

Southwest Planning Region

REGIONAL DESCRIPTION

Twelve counties, covering approximately 15.7 percent of the state, comprise the Southwest Planning Region (Figure 30). They are Beckham, Caddo, Comanche, Cotton, Custer, Greer, Harmon, Jackson, Kiowa, Roger Mills, Tillman and Washita Counties. The region lies at the center of the Southern Great Plains and normally experiences mild winters and long, hot summers. The region's terrain includes vast farming areas with rolling river bottoms and the rocky Wichita Mountains. Stream and surface water sources are relatively scarce in the region.

The Southwest Region is projected to have approximately 17 percent of the overall statewide water demand for the year 2050. The region is sparsely populated with the largest cities being Lawton, Altus, Anadarko and Hobart. The projected 2050 agricultural demand is estimated to be the second highest in the state, behind the Northwest Planning Region.

The region's climate is mild with annual mean temperatures varying from 59 to 64 degrees. Annual evaporation within the region ranges from 62 to 65 inches. Rainfall averages 22 inches per year in western areas to almost 32 inches per year in the east. These factors, along with the existence of numerous natural chloride deposits in southwest Oklahoma, lead to water quality problems in many of the region's stream systems.

WATER RESOURCES

Stream Water

The region's major streams include the Red and Washita Rivers and Cache Creek. Stream water is not a dependable supply source due to intermittent flow and generally poor water quality.

The Red River (including the Salt Fork and North Fork) is the major stream in the Southwest Region and forms its southern border. The water is highly mineralized with chlorides, sulfates and dissolved solids exceeding EPA limits most of the time.

The Washita River, which flows through the northern portion of the re-

gion, is also highly mineralized with dissolved solids usually exceeding 2,000 mg/L. Tributary streams of the Washita improve the overall stream quality in the lower reaches, making it suitable for irrigation.

Cache Creek, which flows through Caddo, Comanche and Cotton Counties, contains the best stream water quality in the region. However, intermittent flows limit the development of additional supplies. Flooding is also a significant problem in the Cache Creek area.

MAJOR RESERVOIRS

Table 35 summarizes the larger impoundments within the region, including five major reservoirs. Lugert-Altus Reservoir is a Bureau of Reclamation project on the North Fork of the Red River in Greer and Kiowa Counties. The reservoir was completed in 1946 for flood control, water supply and irrigation purposes. The impoundment provides 19,600 ac-ft of flood control storage and 132,830 ac-ft of conservation storage. The lake has a 20 percent dependable yield of 47,100 af/yr (42 mgd). The water, used primarily by the Lugert-Altus Irrigation District, is of fair quality and suitable for most uses.

Fort Cobb Lake is a Bureau of Reclamation project on Pond Creek, a tributary of the Washita River, in Caddo County. The lake was built in 1959 for flood control, water supply, fish and wildlife mitigation, and recreation. The lake contains 63,700 ac-ft of flood control storage and 78,340 ac-ft of water supply storage which yields 18,000 af/yr (16.1 mgd). All of the available yield is allocated to the Fort Cobb Master Conservancy District. The water is of fair quality with sulfates approaching acceptable limits.

Foss Reservoir is located on the Washita River, in Custer County. The lake was built by the Bureau in 1961 and provides 180,410 ac-ft of flood control storage and 165,480 ac-ft of water supply and irrigation storage. The dependable water supply yield of the lake is 18,000 af/yr (16.1 mgd), all of which is allocated to Foss Reservoir Master Conservancy District. The water in Foss Reservoir is highly mineralized and requires desalinization prior to municipal use, although it is suitable for irrigation uses without extensive treatment.

Tom Steed Reservoir is located on West Otter Creek, a tributary of the North Fork of the Red River, in Kiowa

County. This Bureau of Reclamation project was completed in 1975 for water supply, flood control, recreation, and fish and wildlife mitigation. The reservoir has 20,310 ac-ft of flood control storage and 88,970 ac-ft of conservation storage. The dependable yield of 16,000 af/yr (14.3 mgd) is allocated to the Mountain Park Master Conservancy District. The water is of marginal quality with high levels of dissolved solids.

