TITLE 252. DEPARTMENT OF ENVIRONMENTAL QUALITY
CHAPTER 616. INDUSTRIAL WASTEWATER SYSTEMS

SUBCHAPTER 1. INTRODUCTION

252:616-1-2. Definitions

The following words and terms, when used in this Chapter, shall have the following meaning, unless the context clearly indicates otherwise:

"Beneficial use" means in the context of land application the use of sludge or wastewater through land application for the purpose of soil conditioning, crop vegetative fertilization, or erosion control, or the use of wastewater for dust suppression where fugitive dust control would otherwise be an air quality problem, in a manner which does not pollute or tend to pollute waters of the state of Oklahoma, the environment or pose a risk to human health.

"Berm" means a man-made barrier designed to control waste and/or stormwater within a surface impoundment or to retard or contain runoff in a given area.

"Bypass" means the intentional or unintentional diversion of waste streams from any portion of a facility.

"Cathodic protection" means protecting a metal from electrochemical corrosion or rusting by using it as the cathode of a cell with a sacrificial anode.

"Cell" means a part of a surface impoundment system that shares a vertical concrete wall ~~and berm~~ with another part of the surface impoundment area.

"DEQ" means the Oklahoma Department of Environmental Quality.

"Engineer" means a professional engineer registered in the state of Oklahoma.

"Flow-through surface impoundment" means a surface impoundment designed and constructed with an outfall structure which allows the controlled discharge of wastewater out of the impoundment.

"Freeboard" means the vertical distance from the surface water or sludge/solids level to the overflow elevation (outfall structure or the lowest part of the surrounding berm) in a surface impoundment.

"Hydraulic conductivity" means the coefficient of proportionality that describes the rate at which a fluid can move through a permeable medium. It is a function of both the medium and of the fluid flowing through it; also defined as the quantity of water that will flow through a unit cross-sectional area of porous material per unit of time under a hydraulic gradient of 1.00 (measured at right angles to the direction of flow) at a specified temperature.

"Industrial wastewater treatment permit" shall include any permit for construction, operation, treatment, storage or disposal required under this Chapter.

"Land application" means the controlled application of treated industrial wastewater or sludge onto the land surface for beneficial use.

"Liner" means a barrier which is designed, constructed and installed in a surface impoundment and which has appropriate chemical and physical properties to ensure that such structures control the seepage or release of waste and wastewater from the impoundment.

"Monitoring well" means all borings, wells, piezometers, or other means of retrieving a soil, waste, wastewater or vapor sample from the subsurface.

"Oklahoma Water Quality Standards" means the rules promulgated by the Oklahoma Water Resources Board and contained in OAC 785:45 which classify waters of the state, designate beneficial uses for which the various waters of the State shall be maintained and protected, and prescribe the water quality standards required to sustain designated uses.

"OPDES" means the Oklahoma Pollution Discharge Elimination System Act at 27A O.S. § 2-6-201 *et seq*.

"Operator" means the person responsible for the maintenance and operation of a surface impoundment, or disposal or wastewater treatment system and responsible for keeping records and providing reports to the DEQ.

"Outfall" means the point where monitoring shall occur for the purpose of evaluating compliance with rules, permits or orders of the DEQ.

"Person" means any individual, company, corporation, government agency, municipality, or any other entity.

"Permeability" means the rate at which liquids pass through soil or other materials in a specified direction.

"Receiving water" means that portion of any waters of the State into which wastewater is or may be released, leached, or discharged.

"Sanitary wastewater" means and includes but is not limited to wastewater from drinking fountains, showers, toilets, lavatories, and kitchens.

"Surface impoundment" means a native soil or lined basin either below or above ground level which is designed, maintained and/or operated to store, recycle, treat and/or dispose of industrial wastewater or stormwater, and shall include but is not limited to lagoons, excavations, basins, diked areas, and pits ~~and ponds~~.

"~~Flexible membrane~~ Synthetic liner" means a manufactured liner material composed of plastics, resins or other flexible materials, which is designed and manufactured to be used to control the seepage or release of waste through the liner material.

