and analysis according to the following schedule:

- (a) *Large concentrated animal feeding operations only*

Sample Type	Analytical Parameter	Minimum Frequency	Sample Method
Manure, litter, and process waste water	(i) Total nitrogen (ii) Total phosphorus	Annually	Sample according to guidance contained in NRCS 590 or 633 practice standard.
Exported manure, litter, and process waste water	(i) Total nitrogen (ii) Total phosphorus	Annually	Sample according to guidance contained in NRCS 590 or 633 practice standard.
Soil from land application area(s)	(i) Total nitrogen (ii) Total phosphorus	Once every 5 years from all fields where manure, litter, or process waste water is applied.	Sample according to guidance contained in PNW 570-E, EM 8832-E, or NRCS 590 practice standard.

- (b) All other operations

Sample Type	Analytical Parameter	Minimum Frequency	Sample Method
Soil from land application area(s)	(i) Total nitrogen (ii) Total phosphorus	Once every 5 years from all fields where manure, litter, or process waste water is applied.	Sample according to guidance contained in PNW 570-E, EM 8832-E, or NRCS 590 practice standard.

Note: In the event of any inconsistency between the monitoring requirements of this permit and NRCS 590, the monitoring requirements of this permit apply. The permittee should be aware that NRCS 590 monitoring frequencies may need to be followed to access or maintain federal funds.

**S4.B. Inspection Requirements**

1. The permittee must conduct the following inspections:

Item	Large Concentrated	Other Operations
(a) Storm water diversion devices, runoff diversion structures, animal waste storage structures, and devices channeling contaminated storm water to waste water and manure storage and containment structures	Weekly and record results	Periodically
(b) Water lines, including drinking water or cooling water lines	Daily and record results	Periodically
(c) Equipment used for land application of manure, litter, or process waste water	Daily when equipment is in use and record results	Periodically when equipment is in use
(d) Liquid impoundments for manure and process waste water	Weekly and record depth of manure and process waste water according to depth marker required by S2.E.3, p. 10	Periodically

2. Any deficiencies found as a result of these inspections must be corrected as soon as possible. The permittee with a *large concentrated animal feeding operation* must record any actions taken to correct these deficiencies and, if deficiencies are not corrected within 30 days, provide an explanation of the factors preventing immediate correction.

**S4.C. Recordkeeping and Availability Requirements**

1. The permittee must maintain all information required by this permit at the facility for at least five (5) years and make this information available to ODA upon request.
2. Upon obtaining permit coverage, the permittee must record the following information: (Note: If any of the following information is provided in the permittee's AWMP, a separate recordkeeping effort is not required.)

Item or Parameter	Large Concentrated	Other Operations
(a) Date, amount, and nutrient loading of manure, litter, or process waste water applied to each field.	Required	Required
(b) Weather conditions at the time of application and 24 hours before and after application.	Required	Not required
(c) Total amount of nitrogen and phosphorus actually applied annually to each field, including documentation of calculations of the total amount applied.	Required	Required
(d) Total amount of manure or waste water transferred or exported to other persons.	Required. Also include: (i) Date and amount of each transfer or export (ii) Name and address of each recipient (iii) Copy of the manure nutrient analysis conducted provided to the recipient [see S2.K.3, p. 11]	Required
(e) Description of actions taken to correct deficiencies discovered during inspections.	Required (see S4.B.2, p. 17)	Not required

#### S4.D. Reporting Requirements

##### 1. 24-hour Reporting

- (a) If a discharge to surface water or groundwater occurs that is not allowed by S2.B and S2.C, p. 9, the permittee must notify ODA within 24 hours of the discharge. The permittee must submit a written report within five (5) days to ODA. The information to be submitted is listed in the monitoring requirements (see S4.A, p. 16) of this permit.
- (b) The permittee must notify ODA within 24 hours of becoming aware of any significant physical failure at any time of a waste water control facility required under this permit.
- (c) The permittee must notify ODA within 24 hours of any permit noncompliance that may endanger health or the environment as described in G2.6, p. 20.