MUNICIPAL LAKES

There are three large municipal lakes in the Southwest Planning Region. Lake Ellsworth, on East Cache Creek in Comanche and Caddo Counties, is a water supply and recreation lake for the City of Lawton. The lake, which contains flood control storage of 116,710 ac-ft and conservation storage of 65,500 ac-ft, has a yield of 23,500 af/yr (21 mgd) due to the City of Lawton's ability to divert from other sources. The water is of excellent quality and suitable for all uses.

Lake Lawtonka is another City of Lawton impoundment on Medicine Creek in Comanche County. The lake, built in 1905 for water supply and recreation purposes, has flood control storage of 25,665 ac-ft and 56,574 ac-ft of conservation storage. Similar to Lake Ellsworth, Lawtonka has a yield of 23,500 af/yr (21 mgd) due to Lawton's ability to divert from other sources. Studies have shown that the reservoir needs only 32,000 ac-ft of conservation storage to develop its maximum yield, liberating an additional 24,574 ac-ft of flood control storage. The water is of excellent quality and suitable for all uses.

Lake Chickasha, built in 1958 for water supply and recreation, serves the City of Chickasha (South Central Planning Region). Located on Spring Creek in Caddo County, the lake has a surface area of 820 acres, conservation storage of 41,080 ac-ft, and a yield of 7,500 af/yr (6.7 mgd). Water quality problems severely restrict use of the lake for M&I purposes.

OTHER IMPOUNDMENTS

There are numerous NRCS projects, small municipal lakes and private reservoirs within the Southwest Planning Region that provide municipal supply, irrigation water and recreational opportunities. Clinton Lake (3,980 ac-ft of conservation storage), Hall Lake (560 ac-ft), Dead Indian Lake (SCS-#4; 977 ac-

ft), Lake Elk City (SCS-#22 R; 2,583 ac-ft), Rocky Lake (2,500 ac-ft), Vanderwork Lake (990 ac-ft), Quanah Parker Lake (905 ac-ft) and Dave Boyer Lake (861 ac-ft) are some of the larger impoundments in this category.

AUTHORIZED DEVELOPMENT

The Red River Chloride Control Project's area in Harmon County is the only major authorized water project in the Southwest Planning Region.

POTENTIAL DEVELOPMENT

There are several potential sites in the Southwest Planning Region for

the development of new water supply projects (Table 35). Several have been extensively studied.

Mangum Reservoir is proposed for the Salt Fork of the Red River in Greer County. The recommended alternative from a 1993 reservoir study by the Corps is for a small impoundment of 2,280 acres. The impoundment would have no flood control storage and provide 9,420 ac-ft of active conservation storage. The estimated yield for water supply is 3,056 af/yr (2.73 mgd). Water quality is anticipated to be fair to poor with elevated levels of sulfates and dissolved solids. However, local interest in the project remains high

for recreation and irrigation benefits.

Cookietown Reservoir is a proposed impoundment on Deep Red Run Creek in Cotton and Tillman Counties. The reservoir would provide 37,500 ac-ft of flood control storage and 208,200 ac-ft of conservation storage. Its yield is estimated at 34,700 af/yr (31 mgd) and water quality would be fair.

STREAM WATER RIGHTS

As of June 1994, the OWRB had issued stream water allocation permits totaling 319,598 ac-ft per year from lakes, rivers and streams within the Southwest Planning Region (Table 36).