"Tank system" means any subsurface disposal system which involves the storage and treatment of wastewater.

"Total retention surface impoundment" means a surface impoundment designed and constructed without an outfall structure.

"U.S.C." means United States Code.

"Waste class" means the following classification of wastewater, including stormwater:

(A) Class I: containing or suspected to contain pollutants for which the toxicity, concentration and volume pose a significant risk of harm to humans, aquatic life, wildlife or the environment, either through high potential to migrate in groundwater or the likelihood, if discharged, to significantly degrade the beneficial uses of the receiving water as designated in the Oklahoma Water Quality Standards. These wastewaters require the most restrictive environmental protection measures.

(B) Class II: containing or suspected to contain pollutants for which the toxicity, concentration and volume pose a moderate risk of harm to humans, aquatic life, wildlife, or the environment, either through the potential to migrate in groundwater or a reasonable possibility, if discharged, to degrade the beneficial uses of the receiving water as designated in the Oklahoma Water Quality Standards.

(C) Class III: containing or suspected to contain pollutants which do not pose a substantial risk of harm to humans, aquatic life, wildlife, or the environment because of a relative immobility in groundwater or a general lack of direct toxicity, and which are not likely, if discharged, to degrade the beneficial uses of the receiving water as designated in the Oklahoma Water Quality Standards.

(D) Class IV: containing only sanitary wastewater from industrial facilities. Class IV wastewaters are not subject to this Chapter, but are governed by OAC 252:641 (under 5,000 gpd) or by OAC 252:656 (5,000 gpd or more).

(E) Class V: industrial wastewater not otherwise classified.

"Waste containment system" means storage tanks, containers and other storage reservoirs, transfer lines, pumps, fittings, overfill prevention devices, and any associated anticorrosion measures and leak prevention or detection systems.

SUBCHAPTER 3. PERMIT PROCEDURES

252:616-3-3. Fees

(a) **Application fees.** Application fees for new industrial wastewater system permits or to renew existing industrial wastewater system permits are non-refundable~~. The application fees~~ and are set forth below:

(1) Class I - $300.00

(2) Class II - $200.00

(3) Class III and authorizations under a general permit- $100.00
(4) Class V - $300.00

(b) **Annual fees.** Permit holders shall submit payment to DEQ for annual fees upon receipt of an invoice from DEQ. Payments for annual fees received by DEQ shall be applied to the twelve-month period following the due date of the initial invoice issued by DEQ, but not past the expiration of the permit. Failure to pay an annual fee may result in suspension or termination of the permit. The annual fees are set forth below.

(1) **Industrial tank systems.** The annual fees for industrial tank systems are as follows:
(A) Class I or II - $970.00
(B) Class III - $330.00
(C) Class V - $440.00

(2) **Industrial surface impoundments.** The annual fees for industrial surface impoundment systems are as follows:
(A) Class I - $1,670.00 per impoundment
(B) Class II - $1,120.00 per impoundment
(C) Class III and authorizations under a general permit- $330.00 per impoundment
(D) Class V - $440.00 per impoundment

(3) **Land application of industrial wastewater or industrial sludge.** The holder of a permit for an industrial tank or impoundment system that allows for the land application of industrial wastewater and/or industrial sludge shall pay an annual fee of $690.00 in addition to the annual fees set forth in (1) and (2) of this subsection.

(d) **Consumer Price Index adjustment.** To assist in meeting rising costs for the industrial wastewater program, the fees set out in (a), and (b) of this Section shall be automatically adjusted on July 1st every year to correspond to the percentage, if any, by which the Consumer Price Index (CPI) for the most recent calendar year exceeds the CPI for the previous calendar year. The Department may round the adjusted fees up to the nearest dollar. The Department may waive collection of an automatic increase in a given year if it determines other revenues, including appropriated state general revenue funds, have increased sufficiently to make the funds generated by the automatic adjustment unnecessary in that year. A waiver does not affect future automatic adjustments.

