FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Environmental Assessment and Restoration, Bureau of Watershed Restoration

CENTRAL DISTRICT • MIDDLE ST. JOHNS BASIN

FINAL TMDL Report

Nutrient and Dissolved Oxygen TMDLs for the Six Middle St. Johns River Segments between the Inlet of Lake Harney (WBID 2964A) and St. Johns River above Wekiva River (WBID 2893C)

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Executive Summary

This report estimates the total maximum daily loads (TMDLs) for nutrients, including total nitrogen (TN) and total phosphorus (TP), that can be discharged into the portion of the Middle St. Johns River from Lake Harney to the confluence of the St. Johns River with the Wekiva River, without causing nutrient and dissolved oxygen (DO) impairments. This portion of the Middle St. Johns River contains six waterbody segments uniquely identified with **w**ater**b**ody **id**entification numbers (WBIDs): Lake Harney (WBID 2964A), St. Johns River Downstream of Lake Harney (WBID 2964), St. Johns River above Lake Jesup (WBID 2893F), St. Johns River above Lake Monroe (WBID 2893E), Lake Monroe (WBID 2893D), and St. Johns River above Wekiva River (WBID 2893C).

Using the methodology in the Impaired Surface Waters Rule (IWR) (Rule 62-303, Florida Administrative Code [F.A.C.]), the Florida Department of Environmental Protection (Department) verified that these WBIDs were impaired for nutrients and DO. The impairments were caused by excessive nutrients discharged into these river segments. Based on Section 403.067, Florida Statues (F.S.), nutrient and DO TMDLs must be developed for these segments.

Establishing target nutrient concentrations is an important step in developing TMDLs. In this report, the target nutrient concentrations established for the two lakes (Lake Harney and Lake Monroe) were applied to all the impaired river segments based on the assumption that, as river channels have lower water residence time than lakes, nutrient concentrations that are sufficient to protect lake water quality should be sufficiently protective for the river segments. The nutrient targets were established using three different methods, as follows: (1) determining the nutrient concentrations that will result in Trophic State Index (TSI) values of less than 60 in Lake Harney and Lake Monroe; (2) determining the nutrient concentrations that will restore the sediment nutrient deposition rates previously determined as the level under low anthropogenic impacts, based on paleolimnological studies; and (3) determining the recommended TN and TP concentrations in published literature for reference lakes. The final target nutrient concentrations, which are 0.07 milligrams per liter (mg/L) for TP and 1.18 mg/L for TN, are medians of the recommended nutrient values obtained from these three methods (0.060 to 0.073 mg/L for TP and 1.11 to 1.22 mg/L for TN).

The target TN and TP loadings were estimated using the Hydrologic Simulation Program–Fortran (HSPF) Model set up and calibrated by the St. Johns River Water Management District (SJRWMD). This model simulates pollutant loadings from pervious and impervious areas of the watershed through surface runoff, interflow, and baseflow and includes the physical, chemical, and biological processes in receiving waters that influence nutrient dynamics. The HSPF Model divides the watershed areas immediately adjacent to the impaired waters into two watersheds (Lake Harney and Lake Monroe), which were further divided into 19 sub-basins. Nutrient inputs from the Upper St. Johns River, Econlockhatchee River, and Lake Jesup were included in the model as boundary conditions. The model also considers point source loadings from the Sanford/North Wastewater Treatment Plant (WWTP) through direct discharge and reuse, loadings from failed septic tanks, loadings from atmospheric deposition directly onto the impaired river segments, and loading attenuation from existing structural best management practices (BMPs). In simulating the target nutrient loadings, the needed nutrient percent reduction established for the Lake Jesup TMDLs was applied to the discharge from the lake into the St. Johns River. Loadings from the Upper St. Johns River and the Econlockhatchee River and point and nonpoint sources (anthropogenic land uses) from the watersheds immediately adjacent to the impaired waters were adjusted until the nutrient concentrations in these impaired segments met the target nutrient concentrations. The final percent reductions needed to achieve the target nutrient concentration in all 6 impaired river segments range from 31 to 33 percent for TP and 37 to 39 percent for TN.

Acknowledgments

This TMDL report was developed based on the Hydrologic Simulation Program–Fortran (HSPF) Model created by the St. Johns River Water Management District (SJRWMD). We deeply appreciate the help and efforts of Dr. Yanbing Jia (SJRWMD Engineering Division) in explaining the model structure and assumptions. We also sincerely thank Dr. Jia and Dr. Xiaoqing Huang for providing the background information and data necessary to develop this report. Our special thanks also go to Dr. Sherry Brandt-Williams (SJRWMD's Environmental Science Division) for all the stimulating discussions and suggestions on water quality target development. We sincerely appreciate the kind help of May Lehmensiek, who provided a tour through the Middle St. Johns River segments to help us better understand the structure and function of the system. We also want to thank Jennifer Gihring (Watershed Planning and Coordination Section of the Florida Department of Environmental Protection [Department]). Her effective contract management with BCI (also thanks to the efforts of Dr. Chandy John, Gerold Morrison, and other BCI staff) created large amounts of useful information on the system that were used to develop the TMDL. We also thank Chris Ferraro from the Department's Central District Office and Michael Hatcher and Marc Harris from the Department's Industrial Wastewater Section. They provided valuable information and suggestions on the point source dischargers in the basin. Last, but not least, we extend our appreciation to Christy Newsome and Janis Paulsen, who prepared the maps for this report. This TMDL report could not have be completed without the generous help of all these individuals. We sincerely thank them and hope to continue working with them in our future TMDL development efforts.

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Total Maximum Daily Loads Program

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http://www.dep.state.fl.us/legal/Rules/shared/62-303/62-303.pdf

Florida STORET Program

http://www.dep.state.fl.us/water/storet/index.htm

2008 305(b) Report

http://www.dep.state.fl.us/water/docs/2008_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

http://www.dep.state.fl.us/water/wqssp/classes.htm

Basin Status Report: Middle St. Johns

http://www.dep.state.fl.us/water/basin411/sj_middle/status.htm

Water Quality Assessment Report: Middle St. Johns

http://www.dep.state.fl.us/water/basin411/sj_middle/assessment.htm

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

http://www.epa.gov/region4/water/tmdl/florida/

National STORET Program

http://www.epa.gov/storet/

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the nutrient and dissolved oxygen (DO) Total Maximum Daily Loads (TMDLs) for six waterbodies in the Middle St. Johns Basin: four segments of the Middle St. Johns River located between the inlet of Lake Harney and the confluence of the Wekiva River and St. Johns River, as well as Lakes Harney and Monroe. These waters were verified as impaired for nutrients and low dissolved oxygen (DO) due to elevated chlorophyll *a* (chl*a*) and depressed DO concentrations, as verified through water quality assessments. They were added to the Verified List of impaired waters for the Middle St. Johns Basin by Secretarial Order on May 19, 2009. The purpose of the TMDLs is to establish the allowable loadings of nutrients to the Middle St. Johns River segments that would restore these waterbodies such that they meet their applicable water quality criteria for nutrients and DO.

1.2 Identification of Waterbody

The waterbodies included in this TMDL report are the main stem segments of the Middle St. Johns River located between the inlet of Lake Harney and the confluence of the St. Johns River with the Wekiva River. This portion of the St. Johns River runs southeast to northwest for about 33 miles before it drains into the Lake George watershed north of the Wekiva River's mouth. The river segments receive discharges from the Upper St. Johns River (which drains parts of Brevard County) and also from several major tributaries, including the Econlockhatchee River, Deep Creek, and Lake Jesup. These tributaries drain a total of about 771,000 acres of land in Lake, Volusia, Seminole, and Orange Counties, and, to a lesser extent, Marion and Brevard Counties.

Two major lakes, Lake Monroe and Lake Harney, are also among the impaired segments of the Middle St. Johns main stem. Interstate 4 (I-4) runs in a south-north direction across the outlet of Lake Monroe, and State Road 46 (SR-46) runs along the southern shorelines of Lake Monroe and Lake Harney. Major municipalities located in the area include the cities of Sanford and Lake Monroe, which are located immediately south of Lake Monroe, and the cities of Deltona, DeBary, and Enterprise, which are located north of Lake Monroe.

Rapid growth in the watersheds of the Middle St. Johns River is one of the major factors contributing to the deterioration of water quality in this portion of the St. Johns River, especially the segments downstream of Lake Jesup, including Lake Monroe. According to the Surface Water Improvement and Management (SWIM) Plan for the Middle St. Johns developed by the St. Johns River Water Management District (SJRWMD) (2002), the Lake Monroe area is heavily developed and is in the location with the highest growth potential in Seminole County. A large amount of acreage in the I-4/SR-46 corridor is designated as higher intensity planned development that allows industrial, office, commercial, and multifamily developments. The southern shoreline of Lake Monroe is seawalled, and a portion of SR-17/92 is immediately adjacent to the seawall, but there is no treatment for road runoff in this area. In addition, DeBary and Deltona contain extensive residential developments.

Another heavily developed area that may significantly impact water quality in the Middle St. Johns River downstream of Lake Jesup is the Lake Jesup watershed. South of Lake Jesup, the municipalities of Longwood, Winter Springs, Oviedo, Casselberry, Maitland, Eatonville, Winter

Park, and Orlando lie partly or wholly in the Lake Jesup watershed, and are all heavily developed. It is estimated that by 2010, there will be close to 2 million people living in the vicinity of Lake Jesup. Effective control of the pollutant loading from these areas will not only improve water quality in Lake Jesup, but will also improve water quality in the Middle St. Johns River downstream of the lake. **Figure 1.1** shows the general location of the Middle St. Johns River segments included in this TMDL report. **Figure 1.2** shows the major tributaries that discharge into these segments.

For assessment purposes, the Department has divided the Middle St. Johns Basin into water assessment polygons with a unique **w**ater**b**ody **id**entification (WBID) number for each watershed or stream reach. This TMDL report addresses nutrient and DO impairments in the WBIDs that are part of the main stem of the Middle St. Johns River. **Table 1.1** summarizes these WBIDs, from upstream to downstream, and the parameters of concern for each segment.

Table 1.1. WBIDs and Parameters Addressed in This TMDL Report

WBID	Waterbody Name	Parameters of Concern
2964A	Lake Harney	DO and Nutrients
2964	St. Johns River Downstream of Lake Harney	DO
2893F	St. Johns River above Lake Jesup	DO
2893E	St. Johns River above Lake Monroe	DO and Nutrients
2893D	Lake Monroe	DO and Nutrients
2893C	St. Johns River above Wekiva River	DO and Nutrients

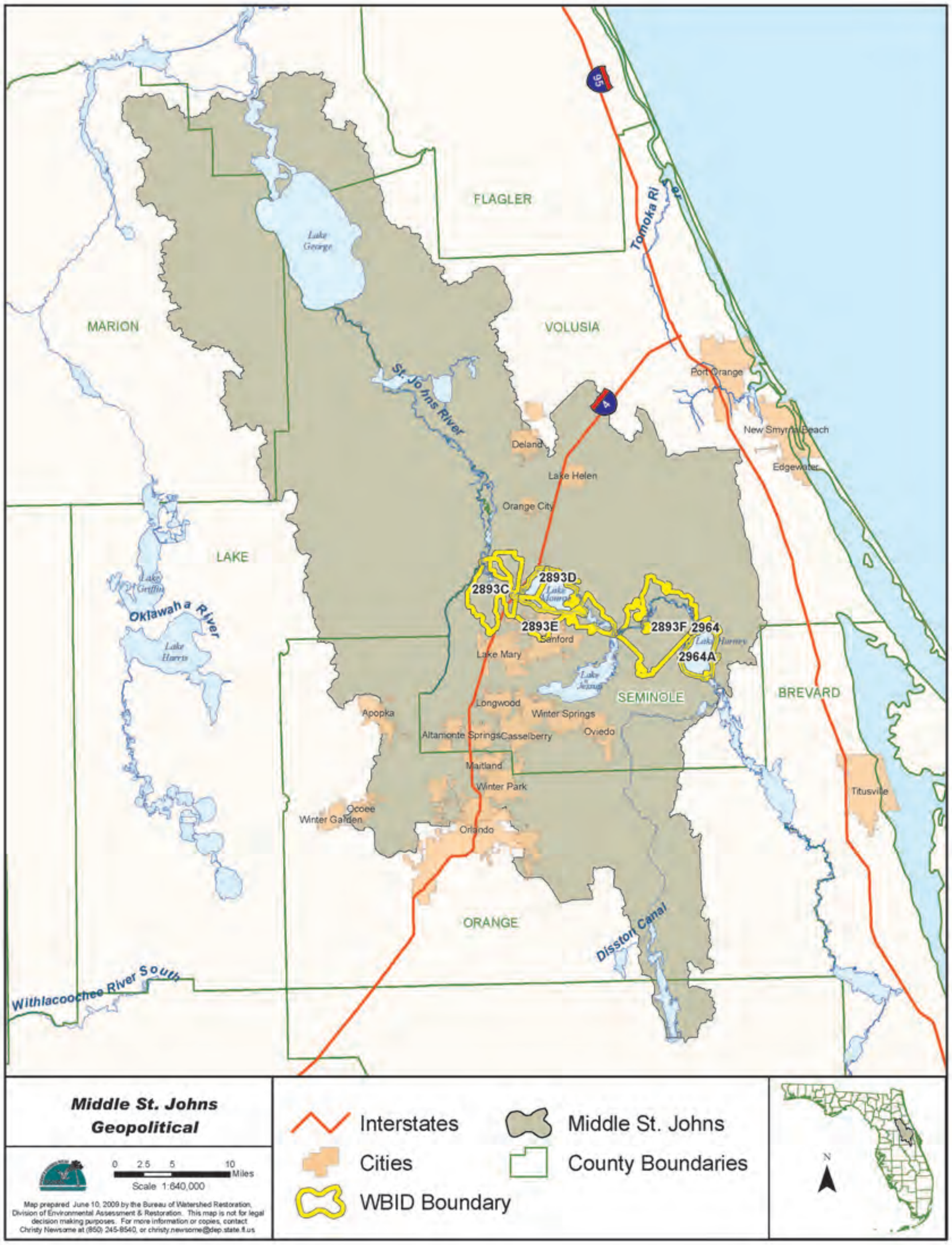
1.3 Background

This report was developed as part of the Department’s watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state’s 52 river basins over a 5-year cycle, provides a framework for implementing the TMDL Program–related requirements of the 1972 federal Clean Water Act and the Florida Watershed Restoration Act (FWRA).

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards, and provide important water quality restoration goals that will guide restoration activities.

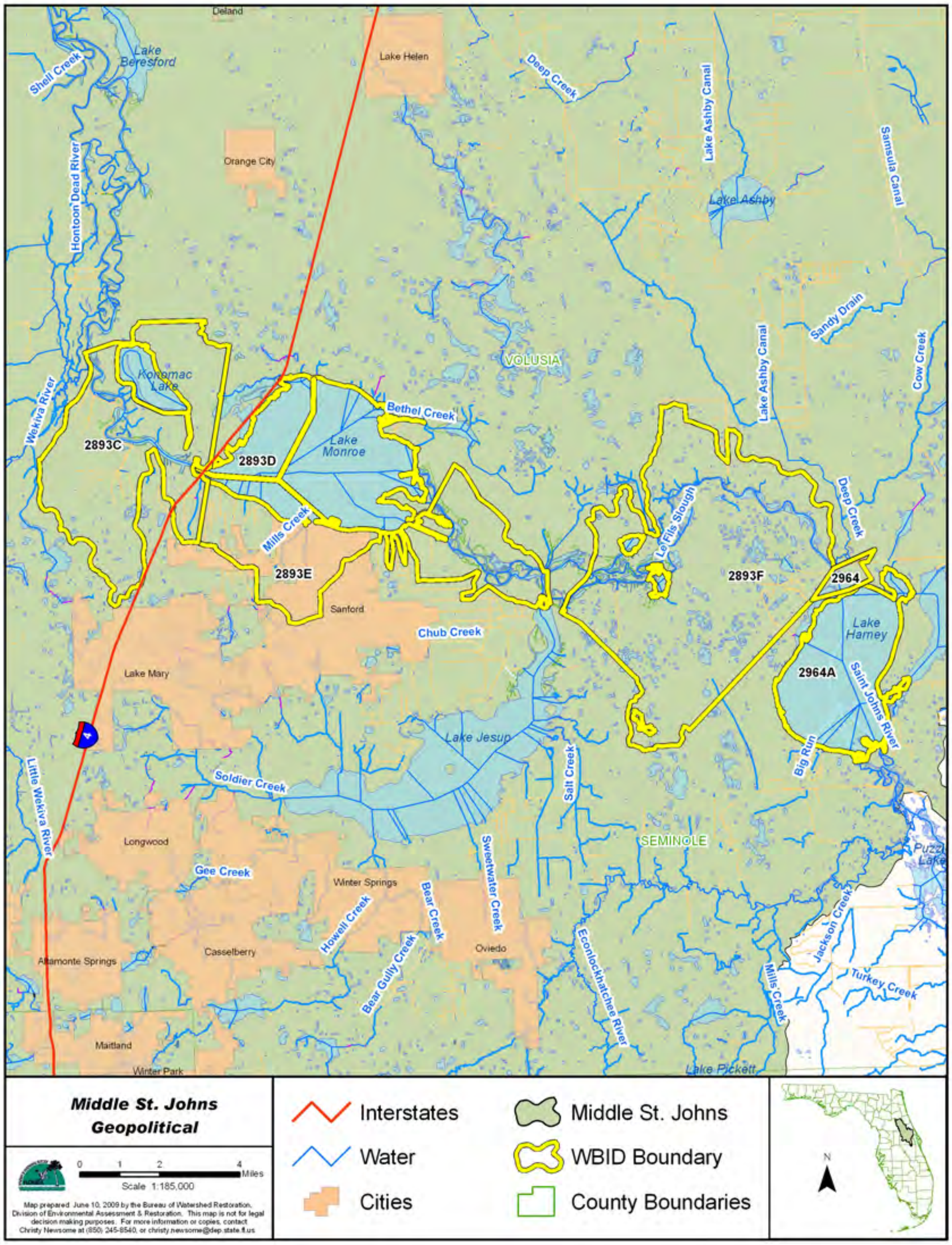
This TMDL report will be followed by the development and implementation of a restoration plan to reduce the amount of nutrients that caused the verified impairment in the Middle St. Johns River. These activities will depend heavily on the active participation of the SJRWMD, local governments, business and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Figure 1.1. General Location of the Impaired Middle St. Johns River Segments in the Middle St. Johns Basin and Major Hydrologic and Geopolitical Features in the Area



Map prepared June 10, 2009 by the Bureau of Watershed Restoration, Division of Environmental Assessment & Restoration. This map is not for legal decision making purposes. For more information or copies, contact Christy Newsome at (850) 245-8540, or christy.newsome@dep.state.fl.us

Figure 1.2. Major Tributaries that Discharge into the Impaired Middle St. Johns River Segments



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Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) a list of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant source in each of these impaired waters on a schedule. The Department has developed these lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin is also required by the Florida Watershed Restoration Act (FWRA) (Subsection 403.067[4], Florida Statutes [F.S.]), and the list is amended annually to include updates for each basin statewide.

Florida's 1998 303(d) list included 22 waterbodies in the Middle St. Johns Basin. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was amended in 2006 and 2007. The list of waters for which impairments have been verified using the methodology in the IWR is referred to as the Verified List.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Middle St. Johns Basin and verified the nutrient and/or DO impairments for the main stem segments of the Middle St. Johns River (**Table 2.1**).

Table 2.1. Verified Impaired Waterbody Segments in the Middle St. Johns River

WBID	Waterbody Segment	Parameters of Concern
2964A	Lake Harney	DO and Nutrients
2964	St. Johns River Downstream of Lake Harney	DO
2893F	St. Johns River above Lake Jesup	DO
2893E	St. Johns River above Lake Monroe	DO and Nutrients
2893D	Lake Monroe	DO and Nutrients
2893C	St. Johns River above Wekiva River	DO and Nutrients

2.2.1 Nutrients

The following four waterbodies—Lake Harney (WBID 2964A), St. Johns River above Lake Monroe (WBID 2893E), Lake Monroe (WBID 2893D), and St. Johns River above Wekiva River (WBID 2893C)—were verified impaired for nutrients (**Table 2.2** lists the data used for verifying the nutrient impairments):

- ***St. Johns River above Lake Monroe (WBID 2893E).*** *This segment was listed for nutrient impairment because, during the verified period (January 1, 2001, through June 30, 2008) of the Cycle 2 assessment conducted by the Department from 2008 to 2009, the annual average chla concentration in 2001, 2002, and 2007 exceeded the threshold of 20 micrograms per liter (μg/L) defined in the IWR for river nutrient assessment (**Table 2.1**). The Department also verified nutrient impairment for the WBID during the the Cycle 1 assessment conducted from 2003 to 2004. Phytoplankton communities in this segment were considered co-limited by both nitrogen and phosphorus, based on a median total nitrogen/total phosphorus (TN/TP) ratio of 17 during the Cycle 2 verified period.*

- ***St. Johns River above Wekiva River (WBID 2893C).*** *For this segment, the chla data for the Cycle 2 verified period were only sufficient to calculate the annual average concentration for 2007, and it did not exceed the 20 μg/L threshold. However, the WBID was verified impaired for nutrients in Cycle 1, and the Cycle 2 assessment did not show sufficient evidence that the earlier determination of impairment should be reversed. Therefore, the WBID was considered still impaired for nutrients even though the single annual average chla concentration during the Cycle 1 verified period did not exceed the assessment threshold. Phytoplankton communities were considered co-limited by nitrogen and phosphorus based on a median TN/TP ratio of 18 during the Cycle 2 verified period.*

- ***Lake Monroe.*** *The major index used by the Department for lake nutrient assessment is the Trophic State Index (TSI), which has a 0 to 100 scale and is calculated based on chla, TN, and TP concentrations. The IWR requires that if the mean color of a given lake is lower than or equal to 40 platinum cobalt units (PCUs), an annual average TSI of 40 should be used as the assessment threshold. If the mean color is higher than 40 PCUs, the annual average TSI of 60 should be used as the assessment threshold. The annual mean color of Lake Monroe is typically higher than 100 PCUs. A TSI target of 60 was therefore used for the nutrient assessment for the lake. During the verified period from 2001 through 2007, the annual average TSIs for the lake only exceeded the annual average TSI threshold of 60 in 2001. In none of the subsequent years did the annual average TSI value exceed this threshold.*

  Normally, the Department would not list the lake for nutrient impairment based on these data. However, as discussed in **Section 2.2.2***, Lake Monroe was verified impaired for low DO, and biochemical oxygen demand (BOD) exceeded the assessment threshold and was therefore considered the causative pollutant for the observed low DO. More detailed data analyses showed a statistically significant positive correlation between BOD and chla concentrations, suggesting that some portions of the BOD might come from elevated phytoplankton biomass in the lake,* *produced due to the excessive nutrient input into the lake. Therefore, Lake Monroe was verified by the Department as impaired for nutrients, which could be at least partially responsible for the observed low DO in the lake. The lake communities were considered co-limited by nitrogen and phosphorus based on a median TN/TP ratio of 18 during the Cycle verified period.*

- ***Lake Harney.*** *Like Lake Monroe, because the mean color level of the lake is higher than 40 PCUs, a TSI of 60 was used as the assessment threshold for Lake Harney. During the Cycle 2 assessment, the lake's annual average TSI exceeded the TSI threshold of 60 only in 2001. The annual average TSIs for the remaining years of the verified period were all lower than the assessment threshold. Normally, the lake would not be verified for nutrient impairment. However, the IWR allows the use of information other than TSI and chla concentration that indicate degraded nutrient condition to list a water for nutrient impairment.*

  For Lake Harney, because of the low DO observed in the lake, and because a statistically significant inverse correlation between monthly average DO and monthly average TP was identified for the lake, nutrients were suspected to be at least partially responsible for the low DO observed in the lake. In addition, a paleolimnological study conducted by Anderson et al. (2006) indicated a trend of elevated nutrient accumulation rate for the lake, and both the historical biogenic silicon indicator and diatom species taxonomic composition suggested that the nutrient condition of the lake has degraded compared with the low-impact condition of the early 20th century. Based on these considerations, Lake Harney was listed for nutrient impairment, even though the TSI of the lake did not exceed the assessment threshold in the more recent years of the verified period.

Table 2.2. Summary of Annual Average Chl*a* Concentrations for St. Johns River above Lake Monroe (WBID 2893E) and St. Johns River above Wekiva River (WBID 2893C), 1996–2007

[1] 1996 to 2003 was the verified period for the Cycle 1 assessment; 2001 to 2008 was the verified period for the Cycle 2 assessment.
NA = Not enough data were available to calculate the annual average chl*a* concentration.

Year[1]	**St. Johns River above Lake Monroe (WBID 2893E)**	**St. Johns River above Wekiva River (WBID 2893C)**
1996	12.9	19.8
1997	14.6	17.2
1998	9.0	15.8
1999	NA[2]	30.4
2000	NA[2]	29.3
2001	40.6	NA[2]
2002	67.8	NA[2]
2003	8.1	NA[2]
2004	7.8	NA[2]
2005	10.2	NA[2]
2006	15.6	NA[2]
2007	28.1	17.6

2.2.2 Dissolved Oxygen

Lake Harney (WBID 2964A), St. Johns River Downstream of Lake Harney (WBID 2964), St. Johns River above Lake Jesup (WBID 2893F), St. Johns River above Lake Monroe (WBID 2893E), Lake Monroe (WBID 2893D), and St. Johns River above Wekiva River (WBID 2893C) were also verified impaired for low DO, based on the observations that DO concentrations in more than 10 percent of the samples collected during the verified period (January 1, 2001, through June 30, 2007) from these segments were lower than the state criterion of 5.0 milligrams per liter (mg/L), with a 90 percent confidence level. BOD and/or nutrients were identified as the causative pollutants for the low DO observed in these segments.

Tables 2.3a through **2.3f** list the data used for verifying the DO impairment, and **Table 2.4** lists the thresholds of TN, TP, and BOD concentrations in lakes, streams, and estuaries above which these pollutants are considered causative pollutants for the observed low DO concentrations.

Table 2.3a. Summary of DO Monitoring Data in the Verified Period for Lake Harney (WBID 2964A)

Parameter	**Summary of Observations**
Total number of samples	192
IWR-required number of exceedances for the Verified List	26
Number of observed exceedances	29
Number of observed nonexceedances	163
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	11.6
Lowest DO observation (mg/L)	0.6
Median DO observation (mg/L)	6.9
Mean DO observation (mg/L)	6.7
Median value for 49 BOD observations (mg/L)	2.0
Median value for 223 TN observations (mg/L)	1.42
Median value for 225 TP observations (mg/L)	0.07
Possible causative pollutant by IWR	Link to nutrients based on statistical analyses and paleolimnological studies
FINAL ASSESSMENT:	**Impaired**

Table 2.3b. Summary of DO Monitoring Data in the Verified Period for St. Johns River Downstream of Lake Harney (WBID 2974)

Parameter	Summary of Observations
Total number of samples	52
IWR-required number of exceedances for the Verified List	9
Number of observed exceedances	15
Number of observed nonexceedances	37
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	9.5
Lowest DO observation (mg/L)	1.6
Median DO observation (mg/L)	6.9
Mean DO observation (mg/L)	6.4
Median value for 16 BOD observations (mg/L)	1.9
Median value for 59 TN observations (mg/L)	1.79
Median value for 62 TP observations (mg/L)	0.09
Possible causative pollutant by IWR	Nitrogen
FINAL ASSESSMENT:	**Impaired**

Table 2.3c. Summary of DO Monitoring Data in the Verified Period for St. Johns River above Lake Jesup (WBID 2893F)

Parameter	Summary of Observations
Total number of samples	155
IWR-required number of exceedances for the Verified List	21
Number of observed exceedances	30
Number of observed nonexceedances	125
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	10.8
Lowest DO observation (mg/L)	0.9
Median DO observation (mg/L)	6.5
Mean DO observation (mg/L)	6.4
Median value for 9 BOD observations (mg/L)	2.2
Median value for 177 TN observations (mg/L)	1.35
Median value for 182 TP observations (mg/L)	0.07
Possible causative pollutant by IWR	BOD
FINAL ASSESSMENT:	**Impaired**

Table 2.3d. Summary of DO Monitoring Data in the Verified Period for St. Johns River above Lake Monroe (WBID 2893E)

Parameter	Summary of Observations
Total number of samples	126
IWR-required number of exceedances for the Verified List	18
Number of observed exceedances	29
Number of observed nonexceedances	97
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	11.1
Lowest DO observation (mg/L)	0.4
Median DO observation (mg/L)	6.4
Mean DO observation (mg/L)	6.1
Median value for 13 BOD observations (mg/L)	3.0
Median value for 143 TN observations (mg/L)	1.52
Median value for 144 TP observations (mg/L)	0.10
Possible causative pollutant by IWR	BOD
FINAL ASSESSMENT:	**Impaired**

Table 2.3e. Summary of DO Monitoring Data in the Verified Period for Lake Monroe (WBID 2893D)

Parameter	Summary of Observations
Total number of samples	201
IWR-required number of exceedances for the Verified List	27
Number of observed exceedances	32
Number of observed nonexceedances	169
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	11.7
Lowest DO observation (mg/L)	1.8
Median DO observation (mg/L)	7.2
Mean DO observation (mg/L)	7.0
Median value for 15 BOD observations (mg/L)	2.7
Median value for 217 TN observations (mg/L)	1.56
Median value for 221 TP observations (mg/L)	0.09
Possible causative pollutant by IWR	BOD (related to phosphorus)
FINAL ASSESSMENT:	**Impaired**

Table 2.3f. Summary of DO Monitoring Data in the Verified Period for St. Johns River above Wekiva River (WBID 2893C)

Parameter	Summary of Observations
Total number of samples	119
IWR-required number of exceedances for the Verified List	17
Number of observed exceedances	26
Number of observed nonexceedances	93
Number of seasons during which samples were collected	4
Highest DO observation (mg/L)	13.8
Lowest DO observation (mg/L)	1.6
Median DO observation (mg/L)	7.04
Mean DO observation (mg/L)	7.01
Median value for 12 BOD observations (mg/L)	2.8
Median value for 101 TN observations (mg/L)	1.60
Median value for 119 TP observations (mg/L)	0.09
Possible causative pollutant by IWR	BOD
FINAL ASSESSMENT:	**Impaired**

Table 2.4. Threshold Values for Identifying Causative Pollutants by Waterbody Type

Waterbody Type	BOD	TN	TP
Lake	2.9	1.7	0.11
Estuary	2.1	1.0	0.19
Stream	2.0	1.6	0.22

2.3 Seasonal and Spatial Variation of Nutrients and DO in the Impaired Waterbodies

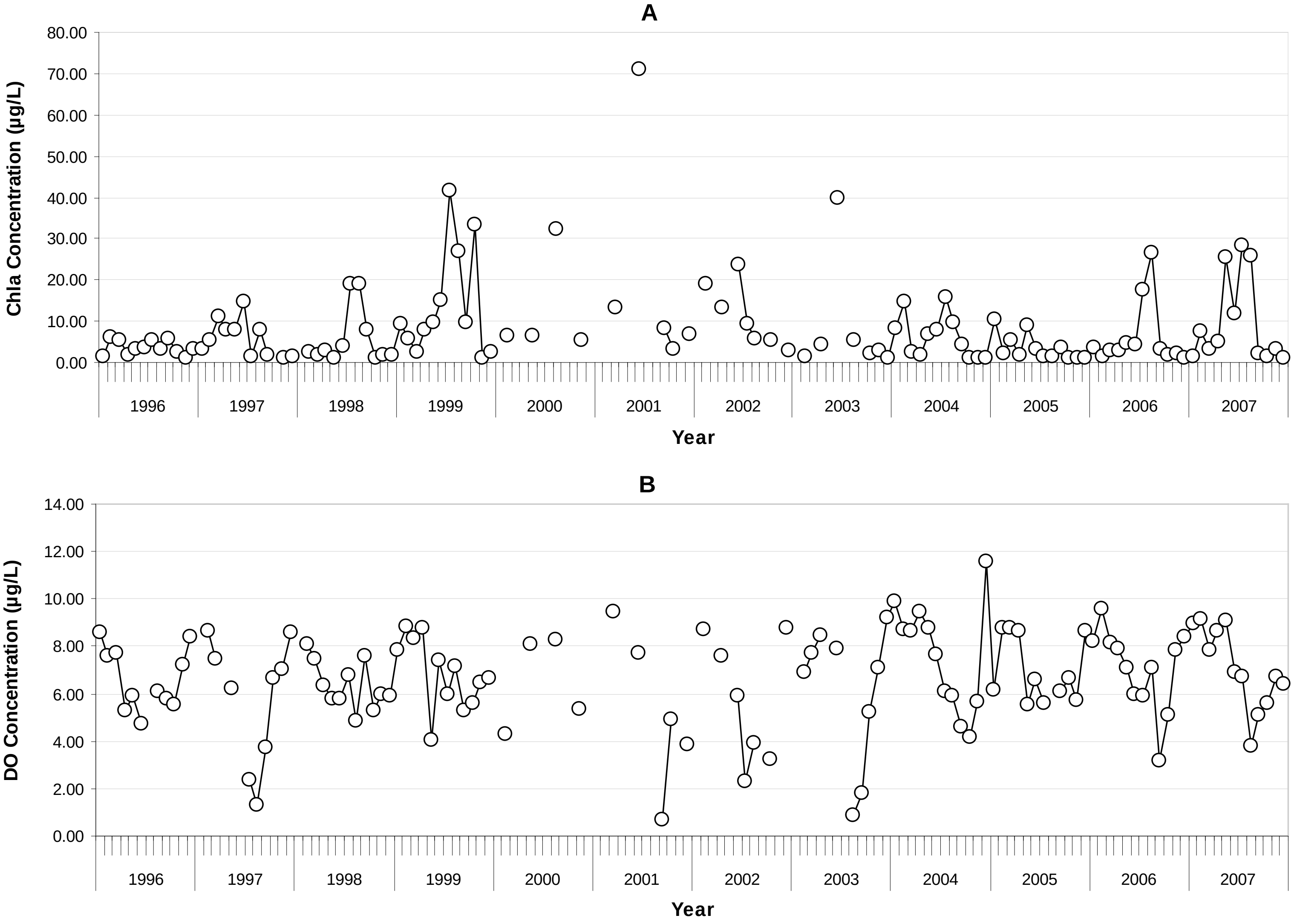
The long-term seasonal variation of chl*a* (all chl*a* data used in this report were corrected for pheophytin), TN, TP, and DO concentrations were analyzed for the period of record (1996–2007), based on water quality data retrieved from IWR Database Run_35. **Figures 2.1A** to **2.1D**, **2.2A** to **2.2D**, **2.3A** to **2.3D, 2.4A** to **2.4D, 2.5A** to **2.5D,** and **2.6A** to **2.6D** show the long-term seasonal trends of these parameters in the six impaired Middle St. Johns River segments addressed in this report.

Overall, peak chl*a* concentrations were observed in the middle of the year, mostly from May to September. DO concentrations lower than 5.0 mg/L were typically observed from July to October. While some low DO concentrations were observed during months with high temperatures (July to September), DO concentrations lower than 5.0 mg/L observed after September could be influenced by the high color of the water, mostly observed between July to the end of the year (discussed in more detail in Chapter 3). This suggests that humic materials from natural sources might also play an important role in causing the observed low DO concentrations.