Table 35
STREAM WATER DEVELOPMENT
Southwest Planning Region

PROJECT	STREAM	PURPOSE*	FLOOD CONTROL STORAGE (acre-feet)	WATER SUPPLY STORAGE (acre-feet)	WATER SUPPLY YIELD (ac-ft/year)
EXISTING OR UNDER CONSTRUCTION					
Chickasha	Spring Creek	ws, r	---	41,080	---
Clinton	Turkey Creek	ws, r	---	3,980	1,700
Ellsworth	East Cache Creek	ws, r	116,710	65,500 ¹	23,500 ²
Fort Cobb	Cobb Creek	ws, fc, r, fw	63,730	78,350	9,720 ³
Foss	Washita River	ws, fc, r, fw, i	180,410 ⁴	165,480 ⁵	18,000
Lawtonka	Medicine Creek	ws, r	25,665	56,574 ⁶	23,500 ²
Lugert-Altus	North Fork of Red River	ws, fc, r, i	19,600	132,830	47,100 ⁷
Tom Steed	West Otter Creek	ws, fc, r, fw	20,310	88,970	16,000
Waurika	Beaver Creek	ws, fc, wq, r, fw, i	----	----	27,190 ⁸
TOTAL			426,425	632,764	139,520
POTENTIAL					
Carnegie Diversion Dam	Washita River	w s	---	---	50,000
Cookietown	Deep Red Run	ws, fc, r, i	37,500	208,200	34,700
Faxon Diversion Dam	West Cache Creek	w s	---	---	10,700 ⁹
Lugert-Altus Modification	North Fork of Red River	ws, fc, r, i	196,000	204,600	8,200 ¹⁰
Mangum	Salt Fork of Red River	ws, fc, r	---	9,420	3,050
Port	Elk Creek	ws, fc, r	47,700	68,000	14,000
Rainy Mountain	Rainy Mountain Creek	ws, fc, r	66,500	60,000	6,000
Snyder	Deep Red Run	ws, fc, r	11,800	95,000	---
Verden	Spring Creek	ws, r	---	40,000	7,500
Weatherford	Deer Creek	ws, fc, r	55,000	62,000	11,200
TOTAL			414,500	747,220	145,350
TOTAL YIELD					284,870

*ws-municipal water supply, fc-flood control, wq-water quality, r-recreation, fw-fish and wildlife, i-irrigation.

¹ 72,500 ac-ft total, including 7,000 ac-ft for sediment reserve.

² Exceeds 98% safe yield due to City of Lawton's ability to divert from other sources.

³ Total water supply yield is 18,000 af/yr, of which 8,280 is allocated to South Central Planning Region.

⁴ Includes 3,500 ac-ft of sediment storage.

⁵ Includes irrigation storage.

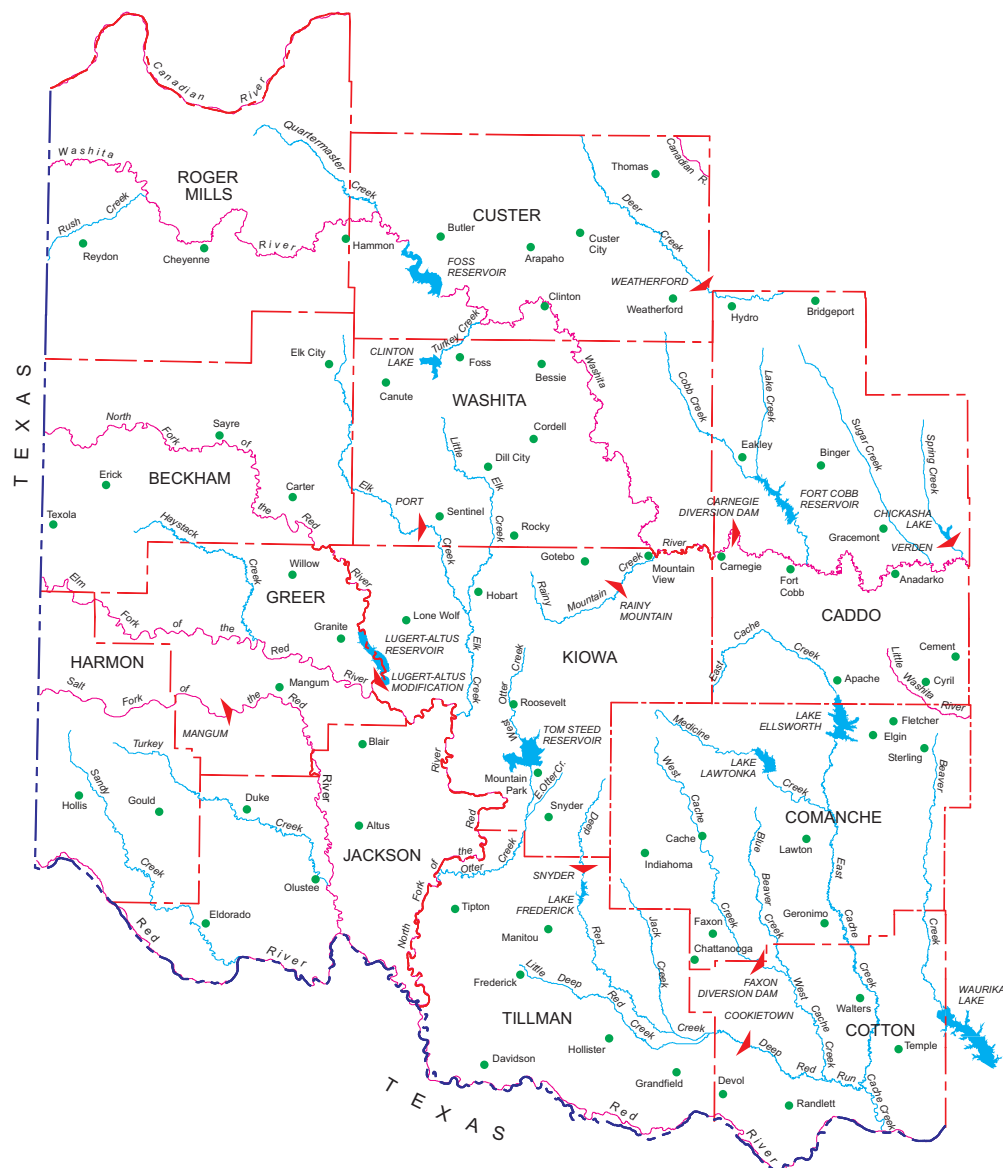
⁶ Only 32,300 ac-ft of conservation storage required to develop maximum yield. As a result, an additional 24,274 ac-ft could be used for flood control storage.