(1) Any automatic fee adjustment under this subsection may be averted or eliminated, or the adjustment percentage may be modified, by rule promulgated pursuant to the Oklahoma Administrative Procedures Act. The rulemaking process may be initiated in any manner provided by law, including a petition for rulemaking pursuant to 75 O.S. § 305 and OAC 252:4-5-3 by any person affected by the automatic fee adjustment.

(2) If the United States Department of Labor ceases to publish the CPI or revises the methodology or base years, no further automatic fee adjustments shall occur until a new automatic fee adjustment rule is promulgated pursuant to the Oklahoma Administrative Procedures Act.

(3) For purposes of this subsection, "Consumer Price Index" or "CPI" means the Consumer Price Index - All Urban Consumers (U.S. All Items, Current Series, 1982-1984=100, CUUR0000SA0) published by the United States Department of Labor. The CPI for a calendar year is the figure denoted by the Department of Labor as the "Annual" index figure for that calendar year.

SUBCHAPTER 7. SURFACE IMPOUNDMENT STANDARDS

252:616-7-4. ~~Flexible membrane~~ Synthetic liners

(a) **Suitability.** A liner system constructed using a soil subbase, a specially prepared subgrade, a ~~flexible membrane~~ synthetic liner ~~(FML)~~, and a protective soil cover can be considered a highly protective liner system and may be appropriate for Class I, II, III or V wastewater and may be required for certain wastewater.

(b) **Pre-construction requirements.** Before construction, classify and test all liner material and submit the following with the industrial wastewater treatment permit application:

(1) design specifications with suitable physical properties of the liner material for percent elongation, strength tests (tensile, tear, breaking, shear, and bonded seam), hydrostatic resistance, percent volatile losses, and reactions to water (absorption and extraction);
(2) design specifications with suitable chemical properties of the liner material for chemical resistance to wastewater, ultraviolet light resistance, and protection against biological decay;
(3) show the liner will maintain physical properties under all prolonged and varying conditions expected at the facility, included but not limited to, temperature variation, UV radiation, biological attack, and waste or wastewater composition; and
(4) show the liner will perform as a physical barrier to waste and wastewater seepage into groundwater.

(c) **Construction requirements.** Construct a ~~flexible membrane~~ synthetic liner system by:
(1) protecting the liner membrane from physical damage by a specially prepared bedding material free of rocks, roots, debris, sharp objects, or foreign matter of a size or shape that could damage the liner;
(2) preventing settlement or stability problems of the subgrade under maximum operational conditions. Vent the subgrade with perforated pipe to reduce gas and hydrostatic pressure;
(3) inspecting each roll of liner material in the field before and during placement by a manufacturer-qualified inspector to meet manufacturer specifications against leaks;
(4) installing liners using commonly accepted industry techniques and practices for bedding and subgrade preparation, anchor trenches of 6-inch minimum depth and placement 9 to 12 inches beyond the dike slope break, ~~FML~~ synthetic liner installation and seaming, and field QA/QC inspections and seam testing;
(5) inspecting seams visually and conduct pressure tests, vacuum tests or other non-destructive seam tests to monitor the effectiveness of personnel and equipment;
(6) maintaining side-slope stability. Exterior side slopes shall be a minimum of 2:1 (horizontal to vertical distance). Internal side slopes shall be between 2.5:1 and 4:1. Use the interfacial friction angle between the soil and the liner material to determine the maximum side-slope angle. All side-slope angles shall be less than the interfacial friction angle; and
(7) taking adequate measures to protect the integrity of the liner. On dike slopes, backfill should consist of at least a 3-inch layer of sand or finely textured soil and covered with at least a 3-inch layer of heavier cobble, coarse gravel, or small riprap.

252:616-7-5. Composite liners

(a) **Suitability.** A liner system constructed with both a clay liner and a ~~flexible membrane~~ synthetic liner ~~(FML)~~ is the most protective liner system and is appropriate for Class I, II, III or V wastewater and may be required for Class I wastewater.