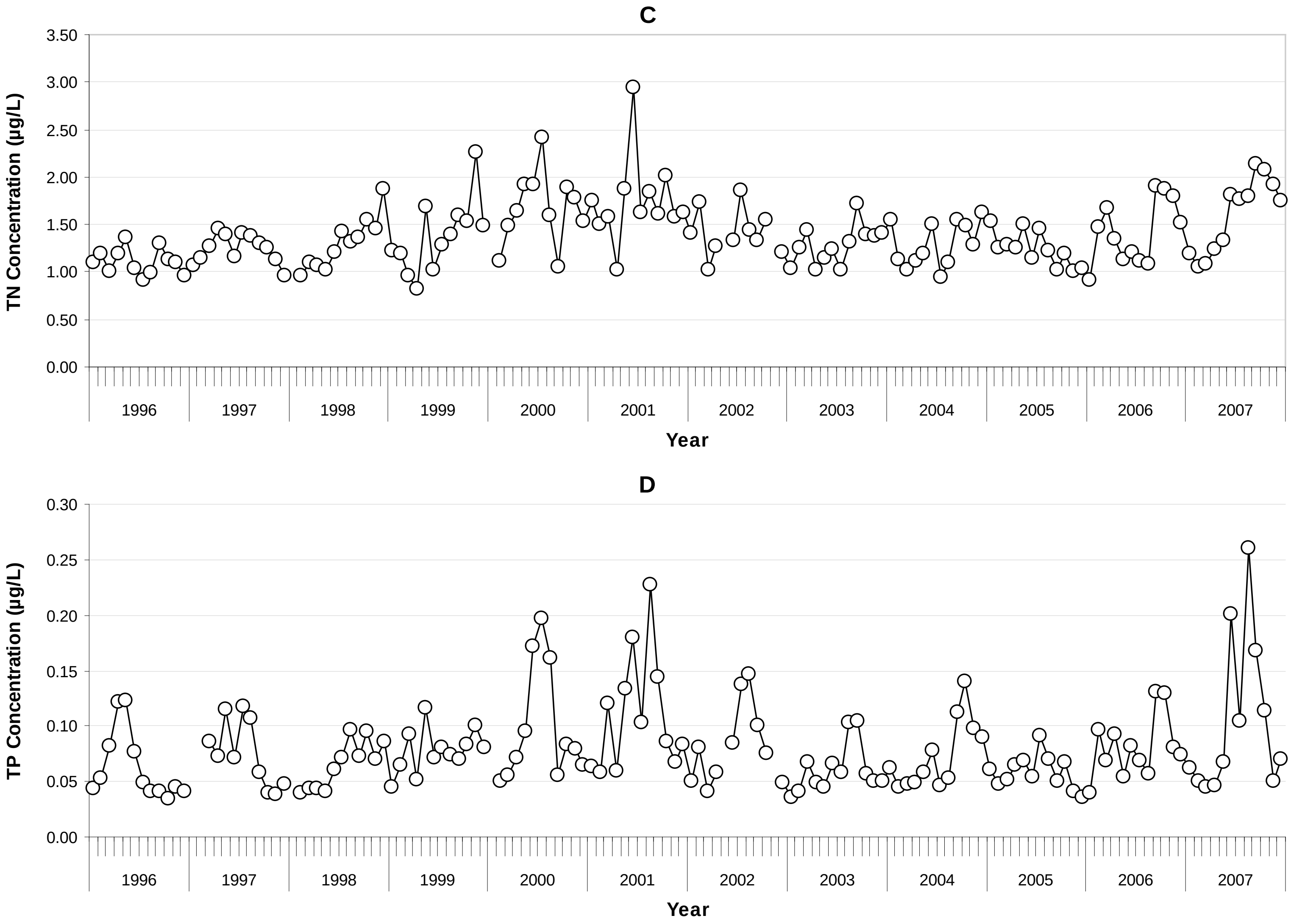
There was no obvious seasonal trend in TN concentrations. A general pattern was observed for TP, which was low at the beginning of each year, rose to the peak value in the middle of the year, and gradually decreased toward the end of the year.

For all the river segments, during the 12-year period included in this analysis, the majority of monthly average chl*a* concentrations were lower than 20 μg/L (the chl*a* threshold used by the Department to assess nutrient impairment in streams and rivers). Values higher than 20 μg/L were mostly observed from May to September. Overall monthly average chl*a* concentrations were higher in 1999, 2000, and 2001 than in other years, likely caused by the concentration effect of 3 consecutive years of drought. Other than these variations, the overall chl*a* concentrations in these segments appeared relatively stable during the 12-year period.

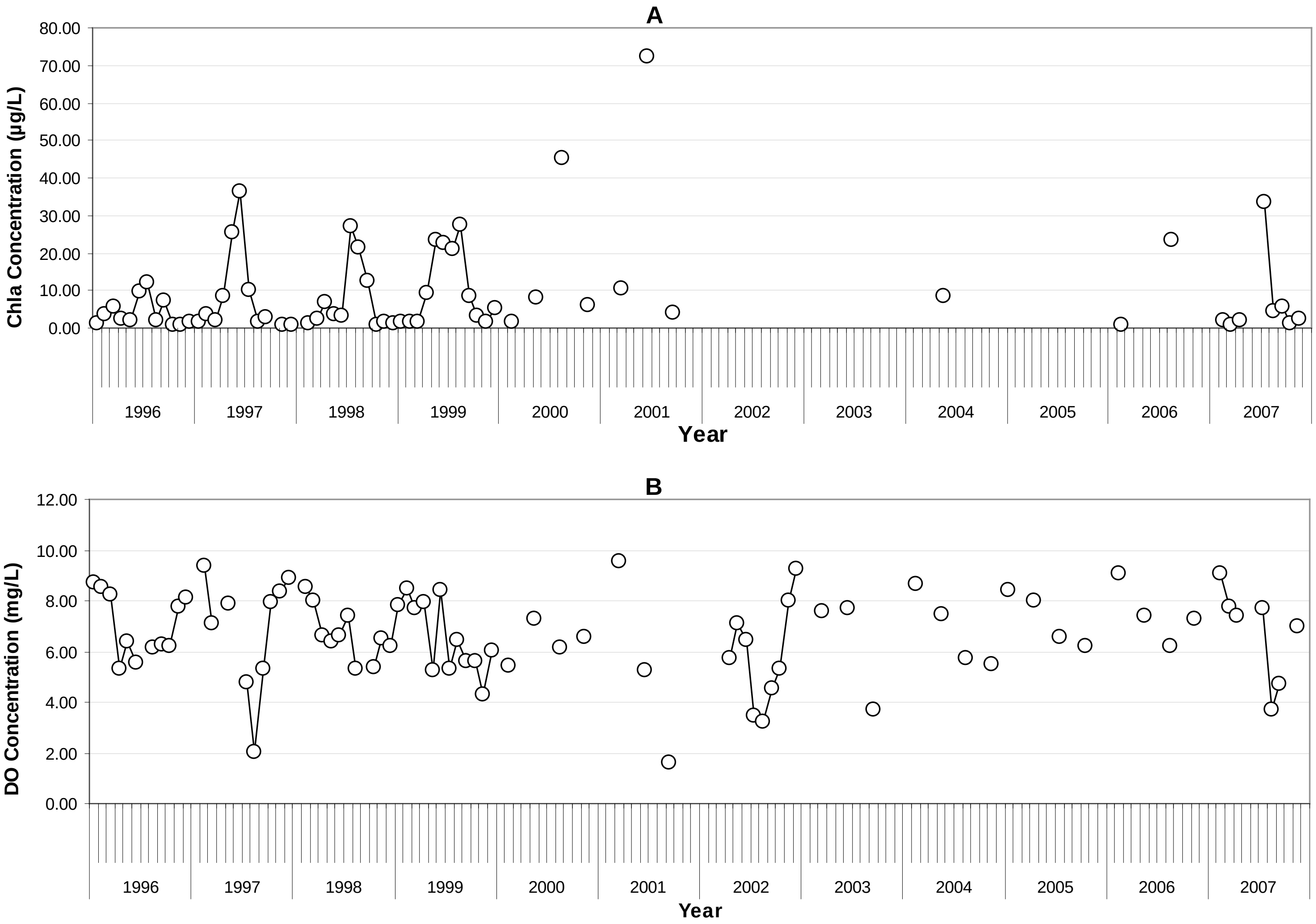
Figures 2.1A, B. Chla and DO Concentrations of Lake Harney (WBID 2964A)



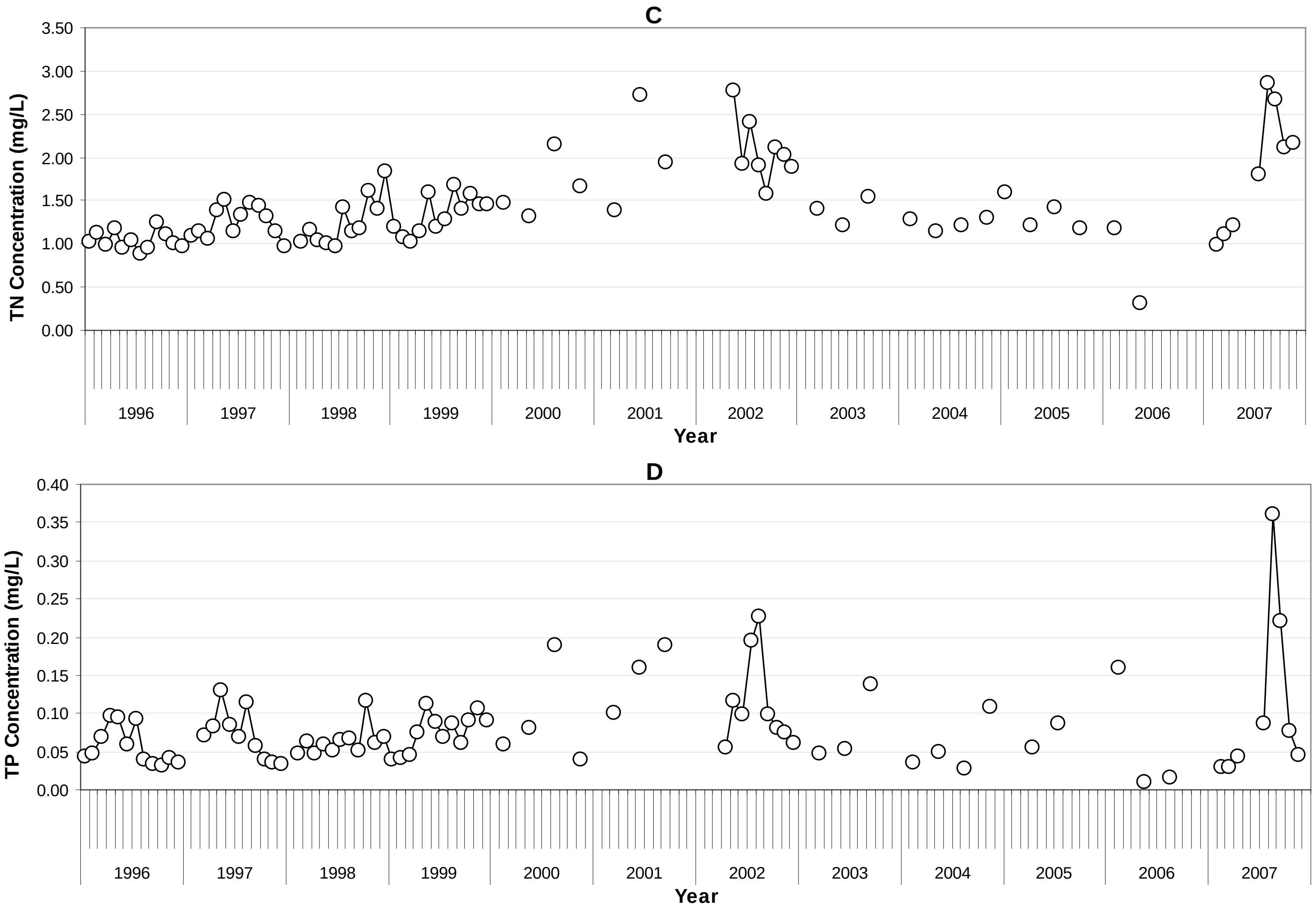
Figures 2.1C, D. TN and TP Concentrations of Lake Harney (WBID 2964A)



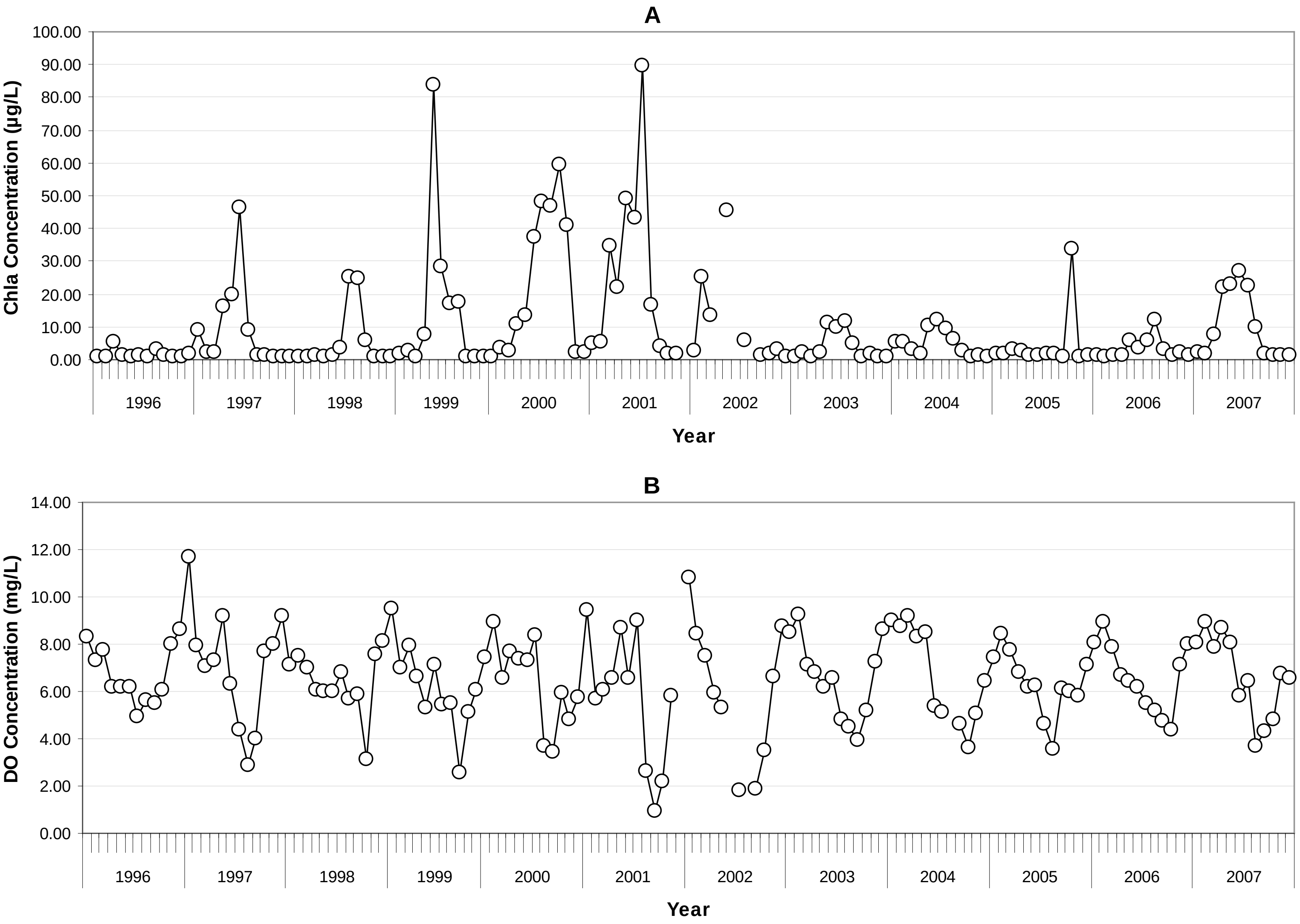
Figures 2.2A, B. Chl*a* and DO Concentrations of St. Johns River Downstream of Lake Harney (WBID 2964)



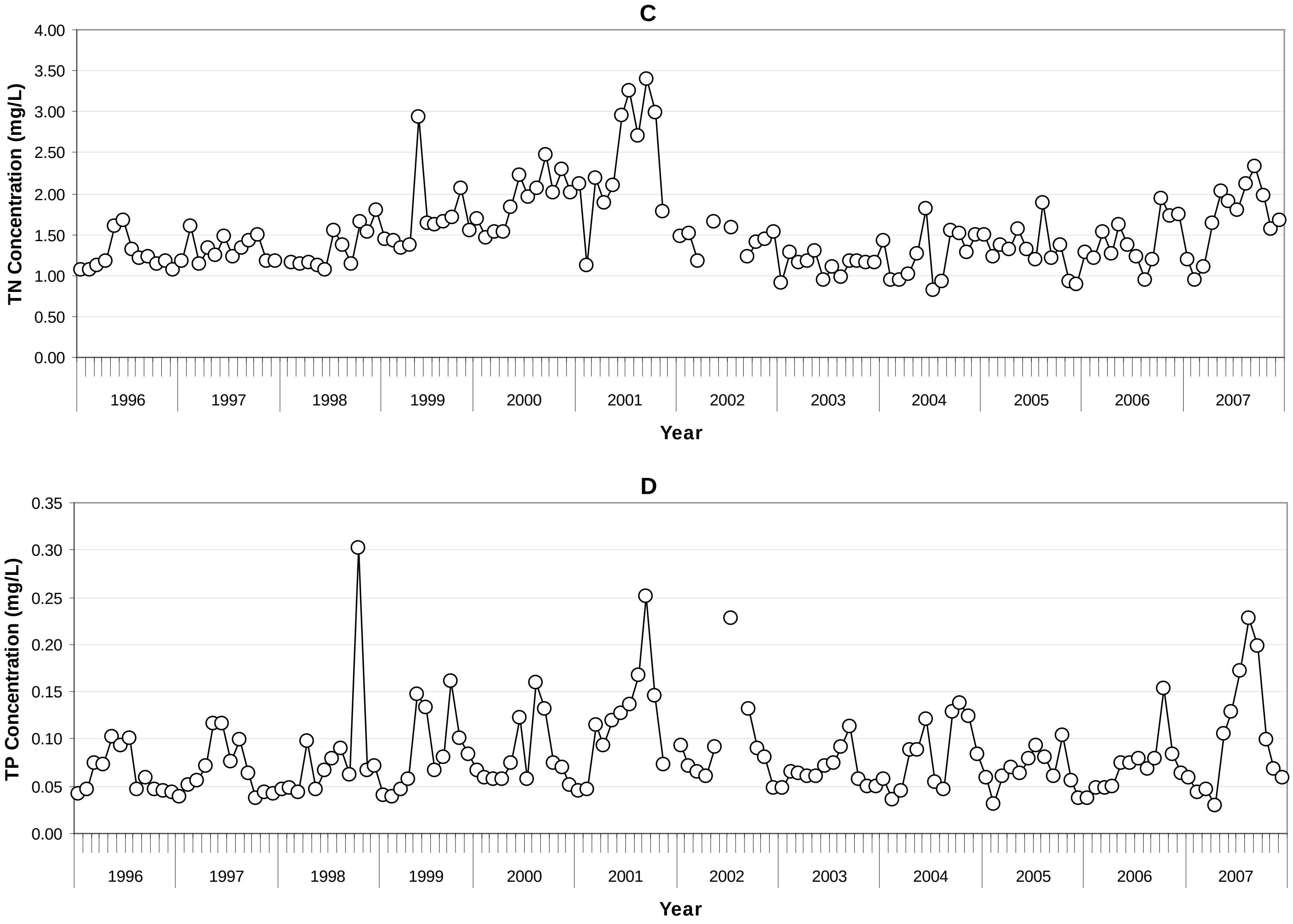
Figures 2.2C, D. TN and TP Concentrations of St. Johns River Downstream of Lake Harney (WBID 2964)



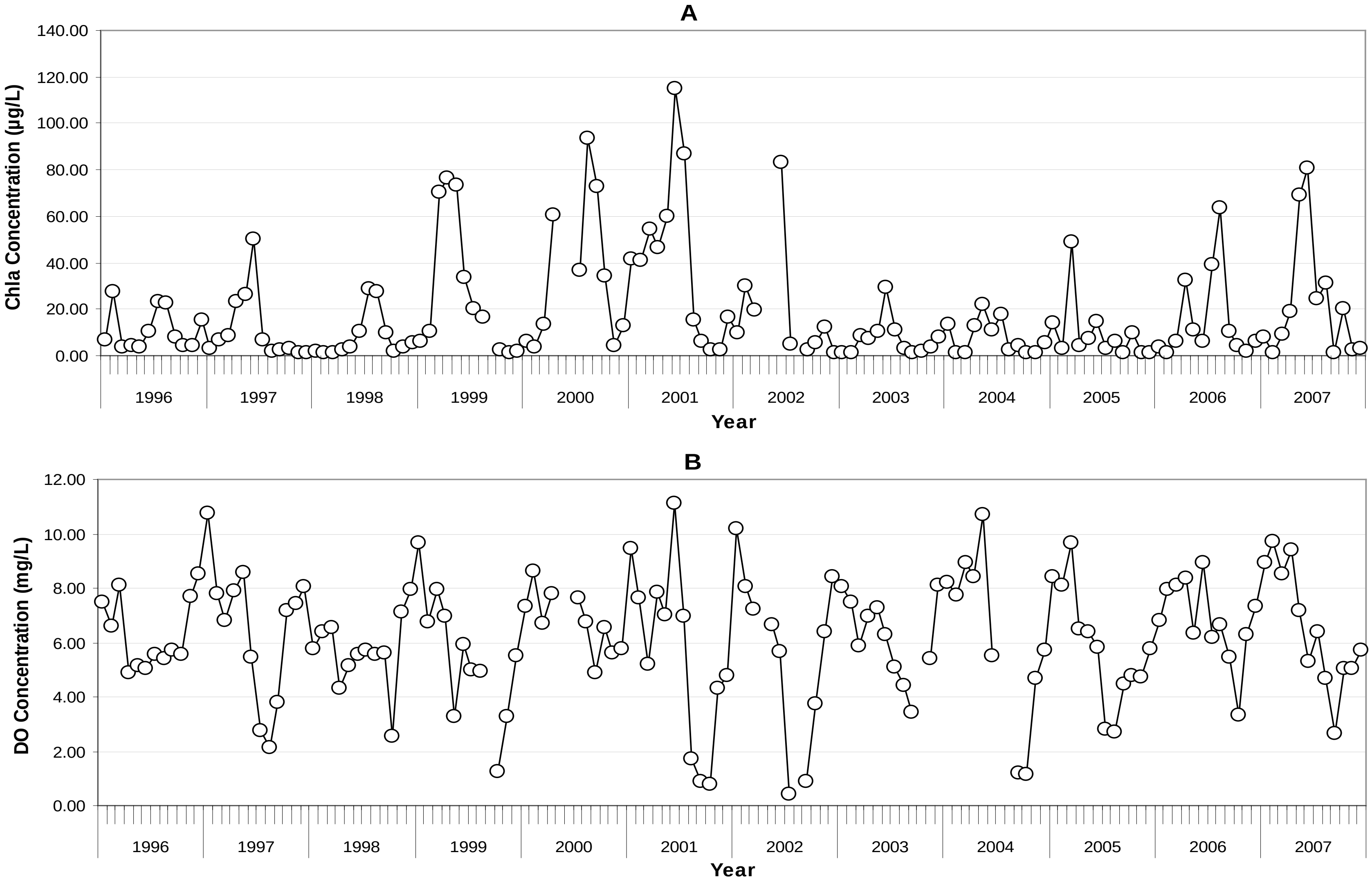
Figures 2.3C, D. Chla and DO Concentrations of St. Johns River above Lake Jesup (WBID 2893F)



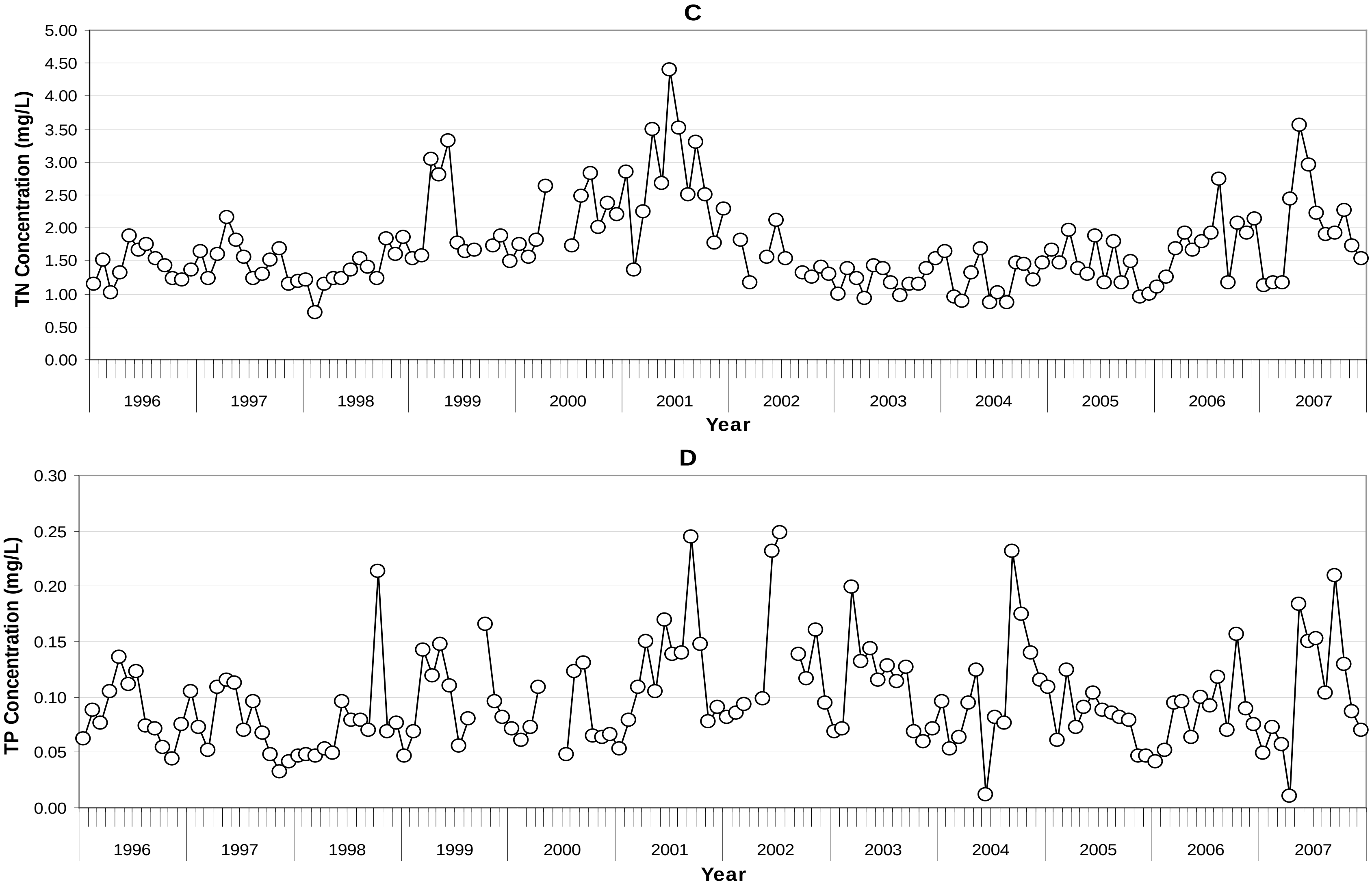
Figures 2.3C, D. TN and TP Concentrations of St. Johns River above Lake Jesup (WBID 2893F)



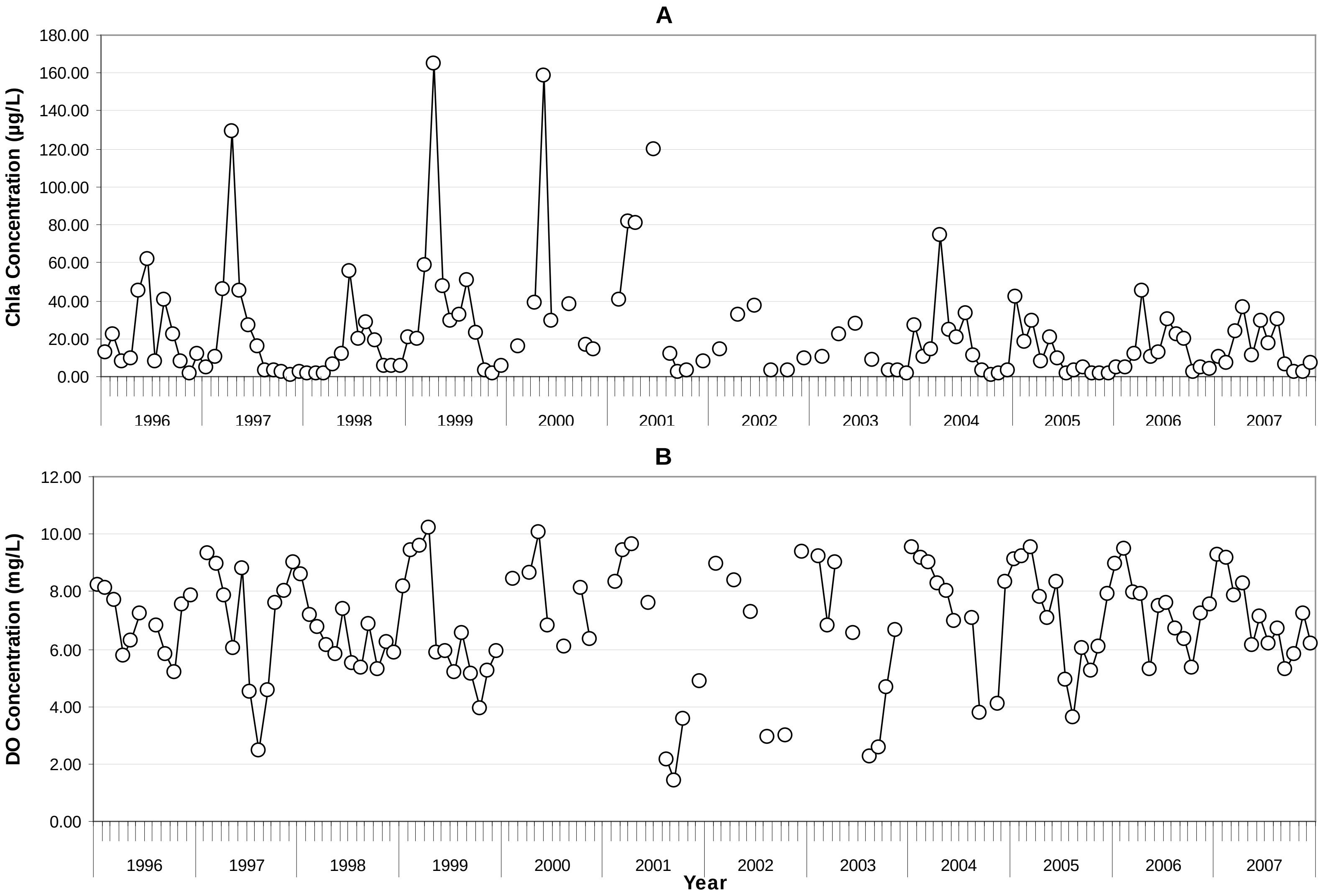
Figures 2.4C, D. Chla and DO Concentrations of St. Johns River above Lake Monroe (WBID 2893E)



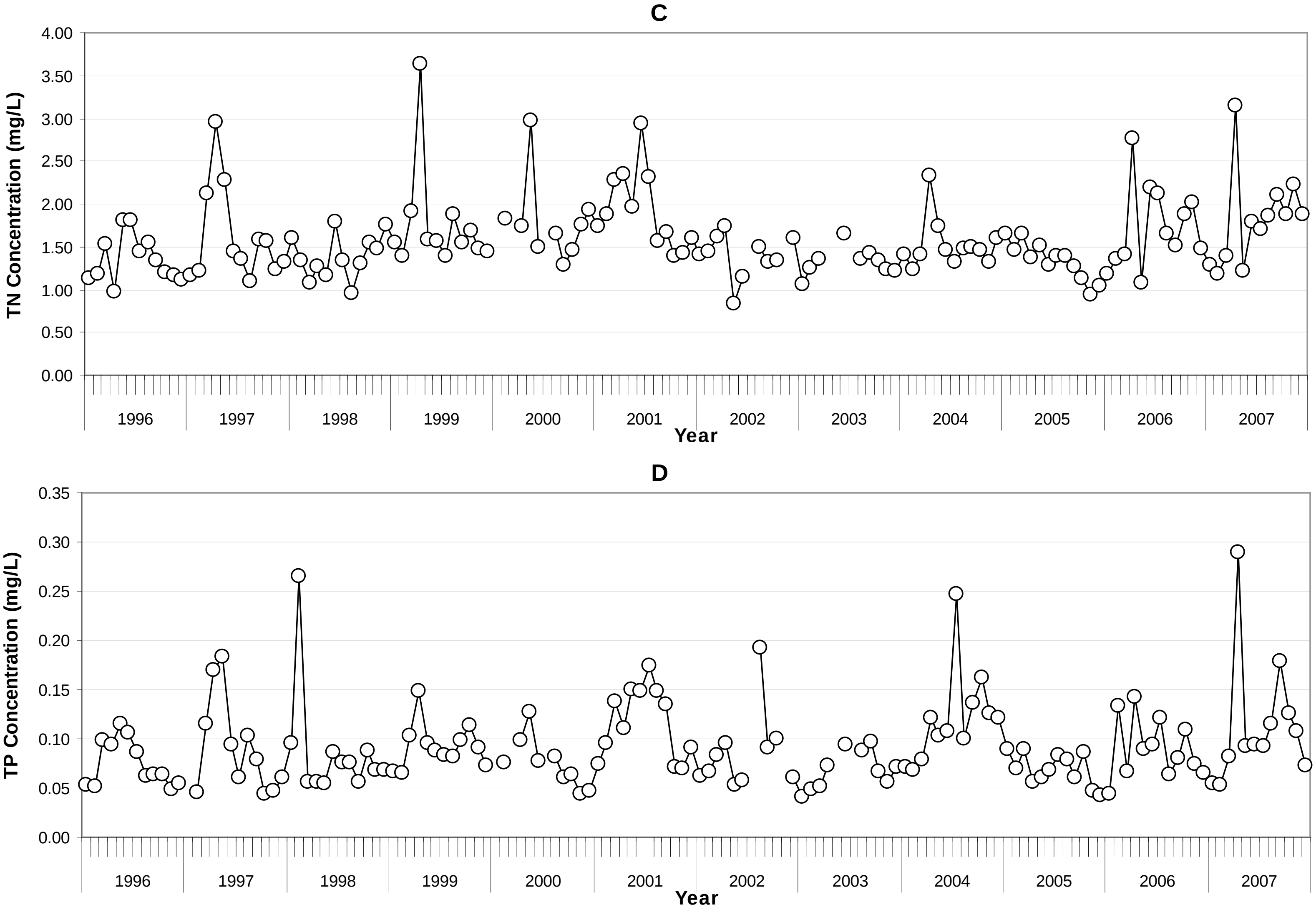
Figures 2.4C, D. TN and TP Concentrations of St. Johns River above Lake Monroe (WBID 2893E)