⁷ Top of irrigation and municipal water supply pool; yield is 20% of dependable yield since primary use is irrigation.

⁸ Reservoir located in South Central Region. Total yield is 45,590 af/yr (including 5,040 af/yr of irrigation storage), of which approximately 27,190 af/yr is allocated to Southwest Region via Waurika Master Conservancy District.

⁹ Additional yield from diversion to be developed in proposed Cookietown Reservoir.

¹⁰ Additional yield from modification of Lugert-Altus Dam.

OKLAHOMA COMPREHENSIVE
WATER PLAN

**Figure 30
SOUTHWEST
PLANNING REGION**

Table 36
WATER RIGHTS
Southwest Planning Region

STREAM WATER ALLOCATIONS								
<i>(acre-feet)</i>								
COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Beckham	---	100	1,110	---	1,402	---	---	2,612
Caddo	24,140	28	16,189	---	840	1,636	---	42,833
Comanche	40,881	6,548	5,153	18	2,225	---	---	54,825
Cotton	300	---	2,485	---	---	---	---	2,785
Custer	17,350	370	5,488	---	982	---	---	24,190
Greer	---	---	555	---	---	---	---	555
Harmon	---	---	208	---	167	---	2,000	2,375
Jackson	4,800	---	94,853	---	---	---	---	99,653
Kiowa	58,100	---	2,662	---	136	---	---	60,898
Roger Mills	434	95	2,678	---	2,483	---	---	5,690
Tillman	3,400	---	3,078	---	---	---	---	6,478
Washita	2,765	50	13,003	8	878	---	---	16,704
TOTAL	152,170	7,191	147,462	26	9,113	1,636	2,000	319,598

GROUNDWATER ALLOCATIONS								
<i>(acre-feet)</i>								
COUNTY	Municipal	Industrial	Agricultural	Commercial	Rec, F&W	Power	Other	TOTAL
Beckham	8,038	4,043	19,879	1,036	325	---	50	33,371
Caddo	6,445	3,220	169,280	153	278	3,697	---	183,073
Comanche	5,804	1,507	14,609	20	---	---	4	21,944
Cotton	4,268	---	4,877	---	---	---	---	9,145
Custer	6,802	11,610	94,636	209	223	---	136	113,616
Greer	1,623	20	19,922	13	---	---	---	21,577
Harmon	1,526	---	66,436	---	---	---	---	67,962
Jackson	670	849	36,171	10	10	---	---	37,710
Kiowa	1,861	178	14,526	194	50	---	---	16,809
Roger Mills	2,042	9,203	134,162	---	60	---	1	145,467
Tillman	3,254	20	42,367	---	---	---	---	45,641
Washita	6,333	5,464	57,152	880	130	---	---	69,959
TOTAL	48,666	36,114	674,016	2,514	1,076	3,697	191	766,273

Note: Agricultural allocations include Irrigation. Mining included in Industrial.
Source of data: Oklahoma Water Resource Board printout, June 23, 1994.