(b) **Construction requirements.** Construct composite liners according to the compacted clay liner and ~~flexible membrane~~ synthetic liner provisions of this Subchapter. Smooth the surface of the constructed clay liner until uniform to prevent a zone of high permeability under the ~~flexible membrane~~ synthetic liner.

SUBCHAPTER 9. TANK SYSTEM STANDARDS

252:616-9-1. Authorized use of tank systems

The use of tank systems for all wastewater classifications is authorized as follows:
(1) ~~Tank~~ Existing tank systems without subsurface absorption trenches or lateral lines can be used for the treatment of Class I, II, III, and V wastewater.
(2) ~~Tank~~ Existing tank systems with subsurface absorption trenches or lateral lines are subject to the Underground Injection Control permitting process.
(3) To ensure the protection of groundwater in accordance with OAC 785:45-7, new tank systems shall not utilize subsurface absorption trenches or lateral lines for disposal or dispersal of industrial wastewater.

SUBCHAPTER 11. LAND APPLICATION STANDARDS

252:616-11-5. Recordkeeping

(a) **Records.** ~~Submit yearly to the DEQ~~ The permittee shall keep the following land application records on site and available to DEQ upon request:

(1) location, day and hour land application began and ended, and the method of application;
(2) analytical data, volume and source(s) of wastewater or industrial sludge applied;
(3) loading rates;
(4) weather conditions during the application period;
(5) type of crop, grass or vegetation grown on site;
(6) ~~pH of wastewater at beginning of application, or weekly if application exceeds seven consecutive days; and~~
~~(7)~~ monitoring records, including the date, time and exact place of the sampling or measurement, the name of the sampler, when analysis began, the name of the certified laboratory and the analytical results;
~~(8)~~(7) for industrial sludge generated outside the State of Oklahoma, test results demonstrating the quality of the sludge, including samples of each load of sludge performed by an independent laboratory approved by the DEQ and an agreement that the DEQ may perform random quality assurance sampling at the site of the generation of the industrial sludge;
~~(9)~~(8) In the case of dust suppression (OAC 252:616-11-6), the following records must be maintained:
(A) location, day and hour land application began and ended, and the method of application;
(B) volume and source(s) of wastewater applied; and
(C) weather conditions during the application period.

(b) **Reporting to DEQ.**

(1) The ~~owner or operator~~ permittee shall submit reports of effluent and sludge monitoring and land application records by month on a quarterly basis. The quarterly reports will be due on or before the last working day of the month following the close of each quarter (i.e., April, July, October and January). Monitoring information shall be submitted to the DEQ on self-monitoring report (SMR) forms or other forms provided or approved by the DEQ.

(2) The permittee shall submit reports of land application records on a yearly basis. The yearly reports shall be due on or before January 31. Monitoring information shall be submitted to DEQ on self-monitoring report (SMR) forms or other forms provided or approved by DEQ.

(c) **Notice of changes.** An owner or operator shall give advance notice to the DEQ of any change in sludge or wastewater source(s), treatment or characteristics, method(s) of land application, or the addition of any specific land application site not previously approved in his/her permit. Such change may require a major modification of the permit.

SUBCHAPTER 13. CLOSURE STANDARDS

252:616-13-3. Closure plan submittal and amendment

(a) **Closure plan required.** A written closure plan shall be submitted to the DEQ at least 90 days prior to commencing closure, unless a lesser amount of time is granted by the DEQ.

(b) **Closure plan amendment.** Closure activities shall occur as specified in the closure plan. Any amendments to the closure plan shall be submitted, in writing, to the DEQ for review and approval before any closure activity is altered, replaced, or deleted.

(c) **Commencement of closure activities.** Closure activities shall not commence until the closure plan and all amendments thereto have been reviewed and approved by the DEQ.