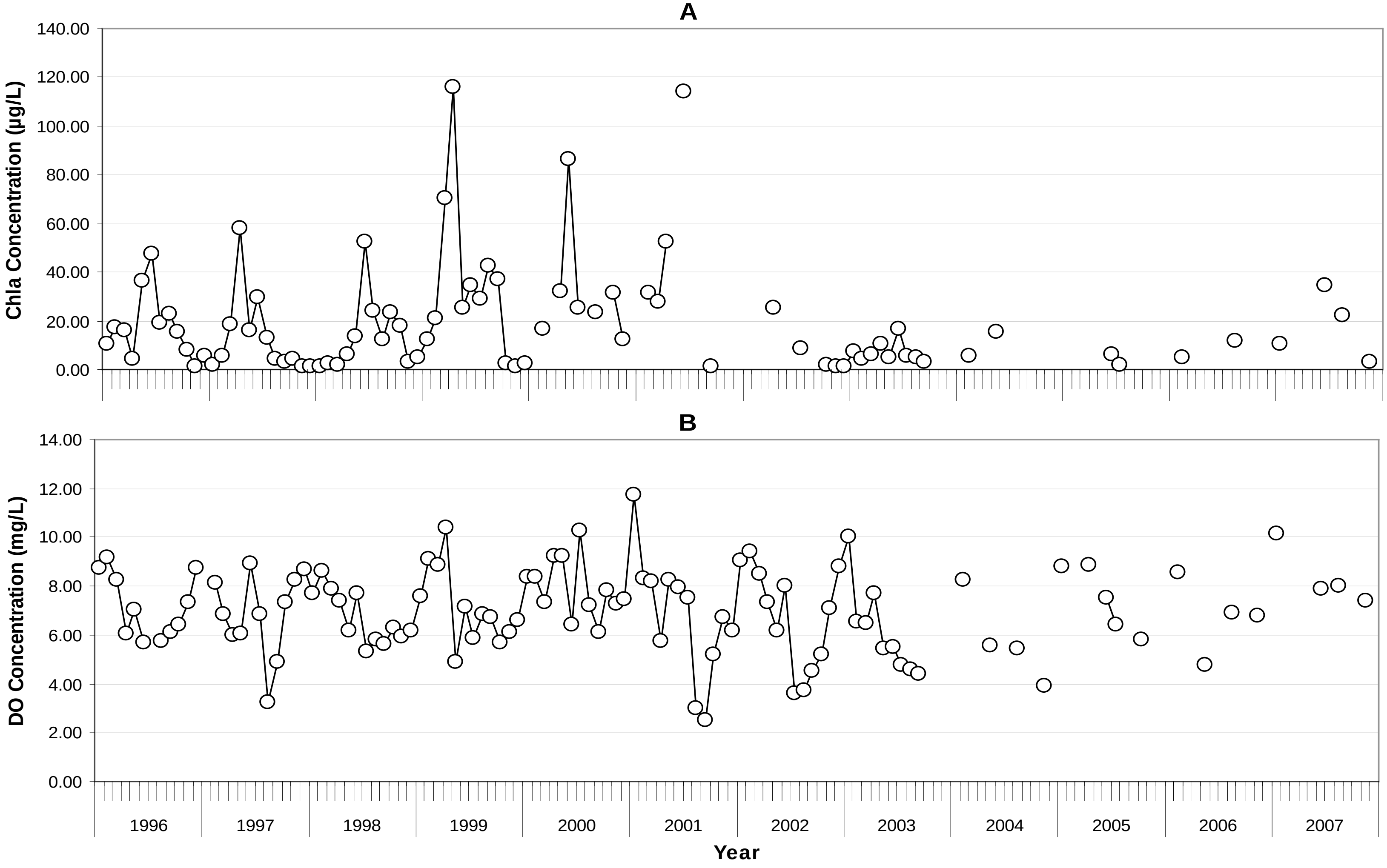
Figures 2.5A, B. Chl*a* and DO Concentrations of Lake Monroe (WBID 2893D)



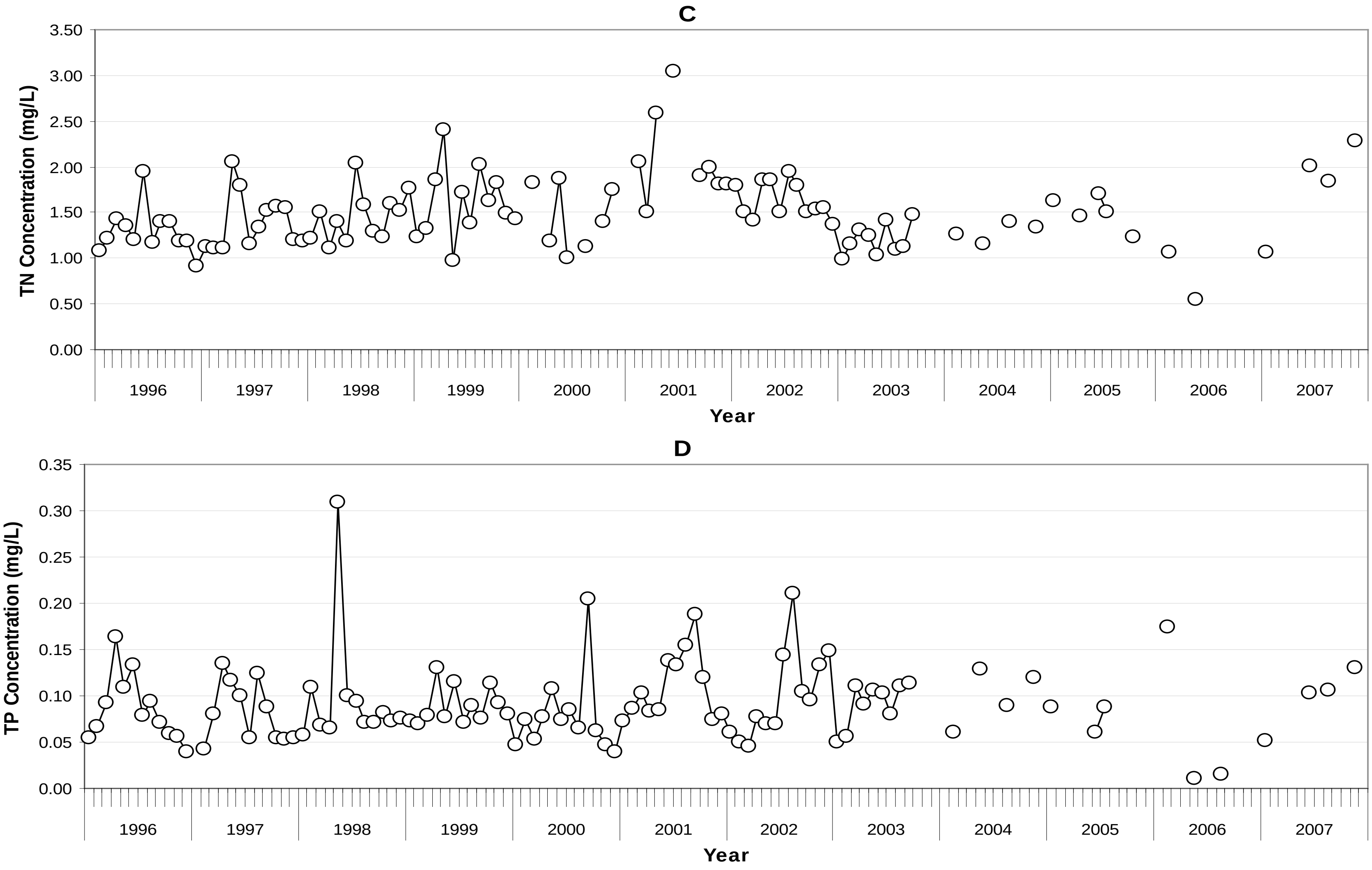
Figures 2.5C, D. TN and TP Concentrations of Lake Monroe (WBID 2893D)



Figures 2.6A, B. Chl*a* and DO Concentrations of St. Johns River above Wekiva River (WBID 2893C)



Figures 2.6C, D. TN and TP Concentrations of St. Johns River above Wekiva River (WBID 2893C)



A spatial trend in chl*a* was observed along these river segments (**Table 2.5a; Figure 2.7a**). For the three segments upstream of Lake Jesup (WBIDs 2964A, 2964, and 2893F), the 75th percentiles of the monthly average chl*a* concentrations were about 9.2, 10.0, and 10.0 μg/L, respectively, while median monthly average chl*a* concentrations were 4.2, 3.4 and 2.3 μg/L, respectively. However, the segments downstream of the Lake Jesup outlet (WBIDs 2893E, 2893D, and 2893C) had significantly higher chl*a* concentrations than the 3 upstream WBIDs. The 75th percentile monthly average chl*a* concentrations for WBIDs 2893E, 2893D, and 2893C were 22.9, 29.0, and 25.2 μg/L, respectively, and the median monthly average chl*a* concentrations were 7.5, 11.8, and 12.2 μg/L, respectively. These spatial trends suggest a significant influence by Lake Jesup on the chl*a* concentration of the main stem river segments.

In contrast to the monthly average chl*a* concentration, no obvious upstream-downstream spatial trend was observed for DO concentrations (**Table 2.5b**; **Figure 2.7b**). The 25th, 50th, and 75th percentiles of monthly average DO concentrations were 5.5, 6.8, and 8.3 mg/L, respectively, for WBID 2964A (upstream of Lake Jesup outlet); 5.5, 6.6, and 8.0 mg/L, respectively, for WBID 2964 (upstream of the Lake Jesup outlet); and 5.4, 6.6, and 7.9 mg/L, respectively, for WBID 2893F (upstream of the Lake Jesup outlet).

For river segments downstream of the Lake Jesup outlet, the 25th, 50th, and 75th percentiles of monthly average DO concentrations were 5.0, 6.4, and 7.8 mg/L, respectively, for WBID 2893E; 5.8, 7.1, and 8.3 mg/L, respectively, for WBID 2893D; and 5.8, 7.0, and 8.3 mg/L, respectively, for WBID 2893C. The fact that chl*a* concentrations differed significantly between river segments upstream and downstream of the Lake Jesup outlet, but that the distribution of DO concentrations did not show a significant difference, suggests that even if the nutrient condition in these segments influences DO concentrations at all, the influence may be relatively minor.

The upstream and downstream trends of TN and TP were not significant (**Tables 2.5c** and **2.5d; Figures 2.7c** and **2.7c**). For TN, the 25th, 50th, and 75th percentiles of monthly average concentrations for the 3 segments upstream of the Lake Jesup outlet were 1.12, 1.33, and 1.58 mg/L, respectively, for WBID 2964A; 1.11, 1.29, and 1.59 mg/L for WBID 2964, respectively; and 1.17, 1.42, and 1.68 mg/L, respectively, for WBID 2893F. For segments downstream of the Lake Jesup outlet, the 25th, 50th, and 75th percentiles of monthly average concentrations were 1.23, 1.54, and 1.89 mg/L, respectively, for WBID 2893E; 1.32, 1.47, and 1.75 mg/L, respectively, for WBID 2893D; and 1.19, 1.43, and 1.79 mg/L, respectively, for WBID 2893C. The downstream segments showed slightly higher TN concentrations, but the difference was mostly lower than 20 percent, which was within one standard deviation of the TN concentrations measured in these segments.

The TP concentration distribution showed a similar pattern. The 25th, 50th, and 75th percentiles of monthly average concentrations for the segments upstream of the Lake Jesup outlet were 0.05, 0.07, and 0.10 mg/L, respectively, for WBID 2964A; 0.05, 0.07, and 0.10 mg/L for WBID 2964, respectively; and 0.05, 0.07, and 0.10 mg/L, respectively, for WBID 2893F. For the segments downstream of the Lake Jesup outlet, the 25th, 50th, and 75th percentiles of monthly average concentrations were 0.07, 0.09, and 0.12 mg/L, respectively, for WBID 2893E; 0.06, 0.08, and 0.10 mg/L, respectively, for WBID 2893D; and 0.07, 0.08, and 0.11 mg/L, respectively, for WBID 2893C. Again, the downstream segments showed only slightly higher TP concentrations than the upstream segments, but the difference is within one standard deviation of the TP concentrations measured in every WBID.

Table 2.5a. Statistical Distribution of Chl*a* Concentrations in the Impaired Middle St. Johns Segments

Quantiles

Percentile	Quantile	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
100.0%	Maximum	70.87	72.24	89.70	115.00	165.05	115.96
99.5%	-	70.87	72.24	89.70	115.00	165.05	115.96
97.5%	-	39.95	55.45	54.35	85.09	128.12	110.56
90.0%	-	20.03	26.31	28.50	55.06	46.46	45.07
75.0%	Quartile	9.19	10.00	10.45	22.94	29.02	25.17
50.0%	Median	4.18	3.49	2.37	7.53	11.80	12.15
25.0%	Quartile	1.93	1.60	1.20	2.88	4.21	4.51
10.0%	-	1.19	1.00	1.00	1.40	1.91	1.62
2.5%	-	1.00	1.00	1.00	1.00	1.29	1.03
0.5%	-	1.00	1.00	1.00	1.00	1.00	1.00
0.0%	Minimum	1.00	1.00	1.00	1.00	1.00	1.00

Moments

Moment	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
Mean	7.95	9.15	9.54	17.56	21.94	18.94
Standard Deviation	10.28	12.84	15.61	23.04	28.43	22.51
Standard Error Mean	0.95	1.61	1.32	1.96	2.55	2.46
Upper 95% Mean	9.83	12.36	12.16	21.44	27.00	23.82
Lower 95% Mean	6.07	6.95	6.92	13.68	16.89	14.05
Number of Samples	117	64	139	138	124	84

Table 2.5b. Statistical Distribution of DO Concentrations in the Impaired Middle St. Johns Segments

Quantiles

Percentile	Quantile	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
100.0%	Maximum	11.59	9.53	11.71	11.14	10.20	11.73
99.5%	-	11.59	9.53	11.71	11.14	10.20	11.73
97.5%	-	9.63	9.39	9.48	10.48	9.65	10.32
90.0%	-	8.78	8.65	8.78	8.58	9.29	9.04
75.0%	Quartile	8.26	7.97	7.92	7.80	8.33	8.25
50.0%	Median	6.75	6.59	6.56	6.36	7.10	7.04
25.0%	Quartile	5.58	5.51	5.37	5.02	5.84	5.85
10.0%	-	3.92	4.58	3.70	2.80	4.14	4.79
2.5%	-	1.27	2.05	2.02	0.87	2.28	3.16
0.5%	-	0.67	1.63	0.93	0.43	1.39	2.50
0.0%	Minimum	0.67	1.63	0.93	0.43	1.39	2.50

Moments

Moment	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
Mean	6.64	6.66	6.48	6.15	6.89	7.00
Standard Deviation	2.02	1.67	1.89	2.22	1.92	1.70
Standard Error Mean	0.19	0.19	0.16	0.19	0.17	0.16
Upper 95% Mean	7.01	7.03	6.80	6.53	7.23	7.32
Lower 95% Mean	6.26	6.28	6.16	5.78	6.54	6.67
Number of Samples	115	80	139	136	121	108

Table 2.5c. Statistical Distribution of TN Concentrations in the Impaired Middle St. Johns Segments

Quantiles

Percentile	Quantile	WBID 2894A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
100.0%	Maximum	2.95	2.86	3.39	4.39	3.63	3.04
99.5%	-	2.95	2.86	3.39	4.39	3.63	3.04
97.5%	-	2.20	2.76	2.97	3.51	2.97	2.50
90.0%	-	1.88	2.12	2.09	2.63	2.14	2.00
75.0%	Quartile	1.58	1.59	1.68	1.90	1.75	1.79
50.0%	Median	1.33	1.29	1.42	1.54	1.47	1.43
25.0%	Quartile	1.12	1.11	1.17	1.23	1.32	1.19
10.0%	-	1.02	0.99	1.07	1.12	1.15	1.09
2.5%	-	0.93	0.90	0.92	0.88	0.96	0.95
0.5%	-	0.82	0.31	0.82	0.72	0.84	0.55
0.0%	Minimum	0.82	0.31	0.82	0.72	0.84	0.55

Moments

Moment	WBID 2894A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
Mean	1.39	1.42	1.51	1.69	1.58	1.49
Standard Deviation	0.34	0.47	0.48	0.63	0.45	0.39
Standard Error Mean	0.03	0.05	0.04	0.05	0.04	0.04
Upper 95% Mean	1.45	1.52	1.59	1.80	1.66	1.57
Lower 95% Mean	1.33	1.31	1.43	1.58	1.51	1.42
Number of Samples	140	83	138	138	136	99

Table 2.5d. Statistical Distribution of TP Concentrations in the Impaired Middle St. Johns Segments

Quantiles

Percentile	Quantile	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
100.0%	Maximum	0.26	0.36	0.30	0.25	0.29	0.31
99.5%	-	0.26	0.36	0.30	0.25	0.29	0.31
97.5%	-	0.20	0.23	0.23	0.23	0.22	0.21
90.0%	-	0.13	0.16	0.14	0.15	0.14	0.13
75.0%	Quartile	0.10	0.10	0.10	0.12	0.10	0.11
50.0%	Median	0.07	0.07	0.07	0.09	0.08	0.08
25.0%	Quartile	0.05	0.05	0.05	0.07	0.06	0.07
10.0%	-	0.04	0.03	0.04	0.05	0.05	0.05
2.5%	-	0.04	0.02	0.04	0.04	0.04	0.03
0.5%	-	0.04	0.01	0.03	0.01	0.04	0.01
0.0%	Minimum	0.04	0.01	0.03	0.01	0.04	0.01

Moments

Moment	WBID 2964A	WBID 2964	WBID 2893F	WBID 2893E	WBID 2893D	WBID 2893C
Mean	0.08	0.08	0.08	0.10	0.09	0.09
Standard Deviation	0.04	0.06	0.04	0.05	0.04	0.04
Standard Error Mean	0.01	0.01	0.01	0.01	0.01	0.01
Upper 95% Mean	0.09	0.09	0.09	0.11	0.10	0.10
Lower 95% Mean	0.07	0.07	0.08	0.09	0.08	0.08
Number of Samples	138	81	140	139	136	106

Figure 2.7a. Distribution of Monthly Average Chl*a* Concentrations in the Impaired Middle St. Johns River Segments

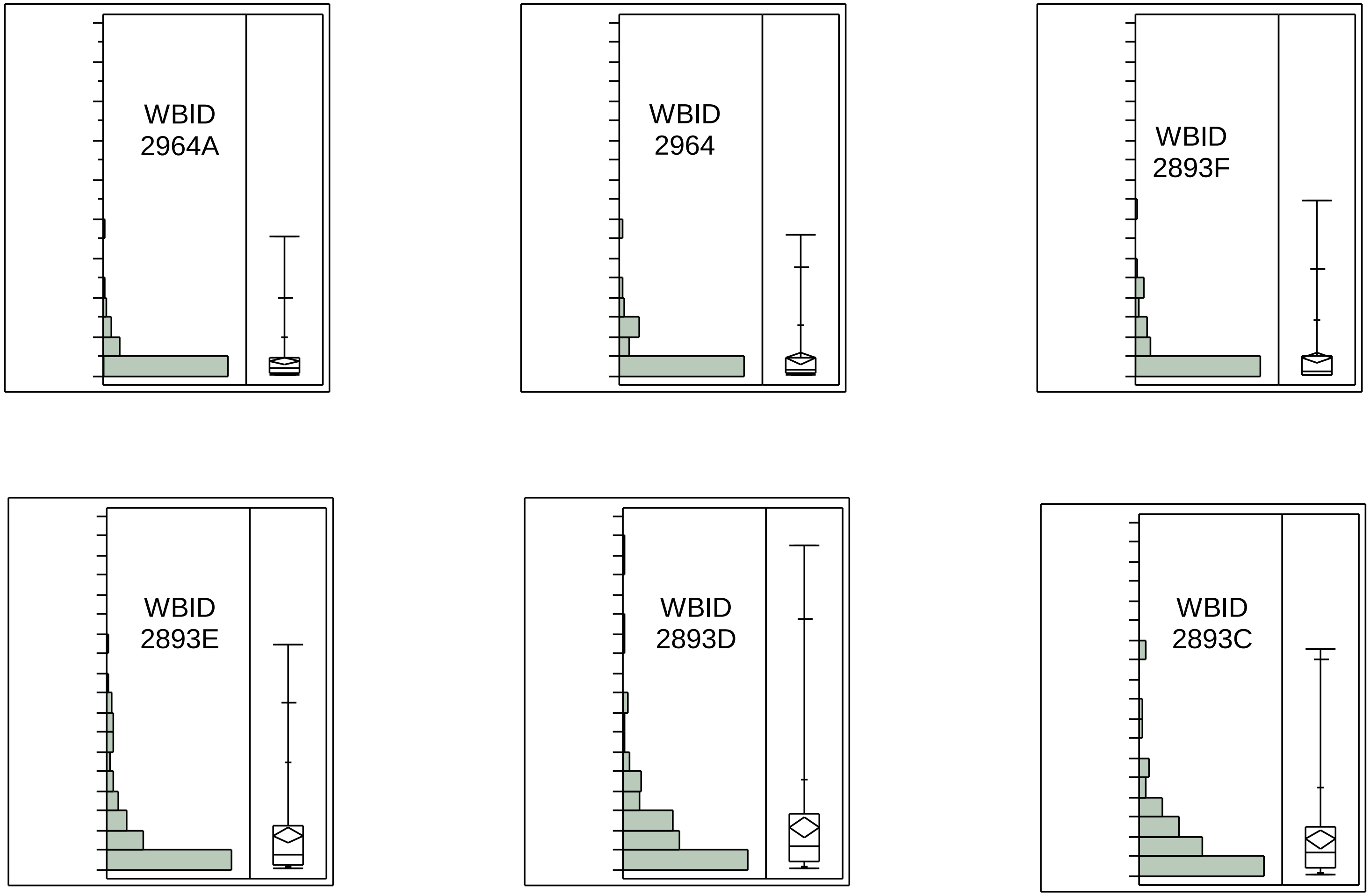


Figure 2.7b. Distribution of Monthly Average DO Concentrations in the Impaired Middle St. Johns River Segments

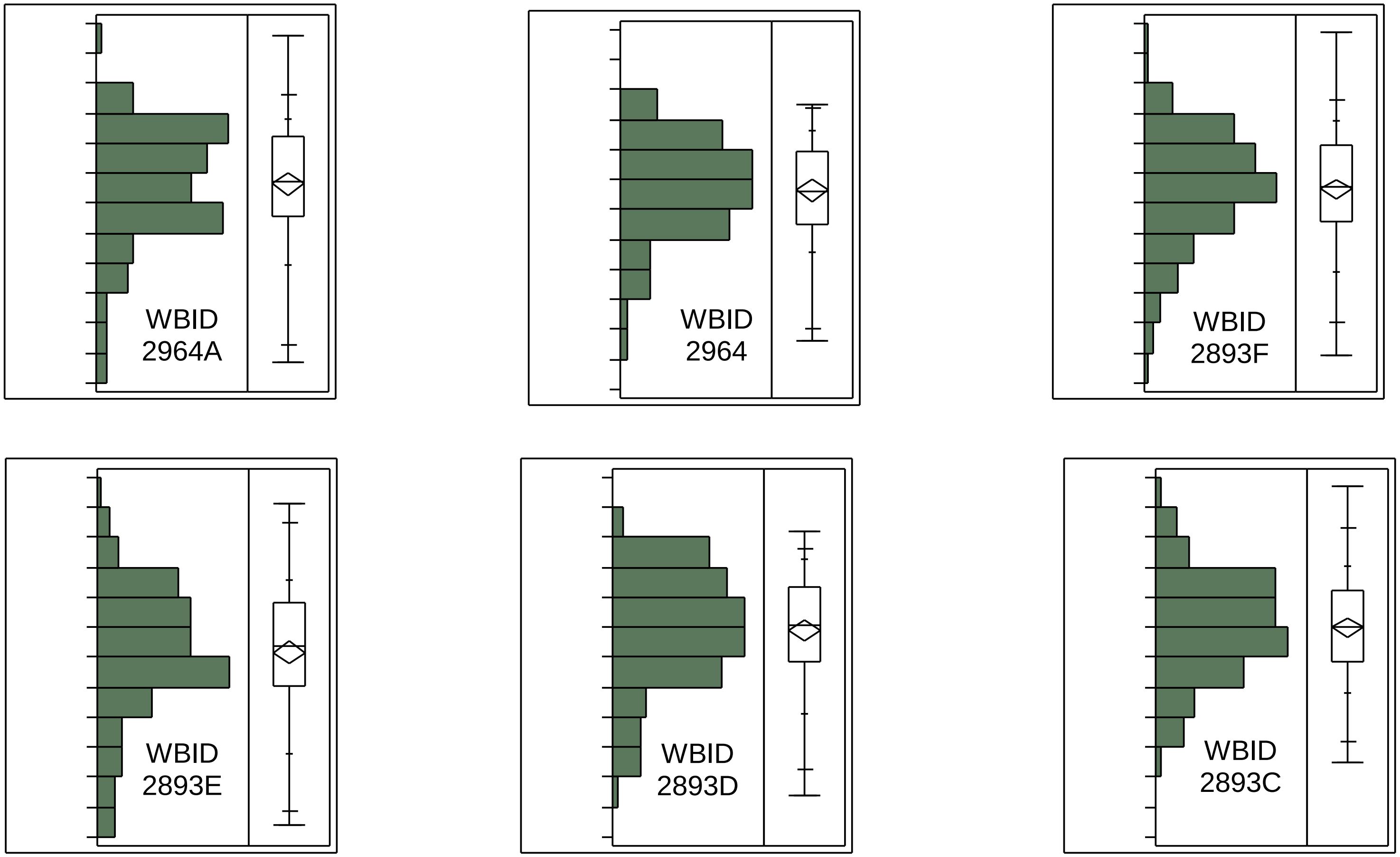


Figure 2.. Distribution of Monthly Average TN Concentrations in the Impaired Middle St. Johns River Segments

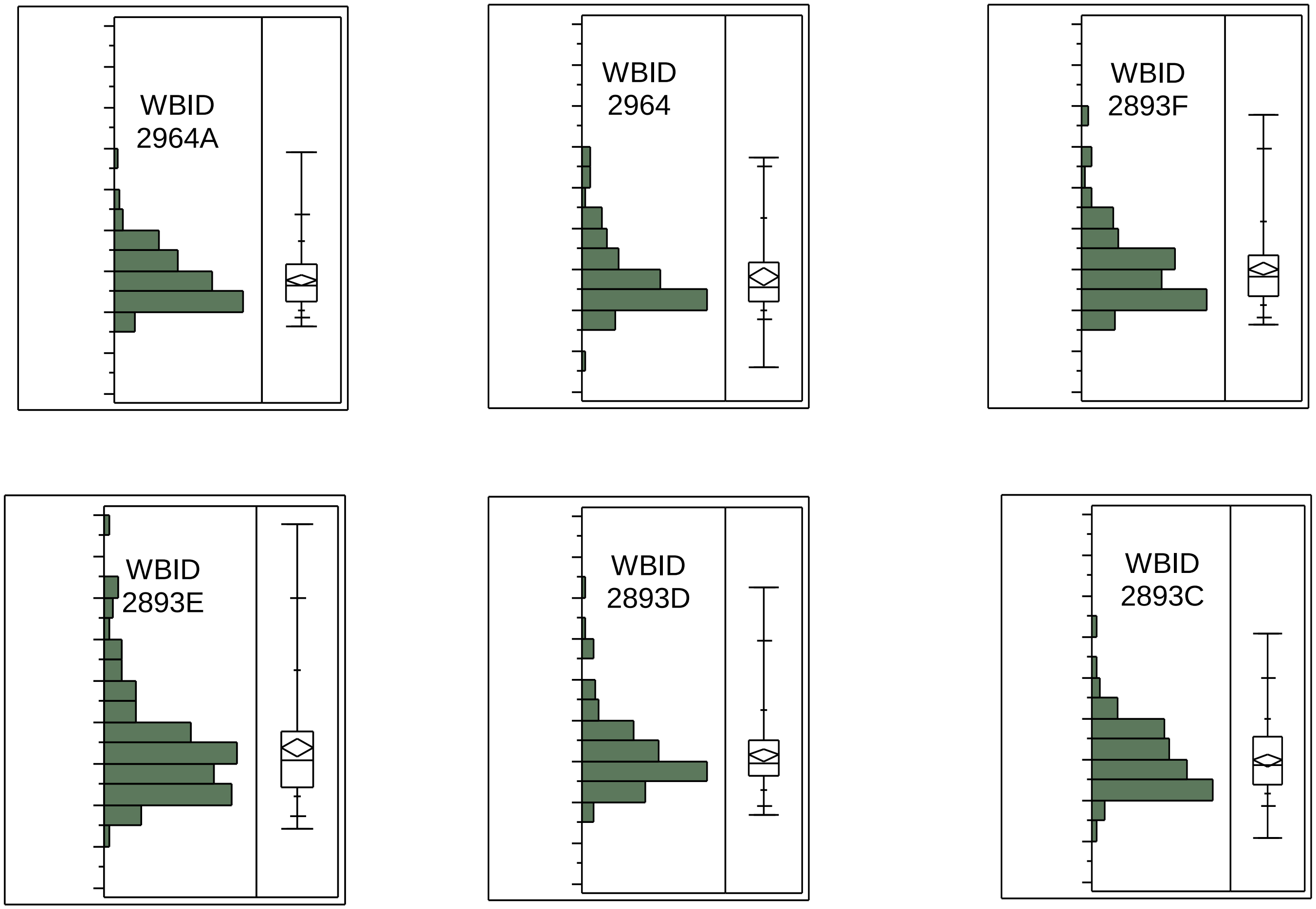
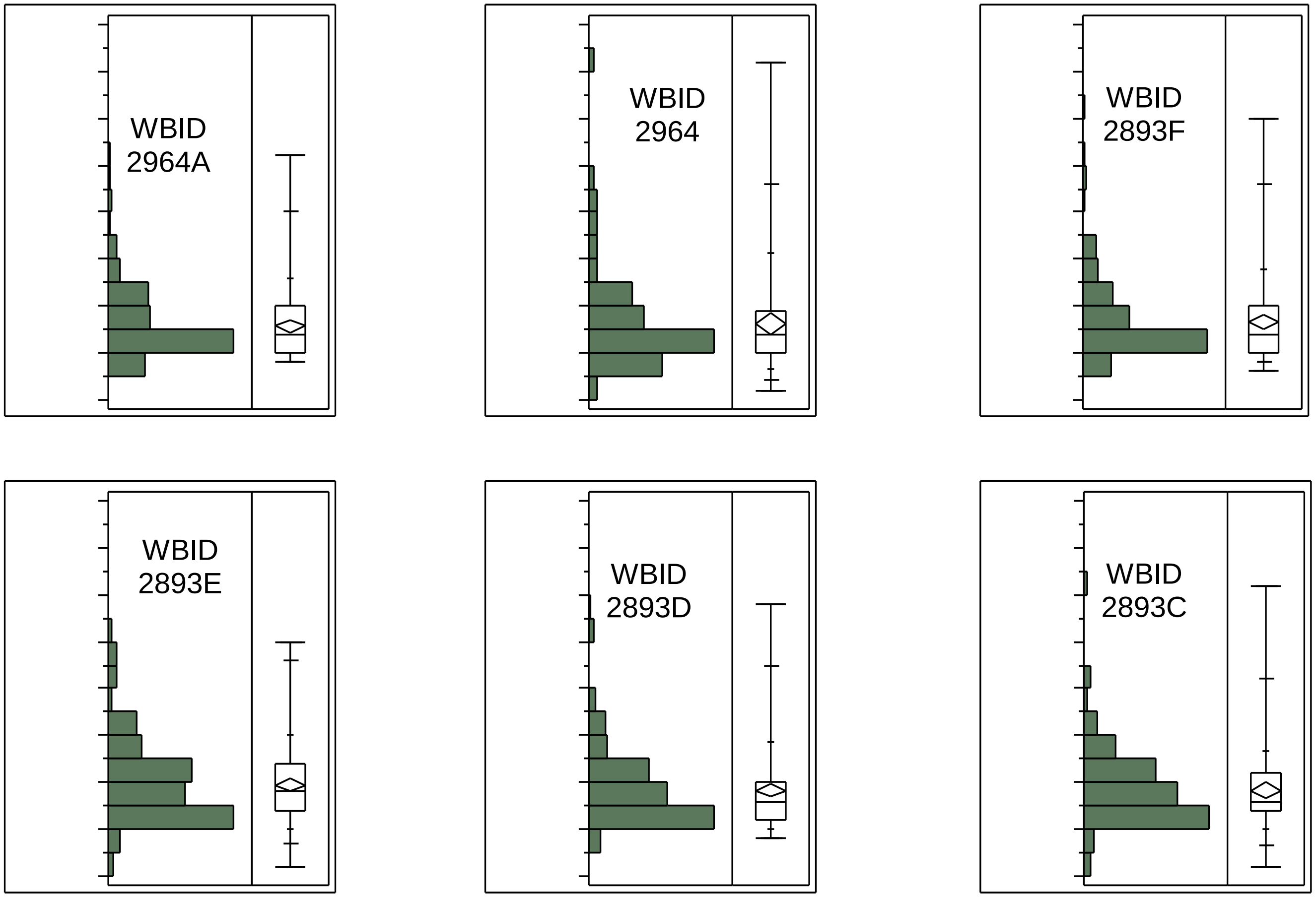


Figure 2.7d. Distribution of Monthly Average TP Concentrations in the Impaired Middle St. Johns River Segments



In summary, chl*a* concentration is the parameter that differs significantly between segments upstream and downstream of the Lake Jesup outlet. This could be caused by the relatively large difference between Lake Jesup chl*a* concentration and chl*a* concentrations of the St. Johns River segments upstream of the Lake Jesup outlet (discussed in more detail in Chapter 3). TN and TP concentrations did not show a significant upstream-downstream pattern, although TN and TP concentrations in the upstream segments were slightly lower than in the downstream segments. The distribution of DO concentrations in the upstream and downstream segments is generally the same. Chapter 3 discusses in detail the relationship between DO and nutrient concentrations. The similar distributions of DO concentrations in the upstream and downstream segments suggest that, even if nutrient concentrations influence DO concentration in these river segments, other factors, such as the input of humic materials from the watershed, could also be an important factor influencing DO.

Chl*a* and TP concentrations showed relatively similar seasonal patterns, peaking in the middle of each year and gradually decreasing toward the end of each year. In contrast, low DO concentrations were mostly observed during the summer months or later in each year. While the low DO concentrations in summer may be caused by the high temperature, and, to a certain extent, the influence of nutrients, the low DO concentrations observed later in the year may be caused by the high color (described in detail in Chapter 3). While these trends indeed show that the summer growth season is the critical season for both chl*a* and DO, higher nutrient inputs during the summer (because of the higher rainfall) should be considered a natural phenomenon. Controlling the overall nutrient loadings on an annual average basis so that the summer nutrient concentrations in these impaired river segments will also be reduced is a reasonable approach to improve the chl*a* and low DO conditions.

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

Class I	**Potable water supplies**
Class II	**Shellfish propagation or harvesting**
Class III	**Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife**
Class IV	**Agricultural water supplies**
Class V	**Navigation, utility, and industrial use (there are no state waters currently in this class)**

The six Middle St. Johns River segments included in this report are Class III waterbodies, with a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the impairment addressed by this TMDL report are for nutrients and DO.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Interpretation of Narrative Nutrient Criterion

Florida's nutrient criterion is narrative only—i.e., the nutrient concentrations of a body of water shall not be altered so as to cause an imbalance in natural populations of aquatic flora or fauna. Accordingly, a nutrient-related target was needed to represent levels at which an imbalance in flora or fauna is expected to occur. A threshold defined by the IWR for assessing nutrient impairment in streams and rivers is an annual average chl*a* concentration of 20 µg/L. For assessing the nutrient condition in lakes, the TSI—which is a unitless index with a 0 to 100 scale that considers influences from chl*a*, TN, and TP concentrations—is used in the IWR.

The value of the TSI threshold varies based on the mean color of the lake being assessed. If the mean color of an assessed lake is less than or equal to 40 PCUs, an annual average TSI of 40 units should be used as the threshold, above which the lake is considered impaired for nutrients. If the mean color of an assessed lake is larger than 40 PCUs, an annual average TSI of 60 units is used as the assessment threshold. More detailed descriptions of nutrient assessment can be found in the IWR (Rule 62-303, F.A.C.).