##### 2. Annual Report

- (a) The permittee must submit an annual report to ODA by March 15 of each year. The annual report must include the following for the previous calendar year:
  - (i) Maximum number and type of animals approved by ODA in the permittee's *Notice of Registration*, whether in open confinement or housed under roof (e.g., beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, other).
  - (ii) Actual number of animals by type at the CAFO averaged over the year.
  - (iii) Estimated amount of total manure, bedding, litter, process waste water, and other material that comes in contact with manure generated by the CAFO (tons, gallons, cubic feet, or cubic yards).
  - (iv) Estimated amount of total manure, bedding, litter, process waste water, and other material that comes in contact with manure transferred to other persons by the permittee (tons, gallons, cubic feet, or cubic yards).
  - (v) Estimated amount of manure, bedding, litter, process waste water, and other material that comes in contact with manure applied to land by the permittee (tons, gallons, cubic feet, or cubic yards).
  - (vi) Total number of acres for land application covered by the AWMP developed in accordance with the terms of this permit.
  - (vii) Total number of acres under control of the permittee that were used for land application of manure, litter, and process waste water.
  - (viii) Summary of all manure, litter, and process waste water discharges from the production area that have occurred, including date, time and approximate volume.
  - (ix) A statement indicating whether the AWMP was developed or approved by a certified waste management planner.
  - (x) As required by 40 CFR § 122.42(e)(4)(viii), the *concentrated animal feeding operation* that discharges or proposes to discharge to waters of the U.S. must also report the following:
    - (1) Actual crop(s) planted and actual yield(s) for each field.
    - (2) Actual nitrogen and phosphorus content of the manure, litter, and process waste water.
    - (3) Data used and results of calculations based on protocol in the ODA-approved AWMP.
    - (4) Amount of manure, litter, and process waste water applied to each field during the previous 12 months.
    - (5) Results of soil testing for nitrogen and phosphorus if testing was performed.
    - (6) Amount of any supplemental fertilizer applied.
- (b) The annual report must be signed and certified by the permittee or permittee's authorized representative with the following statement: "*I certify, under penalty of law, that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.*"

**S4.E. Additional Monitoring**

1. ODA may establish specific monitoring requirements in addition to those contained in this permit by administrative order. An administrative order is an agency action expressed in writing directed to a named person or named persons (ORS 183.310).
2. If a permittee experiences two or more discharges within a 24-month period that are not associated with a 25-year, 24-hour or greater rainfall event, ODA may require surface water and/or groundwater quality monitoring or transfer the permittee to an individual permit. Monitoring for the following parameters may be required: bacteria, total suspended solids, total Kjeldahl nitrogen, biochemical oxygen demand, and other nutrient indicators. If ODA waives the additional monitoring requirements because such monitoring would be impracticable or not likely to produce useful information, ODA will set out the basis for the decision in writing and make the decision available to interested parties.

## GENERAL CONDITIONS

### G1. Noncompliance reporting requirements

1. If for any reason, the permittee does not comply with, or will be unable to comply with any of the requirements or conditions specified in the permit, the permittee must, at a minimum, provide ODA with the following information:
  - (a) A description of the nature and cause of noncompliance, including the quantity and quality of any unauthorized waste discharges;
  - (b) The period of noncompliance, including exact dates and times, and the anticipated time when the permittee will return to compliance; and
  - (c) The steps taken, or to be taken to reduce, eliminate, and prevent recurrence of the noncompliance.
2. In addition, the permittee must take immediate action to stop, contain, and clean up any unauthorized discharges and take all reasonable steps to minimize any adverse impacts to waters of the state and correct the problem. The permittee must notify ODA by telephone so that an investigation may be made to evaluate any resulting impacts and the corrective actions taken to determine if additional action should be taken.
3. Compliance with these requirements does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or resulting liability for failure to comply.

