



Natural Resources Conservation Service  
Conservation Across America

**Job Sheet - 633 Waste Utilization**  
Revised 8/01

**Determining Effluent Application Rates**

**Total Annual Application** – Should not exceed the maximum annual P2O5 per field noted in Table 3 and/or Table 7 of the Waste Utilization Nutrient Management Plan and may not exceed the annual nitrogen recommendation for the crop.

**Maximum Hourly Application Rate** - The maximum hourly application rate is determined by the texture of the soil layer with the lowest permeability within the upper 24 inches of the of the predominant soil in each field. *The hourly application rate must be low enough to avoid runoff and/or ponding.* For effluent with 0.5% solids or less do not exceed the rates shown in Table 1. If the effluent contains more than 0.5% solids the Table 1 values must be reduced by the appropriate amount shown in Table 2.

Table 1 – Maximum Application Rate (in/hr)

Soil Texture	Application amount in inches						
	0.25	0.50	0.75	1.00	1.25	1.50	2.00
Sand	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Loamy sand	6.00	6.00	4.83	4.22	3.86	3.62	3.32
Sandy loam	4.91	2.97	2.32	1.99	1.80	1.67	1.51
Loam	3.11	1.69	1.21	0.98	0.84	0.74	0.62
Silt loam	2.70	1.45	1.03	0.82	0.70	0.61	0.51
Sandy clay loam	1.74	0.96	0.69	0.56	0.48	0.43	0.37
Clay loam	1.27	0.68	0.48	0.39	0.33	0.29	0.24
Silty clay loam	1.09	0.57	0.40	0.32	0.26	0.23	0.19
Sandy clay	0.61	0.33	0.23	0.19	0.16	0.14	0.12
Silty clay	0.84	0.44	0.30	0.24	0.20	0.17	0.14
Clay	0.39	0.21	0.14	0.11	0.09	0.08	0.07

NOTE: This table is for infiltration for full cover conditions and initial moisture content at 50 percent of available water capacity. Field capacity of sand through sandy loam is assume to be 1/10 bar.

Table 2 – Reduction Coefficients by Percent Solids

Soil Texture	Percent Solids (by wt)						
	0.50	1.0	2.0	3.0	5.0	7.0	10.0
Sand	0.88	0.55	0.31	0.22	0.13	0.10	0.07
Loamy sand	0.70	0.54	0.37	0.28	0.19	0.14	0.10
Sandy loam	0.87	0.77	0.63	0.53	0.40	0.32	0.25
Loam	0.97	0.93	0.88	0.83	0.74	0.67	0.59
Silt loam	0.98	0.95	0.91	0.87	0.81	0.75	0.68
Sandy clay loam	0.99	0.97	0.95	0.92	0.87	0.83	0.78
Clay loam	0.99	0.99	0.98	0.97	0.94	0.92	0.89
Silty clay loam	1.00	1.00	0.99	0.99	0.98	0.97	0.96
Sandy clay	1.00	1.00	1.00	1.00	0.99	0.99	0.99
Silty clay	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Clay	1.00	1.00	1.00	1.00	1.00	1.00	1.00

**Maximum One-time Application Rate** - The maximum amount of effluent that can be applied to a field at any one time is the amount that will bring the top 24 inches of the soil to its available water holding capacity which is the maximum amount of plant available water that can be held by the soil against the forces of gravity. The available water capacity (AWC) of upper 24 inches of the predominant soil in each field should be used. The AWC of the upper 24 inches of the profile may be calculated from AWC data in Section II of the NRCS Field Office Technical Guide.

To determine any one-time application amount the current soil moisture level of the upper 24 inches of the predominant soil in the field should be estimated using the guidance in Table 3. Additional information on estimating soil moisture can be found in the NRCS Program Aid 1619, *Estimating Soil Moisture by Feel and Appearance*, or from the University of Nebraska Extension publication No. G84-690-A by the same name. Both of these publications have pictures of various soils at different AWC's to be used as a guide to estimating soil moisture.

Once the current moisture of the upper 24 inches is estimated it is subtracted from the AWC of the upper 24 inches and the difference is the maximum application for those soil conditions on that day. **Remember, the maximum hourly application and the maximum one time application rates are only estimates to be used as a guide.** No runoff or ponding should occur during application, so frequent observations should be made during each application to ensure that these conditions are met.

**Table 3 - How soil feels and looks at various soil moisture levels**

<b>Soil Moisture level</b>	<b>Fine sand, loamy fine sand</b>	<b>Sandy loam, fine sandy loam</b>	<b>Sandy clay loam, loam, silt loam</b>	<b>Clay loam, clay, silty clay loam</b>
<b>0 - 25 % available soil moisture</b>	Appears dry; will not retain shape when disturbed or squeezed in hand.	Appears dry; may make a cast when squeezed in hand but seldom holds together.	Appears dry. Aggregates crumble with applied pressure.	Appears dry. Soil aggregates separate easily, but clods are hard to crumble with applied pressure
<b>25 - 50 % available soil moisture</b>	Slightly moist appearance. Soil may stick together in very weak cast or ball.	Slightly moist. Soil forms weak ball or cast under pressure. Slight staining on finger.	Slightly moist. Forms a weak ball with rough surface. No water staining on fingers.	Slightly moist; forms weak ball When squeezed, but no water stains. Clods break with applied pressure.
<b>50 - 75 % available soil moisture</b>	Appears and feels moist. Darkened color. May form weak cast or ball. Leaves wet outline or slight smear on hand.	Appears and feels moist. Color is dark. Forms cast or ball with finger marks. Will leave a smear or stain and leaves wet outline on hand.	Appears and feels moist; pliable. Color is dark. Forms ball and ribbons when squeezed.	Appears moist. Forms smooth ball with defined finger marks; ribbons when squeezed between thumb and forefinger.
<b>75 - 100 % available soil moisture</b>	Appears and feels wet. Color is dark. May form weak cast or ball. Leaves wet outline or smear on hand.	Appears and feels wet. Color is dark. Forms cast or ball. Will smear or stain and leaves wet outline on hand; will make weak ribbon.	Appears and feels wet. Color is dark. Forms ball and ribbons when squeezed. Stains and smears. Leaves wet outline on hand.	Appears and feels wet; may feel sticky. Ribbons easily; smears and leaves wet outline on hand. Forms good ball.
<b>Above Field Capacity</b>	Free water appears when soil is bounced in hand.	Free water is released with kneading.	Free water can be squeezed out.	Puddles are present; free water forms on surface of soil ball.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at 202-720-2600 (voice and TDD).

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