The IWR also allows the use of information other than chl*a* concentration and TSI to evaluate an imbalance in flora or fauna due to nutrient enrichment. The information may include, but is not limited to, algal blooms, excessive macrophyte growth, a decrease in the distribution (either in density or areal coverage) of seagrasses or other submerged aquatic vegetation, changes in algal species richness, and excessive diel oxygen swings.

It should be noted that, while the IWR provides thresholds for assessing nutrient impairments for lakes based on annual average TSI levels and on annual average chl*a* levels for streams, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. In fact, in recognition that the IWR thresholds were developed using statewide average conditions, the IWR (Subsection 62-303.450, F.A.C.) specifically allows the use of alternative, site-specific nutrient targets that more accurately reflect conditions beyond which an imbalance in flora or fauna occurs in a waterbody.

For the Middle St. Johns River segments, nutrient targets were established not only to restore healthy TSI and chl*a* levels, but also with the intent to address the low DO condition of these waters. Because nutrients can influence the DO concentration in a receiving water by influencing the chl*a* concentration (algal biomass), discussions of nutrient target development primarily focused on the functional relationship between chl*a* and nutrient concentrations. Therefore, although two of the three river segments upstream of the Lake Jesup outlet were not verified for nutrient impairment, as discussed in the following sections, low DO concentrations observed in these waters can still be linked to nutrients, which also influence chl*a* concentrations.

The following three questions were asked in developing nutrient targets for impaired segments of the Middle St. Johns River, and are discussed in detail in subsequent sections:

1. *Are the relationships between chla and nutrient concentrations different in river segments upstream and downstream of the Lake Jesup outlet?*
2. *If the answer to Question 1 is yes, what causes the upstream-downstream difference in the chla-nutrient relationship? Are different nutrient targets warranted for the upstream and downstream segments?*
3. *If different targets are needed, what should these targets be?*

1. Are the relationships between chl*a* and nutrient concentrations different in river segments upstream and downstream of the Lake Jesup outlet?

This question was triggered by the upstream and downstream spatial patterns discussed in Chapter 2. It appears that TP and TN concentrations in the segments upstream of the Lake Jesup outlet (WBIDs 2964A, 2964, and 2893F) were not dramatically different from those in the downstream segments (WBIDs 2893E, 2893D, and 2893C). However, chl*a* concentrations in these two parts of the river differ by two- to threefold (**Tables 2.5a** through **2.5d**). This suggests that with the same TN and TP concentrations in the river, the downstream segment may support two to three times more algal biomass than the upstream segments. Therefore, the functional relationship between chl*a* and nutrient concentrations upstream and downstream of the Lake Jesup outlet must be different.

To demonstrate that this is the case, chl*a* (corrected for pheophytin), TN, and TP concentrations were retrieved from the Department's IWR Database Run_35 for the six segments included in this report. The relationships between chl*a* concentrations and TN and TP concentrations were analyzed by aggregating the three downstream segments into one analysis unit and the upstream segments into another analysis unit.

The period of record used for this analysis was 1996 through 2007. Because the IWR requires that the assessment of nutrient condition in ambient waters be conducted based on annual average chl*a* concentration or annual average TSI, the functional relationship analyses were conducted by regressing the annual average chl*a* in each analysis unit against the annual average TN and TP concentrations for the same unit.

To ensure that all the data included in the analysis were representative of the typical chl*a*-nutrient relationship, annual average values from 2000 were excluded because it was the peak of the 3 consecutive dry years from 1999 through 2001. During about 21 percent of this year, the daily flow measured at a U.S. Geological Survey (USGS) flow gage (02234500) located at the outlet of Lake Monroe showed reverse flow from downstream to upstream—likely due to the large-scale, wind-driven currents and seiches that formed in this part of the St. Johns River—while for the entire period of record of flow from 1996 through 2007, the percent annual reverse flow rate at the same gaging station was about 10 percent. A higher percentage of reverse flow during a year may significantly change the source of chl*a* , TN, and TP, and therefore change the functional relationship between algae and nutrients.

In addition, the annual average daily flow for 2000 at Gage 02234500 was about 759 cubic feet per second (cfs), while the long-term annual average daily flow for 1996 to 2007 was about 2,313 cfs. Under the extended low-flow condition, concentration effects from the uncompensated evaporation may increase the concentrations of chl*a*, TN, and TP, and therefore distort the functional relationship between algal biomass and nutrient concentrations. For these reasons, data from 2000 were not included in the analysis.

Figure 3.1 shows the relationship between annual average chl*a* and TP concentrations in the upstream and downstream analysis units. **Figure 3.2** shows the relationship between annual average chl*a* concentrations and TN concentrations in the upstream and downstream analysis units.

Significant functional relationships were identified between chl*a* concentrations and TN and TP concentrations in river segments both upstream and downstream of the Lake Jesup outlet, based on **Figures 3.1** and **3.2**. However, with the same nutrient concentrations, the downstream segments support higher chl*a* concentrations than the upstream segments. In addition, the per unit variation in TP concentrations apparently is associated with a larger variation in chl*a* concentrations in the downstream segments than in the upstream segments, indicating that the functional relationship between chl*a* and nutrient concentrations differs between these upstream and downstream segments. Another observation from **Figures 3.1** and **3.2** is that the difference in chl*a* concentrations that can be supported by the same nutrient concentrations in the upstream and downstream segments decreases as nutrient concentrations decrease. This implies that, under the target nutrient concentrations, the difference in the achievable chl*a* concentration between the upstream and downstream segments is smaller than the difference for the existing condition.

2. If the answer to Question 1 is yes, what causes the upstream-downstream difference in the chl*a*-nutrient relationship? Are different nutrient targets warranted for the upstream and downstream segments?

There are several possible reasons that upstream and downstream chl*a*-nutrient relationships are different. For example, the different morphology of waterbodies can influence the chl*a*-nutrient relationship. Assuming the same volume, a deeper river/lake with a smaller surface area provides a smaller percent volume of the water column that is above the euphotic zone for algal growth, compared with a shallower river/lake with a larger surface area. Therefore, the same amount of nutrients in lakes/rivers with a smaller surface area and greater depth will produce less algal biomass than waters with shallower depth and a larger surface area.

Figure 3.1. Functional Relationship between Chl*a* and TP Concentrations in River Segments Upstream and Downstream of the Lake Jesup Outlet

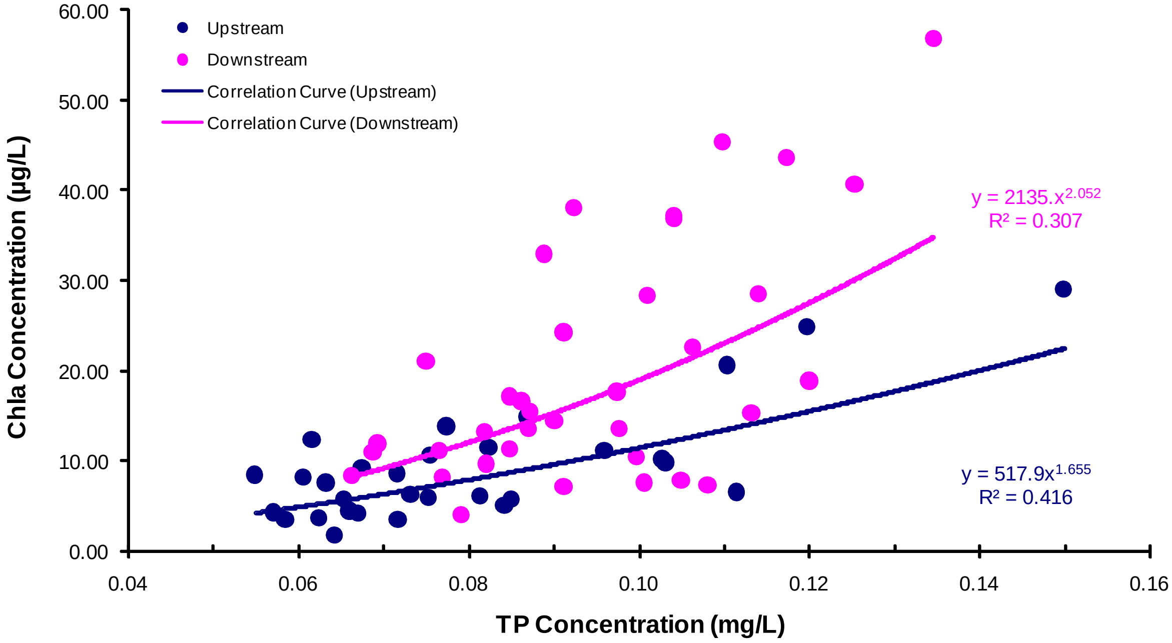
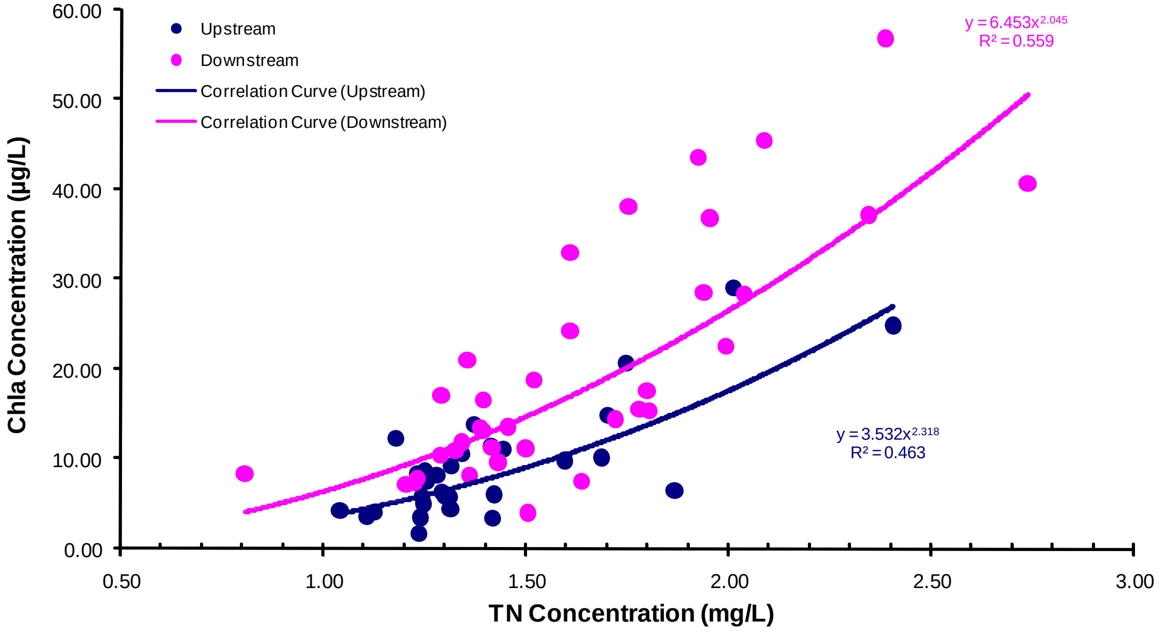


Figure 3.2. Functional Relationship between Chl*a* and TN Concentrations in River Segments Upstream and Downstream of the Lake Jesup Confluence



Waterbody volume may also influence the chl*a*-nutrient relationship. Assuming that the total flow between the upstream and downstream segments does not differ by much, segments with a smaller volume will have a shorter water residence time than segments with a larger volume. Therefore, with the same amount of nutrients, segments with a shorter water residence time will produce less algal biomass than segments with a longer water residence time.

The amount of algal biomass produced from the same quantity of nutrients can also be influenced by the color level or turbidity of the water. Because high color—specifically, the high color caused by the high content of humic materials—can absorb light in the blue-green portion of the visible spectrum, reducing the amount of photosynthetically active radiation that is available in the water column, water segments with higher color typically produce smaller amounts of algal biomass than segments with relatively low color with the same supply of nutrients. High turbidity can physically block light penetration in the water column and cause algal growth to be limited by the availability of light even when the nutrient supply is abundant.

Different nutrient compositions may also influence algal productivity. If the percentage of inorganic nutrients in the total nutrients is high, or if a higher percentage of the organic portion of the total nutrients is relatively labile, the same amount of total nutrients may support more algal biomass than nutrients with a relatively low percentage of inorganic fraction and/or where the organic fraction of the total nutrient is relatively recalcitrant.

Another factor that may influence the chl*a*-nutrient relationship in a given waterbody is if it receives algal biomass produced by another water system with a different chl*a*-nutrient relationship, due to some or all of the factors discussed above. The final chl*a*-nutrient relationship in the waterbody in question is the mixing result of the two different chl*a*-nutrient relationships and therefore differs from the original chl*a*-nutrient relationship in the target waterbody.

It is commonly accepted that, with all the other environmental factors being the same, a riverine system typically produces less algal biomass than a lacustrine system because the latter has a relatively longer water residence time. Nutrient targets appropriately set up for lakes should protect the nutrient condition of the associated river channels. Therefore, when examining the characteristics of the upstream and downstream segments, efforts focused on comparing Lake Harney with Lake Monroe. **Table 3.1** lists some major morphological (surface area, mean depth, and maximum depth), hydrologic, chemical, and biological factors of the two lakes.

Based on **Table 3.1**, the morphology of Lake Harney and Lake Monroe is very similar. Both are shallow lakes with relatively large surface areas and long-term average water residence times of less than 1 month. The water residence time estimated by BCI Engineers and Scientists (2008) for Lake Monroe (based on flow records from 1995 through 2006) was about 23 days, which is slightly longer than the long-term average water residence time for Lake Harney (15 days). Biologically, a few more days of water residence time should not result in two to three times more algal biomass with the same amount of nutrients.

The mean color of Lake Harney is only slightly higher than that of Lake Monroe. Taking into consideration the standard deviation, the color levels of the two lakes do not differ significantly. In fact, the mean Secchi depth of Lake Harney was even higher than that of Lake Monroe, and the turbidity level of Lake Monroe was slightly higher than that of Lake Harney, suggesting that light limitation is not a major factor causing the different chl*a*-nutrient relationships in these two waters.

Table 3.1. Comparison of Characteristics of Lake Harney and Lake Monroe

[1] Numbers cited from BCI Engineers and Scientists (2008).
[2] Numbers cited from *Seminole County Water Atlas* (http://www.seminole.wateratlas.usf.edu/).
[3] NTU = Nephelometric turbidity unit
[4] µS = Microsiemens
[5] TKN = Total Kjeldahl nitrogen
[6] NH3+4 = Nitrogen ammonia
[7] NO2+3 = Nitrate nitrite
[8] DIN = Dissolved inorganic nitrogen
[9] SRP = Soluble reactive phosphorus
[10] NA = Not available

Parameter	Lake Harney (WBID 2964A) Representing Upstream Condition–Mean	Lake Harney (WBID 2964A) Representing Upstream Condition–Standard Deviation	Lake Monroe (WBID 2893D) Representing Downstream Condition–Mean	Lake Monroe (WBID 2893D) Representing Downstream Condition–Standard Deviation
Watershed Area[1] (square miles)	2,070	NA[10]	2,624	NA[10]
Surface Area (acres)[2]	7,935	NA[10]	8,814	NA[10]
Mean Depth (feet)[2]	7	NA[10]	6	NA[10]
Maximum Depth (feet)[2]	15	NA[10]	16	NA[10]
Water Residence Time (days)[1]	15	NA[9]	23	NA[10]
Flow (30-day mean, cfs)	2,038	1,935	2,472	2,316
Secchi (feet)	2.34	0.86	1.98	0.53
Turbidity (NTU)[3]	3.31	2.61	4.87	3.75
pH	7.65	0.55	7.64	0.69
Alkalinity (mg/L)	100.4	47.8	107.6	43.7
Temperature (^{0}C)	23.97	5.11	23.61	5.11
Specific Conductivity (µS)[4]	1,130	605	1,028	451
Color (PCU)	182.4	106.9	170.4	114.14
TN (mg N/L)	1.37	0.32	1.52	0.43
TKN (mg N/L)[5]	1.28	0.29	1.45	0.42
NH3+4 (mg N/L)[6]	0.04	0.04	0.05	0.05
NO2+3 (mg N/L)[7]	0.09	0.10	0.07	0.07
DIN (mg N/L)[8]	0.13	0.09	0.12	0.12
TP (mg P/L)	0.07	0.04	0.08	0.03
SRP (mg P/L)[9]	0.03	0.02	0.03	0.03
Chl*a* Corrected (µg/L)	10.31	14.41	20.55	24.40

TN and TP concentrations, as well as compositions of TN and TP, are also very similar in Lake Harney and Lake Monroe. The concentrations of dissolved inorganic nitrogen and phosphorus, and their ratios to TN and TP, are similar for both lakes, suggesting that nutrient composition is not a major factor causing the observed difference in chl*a*-nutrient relationships in these waters.

Based on the above data, it appears that the most likely cause for the higher chl*a*-nutrient ratio observed in the downstream segments is that these segments receive the chl*a* input from Lake Jesup. Compared with Lake Harney and Lake Monroe, which have a long-term average water residence time of 10 to 20 days, the long-term average water residence time for Lake Jesup is about 3 months (Keesecker, 1992). Thus phytoplankton have a longer time to respond to the change in nutrient concentrations and produce more algal biomass than Lake Harney and Lake Monroe.

In addition, Lake Jesup has a lower color level than Lake Harney and Lake Monroe. The long-term average color level of Lake Jesup for 1996 through 2007 was less than 90 PCUs, compared with more than 170 PCUs observed in Lake Harney and Lake Monroe. Lower color supports more algal growth with the same nutrient availability. In fact, the long-term average chl*a*-to-TP and chl*a*-to-TN ratios for Lake Jesup, based on data from 1996 through 2007, were about 23 and 424, respectively, while the long-term average chl*a*-to-TP and chl*a*-to-TN ratios were 7 and 107, respectively, for the segments upstream of the Lake Jesup outlet, and 13 and 223, respectively, for the segments downstream of the Lake Jesup outlet. Apparently, the downstream chl*a*-to-TN and chl*a*-to-TP ratios were closer to the Lake Jesup ratios than the upstream ratios.

If the downstream segments receive the Lake Jesup chl*a* output, as well as outputs of TN and TP, why is the downstream chl*a* concentration significantly different from the upstream segments, while the difference between TN and TP concentrations in the upstream and downstream segments is not so obvious? This is likely caused by the larger difference in chl*a* concentrations between Lake Jesup and the upstream segments than the difference in TN and TP concentrations between Lake Jesup and the upstream segments. For Lake Jesup, the long-term (1996–2007) average annual chl*a*, TN, and TP concentrations were about 66.5 µg/L, 2.96 mg/L, and 0.16 mg/L, respectively. For the river segment immediately upstream of the Lake Jesup outlet (WBID 2893F), the long-term average annual chl*a*, TN, and TP concentrations were about 9.9 µg/L, 1.54 mg/L, and 0.09 mg/L, respectively. While the long-term annual average chl*a* concentration in Lake Jesup was about 6.7 times higher than the chl*a* concentration in the immediate upstream segment, the TN and TP concentrations only differed by factors of about 1.9 and 1.8, respectively. This may have caused the higher chl*a* concentrations observed in the downstream segments (compared with the upstream segments), while the TN and TP concentrations in the upstream and downstream segments were about the same.

To demonstrate that this is the case, flow measurements from a USGS gaging station located at the outlet of Lake Jesup (02234435) were compared with measurements from the gaging station located at the outlet of Lake Monroe (02234500). Flow data were downloaded from a USGS Website (http://waterdata.usgs.gov/usa/nwis/sw) and used to estimate the relative ratio of the Lake Jesup water outflow and the main stem flow. This ratio was then used to calculate chl*a*, TN, and TP concentrations in the downstream segments based on the long-term average annual chl*a*, TN, and TP concentrations of both the Lake Jesup and upstream river segments. If the calculated downstream chl*a*, TN, and TP concentrations generally match up with the measured downstream concentrations, the observed higher chl*a* concentration and similar TN and TP concentrations compared with the upstream segments would result from mixing Lake Jesup water with the main stem St. Johns River water.

Table 3.2 shows the annual total outflows from Lake Jesup and main stem flow in this area of the St. Johns River. **Figure 3.3** shows the location of the two USGS gaging stations used for this analysis. It should be noted that reverse flow (i.e., flow from the St. Johns River into Lake Jesup) happens episodically, depending on the regional rainfall pattern. Because Lake Jesup does not contribute chl*a*, TN, and TP to the main stem under the reverse flow condition, all the reverse flows (negative flow values) were assumed to be 0 in calculating the annual total outflow from Lake Jesup.

Table 3.2. Ratio of Lake Jesup Outflow to the Main Stem Flow of the St. Johns River

- = Flow data are missing for a significant portion of 2004. Therefore, the annual total outflow was not calculated for the year.

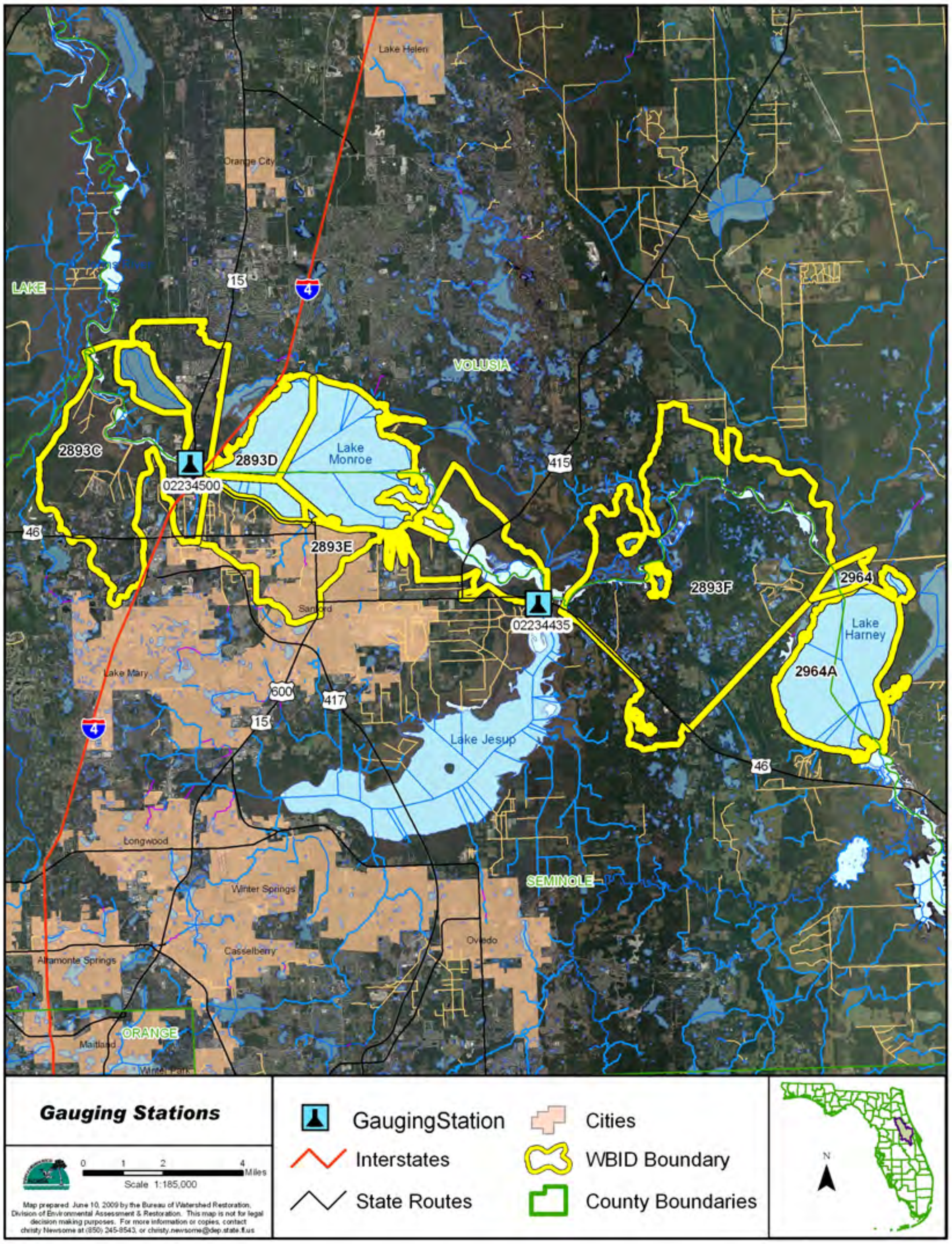
[1] Ac-ft/yr = Acre-feet per year

Year	Lake Jesup Outflow (ac-ft/yr)[1]	St. Johns River Main Stem Flow (ac-ft/yr)[1]	Ratio between Lake Jesup and Main Stem Flow (%)
1996	163,015	1,746,565	9%
1997	87,382	1,077,077	8%
1998	196,507	2,474,477	8%
1999	95,469	1,468,957	6%
2000	107,434	550,854	20%
2001	104,021	1,732,698	6%
2002	180,408	2,157,025	8%
2003	185,138	2,276,356	8%
2004	-	2,375,235	-
2005	182,319	2,616,232	7%
2006	117,314	848,757	14%
2007	92,585	778,903	12%
Mean	**145,126**	**1,716,746**	**10%**

Based on **Table 3.2**, the long-term average ratio between the Lake Jesup outflow and the main stem flow of the St. Johns River was about 10 percent. Using the long-term average annual chl*a*, TN, and TP concentrations for Lake Jesup and the immediate upstream segment of the St. Johns River (provided in the preceding text), the calculated downstream chl*a*, TN, and TP concentrations were 15.5 µg/L, 1.68 mg/L, and 0.096 mg/L, respectively. The long-term average annual chl*a*, TN, and TP concentrations based on measured data (1996–2007) in the segment immediately downstream of Lake Jesup were 16.4 µg/L, 1.75 mg/L, and 0.095 mg/L, respectively. Thus the estimated downstream chl*a*, TN, and TP concentrations matched the long-term average annual chl*a*, TN, and TP concentrations calculated on the basis of measured data. These results suggest that the assumption that the observed downstream higher chl*a* concentration and TN and TP concentrations similar to the upstream segments were caused by mixing the Lake Jesup outflow and St. Johns River main stem flow is likely correct.

All of the above discussions clarify the question of whether different water quality targets are warranted for the Middle St. Johns River segments upstream and downstream of the Lake Jesup outlet. It appears that, because of the general morphological and hydrologic similarities between the upstream and downstream segments, and the relatively small difference between Lake Jesup TN and TP concentrations and the TN and TP concentrations of the river segments upstream of the Lake Jesup outlet, establishing the same TN and TP targets for both the upstream and downstream river segments appears reasonable. However, because the downstream segments constantly receive the chl*a* discharge from Lake Jesup, which has a significantly longer water residence time than the downstream river segments, the chl*a*-nutrient relationships between the upstream and downstream segments are different. The chl*a*-to-nutrient ratios for the downstream segments are higher than those of the upstream segments.

Figure 3.3. Location of USGS Gaging Stations Used in Calculating the Long-Term Flow Ratio between Lake Jesup Flow and Flow through the Main Stem of the St. Johns River around Lake Jesup



This should be considered a natural phenomenon. Therefore, while the same TN and TP targets can be established for the river segments both upstream and downstream of the Lake Jesup outlet, achievable chl*a* concentrations could be different for the upstream and downstream segments, with the downstream achievable chl*a* concentration being relatively higher than the upstream achievable chl*a* concentration.

3. If different targets are needed, what should these targets be?

When these TMDLs were developed, there were no data that could be used directly to derive the TN and TP concentration targets for the impaired river channels. However, data and information were available that allowed the development of TN and TP targets for Lake Harney and Lake Monroe. Due to the general similarities in TN and TP concentrations between the lakes and the river segments associated with these lakes, TN and TP targets were developed for Lake Harney and Lake Monroe and applied to these associated river channels. Because the river channels have a shorter water residence time than the lakes, these segments should be less vulnerable to the impacts of nutrients than lakes. Therefore, nutrient targets sufficient to protect lakes should be sufficient to protect these river channels. Based on this logic, the nutrient targets for the impaired St. Johns River segments were developed for the lakes and applied to the river segments between the lakes. Achievable chl*a* concentrations were estimated for the river segments, depending on their spatial relationship with the Lake Jesup outlet.

Several methods were used to develop the TN and TP targets. The general goal of using these methods was, first, to ensure that nutrient concentrations in these waters were generally below the upper limit of mesotrophic condition but not below the pristine natural background condition. One method used was to ensure that the TSI values calculated on the basis of target TN and TP concentrations were all equal to or smaller than a TSI of 60. As discussed in Chapter 2, the Department uses a TSI of 60 as the assessment threshold for lakes with a mean color greater than 40 PCUs. This procedure is defined in the IWR (Section 62-303.352. F.A.C.).

As tabulated in **Table 3.1**, mean color levels for Lake Harney and Lake Monroe were 182 and 170 PCUs, respectively, which were both higher than the threshold of 40 PCUs. A TSI of 60 is therefore a reasonable threshold for both Lake Monroe and Lake Harney. It is commonly accepted that a TSI of 60 represents the division between mesotrophic and eutrophic conditions in lakes. The equations used to calculate the TN and TP TSI were developed by Huber et al. (1982). For lakes with a TN/TP ratio falling between 10 and 30, the TN and TP TSI equations are as follows:

Equation (1) $$\mathrm{TSI\ (TN)} = 10*(5.6 + 1.98*\mathrm{LnTN})$$

Equation (2) $$\mathrm{TSI\ (TP)} = 10*(1.86*\mathrm{Ln}(\mathrm{TP}*1000) - 1.84)$$

Under the existing condition, the long-term average annual TN and TP concentrations were 1.38 and 0.08 mg/L, respectively, for Lake Harney and 1.57 and 0.09 mg/L, respectively, for Lake Monroe. The corresponding TN and TP TSIs are both 62 for Lake Harney and both 65 for Lake Monroe. Lake Harney was not verified impaired for nutrients based on the TSI because the annual chl*a* TSI was low for the lake during most of the verified period. Therefore, the overall TSI value, which is the mean value between the chl*a* TSI and nutrient TSI, was below 60.

For Lake Monroe, although the annual average chl*a* TSI in 2001 exceeded 60, the annual average chl*a* TSIs in the most recent years from 2002 through 2007 were all sufficiently low to bring the overall TSI values for the lake lower than 60. Therefore, the lake was not verified for nutrient impairment.

However, the fact that TN and TP TSIs in both lakes were higher than 60 indicates that these systems have the potential to become eutrophic. This did not occur because the high color and short water residence time depressed the expression of the typical chl*a*-nutrient functional relationships in these systems. Should the color of the system decrease and water residence time increase (e.g., under drought conditions), or if excessive amounts of nitrogen and phosphorus are carried downstream into waterbodies with low color and a relatively high water residence time, higher chl*a* concentrations would be expected. Therefore, when setting TN and TP targets for these lakes, it is desirable to ensure that the TN and TP TSIs will also meet the TSI threshold of 60. For them to meet this threshold, the target TN and TP concentrations for Lake Monroe and Lake Harney calculated using Equations (1) and (2) are 1.22 and 0.068 mg/L, respectively.

Nutrient targets can also be developed by examining nutrient concentrations under the predevelopment or low-impact condition during the early stages of development in a watershed. Paleolimnological studies were conducted by Anderson et al. (2004, 2006) for both Lake Harney and Lake Monroe using a lead isotope (^{210}Pb) to estimate the general time frame when lake sediments of a certain depth were formed. The nutrient contents of the sediment at different depths were then measured, allowing the nutrient accumulation rate in the sediment during a certain period to be estimated. By assuming that the nutrient accumulation rate roughly equals the nutrient sedimentation rate, and the specific sedimentation rate (total sedimentation divided by total nutrient concentration in the water column) is generally constant, as long as the sedimentation rates for both the low-impact and existing conditions are known, the nutrient concentrations for a given lake under the low-impact condition can be derived. This concentration is the nutrient target for the lake.

In developing nutrient targets based on paleolimnological information, the Department focused on studies conducted in Lake Monroe (Anderson et al., 2004). Six sediment cores collected across the lake were dated using ^{210}Pb and carbon 14 (^{14}C) radiometric technologies. Information on phosphorus and nitrogen accumulation rates, the biogenic silicon accumulation rate, and diatom taxonomy was also collected to evaluate the critical period when significant shifts in trophic state were observed in the lake.

These studies indicated that Lake Monroe's sediments comprised three main types: gyttja, peat, and sands/clay/mud. The gyttja layer was primarily composed of fine-grained materials that might primarily come from phytoplankton, were on top of all the sediment cores, and were deposited over the last 100 years or so. The radiometric technologies demonstrated that the accumulation of fine-grained material (gyttja) in the lake did not start until the 1900s, coinciding with settlement and development in the region (Anderson et al., 2004). At the same time, the mass accumulation rates of silica, which is used as an indicator for diatom productivity, emergent plants, and attached sponges, started to increase as early as the 1920s, but the most significant increase happened after 1970. The diatom taxonomy results also generally supported this time frame.

Therefore, to develop nutrient targets based on these paleolimnological studies, nutrient accumulation rates from 1920 to 1970 from each sediment core were used to represent the low-impact condition. The nutrient accumulation rates for the latest period, mostly in the 1990s, were used to represent the existing condition. The results from the sediment core collected from Site LM45-03 during the study were not used in this TMDL analysis because the core only showed the accumulation rate for 1964. Neither the accumulation rate for the period before this date nor the accumulation rate after this date were available. It was difficult to judge whether there was any increasing trend in accumulation rate at the site or not.

Nutrient target development based on paleolimnological studies was only conducted for TP. Because of the potential impact of denitrification on estimating the nitrogen sediment accumulation rate, the TN target concentration was not developed using this method. The target TN concentration was inferred using the TP target concentration and the relationship between TN and TP concentrations established on the basis of existing data. **Table 3.3** shows the TP accumulation rate for all the sediment cores for the low-impact condition (1920s through 1960s) and the existing condition (1990s). The target TP concentration for the low-impact condition was calculated by assuming that the quotient between the average low-impact TP accumulation rate and the target TP concentration equals the quotient between the existing TP accumulation rate and the existing TP concentration.

Annual average TP concentrations for Lake Monroe from 1990 through 1999 were calculated based on TP measurements retrieved from IWR Database Run-35. The calculated long-term average annual mean TP concentration for this period was 0.08 mg/L. Using the accumulation rates for the low-impact and existing conditions listed in **Table 3.3**, the estimated target TP concentration for the low-impact condition was about 0.06 mg/L.