### G2. Additional reporting requirements [40 CFR §122.41(l)]

1. *Planned changes.* The permittee shall give notice to the director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
  - (a) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in §122.29(b); or
  - (b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under §122.42(a)(1).
  - (c) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
2. *Anticipated noncompliance.* The permittee shall give advance notice to the director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
3. *Transfers.* This permit is not transferable to any person except after notice to the director. The director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See §122.61; in some cases, modification or revocation and reissuance is mandatory.)
4. *Monitoring reports.* Monitoring results must be reported at the intervals specified elsewhere in this permit.
  - (a) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the director for reporting results of monitoring of sludge use or disposal practices.
  - (b) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the director.
  - (c) Calculations for all limitations which require averaging of measurements must utilize an arithmetic mean unless otherwise specified by the director in the permit.
5. *Compliance schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.
6. *Twenty-four hour reporting.*
  - (a) The permittee shall report any noncompliance which may endanger health or the environment. Any information must be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission must also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not

- been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- (b) The following must be included as information which must be reported within 24 hours under this paragraph.
    - (i) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See §122.41(g) or G16, p. 23.)
    - (ii) Any upset which exceeds any effluent limitation in the permit. (See §122.41(n) or G17, p. 24.)
    - (iii) Violation of a maximum daily discharge limitation for any of the pollutants listed by the director in the permit to be reported within 24 hours. (See §122.44(g).)
  - (c) The director may waive the written report on a case-by-case basis for reports under G2.6(b) of this section if the oral report has been received within 24 hours.
7. *Other noncompliance.* The permittee shall report all instances of noncompliance not reported under G2.4, 5, and 6 of this section, at the time monitoring reports are submitted. The reports must contain the information listed in G2.6 of this section.
8. *Other information.* Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the director, it shall promptly submit such facts or information.

**G3. Duty to comply [40 CFR §122.41(a)]**

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

1. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
2. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation. The Clean Water Act provides that any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who *knowingly* violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.
3. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000.

Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

**G4. Compliance with other laws and statutes**

Nothing in the permit will be construed as excusing the permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

**G5. Property rights [40 CFR §122.41(g)]**

This permit does not convey any property rights of any sort, or any exclusive privilege.

**G6. Duty to reapply**

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new or renewal permit. The application must be submitted at least 180 days before the expiration date of this permit. The director may grant permission in writing to submit an application less than 180 days in advance but no later than the permit expiration date.

**G7. Need to halt or reduce activity not a defense [40 CFR §122.41(c)]**

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

**G8. Duty to mitigate [40 CFR §122.41(d)]**

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

**G9. Proper operation and maintenance [40 CFR §122.41(e)]**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

**G10. Permit actions**

1. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR §122.41(f)]
2. After notice, registration under this permit may be modified or revoked as it applies to any person for cause as follows:
  - (a) Violation of any terms or conditions of the permit,
  - (b) Failure of the permittee to disclose fully all relevant facts, or misrepresentations of any relevant facts by the permittee during the permit issuance process and during the life of the permit;
  - (c) Failure to pay permit fees required by Oregon Administrative Rule when due;
  - (d) Information indicating that the permitted operation poses a threat to human health or welfare;
  - (e) A change in ownership or control of the operation, or
  - (f) Other causes listed in 40 CFR §122.62 and 122.63.
3. Modification or revocation of coverage under this permit as it applies to any person may be initiated by ODA.
4. Issuance of coverage under an individual permit may be initiated by ODA in accordance with S1.F Individual Permit Coverage, p. 7.

**G11. Change of ownership or control**

The permittee must notify ODA in writing thirty (30) days prior to a change in facility ownership or control.

**G12. Duty to provide information [40 CFR §122.41(h)]**

The permittee shall furnish to the director, within a reasonable time, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine

compliance with this permit. The permittee shall also furnish to the director upon request, copies of records required to be kept by this permit.

**G13. Inspection and entry [40 CFR §122.41(i)]**

The permittee shall allow the director or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act or state law, any substances or parameters at any location.