Groundwater

Southwest Oklahoma overlies seven principal groundwater aquifers -- the Arbuckle-Timbered Hills Group, Rush Springs Sandstone, Blaine Formation, Elk City Sandstone, Ogallala Formation and alluvium and terrace deposits of the Washita River and North Fork of the Red River. Groundwater is the principal supply for most irrigation needs, as well as the major source for many small communities in the region.

The Arbuckle-Timbered Hills Group is a confined, high-porosity limestone, dolomite and conglomerate formation found in portions of Comanche, Kiowa and Caddo Counties. The formation is approximately 6,000 feet thick and well depths are commonly between 100 and 2,800 feet. Well yields range between 25 and 500 gpm. The water is generally soft; however, fluoride concentrations exceed EPA limits and chloride concentrations approach those limits

at most locations. The water is generally not suited for most uses.

The Rush Springs Sandstone is a fine-grained sandstone aquifer with some shale, dolomite and gypsum. Within this region, the aquifer outcrops in portions of Caddo, Custer and portions of Washita Counties. Thickness of the formation ranges from 200 feet in the southern end to 330 feet in the north. Well depths are usually 100 to 200 feet and yield between 200 and 600 gpm. The water tends to be of a calcium bicarbonate type and very hard. TDS levels are generally less than 500 mg/L and the water is suitable for most uses.

The Blaine-Dog Creek Shale Formation is found in Greer, Jackson and Harmon Counties. It is an interbedded gypsum, dolomite and siltstone formation usually between 300 and 400 feet thick. Well depths range from 100 to 200 feet with yields between 100 and 500 gpm, although they can exceed 2,500 gpm.

The water is of a calcium sulfate chloride type with dissolved solids exceeding 2,000 mg/L. The water is not suitable for municipal or industrial purposes, although it can be used for irrigation on some tolerant crops. The aquifer is recharged by surface runoff into sinkholes and solution openings.

The Elk City Sandstone Formation is a fine-grained sandstone with little or no shale. The formation is thinner and less productive than the Rush Springs Sandstone with yields commonly between 60 and 200 gpm. The formation is found in Washita and Beckham Counties and its water is generally suitable for most uses.

The Ogallala Formation in the Southwest Region underlies portions of Roger Mills and Beckham Counties. The semi-consolidated aquifer consists primarily of fine sands and silt with lesser quantities of gravel and clay and minor beds of limestone and caliche. The saturated thickness of the formation ranges from a few

feet to more than 500 feet. Well depths range from 100 to 500 feet with yields between 100 and 800 gpm. Locally, some portions of the formation have high fluoride and chloride concentrations. Overall, the water is of good quality and, although hard, is suitable for most uses.

The major alluvial and terrace deposit aquifers are found around the two major rivers in the region, the North Fork of the Red and Washita Rivers. Wells into those formations yield from 200 to 500 gpm and formation deposits average 70 feet in thickness. The formations consist of silt and clays, downgrading into fine to coarse sand. The water is hard to very hard and of a generally calcium magnesium bicarbonate type. TDS values are usually less than 1,000 mg/L in the Washita River Basin and less than 2,000 mg/L in the Red River Basin. Water levels have generally declined in recent years.

GROUNDWATER DEVELOPMENT

Extensive development of groundwater supplies has occurred in the Southwest Planning Region, with overdevelopment in some areas. This is due, in part, to low rainfall and poor aquifer recharge. Many communities rely on groundwater as their primary supply due to the limited availability of suitable surface water.

GROUNDWATER RIGHTS

As of June 1994, the OWRB had issued groundwater allocation permits totaling 766,273 ac-ft per year from aquifers in the Southwest Planning Region (Table 36).

SUPPLY AND DEMAND ANALYSIS

The Southwest Planning Region's extensive agricultural demand may pose serious water problems in some areas,

including Jackson and Tillman Counties, which are projected to have substantial shortages. These problems could be compounded by the current overdevelopment of groundwater in those areas. Water quality is also a problem in the west. Existing reservoirs in the region are fully allocated with no surplus water available. Table 37 indicates the availability of water from existing sources. The long-range projection of M&I water demand in the year 2050 is 125,400 af/yr (111.5 mgd). The agricultural demand of 531,500 af/yr (473 mgd) is projected to be the second highest of any planning region.