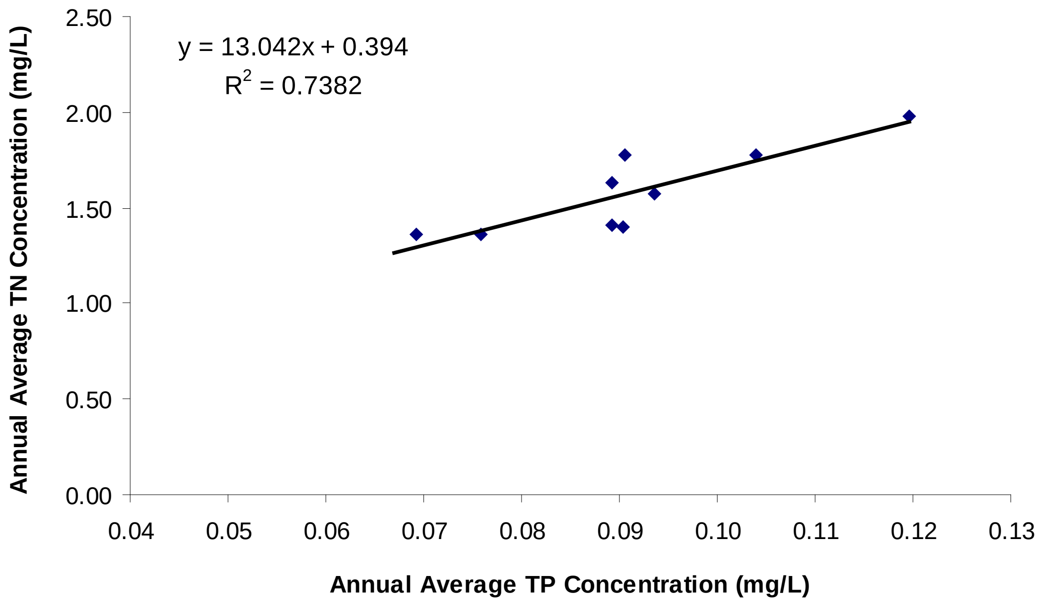
Table 3.3. TP Sediment Accumulation Rate for Low-Impact and Existing Conditions

[1] µg/cm^2/yr = Micrograms per square centimeter per year
- = Empty cell/no data

Sediment Core ID	Low-Impact Condition (1920s through 1960s)– Year	Low-Impact Condition (1920s through 1960s)– Accumulation Rate (µg/cm^2/yr)[1]	Existing Condition (1990s)– Year	Existing Condition (1990s)– Accumulation Rate (µg/cm^2/yr)[1]
LM06-03	1933	3.6	1995	7.4
LM28-03	1922	7	1998	37
LM28-03	1960	17	1998	37
LM31-03	1931	6.0	1992	34
LM32-03	1921	16	1994	36
LM32-03	1956	19	1994	36
LM50-03	1927	95	1998	55
LM50-03	1940	28	1998	55
LM50-03	1952	38	1998	55
-	**Average:**	**26**	**Average:**	**34**

As mentioned in the preceding text, because of the possible interference from denitrification, the TN target was not developed based on results from the paleolimnological studies. Instead, a correlation between annual average TN and TP concentrations was established for the period from 1996 through 2007. **Figure 3.4** shows the correlation between annual average TN and annual average TP concentrations for Lake Monroe. Assuming that the same correlation exists under the low-impact condition, the target TN concentration derived was 1.18 mg/L.

Figure 3.4. Correlation between Annual Average TN and TP Concentrations for Lake Monroe



Paleolimnological studies conducted in Lake Harney were not used to develop the nutrient targets. This was because the four sediment cores collected and dated for Lake Harney were mostly collected from areas with the thickest organic sediments and floc. While results from these cores are valuable in demonstrating a trend of increasing nutrient accumulation rates in recent years compared with the low-impact historical condition (suggesting elevated nutrient concentrations in the lake in the 20th century), it may not be totally appropriate to use these data to quantify the nutrient concentrations under the low-impact condition for Lake Harney, because these cores may not be completely representative of the nutrient accumulation rate across the whole lake. In fact, three out of four dated sediment cores were almost completely composed of gyttja. Therefore, it was hard to exclude the possibility that the high nutrient accumulation rates observed at these sites might have resulted from sediment focusing. Sediment focusing is the process through which sediments move from the shallow littoral zone to the deeper part of the lake, instead of accumulating from the natural sedimentation process.

Because of the general similarities between Lake Harney and Lake Monroe, as shown in **Table 3.1**, the nutrient targets developed for Lake Monroe should also meet the goal of protecting Lake Harney. In this TMDL analysis, while different chl*a* concentration targets were developed for Lake Harney and Lake Monroe, the nutrient targets for the two lakes and their associated river channels are the same.

TN and TP targets for Lake Harney and Monroe were also derived from a study conducted by Tetra Tech, Inc., based on data collected from 200 Florida lakes between 1993 and 1997 (Paul and Gerritsen, 2002). A variety of exploratory analyses of these data suggested that the strongest organizing forces on the biota of the relatively undisturbed lakes were water color and pH (Gerritsen et al., 2000). On the basis of these results, the sampled lake regions were aggregated into 5 lake classes, such that the lakes in each class have similar biological assemblages. The lake classes were created on the basis of water color (greater than or less than 20 PCUs, pH (greater than or less than 6.5), and ecoregion for acid clear lakes only (Omernik, 1987: Region 65 in northwest Florida and Region 75 in peninsular Florida).

Several techniques were used in each lake class to establish TN and TP target concentrations in Paul and Gerritsen's 2002 studies. These included the reference lake technique, sediment diatom reconstructions, morphoedaphic indices, LOESS regression of the trophic Lake Condition Index (tLCI) versus nutrients, and multiple linear regression. Among all the techniques used, the reference lake technique, LOESS regression of tLCI versus nutrients, and diatom reconstruction based on paleolimnological data produced meaningful results (**Table 3.4**).

Table 3.4. Summary of Phosphorus/Nitrogen Concentrations (µg/L) Suggested as Potential Criteria for Five Different Lake Classes in Florida

- = Empty cell/no data
* = N < 6
**NA = Not applicable

Lake Class	Methodological Approach Using 75th Percentile of Reference Distribution	Methodological Approach Using LOESS Regression (tLCI versus nutrients)	Methodological Approach Using Paleolimnology (TROPH1 model)
Acid clear lakes	-	-	-
EcoRegion 65	10/330	21/473	4*/NA**
EcoRegion 75	10/470	23/776	67*/NA**
Acid colored lakes	42/910	43/1,202	17*/NA**
Alkaline clear lakes	10/750	17/692	25/NA**
Alkaline colored lakes	73/1,110	40/1,148	32/NA**

Since the long-term average colors for both Lake Harney and Lake Monroe were greater than 20 PCUs and the long-term average pHs were greater than 6.5 (**Table 3.1**), these lakes were considered alkaline colored lakes. Because no diatom data were available to the Department when this TMDL report was developed, and therefore it was impossible to determine whether the TROPH1 model fitted the condition for Lake Harney and Lake Monroe, the Department did not use the results from this technique. While the reference lake technique and LOESS regression produced relatively similar results for TN—about 1,100 mg/L for alkaline colored lakes—the TP results from these 2 techniques appeared to be different (**Table 3.4**).

Paul and Gerritsen (2002) believed that the difference could be caused by the different responses of different communities to the same nutrient concentration. They suggested that 40 µg/L of TP should be used as the target concentration, to be more conservative and to protect downstream waters. However, the Department believes that, as the LOESS regression relied heavily on the biological response to the nutrient concentration, and many factors other than nutrient concentration per se may influence the response, the results from LOESS are not as easily interpretable as the results from the reference lake technique. A large standard deviation was indeed associated with the regression curve between tLCI and TP concentration in Paul and Gerritsen's study, significantly increasing the uncertainties of these targets. Therefore, in this TMDL, only the TN and TP concentrations from the reference lake technique, which are 1.100 and 0.073 mg/L, respectively, were included as potential candidates for nutrient target development.

Table 3.5 summarizes the nutrient targets developed using different methods. The candidate TP targets ranged from 0.06 to 0.073 mg/L, and the candidate TN targets ranged from 1.10 to 1.22 mg/L. Median values were calculated based on these candidate targets and used as the final nutrient targets for Lake Monroe, Lake Harney, and the impaired Middle St. Johns River segments. The final targets for TN and TP for this TMDL are 1.18 and 0.068 mg/L, respectively. For the TP target, the method detection limit for the most commonly used method to measure TP is 0.01 mg/L. Therefore, instead of using 0.068 mg/L as the target, this report uses 0.07 mg/L as the final TP target.

Table 3.5. Summary of Nutrient Targets

Method	TN (mg/L)	TP (mg/L)
Nutrient TSI Equal to 60	1.22	0.068
Paleolimnological Studies/TN-TP Correlation	1.18	0.060
75th Percentile Reference Lake Method	1.11	0.073
Final Targets:	**1.18**	**0.068 (0.07)**

Chl*a* concentrations that could be achieved after achieving the TN and TP targets were estimated on the basis of the relationship between the annual average chl*a* and annual average nutrient concentrations shown in **Figures 3.1** and **3.2**. The achievable chl*a* concentrations for the upstream and downstream segments were calculated as the mean values between the achievable chl*a* concentrations estimated on the basis of the chl*a*-TP and chl*a*-TN relationships. These concentrations are 5.8 μg/L for the river segments above the Lake Jesup outlet and 9.1 μg/L for the river segments below the Lake Jesup outlet. They correspond to TSI_{Chla} of 42 and 48, respectively, using the TSI equation by Huber et al. (1982) for Florida lakes. Achieving these TSI values will ensure that Lake Harney and Lake Monroe and associated Middle St. Johns River segments are kept in a lower mesotrophic status and that healthy and balanced aquatic flora and fauna are maintained in these segments. **Table 3.6** summarizes the TN, TP, and chl*a* (TSI) targets for all the impaired Middle St. Johns River segments.

Table 3.6. Target Nutrient and Achievable Chl*a* Concentrations (TSI) for Impaired Middle St. Johns River Segments

WBID	TN (mg/L)	TP (mg/L)	Chl*a* or TSI
2964A	1.18	0.07	51 (TSI)
2964	1.18	0.07	5.8 μg/L
2893F	1.18	0.07	5.8 μg/L
2893E	1.18	0.07	9.1 μg/L
2893D	1.18	0.07	54 (TSI)
2893C	1.18	0.07	9.1 μg/L

3.2.2 Dissolved Oxygen

Florida's DO criterion for Class III freshwater bodies states that DO "shall not be less than 5.0 mg/L, and the normal daily and seasonal fluctuations above this level shall be maintained." However, DO concentrations in ambient waters can be affected by many factors. For example, DO solubility can be influenced by temperature and salinity. DO enrichment processes can be influenced by reaeration, which is controlled by flow velocity and water depth, and the photosynthesis of phytoplankton, periphyton, and other aquatic plants. DO consumption from the decomposition of organic materials in the water column and sediment, the oxidation of some reductants such as ammonia and metals, and respiration by aquatic organisms can all contribute to reduced DO concentrations in the water column.

The Middle St. Johns River segments receive a large quantity of dark colored water from surrounding wetlands and sandy forest lands in the immediate watershed, and also from the Upper St. Johns River and Econlockhatchee River. The DO concentration in this water in some seasons could be naturally low because of the high bacteria respiration supported by a large and constant supply of humic dissolved organic carbon (DOC). Although the major portion of the humic DOC pool is usually recalcitrant to most bacteria species, some species adapted to living in blackwater systems can readily use it to support their growth.

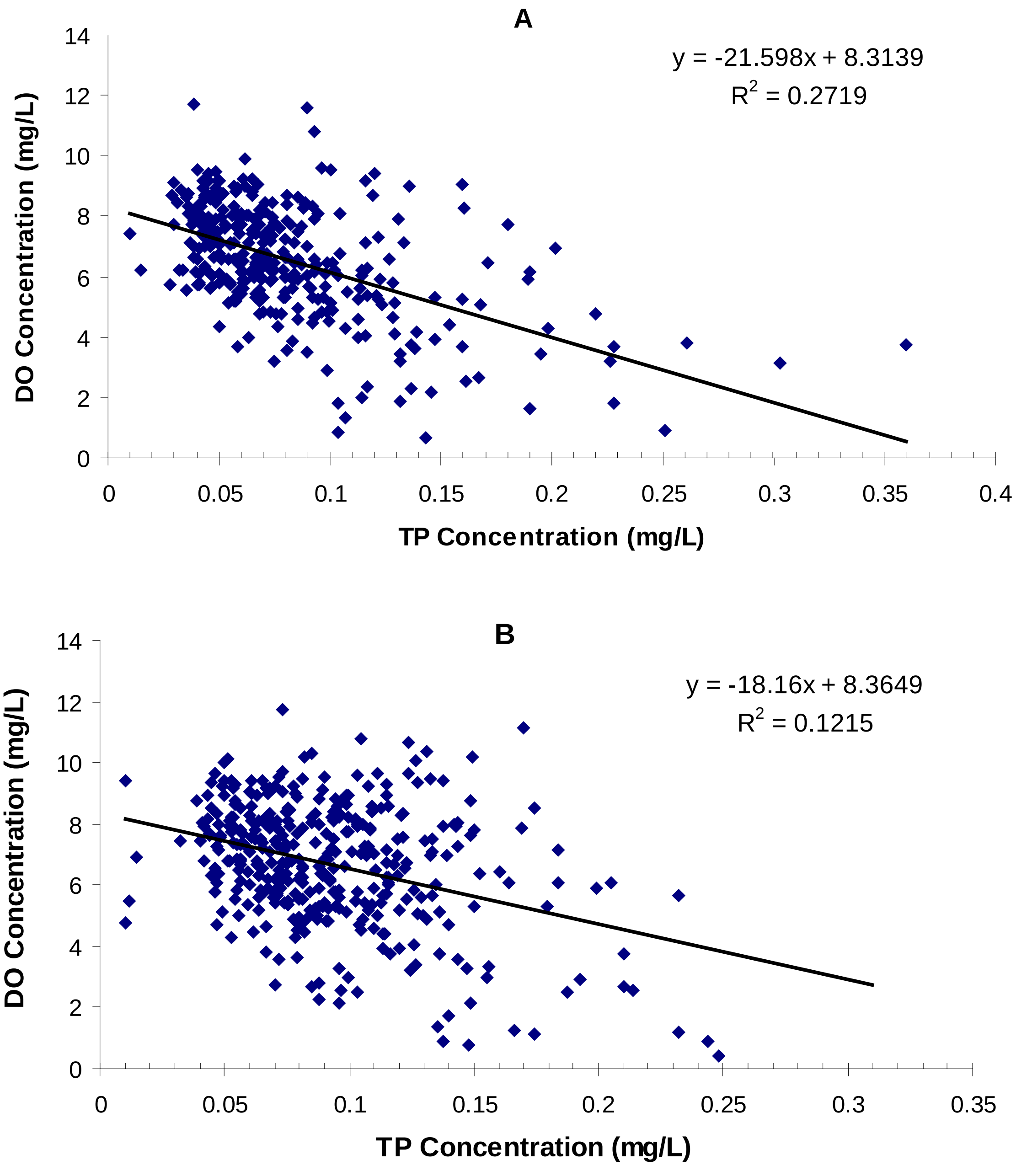
Bacterial activities can be significantly stimulated if nitrogen and phosphorus are added into the system because they provide bacteria with nutrients. The further stimulation of bacterial activities can be observed if labile DOCs, such as those released by algal populations, increase in the water column. As the algal biomass is influenced by the availability of nutrients, controlling the nutrient concentrations will indirectly control the availability of labile DOCs in the water, so that the DO depression due to the bacterial activities can be alleviated.

Another source of DO consumption may originate from the organic materials accumulated in the river floodplain and at the bottom of contributing wetlands. Due to the limited amount of time available for completing this analysis, factors that affect DO concentration in the impaired river segments were not examined by measuring directly the actual DO consumption rate from each source. Instead, TN, TP, and BOD concentrations were treated as the focus of the analysis. The possible impacts of these nutrients and organic carbon on DO levels were analyzed by examining the correlations between DO and TN, TP, and BOD concentrations.

To analyze the possible correlation between DO and nutrients and BOD, data for the period from 1996 through 2007 for all impaired river segments were retrieved from the Department's IWR database Run_35. Data for the upstream segments (WBIDs 2964A, 2964, 2893F) and downstream segments (WBIDs 2893E, 2893D, and 2893C) were aggregated into upstream and downstream analysis units and analyzed separately. Because DO concentration does not respond to the change in nutrient concentrations instantaneously, to analyze the DO and nutrient concentrations, monthly average DO and nutrient concentrations were calculated and correlation analyses were conducted based on monthly average DO and nutrient concentrations. **Figure 3.5** shows DO-TP relationships for the upstream and downstream segments, respectively, and **Figure 3.6** shows DO-TN relationships for the upstream and downstream segments, respectively.

Figures 3.5a and **3.5b** show that, for the period from 1996 through 2007, statistically significant inverse correlations between monthly average DO and TP concentrations were found in the river segments both upstream and downstream of the Lake Jesup outlet ($p<0.05$). Although the correlation coefficients were relatively low (0.27 for upstream and 0.12 for downstream), considering the number of data points involved, these correlations are biologically significant. The results indicate that, in both upstream and downstream river segments, at least to a certain extent, elevated phosphorus concentration is responsible for some observed low DO concentrations. Another interesting point is that both the slopes and intercepts were very similar

Figures 3.5a, b. Functional Relationship between DO and TP Concentrations in River Segments Upstream (a) and Downstream (b) of the Lake Jesup Confluence



between the upstream and downstream curves, suggesting that phosphorus concentration influences DO concentration in both the upstream and downstream segments in similar ways. Examining the lower edge of the data distribution also suggests that, if the monthly average TP concentration is reduced to about 0.068 mg/L, the vast majority of the monthly average DO concentration would be higher than 5.0 mg/L.

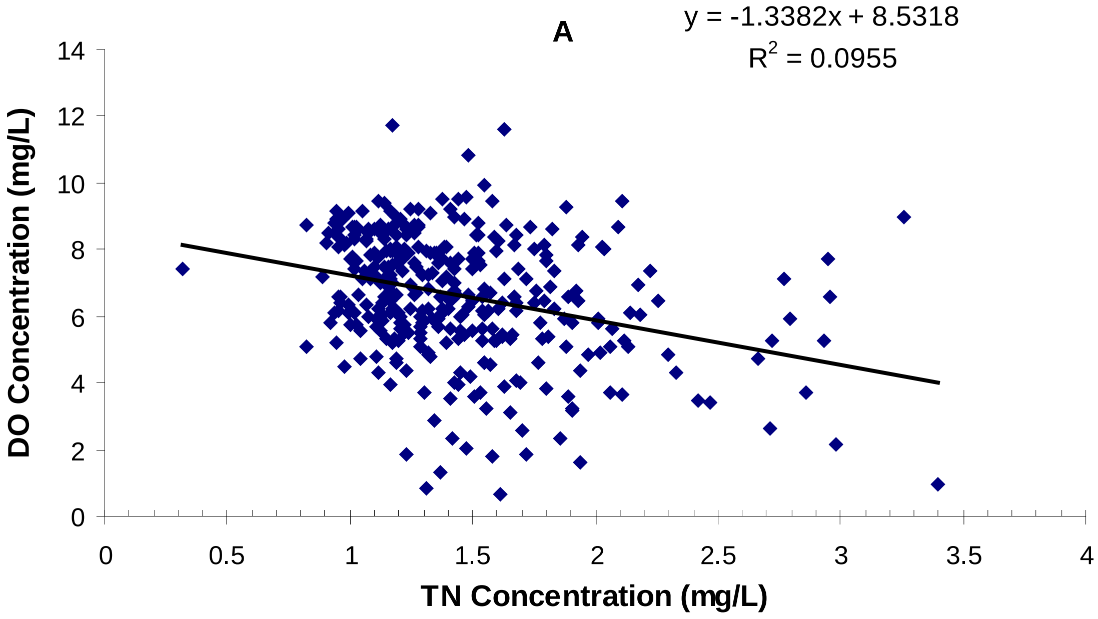
No strong correlations were observed between DO and TN concentrations. Although a statistically significant correlation was observed between DO and TN concentrations in the upstream segments, the correlation coefficient was less than 0.1. The DO and TN correlation in the downstream segments was not statistically significant (**Figures 3.6a** and **3.6b**). These results suggested that phosphorus may play a more important role than nitrogen in controlling DO concentrations in these impaired waters.

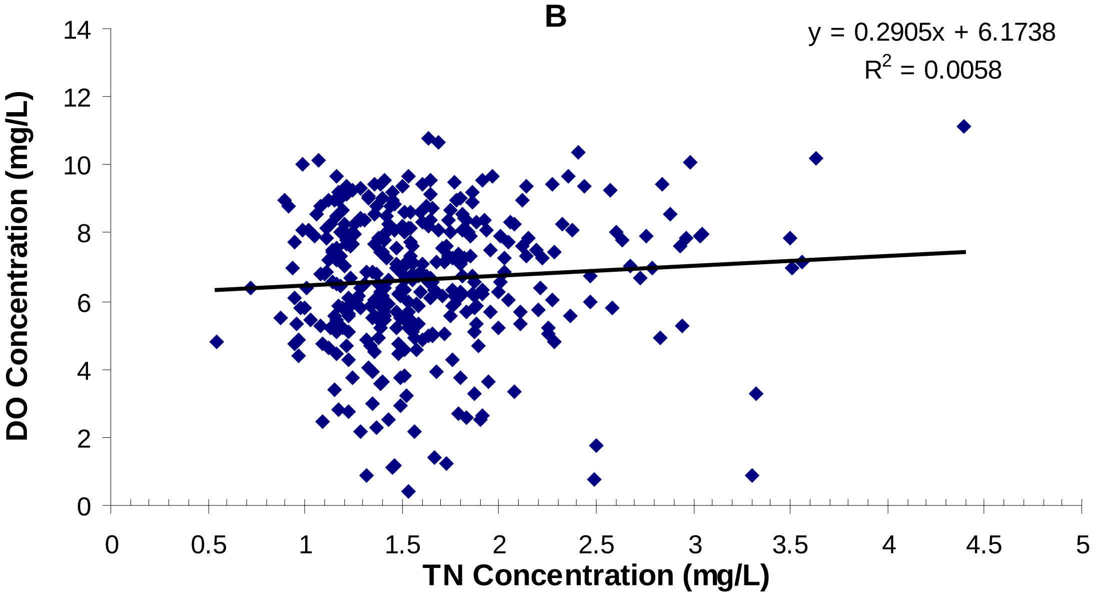
Because significant correlations indeed exist between DO and TP concentrations, and it appears that if the monthly average TP concentration can be reduced to about 0.07 mg/L, the majority of DO concentrations would be higher than 5.0 mg/L. Whether the 5.0 mg/L DO concentration can be achieved all the time in these river segments is not certain. This is because, due to the input of humic DOC from the watershed, low DO can be caused at least to a certain extent by this natural process. **Figures 3.7a** and **3.7b** demonstrate correlations between DO concentration and color in river segments both upstream and downstream of the Lake Jesup outlet. These results indicate that, while reducing TP loading into the impaired river segments may alleviate the anthropogenic impacts that caused the low DO, part of the low DO concentration in the system is a natural phenomenon and will exist even when nutrient targets are achieved.

BOD was also considered as a possible causative pollutant for observed low DO in some impaired St. Johns River segments included in this TMDL report. When TMDLs were developed for these waters, there were not enough BOD data for the type of correlation analyses conducted for nutrients. However, comparing individual BOD and chl*a* data revealed statistically significant correlations between these two parameters for river segments both upstream and downstream of the Lake Jesup outlet (**Figures 3.8a** and **3.8b**) ($p<0.05$). For river segments downstream of the Lake Jesup outlet, the variance in chl*a* concentration explained close to 80 percent of the BOD variance. This suggests that most of the BOD in these segments was most likely from the algal biomass.

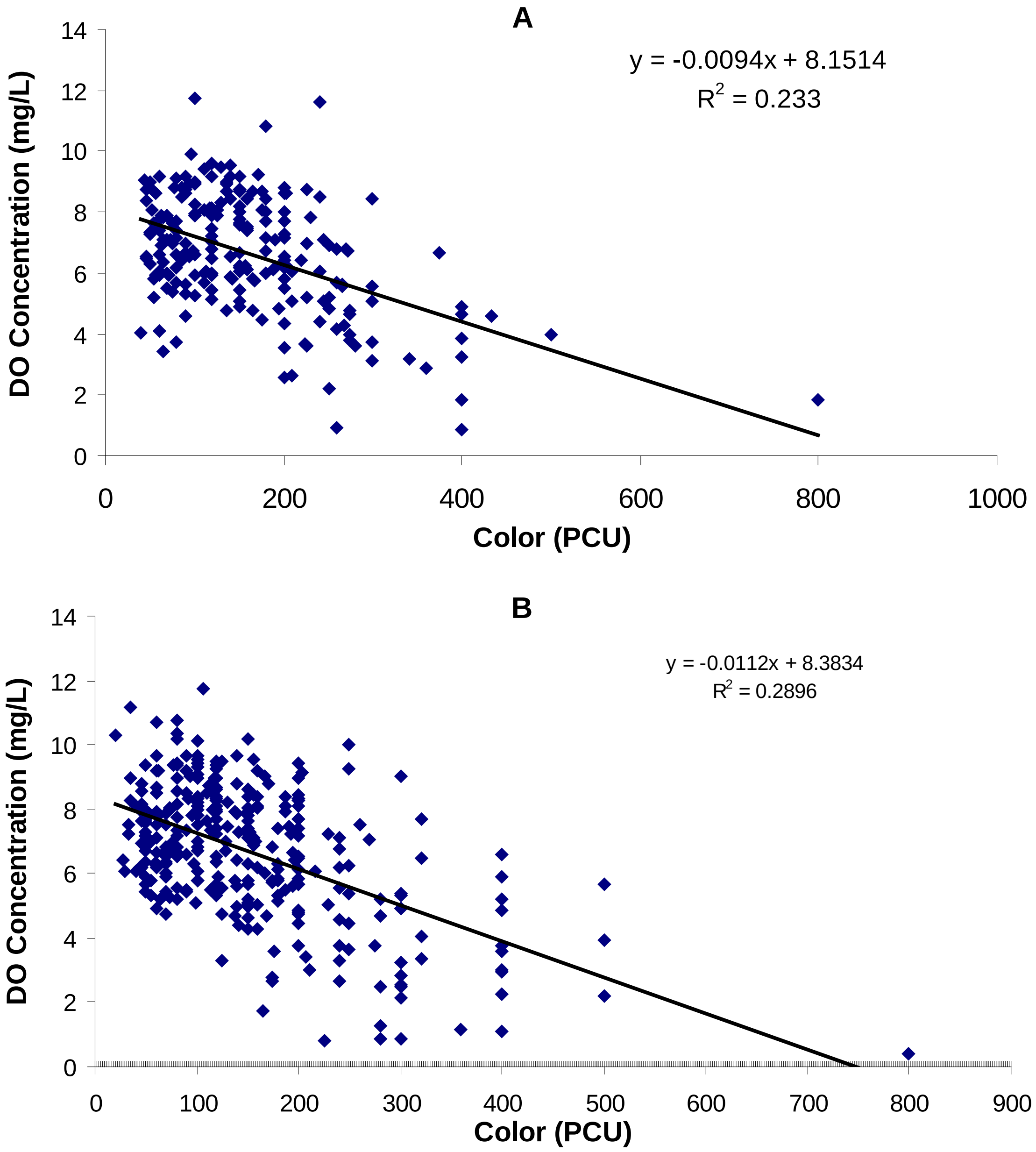
BOD concentrations in upstream segments showed a lower correlation coefficient with chl*a* concentrations ($R^2 = 0.36$). As chl*a* concentrations in the upstream segments were significantly lower than in the downstream segments, the influence of humic DOC on the BOD-chl*a* correlation may become significant. However, the BOD-chl*a* correlation, based on a combined dataset from both the upstream and downstream segments, still has a correlation coefficient of close to 75 percent (**Figure 3.8c**). This indicates that the BOD concentration in the Middle St. Johns River is controlled by algal biomass, which, in turn, suggests that as long as the nutrient concentrations in these segments are controlled, the BOD concentration and its negative impact on DO concentration will be reduced. Based on these results, this TMDL analysis focuses on controlling nutrient concentrations in the impaired river segments to restore their normal function and protect their designated uses.

Figures 3.6a, b. Functional Relationship between DO and TN Concentrations in River Segments Upstream (a) and Downstream (b) of the Lake Jesup Confluence

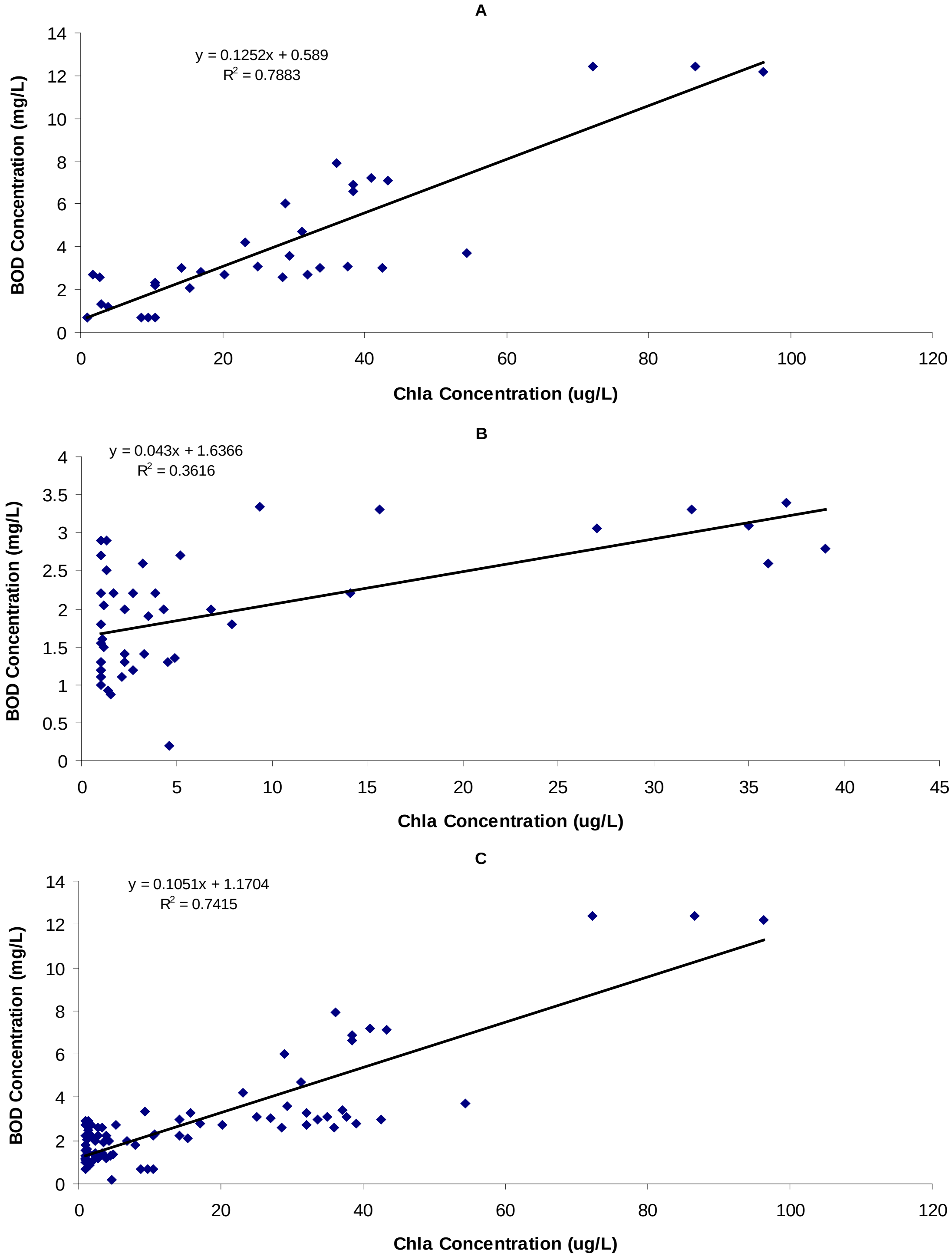




Figures 3.7a, b. Functional Relationship between DO and Color in River Segments Upstream (a) and Downstream (b) of the Lake Jesup Confluence



Figures 3.8a, b, c. Correlation between BOD and Chla Concentrations in River Segments Downstream (a) and Upstream (b) of the Lake Jesup Outlet and for a Combined Dataset from both Upstream and Downstream Segments (c)



Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of the pollutant of concern in the target watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either point sources or nonpoint sources. Historically, the term “point sources” has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term “nonpoint sources” was used to describe intermittent, rainfall-driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under the EPA’s National Pollutant Discharge Elimination System (NPDES) Program. These nonpoint sources encompassed certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix A** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term “point source” is used to describe traditional point sources (such as domestic and industrial wastewater discharges) **AND** stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL (see **Section 6.1** on Expression and Allocation of the TMDL). However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

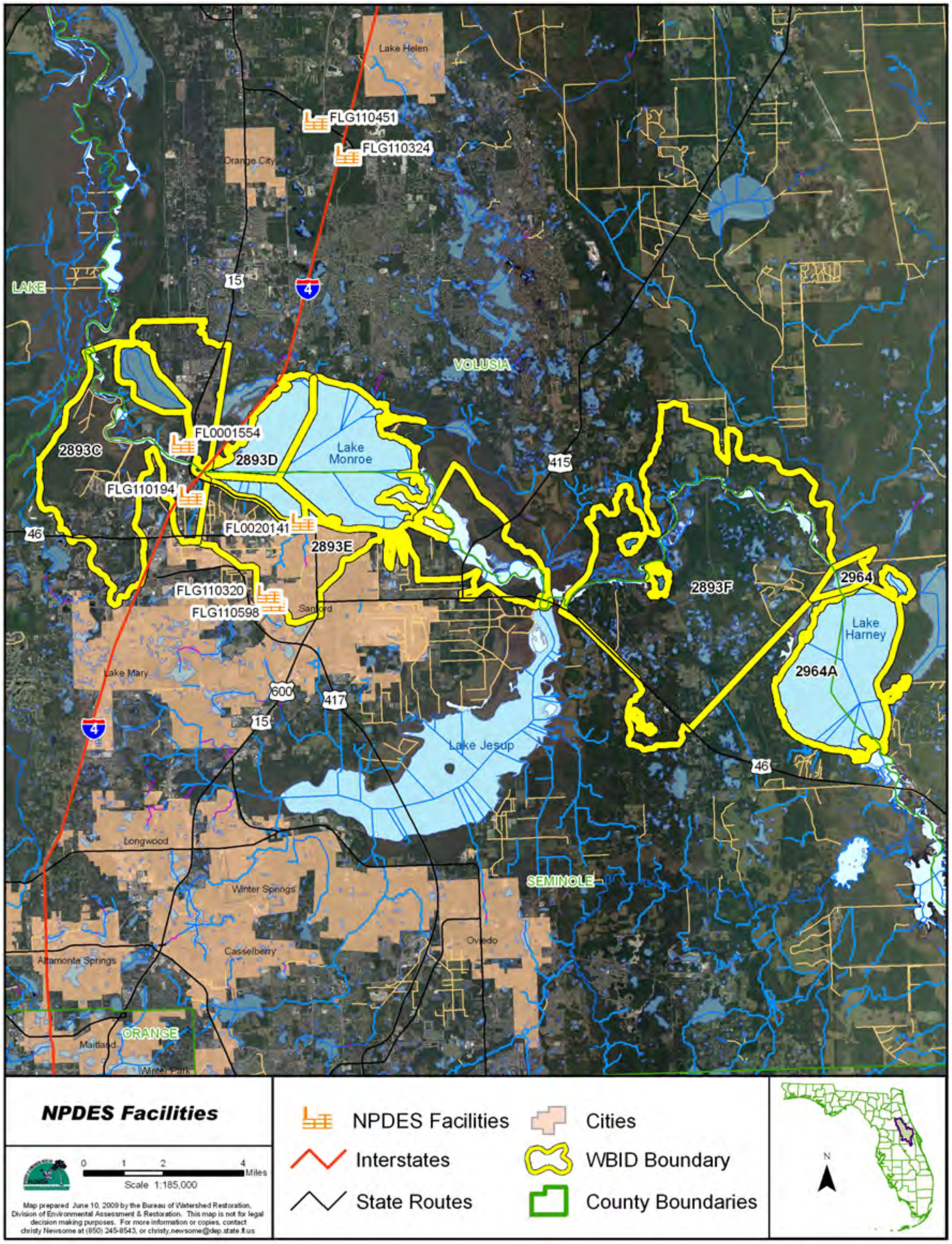
4.2 Potential Sources of Pollutants in the Middle St. Johns River Basin

4.2.1 Point Sources

4.2.1.1 Wastewater Point Sources

Seven NPDES-permitted facilities were identified in the watersheds that discharge to the part of the St. Johns River between the confluence with the Econlockhatchee River and the confluence with the Wekiva River. **Figure 4.1** shows the locations of these NPDES-permitted facilities. Five of them are concrete batch plants (CBPs): Cemex-Orange City CBP (FLG110451), Inland Materials-Deltona CBP (FLG110324), Florida Rock Industries-Sanford CBP (FLG110194), Cemex-Sanford CBP (FLG110598), and Cemex-Sanford-Lake Mary Road Ready Mix Plant (FLG110320). (It should be noted that, although FLG110451 and FLG110324 are not located within the boundary of any impaired WBID, they are located within the watershed boundary of these impaired river segments.