**G14. Monitoring and records [40 CFR §122.41(j)]**

1. Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity.
2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which must be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the director at any time.
3. Records of monitoring information must include:
  - (a) The date, exact place, and time of sampling or measurements;
  - (b) The individual(s) who performed the sampling or measurements;
  - (c) The date(s) analyses were performed;
  - (d) The individual(s) who performed the analyses;
  - (e) The analytical techniques or methods used; and
  - (f) The results of such analyses.
4. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR subchapters N or O.
5. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

**G15. Signatory requirement [40 CFR §122.21(k)]**

1. All applications, reports, or information submitted to the director shall be signed and certified. (See §122.22)
2. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

**G16. Bypass [40 CFR §122.41(m)]**

1. *Definitions.*
  - (a) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.
  - (b) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of G16.3 and 4 of this section.
3. *Notice*
  - (a) *Anticipated bypass.* If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
  - (b) *Unanticipated bypass.* The permittee shall submit notice of an unanticipated bypass as required in G2.6 of this section (24-hour notice).
4. *Prohibition of bypass.*
  - (a) Bypass is prohibited, and the director may take enforcement action against a permittee for bypass, unless:
    - (i) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
    - (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
    - (iii) The permittee submitted notices as required under G16.3 of this section.
  - (b) The director may approve an anticipated bypass, after considering its adverse effects, if the director determines that it will meet the three conditions listed above in G16.4(a) of this section.

**G17. Upset [40 CFR §122.41(n)]**

1. *Definition.* *Upset* means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. *Effect of an upset.* An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of G17.3 of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
3. *Conditions necessary for a demonstration of upset.* A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
  - (a) An upset occurred and that the permittee can identify the cause(s) of the upset;
  - (b) The permitted facility was at the time being properly operated; and
  - (c) The permittee submitted notice of the upset as required in G2.6(b)(ii) of this section (24 hour notice).
  - (d) The permittee complied with any remedial measures required under G8 of this section.
4. *Burden of proof.* In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

# Appendix B

## Facility Engineering Drawings



# Appendix C

## Lease/Spreading Agreements

Wildlife Safari NMP



# Appendix D

## RUSLE Calculations

Wildlife Safari NMP





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Africa  
  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 188D PENGRA SILT LOAM, 2 TO 20 PERCENT SLOPES\PENGR A silt loam 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 190 ft  
 Avg. slope steepness: 10 %

**Alternatives:  
Management**

	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a. Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.51	1	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Asia  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 48C CURTIN CLAY, 3 TO 12 PERCENT SLOPES\CURTIN clay 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 150 ft  
 Avg. slope steepness: 12 %

**Alternatives:**

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a. Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.35	2	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a positive value, soil organic matter levels are predicted to increase under that production system. If the index is a negative value, soil organic matter levels are predicted to decline under that production system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Cheetah Area  
  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 48C CURTIN CLAY, 3 TO 12 PERCENT SLOPES\CURTIN clay 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 99 ft  
 Avg. slope steepness: 12 %

**Alternatives:  
Management**

Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
default	(none)	(none)	0.33	2	75.20
a.Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53					

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.



## RUSLE2 Worksheet Erosion Calculation Record

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Facilities  
  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 189E PHILOMATH-DIXONVILLE COMPLEX, 3 TO 30 PERCENT SLOPES\PHILOMATH silty clay 55%  
 T value: 2.0 t/ac/yr  
 Slope length (horiz): 200 ft  
 Avg. slope steepness: 8.0 %

**Alternatives:**

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a.Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.40	2	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a positive value, soil organic matter levels are predicted to increase under that system. If the index is a negative value, soil organic matter levels are predicted to decline under that production system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Natural Area 1 & 3  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 189E PHILOMATH-DIXONVILLE COMPLEX, 3 TO 30 PERCENT SLOPES\PHILOMATH silty clay 55%  
 T value: 2.0 t/ac/yr  
 Slope length (horiz): 99 ft  
 Avg. slope steepness: 16 %

**Alternatives:**

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a.Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.88	1	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Natural Area 2  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 188E PENGRA SILT LOAM, 20 TO 30 PERCENT SLOPES\PENGRA silt loam 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 97 ft  
 Avg. slope steepness: 25 %