Table 37
SUPPLY AND DEMAND ANALYSIS
Southwest Planning Region
(1,000 ACRE-FEET/YEAR)

SOURCE	COUNTY												TOTAL
	Beckham	Caddo	Comanche	Cotton	Custer	Greer	Harmon	Jackson	Kiowa	Roger Mills	Tillman	Washita	
MUNICIPAL AND INDUSTRIAL COMPONENT													
Clinton	---	---	---	---	---	---	---	---	---	---	---	1.7	1.7
Ellsworth	---	---	23.5	---	---	---	---	---	---	---	---	---	23.5
Fort Cobb	---	8.4	---	---	---	---	---	---	---	---	---	---	8.4
Foss	---	---	---	---	1.2	---	---	---	1.0	---	---	1.2	3.4
Lawtonka	---	---	23.5	---	---	---	---	---	---	---	---	---	23.5
Lugert-Altus	---	---	---	---	---	---	---	4.8	---	---	---	---	4.8
Tom Steed	---	---	---	---	---	---	---	13.0	1.0	---	2.0	---	16.0
Waurika	---	---	23.8	2.6	---	---	---	---	---	---	---	---	26.4
SCS & Municipal Lakes	1.3	22.9	9.9	---	---	---	---	1.3	---	0.1	4.8	4.4	44.6
Groundwater	13.5	10.1	7.3	4.3	19.0	1.7	1.5	1.5	2.3	11.3	3.3	12.8	88.6
M & I Supply	14.8	41.4	88.0	6.9	20.2	1.7	1.5	20.6	4.3	11.4	10.0	20.1	240.9
2050 M & I Demand	6.7	9.4	61.6	3.4	8.7	2.7	1.7	20.5	2.5	1.8	2.9	3.5	125.4
M & I Surplus/(Deficit)	8.1	32.0	26.4	3.5	11.5	(1.0)	(0.2)	0.1	1.8	9.6	7.1	16.6	115.5
AGRICULTURAL COMPONENT													
Foss	---	---	---	---	7.4	---	---	---	3.8	---	---	3.4	14.6
Lugert-Altus	---	---	---	---	---	---	---	42.3	---	---	---	---	42.3
SCS & Municipal Lakes	4.3	12.6	4.1	0.8	15.3	0.7	1.9	0.3	6.6	16.3	3.0	17.0	82.8
Groundwater	19.9	169.3	14.6	4.9	94.6	19.9	66.4	36.2	14.5	134.2	42.4	57.2	674.0
Agricultural Supply	24.2	181.9	18.7	5.7	117.3	20.6	68.4	78.7	25.0	150.4	45.3	77.6	813.8
2050 Agricultural Demand	10.7	147.6	6.1	5.7	34.1	26.5	40.9	136.3	11.5	17.8	68.4	25.9	531.5
Agricultural Surplus/(Deficit)	13.5	34.3	12.6	---	83.2	(5.9)	27.5	(57.6)	13.5	132.6	(23.1)	51.7	282.3
POWER COMPONENT													
Fort Cobb	---	1.3	---	---	---	---	---	---	---	---	---	---	1.3
SCS & Municipal Lakes	---	1.6	---	---	---	---	---	---	---	---	---	---	1.6
Treated Sewage Effluent	---	---	4.0	---	---	---	---	---	---	---	---	---	4.0
Groundwater	---	3.7	---	---	---	---	---	---	---	---	---	---	3.7
Power Supply	---	6.6	4.0	---	---	---	---	---	---	---	---	---	10.6
2050 Power Demand	---	5.9	5.9	---	---	---	---	---	---	---	---	---	11.8
Power Surplus/(Deficit)	---	0.7	(1.9)	---	---	---	---	---	---	---	---	---	(1.2)
TOTALS													
Total Local Supply	39.0	229.9	110.7	12.5	137.5	22.3	69.9	99.3	29.3	161.8	55.4	97.7	1,065.2
Total 2050 Demand	17.4	162.9	73.6	9.1	42.8	29.2	42.6	156.8	14.0	19.6	71.3	29.4	668.7
Total Surplus/(Deficit)	21.6	67.0	37.1	3.4	94.7	(6.9)	27.3	(57.5)	15.3	142.2	(15.9)	68.3	396.5