Figure 4.1. NPDES-Permitted Facilities Located in the Watersheds Discharging to the Impaired Middle St. Johns River Segments



Map prepared June 10, 2009 by the Bureau of Watershed Restoration, Division of Environmental Assessment & Restoration. This map is not for legal decision making purposes. For more information or copies, contact christy Newsome at (850) 245-8543, or christy.newsome@dep.state.fl.us

Section 4.2.2.1 discusses details of the difference between the WBID boundary and watershed boundary for impaired river segments. All these facilities are covered by generic permits, which require that the facilities meet certain treatment requirements but have no requirements for routine monitoring. Untreated discharges from the facilities may be high in turbidity and may also change the pH of receiving waters, but they are generally not considered significant sources of nutrients.

Other than the CBPs, a power plant, the FPL Sanford Steam Electric Power Plant (FL0001554), is located near the northern bank of WBID 2893C, downstream of Lake Monroe (950 South Highway 17-92, DeBary, FL). The facility consists of 3 fossil fuel–powered, steam electric–generating units (Units 3, 4, and 5) with nominal ratings of 150 , 400, and 400 megawatts (MW), respectively. The facility's surface discharge consists of once-through cooling water, potential cooling pond overflow and reverse osmosis reject, boiler blowdown, metal cleaning waste, industrial and nonindustrial stormwater, and tank farm diked area runoff. For now, based on its permit, the facility discharges to the St. Johns River segments downstream of Lake Monroe through its main effluent point D-001 (located approximately at Latitude: 28^{0} $50^{'}$ $29^{''}$, Longitude: 81^{0} $19^{'}$ $25^{''}$), at a discharge rate of 125,028 gallons per minute (gpm), of which 116,000 gpm are once-through cooling water, and 9,028 gpm are auxiliary equipment cooling water.

Most of the other nonstormwater internal discharges are routed to a cooling pond. Discharge from the cooling pond directly to the St. Johns River is only allowed once per year to test emergency spillway gates (the test typically lasts only about several hours), in cases of extreme rainfall events, or to prevent the loss of property or life. Approximately 5,000 gpm of water from the cooling pond, on an average annual basis, are discharged through D-001. The facility's permit does not require nutrient monitoring at D-001. No nutrient data were identified from the Department's permit compliance system (PCS) database and data monitoring report (DMR) database whe this TMDL report was developed.

Because the majority of the discharge is once-through cooling water from the St. Johns River, the facility is not considered a major nutrient contributor to the impaired river segments included in this report. The facility will be allowed to discharge to its current permit limit. However, it is recommended that the nutrient concentrations at D-001 be monitored when the facility renews its discharge permit.

A domestic WWTF, the Sanford/North WWTF (FL0020141), is located close to the northwestern bank of Lake Monroe (1201 West Seminole Boulevard, Sanford, FL) (**Figure 4.1**). Based on the permit issued, the facility has an existing 7.3-million-gallons-per-day (mgd), annual average daily flow (AADF) permitted capacity, complete mix activated sludge domestic WWTP, consisting of flow equalization, influent screening, grit removal, aeration, secondary clarification, chemical feed, filtration, chlorination, followed by dechlorination prior to surface water discharge, with sludge thickening, aerobic digestion, and the dewatering of residuals.

The facility has an existing 1.0 mgd AADF permitted discharge to the St. Johns River at D-001, located at Latitude: 28^{0} $50^{'}$ $30^{''}$, Longitude: 81^{0} $19^{'}$ $00^{''}$, east of the Highway 17-92 bridge at the outlet of Lake Monroe. Permit limits for pollutants include a limit of 12.0, 15,0, 18.0, and 24.0 mg/L for annual average, monthly average, weekly average, and single sample concentrations, respectively, for TN; and a limit of 4.0, 5.0, 6.0, and 8.0 mg/L for annual average, monthly average, weekly average, and single sample concentrations, respectively, for TP.

The majority of the treated wastewater from the facility is routed to a slow-rate public access reuse system (R-001) consisting of 1,800 irrigated acres as well as the facility's other reuse service area. The existing permitted capacity for reuse is about 7.14 mgd AADF with an anticipated future reuse capacity of 12.08 mgd AADF.

Table 4.1 lists the annual TN and TP loadings from the facility. The flow, BOD, TN, and TP concentration data used in estimating the annual loading were retrieved from the Department's PCS database. To calculate the annual loadings, monthly loadings were first calculated by multiplying the monthly discharge rate for each month by the monthly average pollutant concentration. Monthly average loadings were then aggregated into annual loadings. The period of record used for the annual loading estimation is 1996 through 2007. Long-term average annual loadings were calculated for the period from 1996 through 2007, as well as the period from 1997 through 2003. The long-term average loadings calculated using the latter period were produced to compare with the nonpoint source loading simulated for the period from 1997 through 2003 by the SJRWMD (Dr. Y. Jia, personal communication).

Table 4.1. Annual TN, TP, and BOD Loadings from the Sanford/North WWTF

[1] Mean (VP) represents the long-term average annual loading for the verified period (2000–2007).
[2] Mean (HSPF) represents the long-term average annual loading for the modeling period (1997–2003) for the HSPF Model set up by the SJRWMD.

Year	TN Annual Loading (lbs/year)	TP Annual Loading (lbs/year)
1996	49,889	4,847
1997	18,026	2,099
1998	18,004	1,606
1999	7,269	729
2000	8,020	560
2001	33,914	4,056
2002	54,096	6,009
2003	60,358	7,683
2004	46,229	6,016
2005	86,655	12,996
2006	8,203	1,375
2007	8,244	1,614
Mean (VP)[1]	**38,215**	**5,039**
Mean (HSPF)[2]	**28,527**	**3,249**

4.2.1.2 Municipal Separate Storm Sewer System Permittees

Like other nonpoint sources of pollution, urban stormwater discharges are associated with land uses and human activities, and are driven by rainfall and runoff processes leading to the intermittent discharge of pollutants in response to storms. The 1987 amendments to the Clean Water Act designated certain stormwater discharges from urbanized areas as point sources requiring NPDES stormwater permits. In October 2000, the EPA authorized the Department to implement the NPDES Stormwater Program in all areas of Florida, except for tribal lands. The Department's authority to administer the NPDES Program is set forth in Section 403.0885, F.S.

The three major components of the NPDES stormwater regulations are as follows:

(1) ***Municipal Separate Storm Sewer System (MS4) Permits*** *that are issued to entities that own and operate master stormwater systems, primarily local governments. Permittees are required to implement comprehensive stormwater management programs designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable.*

(2) ***Stormwater Associated with Industrial Activities,*** *which is regulated primarily by a multisector general permit that covers various types of industrial facilities. Regulated industrial facilities must obtain NPDES stormwater permit coverage and implement appropriate pollution prevention techniques to reduce the contamination of stormwater.*

(2) ***Construction Activity Generic Permits*** *for projects that ultimately disturb one or more acres of land and that require the implementation of stormwater pollution prevention plans to provide erosion and sediment control during construction.*

In addition to the NPDES stormwater construction permitting regulations, Florida was the first state in the country to require the treatment of stormwater for all new developments with the adoption of the state Stormwater Rule in late 1981. The Stormwater Rule is a technology-based program that relies on the implementation of best management practices (BMPs) designed to achieve a specific level of treatment (i.e., performance standards), as set forth in Rule 62-40, F.A.C. In 1994, state legislation created the Environmental Resource Permitting Program to consolidate stormwater quantity, stormwater quality, and wetlands protection into a single permit. Currently, the majority of Environmental Resource Permits are issued by the state's five water management districts, although the Department continues to do the permitting for specified projects.

The NPDES Stormwater Program was implemented in phases, with Phase I MS4 areas including municipalities having a population above 100,000. Because the master drainage systems of most local governments in Florida are interconnected, the EPA implemented Phase 1 of the MS4 Permitting Program on a countywide basis, which brings in all cities, Chapter 298 urban water control districts, and the Florida Department of Transportation (FDOT) throughout the 15 counties meeting the population criteria. Phase II of the NPDES Program was expanded in 2003 and requires stormwater permits for construction sites between 1 and 5 acres, and for local governments with as few as 10,000 people.

Although MS4 discharges are technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility. All Phase 1 MS4 permits issued in Florida include a reopener clause allowing permit revisions for implementing TMDLs once they are formally adopted by rule. Florida's Phase II MS4 Generic Permit has a "self-implementing" requirement once TMDLs are adopted that requires the MS4 permittee to update its stormwater management program (as needed) to meet its TMDL allocations.

Table 4.2 lists the counties, cities, and FDOT districts with MS4 permits influenced by TMDLs in the Middle St. Johns River Basin.

Table 4.2. MS4 Permittees Affected by TMDLs in the Middle St. Johns River Basin

MS4 Permit Phase	Permit Name	Permit Number	County
I	Seminole County	FLS000038	Seminole
I	City of Lake Mary	FLS000038	Seminole
I	City of Sanford	FLS000038	Seminole
II	FDOT Turnpike District	FLR04E049	Multiple
II	FDOT District 5	FLR04E024	Multiple
II	Brevard County	FLR04E052	Brevard
II	Lake County	FLR04E106	Lake
II	Volusia County	FLR04E033	Volusia
II	City of DeBary	FLR04E120	Volusia
II	City of Deltona	FLR04E099	Volusia
II	City of Lake Helen	FLR04E125	Volusia

4.2.2 Nonpoint Sources

Other than the TN and TP loadings from NPDES-permitted point sources, the majority of nutrient loadings are generated from nonpoint sources in the watershed. Major nonpoint sources may include, but are not limited to, loadings through surface runoff, ground water, and atmospheric deposition directly onto the surface of receiving waters. Pollutant loadings produced through these processes are primarily driven by weather, especially rainfall. In a specific watershed, the percent imperviousness of the land cover, especially the percent imperviousness directly connecting to the receiving water, determines the hydrology and pollutant loadings into the receiving water. In residential areas where septic tanks are the major way to dispose of domestic wastewater, failed septic tanks elevate pollutant loadings into the receiving water. In both urban and agricultural areas where structural or nonstructural BMPs are applied, pollutant loadings can be reduced either at the source or retained in areas downgradient of the source before they enter the receiving water.

In developing TMDLs for the impaired St. Johns River segments covered in this report, pollutant loading production and attenuation through all these processes were simulated using a Hydrologic Simulation Program–Fortran (HSPF) Model set up and calibrated by the SJRWMD (Dr. Y. Jia, personal communication). HSPF (Bicknell et al., 2004), developed and maintained by Aqua Terra and the EPA, is a comprehensive package that can be used to develop a combined watershed and receiving water model. It can simulate various species of nitrogen and phosphorus, chl*a*, BOD, coliform bacteria, metals, and DO concentrations in receiving waters. The model has three major modules, as follows, that simulate pollutant loadings from the watershed and in-water transport of the pollutants and their effects on chl*a* and DO concentrations:

- *The PERLND Module performs a detailed analysis of surface and subsurface flow for pervious land areas based on the Stanford Watershed Model. This model simulates watershed hydrology through examining the processes starting from rain precipitation, canopy intercept, storage, and evaporation; land surface depression storage and evaporation; infiltration; upper-zone and lower-zone storage and evapotranspiration; interflow and baseflow; the loss of water to deep ground water storage; and the formation of surface runoff. Several model parameters, including* *the lower zone storage nominal (LZSN, defining the maximum storage capacity of the lower zone of the model domain), upper-zone storage nominal (UZSN, defining the maximum storage capability of the upper zone of the model domain), lower-zone evapotranspiration potential (LZETP, defining the lower-zone evapotranspiration potential), and infiltration (INFILT, defining the infiltration rate of the soil), are the key parameters that control the total amount of runoff created in the watershed. In addition, the watershed flow-path slope (SLSUR), the roughness of the land surface (NSUR), and ground water recession rate (AGWRC) are parameters that may significantly influence the hydrograph.*

Water quality constituents can be simulated by the HSPF using different methods. Sediment in pervious land runoff is simulated by examining sediment detachment during rainfall events and reattachment during dry periods, with the potential for washoff during runoff events. For other water quality constituents, watershed loadings are simulated as the sum of the loadings through surface runoff, interflow, and baseflow. The surface runoff loadings are usually simulated by examining the buildup and wash-off rates of the water quality constituents. Loadings through interflow and baseflow are simulated by multiplying the model-simulated inflow and baseflow by user-defined concentrations of water quality constituents in the interflow and baseflow. In addition, runoff loadings can be determined using the "potency factor," which relates constituent washoff to sediment loadings created in the watershed. In this TMDL analysis, the surface loadings of water quality constituents were simulated using the buildup and wash-off method.

- *The IMPLND Module analyzes hydrology and water quality constituent loadings in impervious areas of the watershed. This module only simulates the surface hydrology and pollutant loadings contributed to the receiving water through surface runoff. It does not consider subsurface processes. The hydrology of the watershed's impervious areas is primarily determined by the surface depression storage (RETSC), flow-path slope (SLSUR), roughness of the land surface (NSUR), and evaporation. Buildup and wash-off algorithms are used to determine pollutant loadings through surface runoff.*

- *The RCHRES Module is used to simulate flow routing and water quality in receiving waters, which are assumed to be one-dimensional. It receives the flow and water quality constituents simulated by the PERLND and IMPLND Modules and simulates the flow velocity, water depth, and kinetics of water quality constituents in the receiving water. The RCHRES simulates the following:*

  - Sedimentation;
  - Resuspension;
  - Sediment release;
  - Uptake by algae (which turns inorganic nutrients into the organic form);
  - Death and decay of algal cells (which turn organic nutrients back to inorganic forms);
  - Nitrification (which turns ammonia into nitrate);
  - Denitrification (which turns nitrate into nitrogen gas and causes the nitrogen to be lost to the atmosphere);
  - Atmospheric deposition directly onto the surface of the receiving water; and
  - Output of nutrients into the downstream segments.

> *In addition, the RCHRES Model considers the impacts of light availability, temperature, and flow velocity on the growth and death of algae, which significantly influence nutrient dynamics in the receiving water.*

More detailed descriptions of the HSPF Model and the functions of different modules can be obtained from Bicknell et al. (2004). Detailed model parameters for the HSPF Model can be obtained from its UCI file (**Appendix B**).

The HSPF Model used several types of data to simulate nonpoint source loadings, including basin delineation and boundary condition; land uses; estimated pollutant loadings from septic tanks, ground water, and direct atmospheric deposition; the attenuation of pollutant loads by BMPs; and rainfall and other meteorological data.

4.2.2.1 Basin Delineation and Boundary Condition

The SJRWMD provided the delineation of the watersheds draining to the impaired Middle St. Johns segments. For this TMDL report, the model domain only includes the watershed adjacent to the impaired waterbodies. Pollutant loadings entering these impaired waterbodies from the Upper St. Johns River, Econlockhatchee River, and Lake Jesup were treated as boundary conditions for the HSPF Model. Boundary loadings were estimated based on the measured flow and pollutant concentrations.

It should be noted that the watersheds and sub-basin delineations used by the SJRWMD for HSPF modeling were different from the WBID boundaries that the Department used to conduct a water quality assessment. As WBID boundaries do not necessarily reflect the actual watershed, in this TMDL analysis, the SJRWMD boundaries were used for the HSPF modeling.

The HSPF Model domain includes two major basins: the Lake Harney Basin and the Lake Monroe Basin. The entire model domain includes 19 sub-basins, based on the stream network and topography of the watershed, of which 11 and 8 sub-basins were delineated for the Lake Harney and Lake Monroe Basins, respectively. **Figure 4.2** shows the delineation of the two major basins, the sub-basin delineations in each major basin, and the directions of the flow between sub-basins. The figure also shows the WBID boundaries used by the Department for water quality assessment purposes. Based on **Figure 4.2**, the six impaired WBIDs were aggregated into four HSPF sub-basins: Sub-basin 8 (WBID 2964A), Sub-basin 11 (WBIDs 2964 + 2893F), Sub-basin 15 (WBIDs 2893E + 2893D), and Sub-basin 20 (WBID 2893C).

4.2.2.2 Land Uses

A geographic information system (GIS) land use map for the areas covered in the model domain was obtained from the SJRWMD GIS database. The land use information was created primarily based on aerial photographs taken in 1999 and 2000. The SJRWMD identified over 100 different land use classes in the watershed based on the Florida Land Use Classification Code Sysem (FLUCCS). For modeling purposes, these were aggregated into 13 major land uses following the Land Use Classification Table developed by the SJRWMD's engineering division (Bergman, 2004). The consolidation of the original land use classes was mainly based on similarities in hydrologic properties and nutrient loadings. **Tables 4.3a** and **4.3b** and **Figure 4.3** show the distribution of these aggregated land uses in the model domain. **Appendix C** shows the relationship between the HSPF land use classification and FLUCCS code.

Figure 4.2. HSPF Model Basin and Sub-basin Delineations and Flow Direction

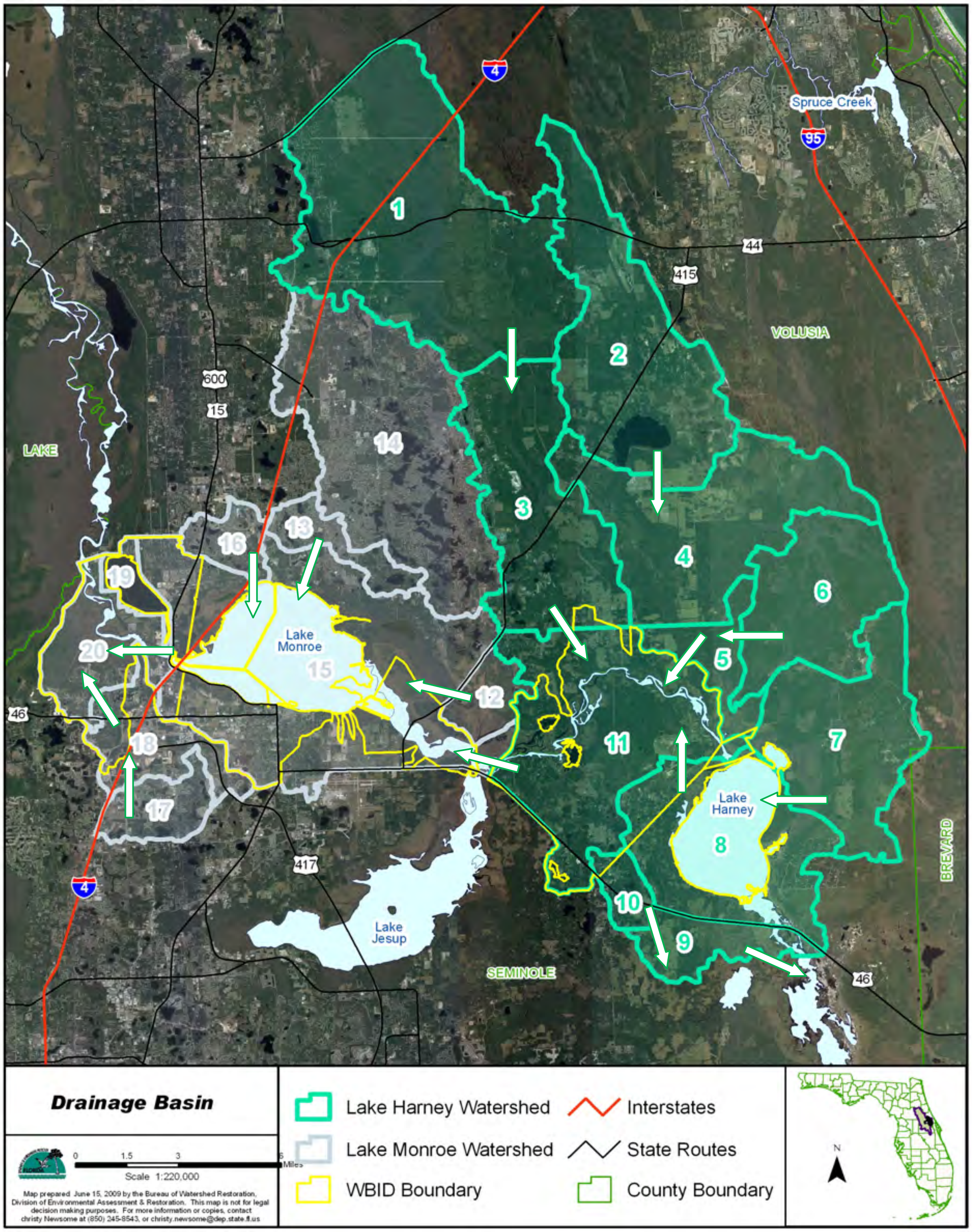
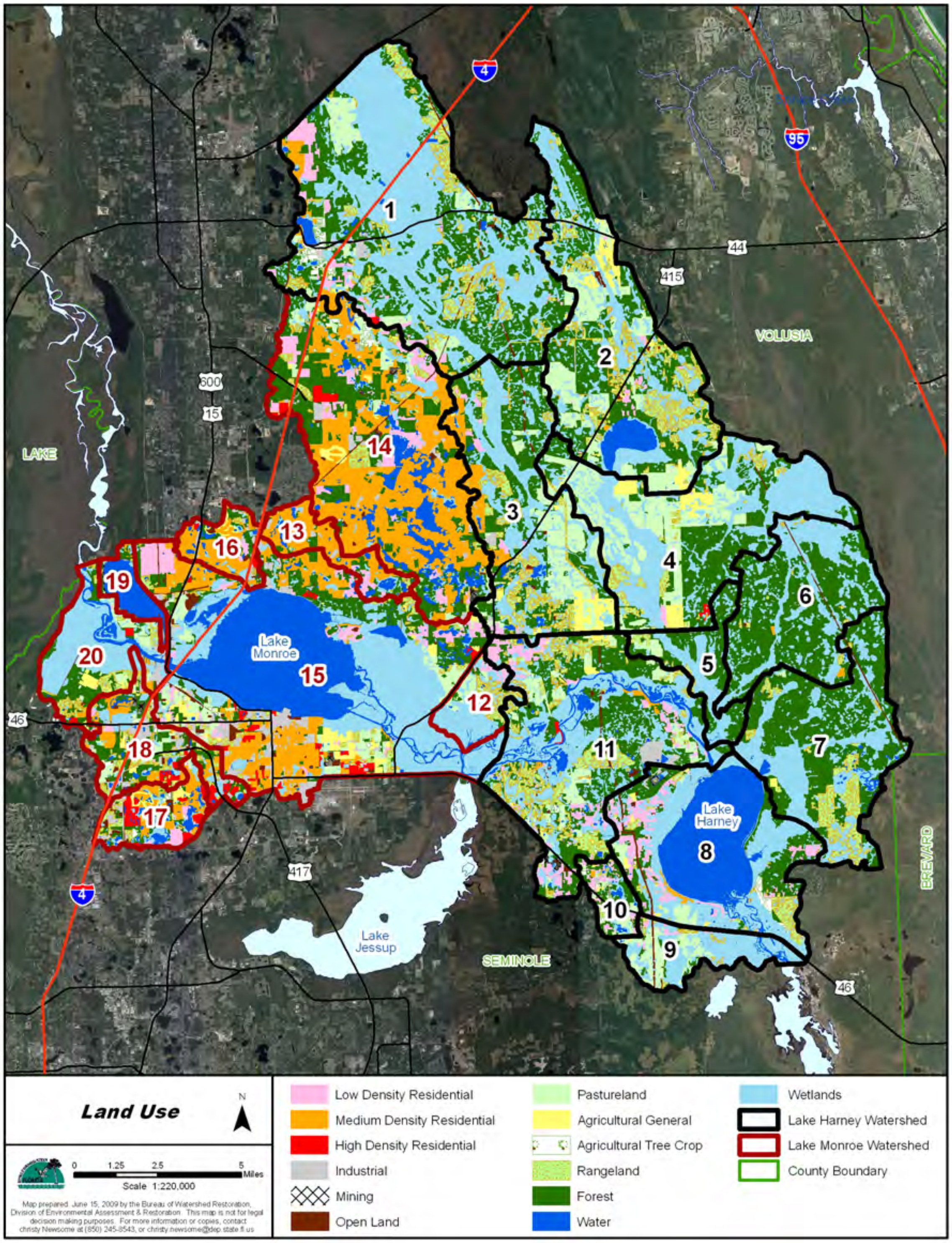


Figure 4.3. Land Use Distribution in the HSPF Model Domain



Map prepared June 15, 2009 by the Bureau of Watershed Restoration, Division of Environmental Assessment & Restoration. This map is not for legal decision making purposes. For more information or copies, contact christy Newsome at (850) 245-8543, or christy.newsome@dep.state.fl.us

Table 4.3a. Land Use Distribution in the Lake Harney Basin to WBIDS 2964, 2964A, and 2893F

Land Use	Acreage	% Distribution
Agricultural General	2,524	2%
Agricultural Tree Crop	975	1%
Forest	47,905	33%
High-Density Residential	123	0%
Industrial	1,154	1%
Low-Density Residential	5,254	4%
Medium-Density Residential	2,070	1%
Mining	223	0%
Open Land	1,069	1%
Pasture	14,164	10%
Rangeland	13,624	9%
Water	632	0%
Wetland	55,389	38%
Total:	**145,106**	**100%**

Table 4.3b. Land Use Distribution in the Lake Monroe Basin to WBIDs 2893E, 2893D, and 2893C

Land Use	Acreage	% Distribution
Agricultural General	1,699	2%
Agricultural Tree Crop	625	1%
Forest	13,132	18%
High-Density Residential	1,926	3%
Industrial	4,489	6%
Low-Density Residential	4,653	7%
Medium-Density Residential	19,977	28%
Mining	358	1%
Open Land	1,398	2%
Pasture	3,777	5%
Rangeland	4,462	6%
Water	1,247	2%
Wetland	13,637	19%
Total:	**71,380**	**100%**

Based on **Tables 4.3a** and **4.3b**, the watersheds that discharge to Lake Harney (WBID 2964A) and its downstream segments (WBIDs 2964 and 2893F), excluding the watersheds for the Upper St. Johns River and the Econlockhatchee River, comprise about 145,106 acres. The watersheds that discharge to the impaired river segments downstream of Lake Jesup, including Lake Monroe (WBIDs 2893E, 2893D, and 2893C), are about 71,380 acres. In the Lake Harney Basin, natural land uses, including open land, forest, water, and wetland, occupy about 72 percent of the area. Urban land uses, including low-, medium-, and high-density residential and industrial, only account for about 6 percent of the total area. In contrast, urban land uses in the Lake Monroe Basin comprise about 43 percent of the total area—significantly higher than the Lake Harney Basin. Natural land uses account for about 41 percent of the Lake Monroe Basin, with the remaining 15 percent occupied by agriculture, mining, pastureland, and rangeland.

Percent impervious area of each land use category is a very important factor that controls the quantity and quality of the flow created from a watershed. Nonpoint pollution monitoring studies throughout the United States over the past 15 years have shown that annual “per acre” discharges of urban stormwater pollution are positively related to the amount of imperviousness in land use (WMM User’s Manual 4.1, 1998). It should be noted that the impervious area percentages do not necessarily represent directly connected impervious area (DCIA), which is the area directly connected to the drainage network with no opportunity for infiltration. Using a single-family residence as an example, rain falls on rooftops, sidewalks, and driveways. The sum of these areas may represent 30 percent of the total lot. However, much of the rain that falls on the roof drains to the grass and infiltrates to the ground or runs off the property, and thus does not run directly to the street.

For the TMDLs covered in this report, only the DCIAs were modeled as impervious areas. The impervious areas that were not DCIAs were aggregated into the pervious land areas for model simulation. The following four land use types were considered to have DCIAs: low-, medium-, and high-density residential, and industrial. Percent impervious areas for each land use were assigned based on previous modeling experience in the St. Johns River Basin and finalized through the hydrology calibration. **Tables 4.4a** and **4.4b** show the percent areas that were considered impervious in the HSPF Model setup by the SJRWMD.

Table 4.4a. Percent DCIA of Different Land Use Classes in the Lake Harney Basin Draining to WBIDs 2964, 2964A, and 2893F

Land Use	Impervious Land (acres)	Pervious Land (acres)	% Impervious
Agricultural General	0	2,524	0%
Agricultural Tree Crop	0	975	0%
Forest	0	47,905	0%
High-Density Residential	74	49	60%
Industrial	904	250	78%
Low-Density Residential	508	4,746	10%
Medium-Density Residential	693	1,377	33%
Mining	0	223	0%
Open Land	0	1,069	0%
Pasture	0	14,164	0%
Rangeland	0	13,624	0%
Water	0	632	0%
Wetland	0	55,389	0%
Total:	**2,179**	**142,927**	**2%**

Table 4.4b. Percent DCIA of Different Land Use Classes in the Lake Monroe Basin Draining to WBIDs 2893E, 2893D, and 2893C

Land Use	Impervious Land (acres)	Pervious Land (acres)	% Impervious
Agricultural General	0	1,699	0%
Agricultural Tree Crop	0	625	0%
Forest	0	13,132	0%
High-Density Residential	1,016	910	53%
Industrial	3,474	1,015	77%
Low-Density Residential	403	4,250	9%
Medium-Density Residential	6,526	13,451	33%
Mining	0	358	0%
Open Land	0	1,398	0%
Pasture	0	3,777	0%
Rangeland	0	4,462	0%
Water	0	1,247	0%
Wetland	0	13,637	0%
Total:	**11,419**	**59,961**	**16%**

4.2.2.3 Estimated Pollutant Loadings from Septic Tanks

Septic tanks, failed or functioning, may also contribute pollutant loadings to the receiving water. Wastewater from failed septic tanks, especially those very close to the receiving waters (within 50 feet) (Dr. Y. Jia, personal communication), may be considered as contributing untreated wastewater directly to the receiving water. The majority of pollutant loadings from functioning septic tanks, when properly installed, can be removed through the physical, biological, and biochemical processes in the septic tanks and drain fields. However, some pollutant species, such as nitrate, which has high solubility in water and low absorption capability to soil particles, can still enter ground water and impact the water quality of surface waters through ground water-surface water interaction. Therefore, when simulating nonpoint source loadings from a watershed, the contribution from septic tanks should be carefully considered.

The number of failing septic tanks in the area was estimated on the basis of the reported septic tank repairs in Seminole County and Volusia County. The number of annual repairs in Seminole County ranged from 339 to 570 between 1997 and 2002 (Florida Department of Health [FDOH], 2004, http://www.doh.state.fl.us/Environment/ostds/statistics/ostdsstatistics.htm). To account for the possibility that not all failing septic tanks in the county were reported and repaired, this analysis used the high end of the reported range as the average number of failing septic tanks in Seminole County. It was assumed that these failing septic tanks were distributed evenly in residential areas (including low-, medium-, and high-density residential). The total residential area in Seminole County is 60,511 acres, based on 2000 land use coverage obtained from the SJRWMD. The average number of failing septic tanks per acre of residential area was calculated as $570 / 60{,}511 \approx 0.00942$ per acre in Seminole County. Using the above procedure, the calculated average number of failing septic tanks per acre of residential area in Volusia County is 0.01198 per acre.

Pollutant contributions from these failing septic tanks were modeled in two ways, depending on their proximity to the stream networks in the Lake Harney and Lake Monroe Basins. For septic tanks located more than 50 feet from streams and lakes, pollutant loadings were simulated implicitly and were lumped with the nonpoint pollutant loadings from residential areas. The septic tanks within 50 feet of streams and lakes were considered direct pipes discharging untreated wastewater to the stream network. These direct pipes were modeled as point sources in HSPF.

In the Lake Harney Basin, there are 57 acres of residential areas in Seminole County and 35 acres of residential areas in Volusia County within 50 feet of the stream network. The number of estimated direct pipes in the Lake Harney Basin is $0.00942 \times 57 + 0.01198 \times 35 \approx 1$. This direct pipe was assigned to Sub-basin 11 in the Lake Harney Basin. In the Lake Monroe Basin, there are 99 acres of residential land use in Seminole County and 174 acres of residential in Volusia County within 50 feet of the stream network. The number of estimated direct pipes in the Deep Creek watershed was $0.00942 \times 99 + 0.01198 \times 174 \approx 3$. These were assigned to 3 sub-basins (Sub-basins 14, 15, and 17) in the Lake Monroe Basin. **Figure 4.4** shows the sub-basins to which the direct pipe discharge from septic tanks was assigned.

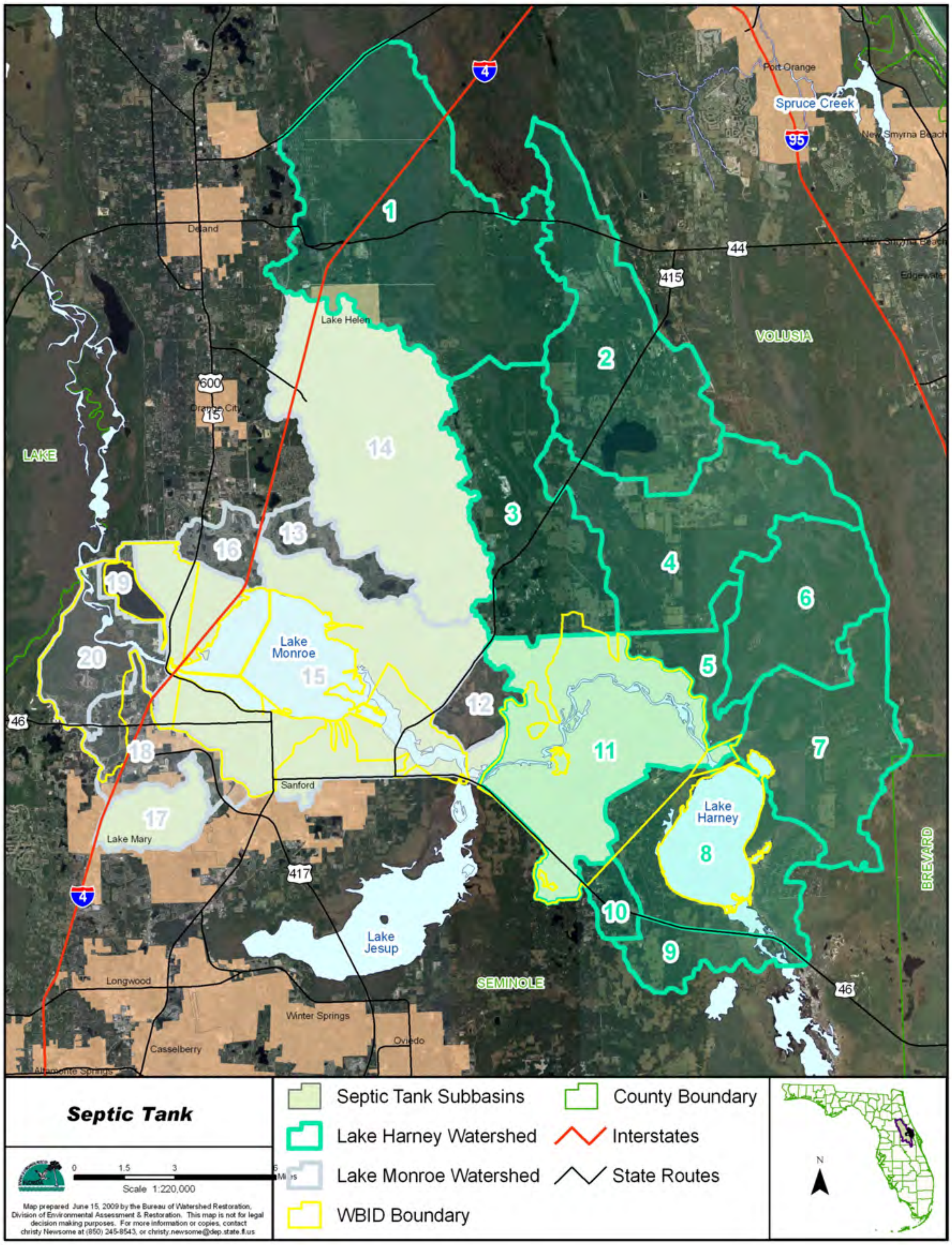
According to the EPA (1980), the per capita flow rate from a failing septic tank is about 7.18×10^{5} cfs. The average number of persons per household is 2.59 in Seminole County and 2.32 in Volusia County (U.S. Census Bureau, 2000, http://quickfacts.census.gov/qfd/states/12/12117.html). Because the majority of residential areas are located in Seminole County, this analysis uses the average number of persons per household in Seminole County. The estimated flow rate from a failing septic tank is $7.18\times10^{-5} \times 2.59 = 1.86\times10^{-4}$ cfs. Pollutant concentrations of the effluent of failed septic tanks were assumed to equal the average concentration measurements in Florida compiled by Parsons Engineering Science (2000). **Table 4.5** shows the average pollutant concentrations used in this analysis. It was assumed that the effluent flow rate and pollutant concentrations were constant over the simulation period.