**Alternatives:**

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a.Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	1.3	1	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a positive value, soil organic matter levels are predicted to increase under that production system. If the index is a negative value, soil organic matter levels are predicted to decline under that production system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: The Americas  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 48C CURTIN CLAY, 3 TO 12 PERCENT SLOPES\CURTIN clay 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 170 ft  
 Avg. slope steepness: 12 %

**Alternatives:  
Management**

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
a. Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.35	2	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Village  
  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 48C CURTIN CLAY, 3 TO 12 PERCENT SLOPES\CURTIN clay 75%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 50 ft  
 Avg. slope steepness: 12 %

**Alternatives:  
Management**

Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value
default	(none)	(none)	0.30	2	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





**RUSLE2 Worksheet Erosion Calculation Record**

**Info:**

Tract #: NA  
 Owner name: Wildlife Safari  
 Field name: Wetlands  
  
 Location: Oregon\Douglas County\OR\_Douglas\_R32-36  
 Soil: 44A CONSER SILTY CLAY LOAM, 0 TO 3 PERCENT SLOPES\CONSER silty clay loam 90%  
 T value: 5.0 t/ac/yr  
 Slope length (horiz): 140 ft  
 Avg. slope steepness: 3.0 %

**Alternatives:**

<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>
a. Single Year/Single Crop Templates\Pasture, yr1 fall plant; manure appl., Z53	default	(none)	(none)	0.13	1	75.20

The SCI is the Soil Conditioning Index rating. If the calculated index is a positive value, soil organic matter levels are predicted to increase under that production system. If the index is a negative value, soil organic matter levels are predicted to decline under that production system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.





Wildlife Safari NMP

# Appendix E

## Phosphorus Index Calculations

Wildlife Safari NMP



## Phosphorus Index

The Phosphorus Index for Oregon was developed by a nutrient management advisory group comprised of members from the Natural Resources Conservation Service in Oregon and Washington, Oregon State University, Washington State University, and agricultural industry.

The Phosphorus Index is a field-level assessment tool designed to evaluate the relative potential for off-site movement of phosphorus from the landscape. The purpose of the Phosphorus Index is to provide field personnel, watershed planners, and land managers with a tool to assess various soils, landforms, and management practices for potential risk of phosphorus movement into surface waters. Conservation planners can use the Phosphorus Index to develop alternatives that include management and conservation practices that will reduce the potential for phosphorus transport to surface waters.

## Phosphorus Movement Factors

The main factors influencing P movement can be separated into two main categories: **transport and source factors**. The following factors are considered in the Phosphorus Index for Oregon.

### **Transport factors:**

- Soil erosion (sheet and rill, wind)
- Irrigation-induced erosion
- Runoff class
- Flooding frequency
- Distance to surface waters / buffer width
- Subsurface drainage

### **Source Factors:**

- Soil test P concentration
- Commercial P fertilizer application rate
- Commercial P fertilizer application method
- Organic P source application rate
- Organic P source application method

Each factor is assigned a **Phosphorus Loss Rating** of *None, Low, Medium, High, or Very High* based on the relative risk of phosphorus transport to surface waters. In addition, each factor is assigned a **Factor Weight** ranging from 0.25 to 1.50, based on the relative contribution of that factor to P transport.

Separate Phosphorus Indices were developed for Western and Eastern Oregon. Differences in cropping systems, tillage practices, irrigation systems, climatic factors, and soil phosphorus testing methods across the state made it necessary to have separate indices.

## Descriptions of Phosphorus Index Factors

### TRANSPORT FACTORS-

#### Soil Erosion

Soil Erosion – tons/ac/yr (RUSLE)	tons/ac/yr (Score)	< 1 (0)	1 – 3 (1.5)	4 – 6 (3.0)	7 – 15 (6.0)	> 15 (12.0)
---	-----------------------	------------	----------------	----------------	-----------------	----------------

This factor includes both sheet and rill and wind erosion. Irrigation-induced erosion is addressed in other factors. Sheet and rill erosion is the detachment of soil particles by raindrop impact, surface runoff from rainfall, and snowmelt runoff on frozen or thawing soil. Wind erosion is the detachment and transport of soil particles by wind forces. Sheet and rill erosion rates are estimated with the Revised Universal Soil Loss Equation (RUSLE). Wind erosion rates are estimated using the Wind Erosion Equation (WEQ). These soil loss models predict long-term average erosion rates, over the entire crop rotation, in tons of soil loss per acre per year. They do not predict sediment transport and delivery to a water body. The prediction models are used in the Phosphorus Index to quantify the movement of soil, thus potential for sediment and attached phosphorus transport on a slope or unsheltered distance toward a water body.