(d) **Content.** The written closure plan shall include the following information, except as specifically waived by the DEQ in accordance with OAC 252:616-13-1(c):

(1) **General information.** The following general information shall be provided in all closure plans:

(A) purpose of closure indicating the reason why the surface impoundment, tank system or land application site is no longer in use and whether wastewater or sludge will be closed in place (in-place closure) or removed (clean closure);
(B) the DEQ Industrial Wastewater Treatment Permit number for the facility. If the facility has not been permitted, submit a completed application for a DEQ Industrial Wastewater Treatment Permit;
(C) the name, address, and telephone number of all record owner(s) of the land upon which the surface impoundment, tank system or land application site is located;
(D) if the operator is not the sole record owner of the land, surface property interests and all water rights, they must provide a written document from each owner(s) indicating consent to on-site or off-site disposal of the contents of the surface impoundment, tank system, or land application site and any other activities associated with closure;
(E) provide a time schedule indicating the major closure activities, approximate time to complete each activity, and the estimated date of final completion of all closure activities; and
(F) the closure plan shall include certification by a Registered Professional Engineer, except for Class III impoundments closed pursuant to the specifications contained in Appendix E of this Chapter.

(2) **Site assessment.** The following minimum information about the site shall be provided in the closure plan.
(A) **Soil information.** Identify the type of soil(s) by soil series name impacted and include a description of the soil profile and the depth to bedrock. List chemical and physical properties of the soil, and their average values for the site, that predict transport and fate of the wastewater contained in the surface impoundment, tank system, or land application.
(B) **Groundwater information.** Identify major and minor aquifers, recharge areas, depth to ground water for both shallow aquifer and drinking water sources, local and regional direction of flow, and estimated or background water quality.
(C) **Surface water information.** Identify surface water bodies that may be hydrologically connected to the groundwater or are immediately downgradient of the surface impoundment, tank system or land application site. Trace the drainage to the nearest major watercourse on a topographic map.
(D) **Plans and specifications.** Provide plans and specifications of the impoundment(s), or tank system(s) to be closed indicating the dimensions of the surface impoundment(s), or tank system(s), location of inflow and outflow piping, location and thickness of sludge, and depth of wastewater in the impoundment.

(3) **Wastewater characterization.** The following minimum information about the wastewater shall be included in the closure plan. Additional information may be required.
(A) **Inventory of wastewater.** Provide an inventory of the types and concentrations of wastewater discharged to the surface impoundment, or tank system. Indicate the frequency and volume of each wastewater that was or may have been discharged to or otherwise placed in the tank system or impoundment.
(B) **Chemical analysis.** When requested by the DEQ, provide a chemical analysis of representative sample(s) of the sludges, sediments, bottom sediments, liners, or other media.

(4) **Sampling, analysis, and monitoring plans.** Sampling, analysis, and monitoring used before, during, and after closure shall be proposed to the DEQ in a written plan as follows:
(A) **Sampling and analysis.** Design a sampling and analysis plan that includes all requirements listed in OAC 252:616-5-4.
(B) **Monitoring.** Design a monitoring plan that will adequately monitor groundwater, soil vapor, or other media according to OAC 252:616-5-4.
(C) **Sampling and monitoring locations.** Indicate on a facility map the location of each sampling site, each monitoring site, the direction of groundwater flow, and the wells used to determine groundwater flow direction.

(5) **Treatment, removal, and disposal.** The closure plan shall include the following minimum discussion of treatment, removal, and disposal activities, as well as any additional information requested by the DEQ:

(A) **Treatment.** Describe all methods to be used to treat or reduce any wastewater or sludge from the surface impoundment or tank system (such as chemical or physical treatment, phase separation, waste stabilization, or other method). Provide a written rationale for each treatment method to be used and sufficient evidence of its effectiveness.

(B) **Removal.** Describe all removal activities for all wastewaters, sludges, liner materials, and subsoils (e.g., volume removed, equipment used, dust control, and other activities).

(C) **Backfill.** If the impoundment is to be closed by backfilling with soil, estimate the volume of soil needed. Include discussion of the material to be used as backfill, sampling used to determine the characteristics of the backfill, the method of compaction, and other methods to be used.