Table 4.5. Pollutant Concentrations of Failing Septic Tank Effluent

[1] According to Parsons Engineering Science (2000), average measured BOD_5 = 141 mg/L. This analysis assumes that BOD = 2.5 BOD_5.
[2] This analysis treats TN loads from septic tanks as nitrate (NO_3) loads.
[3] This analysis treats TP loads from septic tanks as orthophosphate (PO_4) loads.

Parameters	Concentration (mg/L)
BOD[1]	352.5
TN[2]	39.0
TP[3]	11.0

Figure 4.4. Sub-basins to Which Direct Pipe Discharges from Septic Tanks Were Assigned



4.2.2.4 Pollutant Loadings through Ground Water

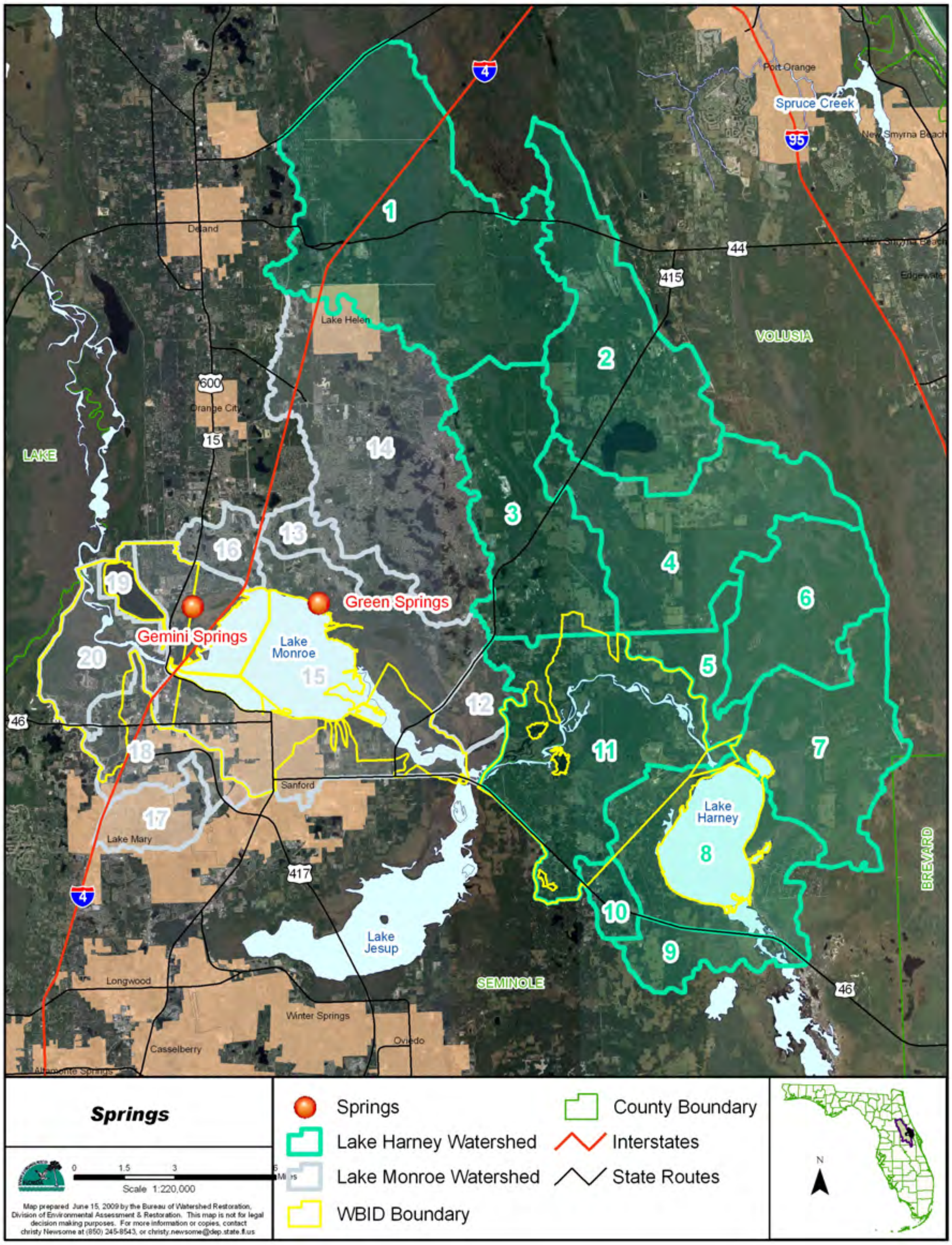
Part of the rainfall reaching the land surface infiltrates into the ground and becomes ground water. In the HSPF Model, the infiltration fills soil water storage, depending on the storage nominal capacity of different soil and land use combinations, leaves the system through evapotranspiration, and reaches deep ground water. The remaining portions of the infiltration become interflow (from the upper zone of the soil) and baseflow (from the lower zone of the soil) and eventually discharge to surface water. The way in which the SJRWMD set up the HSPF Model requires user-defined pollutant concentrations for interflow and baseflow in order to calculate pollutant loadings through ground water flow. These concentrations were defined in the model based on previous modeling experience (Jia, 2008). The contributions of pollutant loadings from ground water were estimated as the product of pollutant concentrations and interflow or baseflow volume.

It should be noted that the HSPF Model is not a ground water model and does not explicitly simulate ground water flow that is not created from rainfall onto the watershed. However, ground water input created from the area beyond the watershed can sometimes be significant. This is usually demonstrated through a large gap between the model-simulated stream flow and measured stream flow, even when related model parameters are adjusted to their empirical extremes, and there is nothing wrong with the rainfall and evapotranspiration measurements.

In this case, regional ground water input can be added into the HSPF Model as a point source time series or boundary condition. For this TMDL analysis, two Floridan aquifer springs, Gemini Springs (second magnitude) and Green Springs (third magnitude), were identified; these springs are located on the north shore of Lake Monroe and discharge into the lake. The SJRWMD and USGS have collected discharge and water quality data for these springs. Based on the statistics published by the SJRWMD (http://sjr.state.fl.us/springs/volusia/index.html), Gemini Springs had a long-term average discharge rate of 10.0 cfs (1996–2005), a nitrate and nitrite concentration of 0.95 mg/L (1995–2005), and a TP concentration of 0.08 mg/L (1996–2005). Of the 0.08 mg/L of TP, about 0.06 mg/L is orthophosphate. Green Springs had a long-term average discharge rate of 1.40 cfs (1932–2005), a nitrate and nitrite concentration of 0.04 mg/L, and a TP concentration of 0.08 mg/L. Of the 0.08 mg/L of TP, 0.07 mg/L is orthophosphate. Contributions of nitrogen and phosphorus from these springs were added into the HSPF Model as two point source time series, which discharge directly to Lake Monroe. **Figure 4.5** shows the location of Gemini Springs and Green Springs.

The Floridan aquifer contribution by upwelling through fractures or faults in the aquifer could be another source of nutrients. Based on the Department's assessment (2005), the portion of the Middle St. Johns River included in this report has relatively high salinity (as high as 1.44 practical salinity units [PSUs]). This indicates a contribution from the Floridan aquifer, because the salt is considered trapped relict seawater or deeper, brackish water that entered the Floridan aquifer when high sea levels inundated large portions of the Florida peninsula. However, when this TMDL report was written, no data were available to quantify the contribution from this source. The SJRWMD's HSPF Model balanced the hydrology without considering the Floridan aquifer as a source. While this approach tends to overestimate the loading from the watershed, it adds a margin of safety (MOS) to the TMDL (discussed in detail in Chapter 6).

Figure 4.5. Locations of Gemini Springs and Green Springs



4.2.2.5 Pollutant Loadings through Direct Atmospheric Deposition onto the Receiving Waters

Atmospheric deposition is another source of pollutants to receiving waters. In HSPF modeling, the atmospheric deposition to the land surface was implicitly simulated as part of the nonpoint source loadings from the watershed. The direct atmospheric deposition onto the surface of streams and lakes was modeled explicitly. In HSPF, direct atmospheric deposition was treated in two different ways, depending on the form of the available data. If the deposition was in the form of a flux (mass per area per time), it was considered dry deposition. If the deposition was in the form of rainfall concentration, it was considered wet deposition, and the model automatically combines it with the input rainfall time series to compute the resulting flux.

The SJRWMD's HSPF Model simulates both wet and dry deposition. For the wet deposition, the model assumed that only inorganic forms of nitrogen and phosphorus are contributed from atmospheric deposition. Ammonia (NH_4) and nitrate (NO_3) concentrations of wet deposition were assumed to be the observed mean values, 0.25 and 1.08 mg/L, based on data collected from Site F32 of the National Atmospheric Deposition Program (http://nadp.sws.uiuc.edu) in Orlando, Florida. The orthophosphate (PO_4) concentration of wet deposition was assumed to be 0.009 mg/L, which is the same concentration of the wet deposition for TP estimated by Brezonik et al. (1983). Inorganic nitrogen and phosphorus dry deposition rates were assumed to be 150 milligrams per square meter per year ($mg/m^2/yr$)of nitrogen and 20 $mg/m^2/yr$ of phosphorus, respectively. These values were equal to the TN and TP dry deposition rates for the Lake Apopka area. The model also assumed that the inorganic nitrogen dry deposition contained 75 percent of NO_3 and 25 percent of NH_4 (Dr. S. Brandt-Williams, SJRWMD, personal communication). The above-average concentrations were assumed to be constant through different seasons in the HSPF Model.

4.2.2.6 Attenuation of Pollutant Loads by BMPs

This analysis also considered the attenuation of pollutant loadings by BMPs implemented in the basins. The BMP information for the Lake Harney and Lake Monroe Basins came from a GIS mapping analysis by Huang et al. (2007) that estimated the spatial distribution of several major BMPs across the entire St. Johns River Basin. Because of the lack of information regarding the nonstructural BMPs, only structural BMPs were considered in this TMDL analysis. Different BMPs in the watersheds were aggregated into three major types: swale, dry detention pond, and wet detention pond. **Tables 4.6a** and **4.6b** list the acreage and percent acreage of different land uses in the Lake Harney and Lake Monroe Basins, respectively, that are served by each of these BMPs. **Figure 4.6** shows the spatial distribution of BMP treatment areas in the Lake Harney and Lake Monroe Basins.

Due to the lack of detailed information regarding the structure and removal efficiencies of each individual BMP in the modeled basins, the pollutant attenuation effects from these structural BMPs were modeled at the sub-basin level in the HSPF Model by treating the BMPs as water segments located between the basin and final receiving water. **Table 4.7** lists the pollutant removal efficiencies for the structural BMPs. These removal efficiencies were mainly based on the median values of the reported ranges (EPA, 1999; Center for Watershed Protection, 2000; Camp Dresser McKee [CDM], 2002).

Table 4.6a. Acreages of Different Land Uses Served with BMPs in the Lake Harney Basin (WBIDs 2964A, 2964, and 2893F)

- = Empty cell/no data

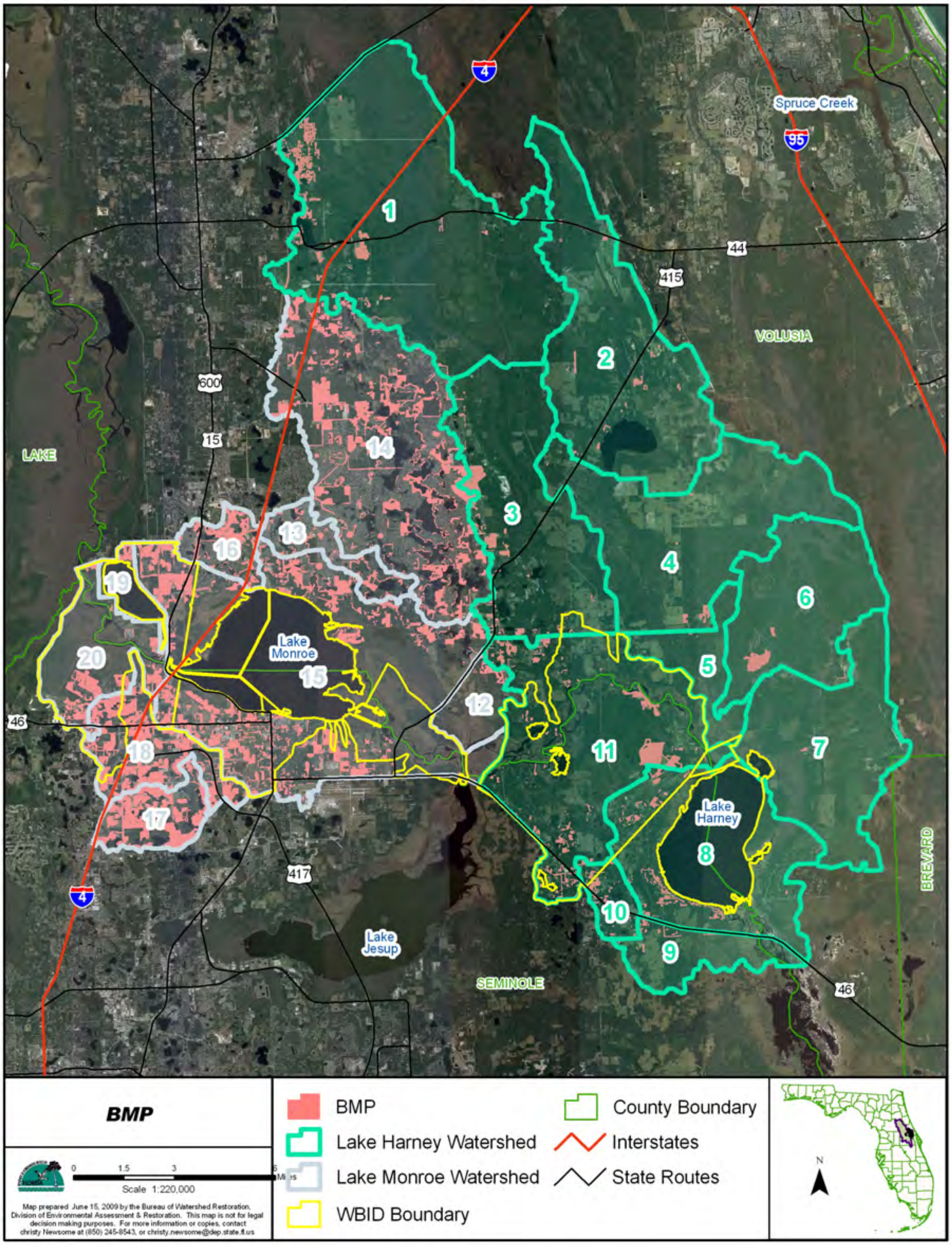
Land Use	Dry Pond	Wet Pond	Swale	No BMP	Subtotal	% Areas Served with BMPs
Agricultural General	-	-	-	2,524	2,524	0.0%
Agricultural Tree Crop	16	3	-	956	975	1.9%
Forest	-	-	-	47,848	47,905	0.1%
High-Density Residential	3	49	-	71	123	42.3%
Industrial	148	554	154	298	1,154	74.2%
Low-Density Residential	339	633	-	4,282	5,254	18.5%
Medium-Density Residential	272	491	-	1,364	2,070	34.1%
Mining	2	18	-	203	223	9.0%
Open Land	-	-	-	1,069	1,069	0.0%
Pasture	2	12	9	14,141	14,164	0.2%
Rangeland	6	-	-	13,618	13,624	0.0%
Water	-	-	-	632	632	0.0%
Wetland	-	-	-	55,389	55,389	0.0%
Total:	**788**	**1,760**	**163**	**142,395**	**145,106**	**1.9%**

Table 4.6b. Acreages of Different Land Uses Served with BMPs in the Lake Monroe Basin (WBIDs 2893E, 2893D, 2893F)

- = Empty cell/no data

Land Use	Dry Pond	Wet Pond	Swale	No BMP	Subtotal	% Areas Served with BMPs
Agricultural General	62	342	-	1,295	1,699	23.8%
Agricultural Tree Crop	118	27	-	480	625	23.2%
Forest	-	-	-	12,431	13,132	5.3%
High-Density Residential	818	542	3	563	1,926	70.8%
Industrial	868	1,022	291	2,308	4,489	48.6%
Low-Density Residential	1,998	611	-	2,745	4,653	41.0%
Medium-Density Residential	3,394	1,488	6	15,089	19,977	24.5%
Mining	8	29	-	321	358	10.3%
Open Land	123	-	-	1,281	1,398	8.4%
Pasture	172	280	16	3,309	3,777	12.4%
Rangeland	176	-	-	4,286	4,462	3.9%
Water	-	-	-	1,247	1,247	0.0%
Wetland	-	-	-	13631	13,637	0.0%
Total:	**7,737**	**4,341**	**316**	**58,986**	**71,380**	**17.4%**

Figure 4.6. Spatial Distribution of BMPs in the HSPF Model Domain



Map prepared June 15, 2009 by the Bureau of Watershed Restoration, Division of Environmental Assessment & Restoration. This map is not for legal decision making purposes. For more information or copies, contact christy Newsome at (850) 245-8543, or christy.newsome@dep.state.fl.us

Table 4.7. Pollutant Removal Efficiencies Used in the HSPF Model (percent)

[1] In the HSPF Model, BOD is used as a pool for organic nitrogen (N) and organic phosphorus (P). The model derives the amount of organic N and organic P based on available BOD and user-defined model parameters (Bicknell et al., 2004).

Pollutant	Dry Detention Pond	Wet Detention Pond	Swale
Total Suspended Solids (TSS)	50%	80%	80%
Total Ammonia	5%	25%	15%
Nitrate + Nitrite	5%	25%	15%
PO_4	20%	55%	30%
BOD[1]	20%	35%	30%

4.2.2.7 Rainfall and Other Meteorological Data

Rainfall is the driving force of the hydrologic processes in all watersheds. For this TMDL analysis, the SJRWMD used hourly Next Generation Radar (NEXRAD) rainfall data from OneRain, Inc. The OneRain NEXRAD rainfall data have a resolution of 2 by 2 kilometers, and the spatial range of the data covers the entire SJRWMD area. The SJRWMD developed a GIS tool, Radar Rainfall Tool Version 6.0, to calculate the areal radar rainfall for a particular watershed. This analysis used the tool to extract the hourly radar rainfall time series for all 20 sub-basins in the HSPF Model domain for the Lake Harney and Lake Monroe Basins. The period of record for NEXRAD rainfall was January 1, 1995, to December 31, 2006. **Table 4.8** lists the annual average NEXRAD rainfall for the Lake Harney and Lake Monroe Basins for this period.

Table 4.8. Annual Rainfall (inches) for the Lake Harney and Lake Monroe Basins for the Period of Record, 1995–2006

Year	Lake Harney Basin	Lake Monroe Basin
1995	46.9	50.8
1996	55.0	52.7
1997	44.8	44.4
1998	43.7	41.4
1999	50.7	48.9
2000	25.8	27.7
2001	51.5	45.3
2002	56.7	56.4
2003	48.4	46.1
2004	62.0	56.7
2005	61.3	59.6
2006	36.9	35.1
Mean	**48.6**	**47.1**

Besides rainfall, the HSPF Model also requires seven other meteorological time series for the model simulation: evaporation, air temperature, wind speed, solar radiation, potential evapotranspiration, dew point temperature, and cloud cover. To collect these meteorological data, weather stations in and around the Lake Harney and Lake Monroe Basins were analyzed for their types of data collected, length of record, and missing data. **Table 4.9** lists the weather stations used in this analysis. The weather data from these stations were obtained from the SJRWMD.

Table 4.9. Major Weather Stations in or near the Econlockhatchee River Watershed

[1] The original LISBON pan evaporation data after 2000 are problematic because they are significantly lower than their historical averages. These low readings were corrected by David Clapp of the SJRWMD. This analysis uses the corrected data.

Station Name	Location	Data Type	Period of Record	Time Interval
LISBON[1]	Lisbon	Pan Evaporation	1/1/1960–Present	Daily
ORLANDO	Orlando International Airport	Wind Speed Air Temperature Dew Point Temperature Cloud Cover	5/7/1952–6/30/1996 for Cloud Cover; 5/7/1952–12/31/2002 for others	Hourly
S61W	Lake Tohopekeliga	Solar Radiation	10/20/1992–Present	Daily

This analysis assumed that the potential evaporation from the water surface equals the potential evapotranspiration in the watershed. The potential evaporation was estimated by applying a pan coefficient to the pan evaporation data from LISBON. An annual pan coefficient of 0.78 was used, resulting in an estimated long-term (1960–2005) average potential evaporation rate of 47.4 inches per year (in/yr). This estimate was close to the estimated average potential evaporation rate of 46 to 48 in/yr for the area by Tibbals (1990). For missing records in a given time series, the long-term daily averages for the period of record were calculated and substituted into the missing time series. Whenever daily data (instead of hourly data) were available for a given time series, the daily data were disaggregated using the WDMUtil Program.

4.2.2.8 Model Calibration

1. Hydrology Calibration and Validation

Measured flow data were needed for hydrology calibration and validation. Three USGS gaging stations were identified in the St. Johns River segments in the HSPF Model domain: 02234500 (St. Johns River near Sanford, FL), 02234440 (St. Johns River at State Highway 415 near Sanford, FL), and 02234010 (St. Johns River of Osceola, FL). Another USGS gage, 02234100 (Deep Creek near Osteen, FL), was identified in Deep Creek, which discharges to the main stem of the St. Johns River immediately downstream of the Lake Harney outlet.

Two of the main stem stations, 02234440 and 20034010, had periods of record starting in 2005 that did not cover the period for HSPF Model simulation (October 1,1995, through September 30, 2003). Therefore, these two stations were not used for the hydrology calibration. The period of record for Gage 02234500 covered the entire period for HSPF Model simulation. The USGS collected flow data at the Deep Creek gage from October 1, 1964, to September 30, 1998. The SJRWMD took over the gage in 1998 and has collected flow measurements since then. **Figure 4.7** shows the locations of the gaging stations identified in the HSPF Model domain. Hydrology calibrations were based on the flow data from Gages 02234500 and 02234100.

Figures 4.8a, **4.8b**, and **4.8c** show the correlation between the model-simulated and measured flow, a comparison of the flow duration curves for simulated and measured flow, and a direct comparison of simulated and measured flows, respectively, at Gage 02234500. **Figures 4.9a**, **4.9b**, and **4.9c** show the correlation between the model-simulated and measured flow, a comparison of the flow duration curves for simulated and measured flows, and a direct comparison of simulated and measured flows, respectively, at Gage 02234100.

Based on **Figures 4.8** and **4.9**, reasonable flow calibrations were achieved at both Gages 02234500 and 02234100. A comparison of the flow duration curves of simulated and measured flows indicated that the model overestimates the flow at Gage 02234500 when the flow is low. This could be caused by reverse flow in the Middle St. Johns River resulting from strong winds. HSPF does not simulate the reverse flow condition. At the Deep Creek gage (02234100), the model again overestimated flow under the low-flow condition. According to SJRWMD staff, depending on the regional rainfall pattern, flow from the main stem of the Middle St. Johns River could block the flow from Deep Creek or could even enter the creek, causing reverse flow in the creek. However, the overall percentage of blocked or reverse flow was not high. Model simulations matched the measured flow reasonably well at this station.

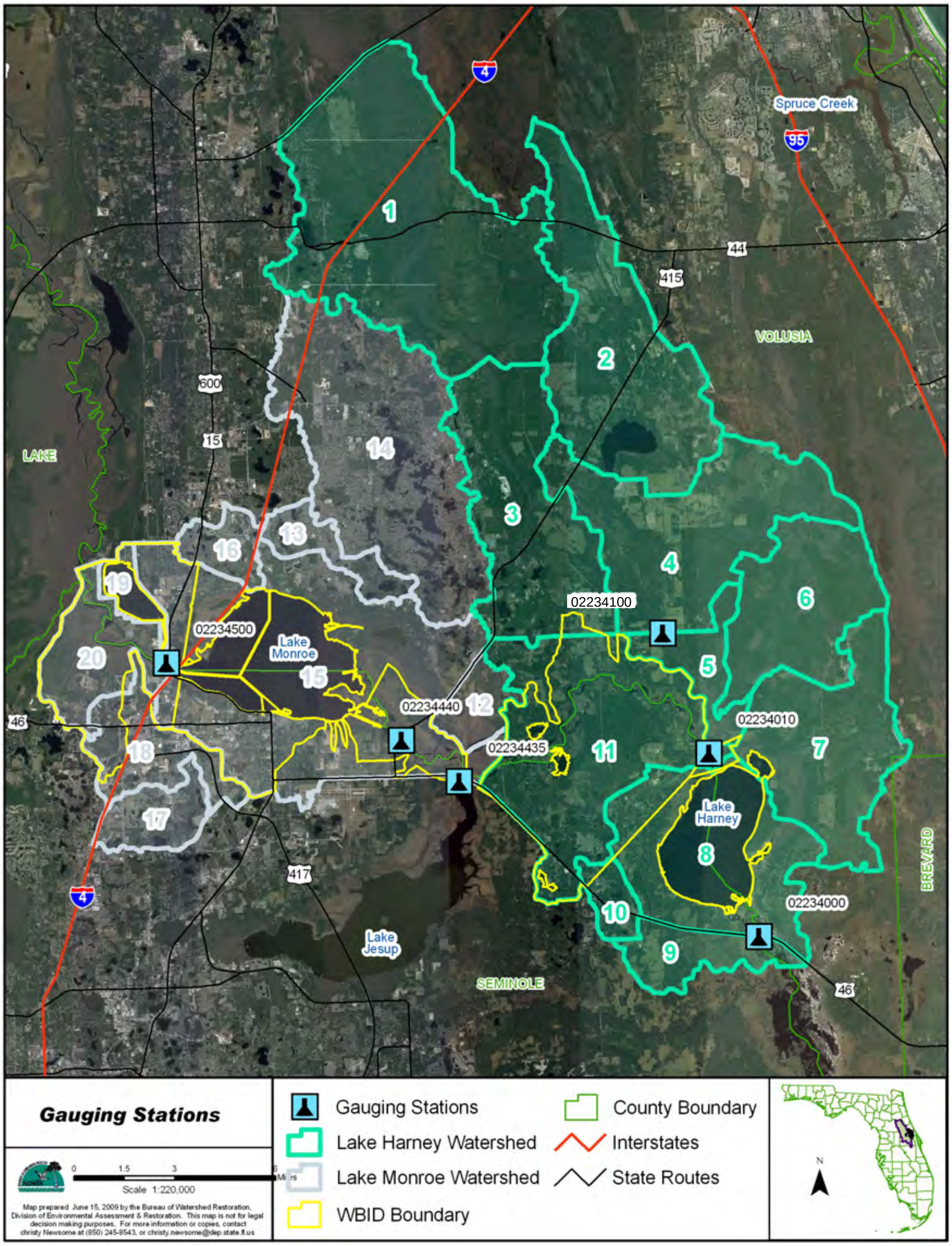
2. Water Quality Calibration and Validation

When the water quality components of the HSPF Model were calibrated, the SJRWMD only used the water quality data collected by the agency itself. The periods of record at some water quality stations did not cover the entire model simulation period; therefore, only part of the model simulations was used for model calibration purposes.

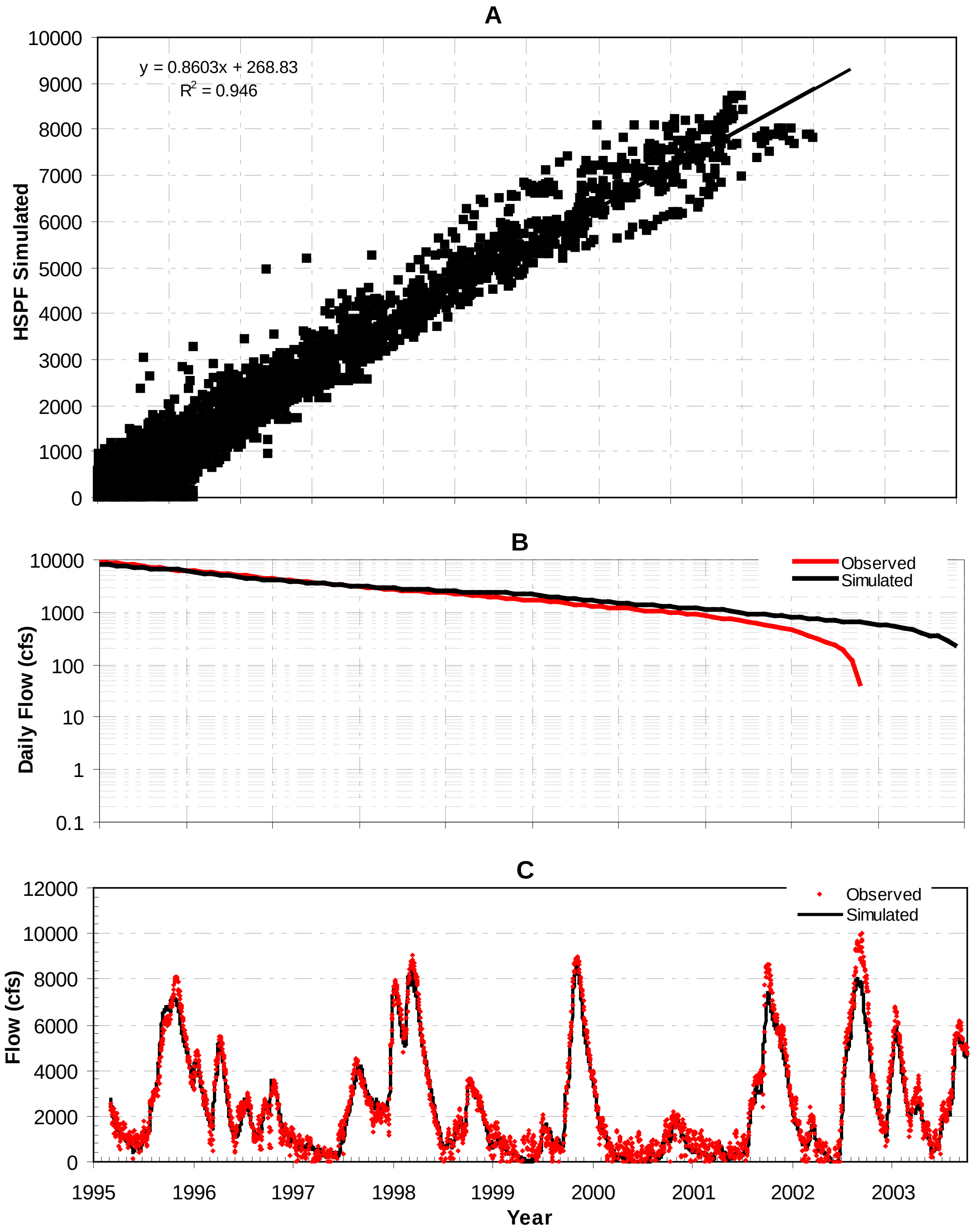
As discussed in **Section 4.2.2.1**, when the SJRWMD set up the HSPF Model, the watershed delineations used for the modeling were different from the WBID boundaries used by the Department for water quality assessment purposes. Because the basin delineation reflected the actual basin areas that contribute to the impaired waters, this report used the basin delineations created by the SJRWMD for TMDL development purposes.

In addition, several WBIDs were aggregated into the receiving water segments in the SJRWMD's HSPF Model, designated as sub-basins or HSPF RCHRES in the model. For example, WBIDs 2964 and 2893F were aggregated into RCHRES 11 (St. Johns River above Lake Jesup), and WBIDs 2893E and 2893D were aggregated into RCHRES 15 (Lake Monroe plus the St. Johns River segment above Lake Monroe).

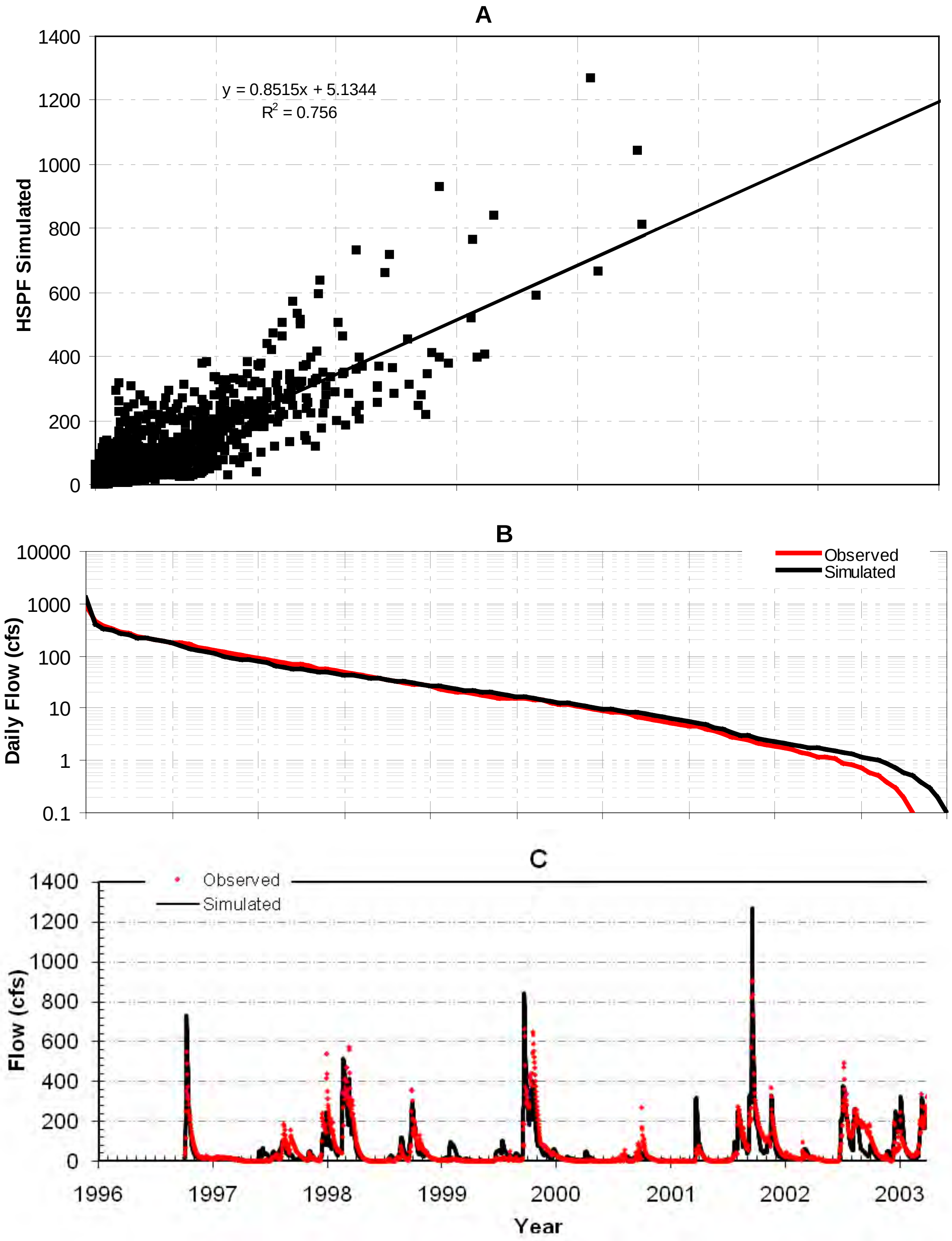
Figure 4.7. Location of USGS Stations in the HSPF Model Domain



Figures 4.8a, b, c. Flow Calibration Results for USGS Gage 02234500 (St. Johns River near Sanford, FL)



Figures 4.9a, b, c. Flow Calibration Results for USGS Gage 02234100 (Deep Creek Near Osteen, FL)



For model calibration purposes, the water quality stations located in these aggregated RCHRES were also aggregated into the same water quality data pool, and the stations with the longest periods of record were used for the water quality calibration for each aggregation. **Table 4.10** shows the HSPF Model RCHRES, WBID numbers, the water quality stations used for the water quality calibration, and the periods of record for these stations. **Figure 4.10** shows the locations of the water quality stations used for the model calibration. **Figures 4.11** through **4.14** show the calibration results for TN and TP concentrations for the impaired St. Johns River segments included in this TMDL report. As shown in **Figures 4.11** through **4.14**, except for some extreme observed values, the HSPF Model generally predicts the range and trend of TN and TP concentrations in the impaired Middle St. Johns River segments reasonably well.