#### Soil Erosion from Sprinkler Irrigation

Soil Erosion from Sprinkler Irrigation	Criteria  (Score)	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)
--	-------------------------	---------------------------------------	---	--	--	---

This factor is evaluated by comparing the application rate of the sprinkler irrigation system (inches of water per hour) with the infiltration rate of the soil. A visual assessment of runoff and soil erosion caused by irrigation water is also conducted to assign a *Phosphorus Loss Rating* to this factor.

#### Runoff Class

Runoff Class	Criteria (Score)	Negligible (0)	Very low or low (1.0)	Medium (2.0)	High (4.0)	(8.0)
--------------	---------------------	-------------------	--------------------------	-----------------	---------------	-------

The *runoff class* is determined from the *hydrologic group* assigned to the soil map units in a field, and the average slope gradient. *Hydrologic groups* are group of soils having similar runoff potential under similar storm and cover conditions. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (National Soil Survey Handbook, Part 618.35).

### Flooding Frequency Class

Flooding Frequency Class	Criteria (Score)	None or very rare (0)	Rare (0.75)	Occasional (1.5)	Frequent (3.0)	Very Frequent (6.0)
--------------------------	------------------	-----------------------	-------------	------------------	----------------	---------------------

Flooding is the temporary covering of the soil surface by flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from high tides, or any combination of sources. Floodwaters can carry both sediment-bound and dissolved P into surface waters. Estimates of flooding frequency are based on the interpretation of soil properties and other evidence gathered during soil survey fieldwork. Flooding frequency is defined as the number of times flooding occurs over a period of time and is expressed as a class.

### Distance to Perennial Surface waters / Buffer Widths

Distance to Perennial Surface Waters / Buffer Widths	Criteria (Score)	> 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)
--	------------------	---	---	---	--	---

This factor considers the flow distance from the edge of the field to the closest perennial surface water, which may include streams, lakes, and those irrigation and drainage ditches that contain water year around. It also considers the presence and width of a vegetated buffer adjacent to that surface water. The closer the edge of the field is to surface water, the higher the potential risk of P transport to that water.

Vegetated buffers are effective in trapping sediment-bound P in runoff water. They are less effective in reducing dissolved P transport. Dissolved P can flow through a buffer and enter surface water. The wider the vegetated buffer, the more effective it will be in reducing total P transport to surface water. Vegetated buffers that are commonly used adjacent to perennial water include filter strips (NRCS Standard 393) and riparian forest buffers (NRCS Standard 391).

### Subsurface Drainage

Subsurface Drainage	Criteria (Score)	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)
---------------------	------------------	--------------------	---	---	---	--

Recent research has shown that P can leach through the soil profile, and the risk of leaching is directly related to the soil test P concentration in the soil. The higher the P concentration, the greater the potential for leaching. When subsurface drainage is present, such as perforated pipe tile drains, dissolved and sediment-bound P can enter the drains and be directly transported to surface water at the drain outlet. This factor therefore considers whether tile drains are present in the field, and the soil test P concentration.



## SOURCE FACTORS-

### Soil Test P

Soil Test P – ppm (Bray P1)	(Score)	Soil Test P – $40 \times 0.10 = ( \quad )$ Assign 0 points if Soil Test P < 40 ppm
-----------------------------------	---------	---

A soil sample from the site is necessary to assess the level of "available P" in the surface layer of the soil. Available P is the level customarily reported in a soil test analysis by commercial soil test laboratories. The soil test level for "available P" does not ascertain the total P in the soil. It does however, give an indication of the amount of total P that may be present because of the general relationship between the forms of P (organic, adsorbed, and labile) and the dissolved P available for crop uptake. The higher the soil test P level, the greater the risk of P transport to surface waters.