(D) **Disposal.** Provide the name and location of any off-site facility to be used to dispose of the tank system, the lateral lines, the piping and fittings, the contents of the tank system or the impoundment, liner materials, or subsoils, and provide the name of the issuing agency, permit number or other information necessary to determine authorization obtained for such disposal.

(6) **In-place closure requirements.** The following additional requirements apply for in-place closure:

(A) If the pollutants cannot be physically removed or must otherwise be closed in-place, the closure plan shall include:

(i) a discussion of remediation alternatives (e.g., clean closure, waste reduction, or chemical, physical, or biological treatment) and documentation as to effectiveness of each alternative;

(ii) a discussion of containment alternatives, (e.g., waste stabilization, impervious cap, or other system) and documentation as to the effectiveness of the containment measure; and

(iii) a proposal of which remediation or containment alternative(s) will be implemented for each surface impoundment or tank system site.

(B) When impervious caps or covers are proposed to be constructed as a method of closure in connection with a closure plan, the following requirements shall be met:

(i) compacted clay caps used to contain wastes in closed surface impoundments shall have a maximum hydraulic conductivity of 1×10^{-7} cm/sec and shall be protected by covering with a soil layer. The clay cap shall be designed and constructed according to the requirements of Subchapter 5 relating to clay liners;

(ii) caps containing ~~flexible membrane~~ synthetic liners used to contain wastes in closed impoundments shall be installed according to requirements of Subchapter 5 relating to ~~flexible membrane~~ synthetic liners in addition to manufacturer's and installer's specifications and accepted industry practices and shall be protected by covering with a composite soil and gravel layer; and

(C) address post-closure activities, as required by the DEQ, such as groundwater monitoring, water or land use restrictions, or deed restrictions.

(7) **Clean closure requirement.** The following additional requirements apply for clean closure:

(A) provide an evaluation of the feasibility of clean closure of the surface impoundment, tank system site including a discussion of available technology, extent of contamination, and other factors; and

(B) discuss target clean-up levels of wastewater, the possible risks at those levels, and the methods to be used to determine that clean closure has been achieved.

APPENDIX C. TABLE OF RAINFALL AND EVAPORATION DATA [REVOKED]

County	Rainfall * (in inches)	Average Pan Evaporation (in inches)	Average Lake Evaporation (in inches)	County	Rainfall * (in inches)	Average Pan Evaporation (in inches)	Average Lake Evaporation (in inches)
Adair	60.16	65	47	LeFlore	62.22	65	48
Alfalfa	39.50	90	62	Lincoln	45.12	80	57
Atoka	54.83	75	53	Logan	51.58	85	60
Beaver	28.31	90	62	Love	52.40	80	58
Beckham	36.66	90	64	McClain	49.04	85	60
Blaine	39.07	90	62	McCurtain	67.76	65	49
Bryan	56.75	75	54	McIntosh	55.66	70	52
Caddo	35.74	90	63	Major	29.32	90	63
Canadian	43.46	90	62	Marshall	58.62	75	55
Carter	50.54	80	58	Mayes	47.79	70	49
Cherokee	57.00	70	48	Murray	56.81	80	58
Choctaw	56.33	70	52	Muskogee	56.72	80	50
Cimarron	24.24	90	58	Noble	41.73	85	59
Cleveland	46.07	85	60	Nowata	48.74	70	51
Coal	60.94	75	55	Okfuskee	56.98	75	55
Comanche	42.29	90	64	Oklahoma	41.19	85	60
Cotton	40.86	90	64	Okmulgee	52.33	75	53
Craig	49.49	70	49	Osage	55.04	75	54
Creek	48.68	75	55	Ottawa	50.98	65	47
Custer	43.38	90	64	Pawnee	44.11	80	56
Delaware	55.88	65	47	Payne	45.52	80	52
Dewey	34.38	90	63	Pittsburg	59.27	75	58
Ellis	31.37	90	64	Pontotoc	52.13	75	56
Garfield	39.58	90	61	Pottawatomie	46.49	80	58
Garvin	46.32	80	59	Pushmataha	60.50	70	50
Grady	44.52	90	62	Roger Mills	37.90	90	64
Grant	40.07	90	60	Rogers	55.99	70	51
Greer	39.67	90	64	Seminole	54.34	75	55
Harmon	36.71	90	64	Sequoyah	61.50	65	48
Harper	25.46	90	62	Stephens	45.65	85	62
Haskell	59.46	70	49	Texas	22.07	90	62
Hughes	58.60	75	54	Tillman	40.43	90	64
Jackson	42.18	90	64	Tulsa	46.88	75	53
Jefferson	38.33	85	61	Wagoner	52.10	70	51
Johnston	49.89	75	55	Washington	44.65	70	53
Kay	40.74	80	58	Washita	36.93	90	64
Kingfisher	39.36	90	62	Woods	35.92	90	62
Kiowa	36.24	90	64	Woodward	27.26	90	62
Latimer	68.60	70	50	* Rainfall data is the 90th percentile			