The depth at which soil samples are collected for available P analysis should be determined from the fertilizer or nutrient management guides for the crops being grown on the site. These guides are available from Oregon State University or Washington State University Cooperative Extension Services. Sampling depth is normally 0 to 6 inches or 0 to 12 inches for cultivated crops, and generally corresponds to typical depth of primary tillage. For established pastures that have not been cultivated for many years, a sample depth of 0 to 3 inches may be appropriate because P tends to be concentrated near the surface when the soil is not cultivated.

In eastern Oregon, soil test P levels should be determined using the Olsen (sodium bicarbonate) extraction method. In western Oregon, the Bray P1 extraction method should be used.

### P Fertilizer Application Rate

Commercial P Fertilizer Application Rate	(Score)	lbs/ac $P_2O_5 \times 0.02 = ( \quad )$
--	---------	---

The P fertilizer application rate is the amount of commercial phosphate fertilizer ( $P_2O_5$ ), in pounds per acre per year, which is applied to the soil. This factor does not include phosphorus from organic sources. The higher the application rate, the greater the risk of P transport to surface waters.

### Commercial P Fertilizer Application Method

Commercial P Fertilizer Application Method	Criteria	None Applied	Injected / banded deeper than 2 inches OR Incorporated within 5 days of application from March through September	Incorporated within 5 days of application from October through February OR Surface applied March through August	Incorporated more than 5 days after application OR Surface applied September through October	Surface applied November through February
	(Score)	(0)	(1.0)	(2.0)	(4.0)	(8.0)

The manner in which P fertilizer is applied to the soil, and the length of time that fertilizer remains on the soil surface will affect potential P movement. Banding or incorporating P fertilizer into the soil reduces the risk of P transport. P fertilizer that is surface applied, and not incorporated into the soil, has a higher risk of transport to surface water.

The time of year that P fertilizer is applied also affects the risk of P movement. P fertilizer that is applied during the winter and early spring in Western Oregon, when heavy or prolonged precipitation events are likely to occur, creates a higher risk of P transport than applications made from mid-spring to early fall. In Eastern Oregon, there is a greater risk of P transport when fertilizer is surface applied and not incorporated prior to irrigation or winter precipitation.

### Organic P Source Application Rate

Organic P Source Application Rate	(Score)	$\text{lbs/ac P}_2\text{O}_5 \times 0.02 = (\quad)$
-----------------------------------	---------	---

The organic P source application rate is the amount of phosphate ( $\text{P}_2\text{O}_5$ ) contained in organic material that is applied to the soil, in pounds per acre per year. An analysis of the organic material is desirable to determine the phosphorus content. When an analysis of the organic material is not available, values from the Animal Waste Management Field Handbook can be used. The higher the application rate, the greater the risk of P transport to surface waters.

**Organic P Source Application Method**

Organic P Source Application Method	Criteria	None Applied	Injected deeper than 2 inches OR Incorporated within 5 days of application from March through September	Incorporated within 5 days of application from October through February OR Surface applied March through August	Incorporated more than 5 days after application OR Surface applied September through October	Surface applied November through February
	(Score)	(0)	(1.0)	(2.0)	(4.0)	(8.0)

The manner in which organic P material is applied to the soil, and the length of time it remains on the soil surface will affect potential P movement. Injecting or incorporating organic P sources into the soil reduces the risk of P transport. Organic P material that is surface applied, and not incorporated into the soil, has a higher risk of transport to surface water.

The time of year that organic P is applied also affects the risk of P movement. Organic P that is applied during the winter and early spring in western Oregon, when heavy or prolonged precipitation events are likely to occur, creates a higher risk of P transport than applications made from mid-spring to early fall. In Eastern Oregon, there is a greater risk of P transport when organic material is surface applied and not incorporated prior to irrigation or winter precipitation.



# Appendix F

## Soil Test Results



# Appendix G

## Manure Tests



Appendix H

Oregon State University  
and  
Pacific Northwest  
Extension Publications

Wildlife Safari NMP