Source of data: OGS average rainfall data for 1988 – 1998; evaporation data from 1976 OSDH Design Guidelines

APPENDIX C. TABLE OF RAINFALL AND EVAPORATION DATA [NEW]

County	Rainfall * (in inches)	Average Pan Evaporation (in inches)	Average Lake Evaporation (in inches)	County	Rainfall * (in inches)	Average Pan Evaporation (in inches)	Average Lake Evaporation (in inches)
Adair	59.90	65	47	LeFlore	62.01	65	48
Alfalfa	38.12	90	62	Lincoln	46.13	80	57
Atoka	61.45	75	53	Logan	46.06	85	60
Beaver	28.57	90	62	Love	51.56	80	58
Beckham	32.86	90	64	McClain	48.08	85	60
Blaine	38.17	90	62	McCurtain	67.41	65	49
Bryan	55.60	75	54	McIntosh	59.39	70	52
Caddo	39.15	90	63	Major	35.22	90	63
Canadian	44.44	90	62	Marshall	55.70	75	55
Carter	50.87	80	58	Mayes	56.42	70	49
Cherokee	61.28	70	48	Murray	55.89	80	58
Choctaw	61.42	70	52	Muskogee	56.82	80	50
Cimarron	21.70	90	58	Noble	47.27	85	59
Cleveland	46.59	85	60	Nowata	50.93	70	51
Coal	64.06	75	55	Okfuskee	51.62	75	55
Comanche	42.08	90	64	Oklahoma	44.53	85	60
Cotton	44.22	90	64	Okmulgee	56.29	75	53
Craig	59.59	70	49	Osage	50.81	75	54
Creek	52.16	75	55	Ottawa	64.92	65	47
Custer	39.05	90	64	Pawnee	46.58	80	56
Delaware	62.82	65	47	Payne	44.24	80	52
Dewey	33.48	90	63	Pittsburg	54.33	75	58
Ellis	29.83	90	64	Pontotoc	49.44	75	56
Garfield	43.26	90	61	Pottawatomie	47.71	80	58
Garvin	45.02	80	59	Pushmataha	65.61	70	50
Grady	44.55	90	62	Roger Mills	35.52	90	64
Grant	44.11	90	60	Rogers	54.57	70	51
Greer	37.31	90	64	Seminole	52.15	75	55
Harmon	36.93	90	64	Sequoyah	55.66	65	48
Harper	29.66	90	62	Stephens	44.28	85	62
Haskell	61.04	70	49	Texas	24.53	90	62
Hughes	53.92	75	54	Tillman	41.14	90	64
Jackson	39.39	90	64	Tulsa	49.54	75	53
Jefferson	42.08	85	61	Wagoner	52.50	70	51
Johnston	61.46	75	55	Washington	49.79	70	53
Kay	46.96	80	58	Washita	40.55	90	64
Kingfisher	40.77	90	62	Woods	35.42	90	62
Kiowa	35.84	90	64	Woodward	31.93	90	62
Latimer	73.97	70	50	* Rainfall data is the 90th percentile			

Source of data: OGS average rainfall data for 1970 – 2004; evaporation data from 1976 OSDH Design Guidelines