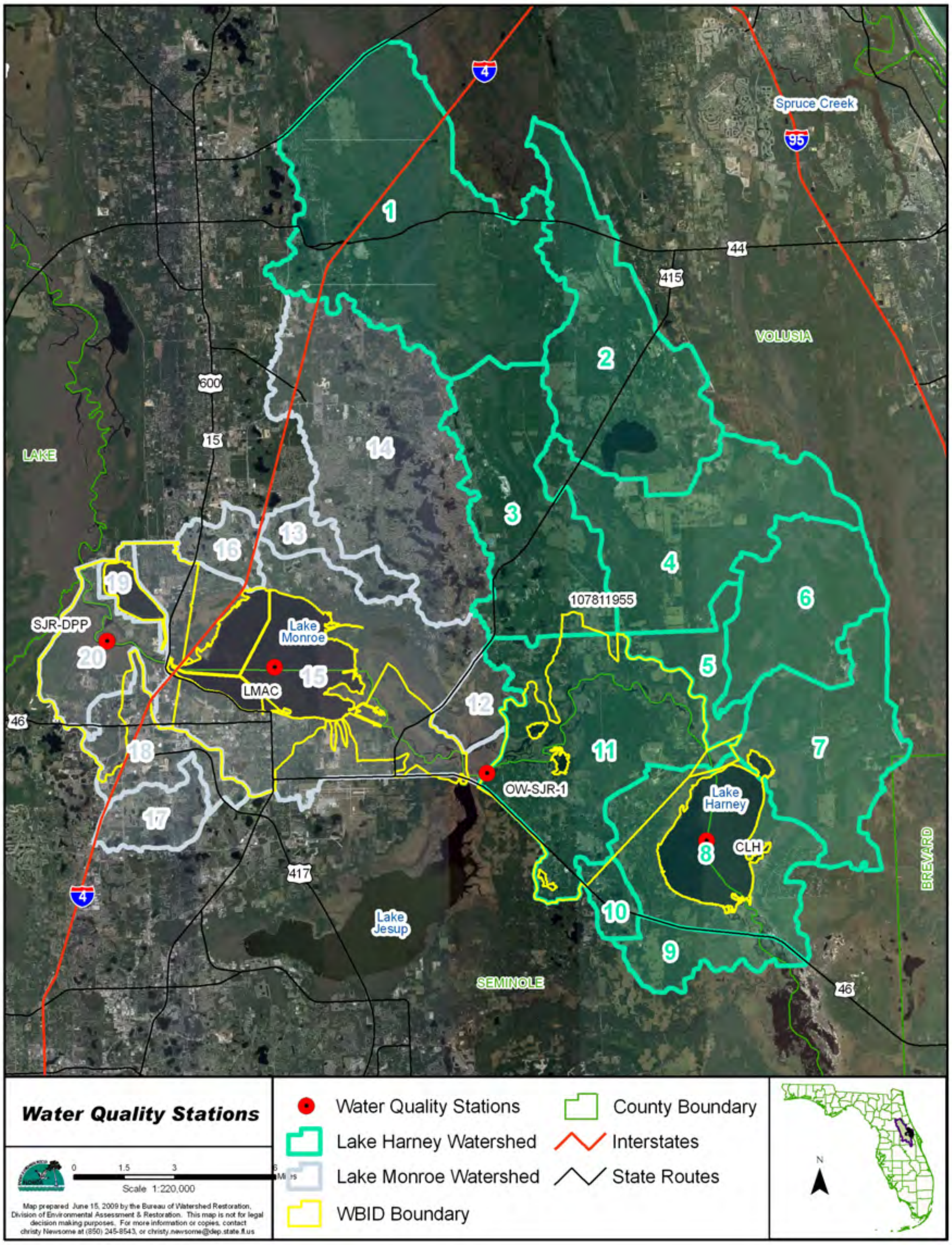
Table 4.10. Water Quality Stations and Their Periods of Record Used for Water Quality Calibrations

[1] RCHRES is the segment of receiving water defined in the HSPF Model. RCHRES receives pollutant loadings from point and nonpoint sources in the watershed and performs computations on physical, chemical, and biological processes in the receiving waterbody.

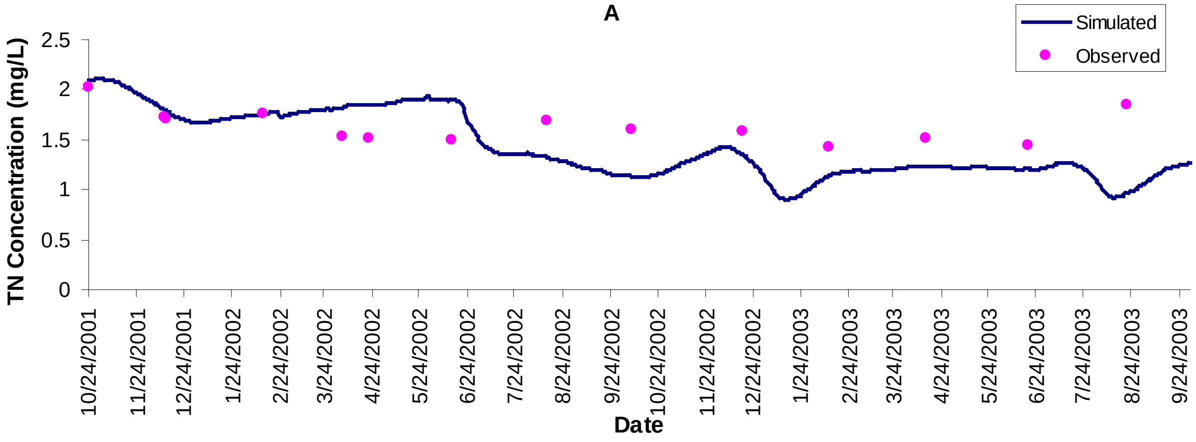
[2] More recent data than 9/30/2003 were available at some stations. However, as the HSPF Model simulation period ended on 9/30/2003, data points more recent than 9/30/2003 were not used in water quality calibration.

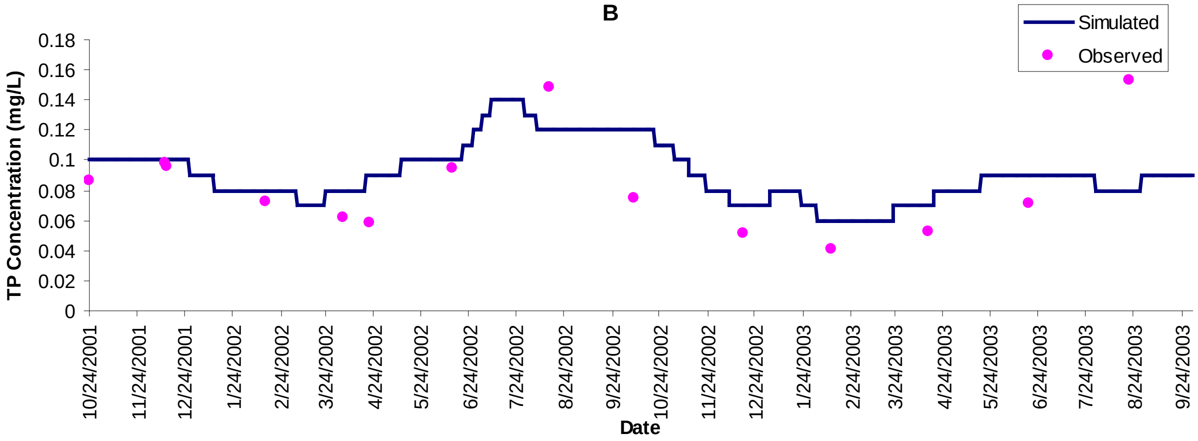
HSPF Model RCHRES[1]	WBID	Waterbodies	Water Quality Station	Period of Record[2]
8	2964A	Lake Harney	CLH	10/24/2001 to 9/30/2003
11	2964 + 2893F	St. Johns River above Lake Harney; St. Johns River above Lake Jesup	OW-SJR-1	3/13/1996 to 9/30/2003
15	2893E + 2893D	St. Johns River above Lake Monroe; Lake Monroe	LMAC	10/1/1995 to 9/30/2003
20	2893C	St. Johns River above Wekiva River	SJR-DPP	10/17/2002 to 9/30/2003

Figure 4.10. Locations of Water Quality Stations Used for the Water Quality Calibration

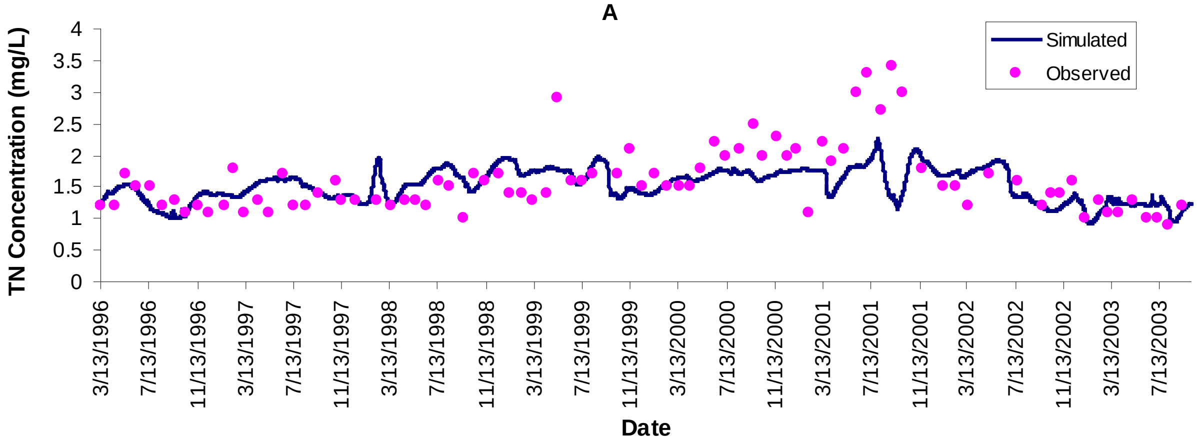


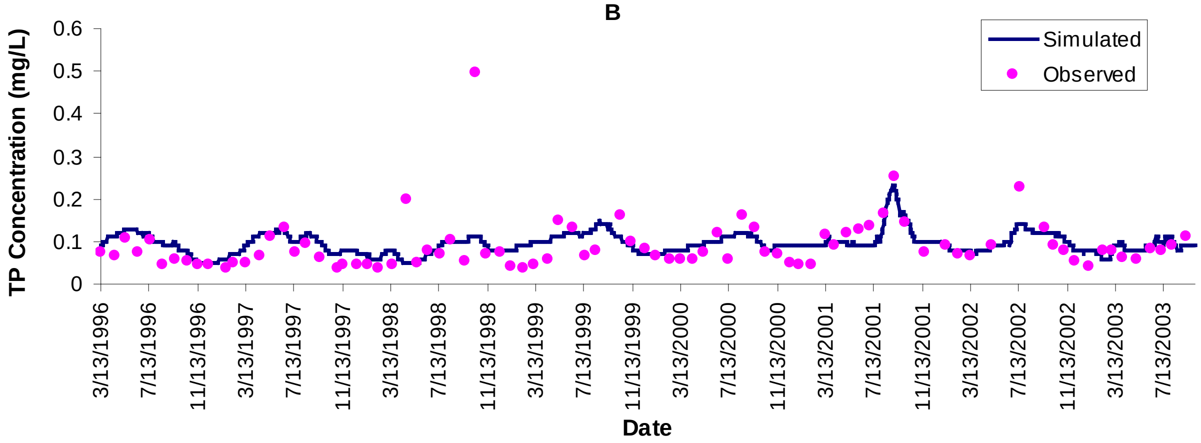
Figures 4.11a, b. TN (a) and TP (b) Calibration Results for Lake Harney (WBID 2964A)



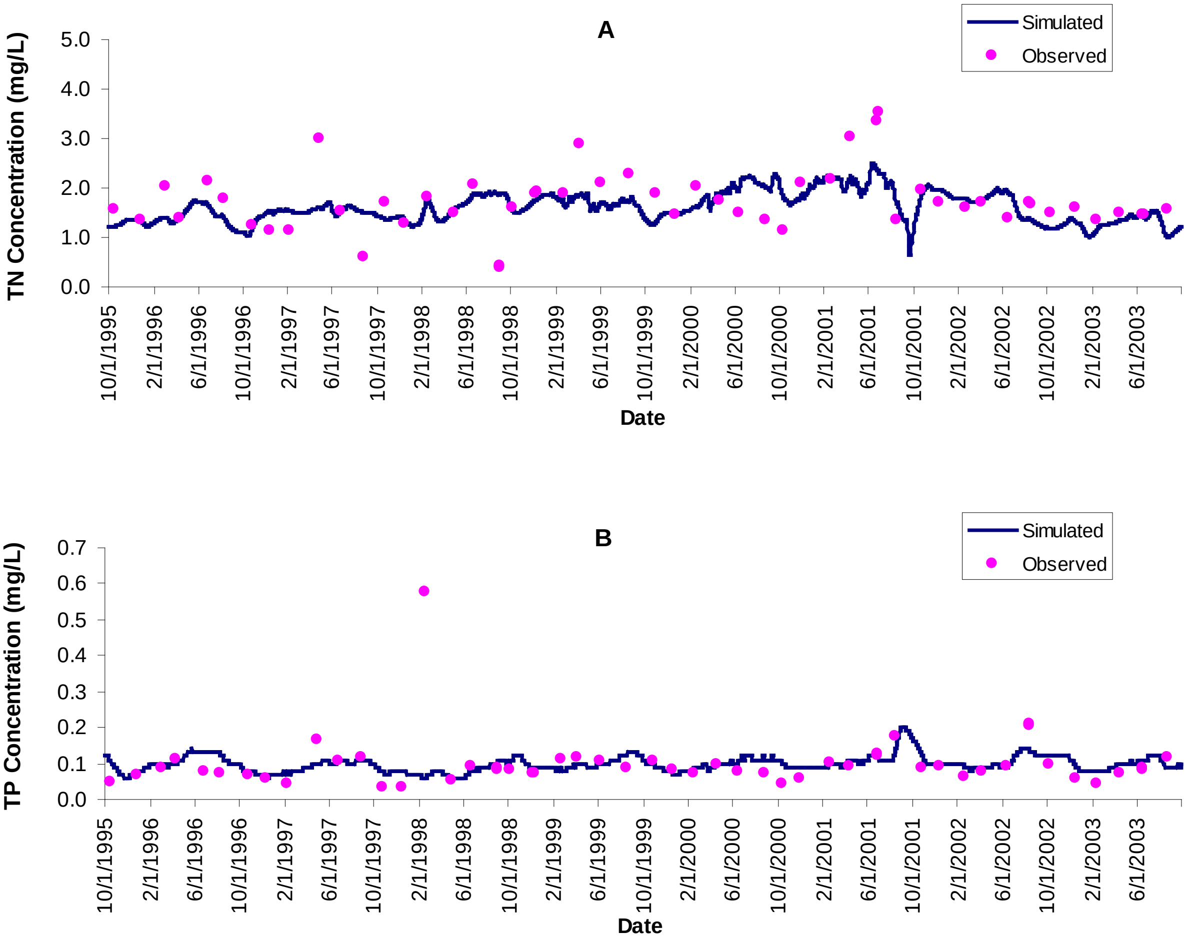


Figures 4.12a, b. TN (a) and TP (b) Calibration Results for St. Johns River above Lake Jesup (WBIDs 2964 and 2893F)

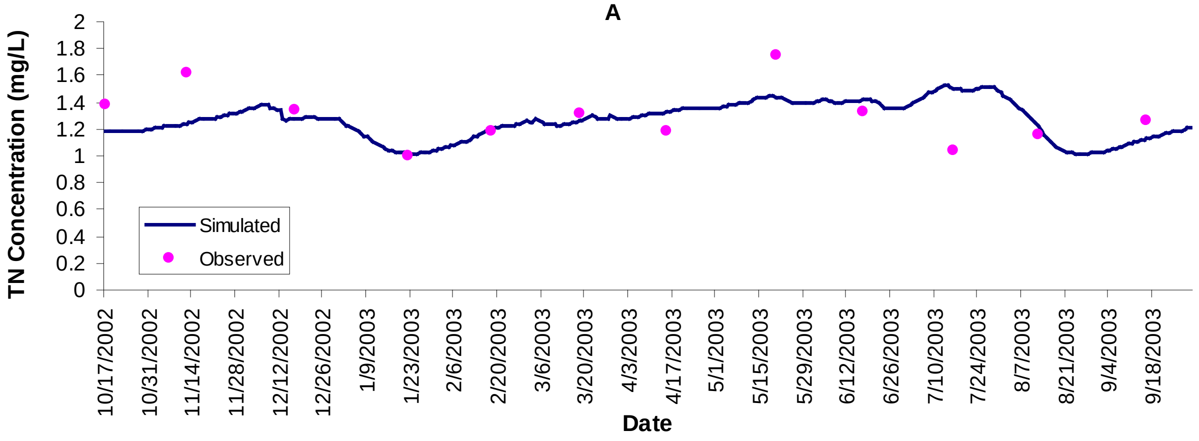


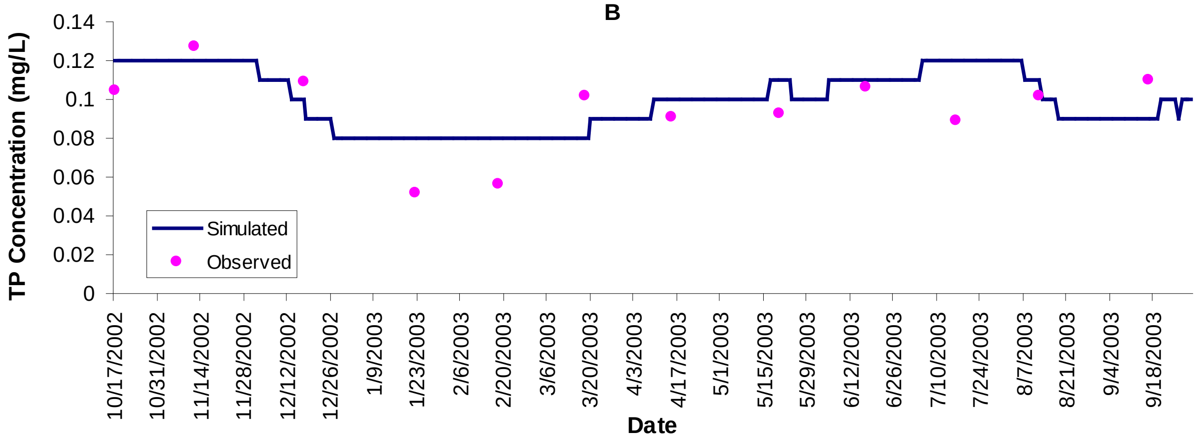


Figures 4.13a, b. TN (a) and TP (b) Calibration Results for St. Johns River above Lake Monroe and Lake Monroe (WBIDs 2893E and 2893D)



Figures 4.14a, b. TN (a) and TP (b) Calibration Results for St. Johns River above Wekiva River (WBID 2893C)





4.2.2.9 Summary of Pollutant Loadings from Point and Nonpoint Sources Contributing to the Impaired Middle St. Johns River Segments

Tables 4.11 to **4.13** tabulate, for each year from 1996 through 2003, the annual flow balance, TN, and TP mass balance for each impaired river segment from the upstream river segments, from the watershed (including surface runoff, interflow, baseflow, and septic tank contributions minus the attenuation effects of BMPs), from rainfall directly onto the surface of the receiving waters, and, for WBID 2893C (St. Johns River above Wekiva River), contributions from the Sanford North WWTP, respectively. These tables also show the flow loss through evaporation, and the TN and TP loadings lost in each segment due to processes such as deposition, denitrification, and sedimentation. **Tables 4.14** to **4.16** summarize the long-term annual average flow, TN, and TP loadings entering each impaired river segment from different sources and the long-term annual average flow, TN, and TP loadings leaving each impaired segment. **Tables 4.14** to **4.16** also list the percent distributions of flow, TN, and TP loadings from each source in the total flow, TN, and TP loadings received by each impaired segment.

It should be noted that, although the period of record for NEXRAD rainfall data was 1995 to 2006, the SJRWMD's HSPF Model was set up only to simulate watershed loadings up to 2003. To simulate watershed loadings in more recent years, more boundary condition flow and hydrology data, point source data, spring discharge data, etc., needed to be assembled to populate the HSPF Model. Due to time constraints, the Department was not able to extend these time series. The existing nutrient loadings were therefore quantified based on model simulations from 1996 through 2003. Using the loadings from this period to represent the existing condition appears reasonable because, based on the long-term trend analyses shown in Chapter 2, except for the three consecutive dry years from 1999 through 2001, water quality in the impaired river segments has been relatively stable for the period from 1996 through 2007.

The existing flow and loading summaries indicated that the flow and nutrient loadings into all the impaired river segments included in this TMDL report were dominated by upstream input. Contributions of flow and TN and TP loadings from upstream river segments accounted for more than 95 percent of the total flow and TN and TP loadings for Lake Harney (RCHRES 8, WBID 2964A) and St. Johns River above Wekiva River (RCHRES 20, WBID 2893C). The relative contributions of flow and TN and TP loadings from the upstream segment into St. Johns River above Lake Monroe and Lake Monroe are about 90, 88, and 87 percent, respectively. Lake Jesup contributed about 6 percent of the flow, 8 percent of the TN, and 8 percent of the TP loadings, respectively, to Lake Monroe and St. Johns River above Lake Monroe. Except for St. Johns River Downstream of Lake Harney and St. Johns River above Lake Jesup, flow and TN and TP loadings entering these river segments from their immediate watersheds were all less than 5 percent of the total flow and loadings received by the segments. Direct rainfall onto the water surface contributes less than 5 percent of the total flow and no more than 1 percent of the total loadings of TN and TP entering these segments. The relative contributions of flow and TN and TP loadings from the Sanford North WWTF to St. Johns River above Wekiva River (RCHRES 20, WBID 2893C) were less than 1 percent of the total flow and nutrient loadings entering this segment.

For St. Johns River Downstream of Lake Harney and St. Johns River above Lake Jesup (RCHRES 11, WBIDs 2964 and 2893F), the upstream contribution of flow, TN, and TP accounted for more than 90 percent of the total flow, 92 percent of the TN loadings, and 89 percent of the TP loadings entering these segments. Contributions from the immediate watershed accounted for about 9 percent of the total flow, 7 percent of the TN loading, and 11 percent of the TP loading entering the segments. Direct rainfall contributed about 0.8 percent of the total flow, 0.3 percent of the total TN loading, and 0.2 percent of the total TP loading. The percent contributions of flow and nutrients from the watershed immediately adjacent to these river segments were higher than those of the other segments because the Deep Creek watershed, which covers a large area (**Figure 4.2**), drains into this portion of the river.

Table 4.17 summarizes the relative contributions of flow and TN and TP loadings from different sources into the impaired segments from the inlet of Lake Harney to the confluence of the St. Johns River and the Wekiva River. Based on the table, the flow, TN, and TP loadings from the Upper St. Johns River and Econlockhatchee River contribute about 77 percent of the flow, 79 percent of the TN loadings, and 74 percent of the TP loadings that enter the impaired segments. Lake Jesup contributes about 5 percent of the flow, 8 percent of the TN loadings, and 8 percent of the TP loadings. The contributions from the Lake Harney and Lake Monroe Basins are 12 percent of flow, 11 percent of TN loadings, and 16 percent of TP loadings. Direct rainfall onto the surface of these impaired segments contributes about 5 percent of the flow, 2 percent of the TN loadings, and 1 percent of the TP loadings. The Sanford/North WWTP discharges to the northern end of the impaired segments. The facility contributes about 0.1 percent of the flow, 0.5 percent of the TN loadings, and 0.7 percent of the TP loadings.

In summary, the upstream contribution dominates the flow and nutrient loadings entering the impaired river segments included in this TMDL report. While efforts need to be made to reduce the nutrient loading from the immediate watersheds, reducing the loading from upstream segments should be emphasized. This includes reducing the nutrient loading entering the Middle St. Johns segments from the Upper St. Johns River, the Econlockhatchee River, and Lake Jesup.

Table 4.11. Water Balance (ac-ft/yr) for the Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only flow from the immediate upstream main stem segment. Tributary inflow is not included.
[2] Watershed Input includes flow (runoff, interflow, and baseflow) from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of water leaving the segment or reduced segment volume.
* Boundary flow from Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary flow from Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Loss through Evaporation[3]	Segment Volume Change[3]	Total Outflow from Segment[3]
RCHRES 8 (2964A)	1996	1,877,380*	Not Applicable	30,738	36,493	Not Applicable	-33,195	-44,551	**-1,955,967**
RCHRES 8 (2964A)	1997	926,998*	Not Applicable	12,772	24,187	Not Applicable	-25,166	9,460	**-929,331**
RCHRES 8 (2964A)	1998	2,212,725*	Not Applicable	26,817	38,604	Not Applicable	-32,141	5,966	**-2,240,039**
RCHRES 8 (2964A)	1999	621,202*	Not Applicable	14,036	22,034	Not Applicable	-20,681	593	**-635,998**
RCHRES 8 (2964A)	2000	1,149,251*	Not Applicable	19,353	22,455	Not Applicable	-23,592	-22,711	**-1,190,178**
RCHRES 8 (2964A)	2001	836,530*	Not Applicable	12,586	26,192	Not Applicable	-23,791	55,044	**-796,473**
RCHRES 8 (2964A)	2002	1,934,819*	Not Applicable	23,768	38,161	Not Applicable	-34,635	-18,668	**-1,980,781**
RCHRES 8 (2964A)	2003	1,570,644*	Not Applicable	34,086	33,453	Not Applicable	-26,545	-1,963	**-1,613,601**
RCHRES 8 (2964A)	**Mean**	**1,391,193***	**Not Applicable**	**21,770**	**30,197**	**Not Applicable**	**-27,468**	**-2,104**	**-1,417,796**
RCHRES 11 (2964, 2893F)	1996	1,955,967	Not Applicable	157,287	10,469	Not Applicable	-14,820	-23,017	**-2,131,920**
RCHRES 11 (2964, 2893F)	1997	929,331	Not Applicable	91,366	16,224	Not Applicable	-10,960	9,306	**-1,016,655**
RCHRES 11 (2964, 2893F)	1998	2,240,039	Not Applicable	161,875	16,608	Not Applicable	-13,608	4,216	**-2,400,697**
RCHRES 11 (2964, 2893F)	1999	635,998	Not Applicable	99,730	10,032	Not Applicable	-9,258	-29	**-736,531**
RCHRES 11 (2964, 2893F)	2000	1,190,178	Not Applicable	91,331	9,477	Not Applicable	-9,181	-12,407	**-1,294,212**
RCHRES 11 (2964, 2893F)	2001	796,473	Not Applicable	123,761	11,394	Not Applicable	-10,243	23,013	**-898,372**
RCHRES 11 (2964, 2893F)	2002	1,980,781	Not Applicable	147,461	14,846	Not Applicable	-13,287	-5,786	**-2,135,587**
RCHRES 11 (2964, 2893F)	2003	1,613,601	Not Applicable	194,038	15,742	Not Applicable	-11,847	-1,922	**-1,813,456**

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Loss through Evaporation[3]	Segment Volume Change[3]	Total Outflow from Segment[3]
RCHRES 11 (2964, 2893F)	**Mean**	**1,417,796**	**Not Applicable**	**133,356**	**13,099**	**Not Applicable**	**-11,651**	**-828**	**-1,553,429**
RCHRES 15 (2893E, 2893D)	1996	213,1920	188,065**	54,026	52,645	Not Applicable	-48,893	-33033	**-2,410,796**
RCHRES 15 (2893E, 2893D)	1997	1,016,655	59,837**	31,061	35,336	Not Applicable	-39,073	5002	**-1,098,814**
RCHRES 15 (2893E, 2893D)	1998	2,400,697	159,243**	54,549	53,330	Not Applicable	-45,921	1987	**-2,619,911**
RCHRES 15 (2893E, 2893D)	1999	736,531	16,131**	36,354	36,537	Not Applicable	-34,918	1004	**-789,631**
RCHRES 15 (2893E, 2893D)	2000	1,294,212	70,559**	32,344	31,494	Not Applicable	-37,402	-17611	**-1,408,818**
RCHRES 15 (2893E, 2893D)	2001	898,372	-36,087**	31,881	37,600	Not Applicable	-37,849	47434	**-846,483**
RCHRES 15 (2893E, 2893D)	2002	2,135,587	139,604**	46,072	48,809	Not Applicable	-47,692	-11944	**-2,334,324**
RCHRES 15 (2893E, 2893D)	2003	1,813,456	173,097**	57,769	49,253	Not Applicable	-39,752	-7989	**-2,061,812**
RCHRES 15 (2893E, 2893D)	**Mean**	**1,553,429**	**96,306****	**43,162**	**42,837**	**Not Applicable**	**-40,589**	**2,147**	**-1,696,323**
RCHRES 20 (2893C)	1996	2,410,796	Not Applicable	22,499	6,420	2,641	-6,571	307	**-2,435,478**
RCHRES 20 (2893C)	1997	1,098,814	Not Applicable	11,893	4,739	596	-4,933	-4,782	**-1,115,891**
RCHRES 20 (2893C)	1998	2,619,911	Not Applicable	27,878	7,176	769	-6,115	677	**-2,648,942**
RCHRES 20 (2893C)	1999	789,631	Not Applicable	14,222	4,125	336	-4,225	194	**-803,895**
RCHRES 20 (2893C)	2000	1,408,818	Not Applicable	14,489	3,854	242	-4,475	226	**-1,422,702**
RCHRES 20 (2893C)	2001	846,483	Not Applicable	14,791	4,643	1,566	-4,645	-2,259	**-865,097**
RCHRES 20 (2893C)	2002	2,334,324	Not Applicable	17,978	6,083	2,278	-6,256	6,493	**-2,347,914**
RCHRES 20 (2893C)	2003	2,061,812	Not Applicable	28,296	6,730	3,136	-5,313	-1,588	**-2,096,249**
RCHRES 20 (2893C)	**Mean**	**1,696,323**	**Not Applicable**	**19,609**	**5,435**	**1,445**	**-5,317**	**-92**	**-1,717,021**

Table 4.12. TN Mass Balance (lbs/yr) for Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only TN loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes loading from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of TN leaving the segment or reduced segment storage.
* Boundary TN loading from Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary TN loading from Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Lost in Segment[3]	Segment Storage Change[3]	Total Output from Segment[3]
RCHRES 8 (2964A)	1996	6,552,424*	Not Applicable	80,198	53,861	Not Applicable	-37,457	-161,415	**-6,810,441**
RCHRES 8 (2964A)	1997	3,701,699*	Not Applicable	37,254	37,371	Not Applicable	-36,068	71,079	**-3,669,177**
RCHRES 8 (2964A)	1998	8,778,734*	Not Applicable	61,138	56,742	Not Applicable	-25,200	49,955	**-8,821,459**
RCHRES 8 (2964A)	1999	2,960,563*	Not Applicable	38,717	34,053	Not Applicable	-29,413	-1,846	**-3,005,765**
RCHRES 8 (2964A)	2000	4,534,291*	Not Applicable	51,835	35,703	Not Applicable	-30,304	-73,680	**-4,665,205**
RCHRES 8 (2964A)	2001	3,686,353*	Not Applicable	35,247	39,330	Not Applicable	-38,959	199,959	**-3,522,012**
RCHRES 8 (2964A)	2002	8,321,436*	Not Applicable	68,930	55,789	Not Applicable	-87,693	-145,128	**-8,503,590**
RCHRES 8 (2964A)	2003	4,818,730*	Not Applicable	98,023	49,623	Not Applicable	-46,773	19,082	**-4,900,521**
RCHRES 8 (2964A)	**Mean**	**5,419,279***	**Not Applicable**	**58,918**	**45,309**	**Not Applicable**	**-41,483**	**-5,249**	**-5,487,271**
RCHRES 11 (2964, 2893F)	1996	6,810,441	Not Applicable	528,977	23,812	Not Applicable	-46,434	-65,849	**-7,382,645**
RCHRES 11 (2964, 2893F)	1997	3,669,177	Not Applicable	281,863	17,123	Not Applicable	-34,407	34,432	**-3,899,324**
RCHRES 11 (2964, 2893F)	1998	8,821,459	Not Applicable	523,156	24,167	Not Applicable	-36,944	22,880	**-9,308,958**
RCHRES 11 (2964, 2893F)	1999	3,005,765	Not Applicable	304,560	15,522	Not Applicable	-35,886	-5,113	**-3,295,074**
RCHRES 11 (2964, 2893F)	2000	4,665,205	Not Applicable	299,876	14,813	Not Applicable	-27,518	-36,812	**-4,989,188**
RCHRES 11 (2964, 2893F)	2001	3,522,012	Not Applicable	375,115	17,056	Not Applicable	-37,714	78,618	**-3,797,851**
RCHRES 11 (2964, 2893F)	2002	8,503,590	Not Applicable	533,009	21,728	Not Applicable	-59,671	-46,556	**-9,045,212**
RCHRES 11 (2964, 2893F)	2003	4,900,521	Not Applicable	693,345	23,084	Not Applicable	-61,395	1,999	**-5,553,556**

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Lost in Segment[3]	Segment Storage Change[3]	Total Output from Segment[3]
RCHRES 11 (2964, 2893F)	**Mean**	**5,487,271**	**Not Applicable**	**442,488**	**19,663**	**Not Applicable**	**-42,496**	**-2,050**	**-5,908,976**
RCHRES 15 (2893E, 2893D)	1996	7,382,645	1,054,522**	196,344	77,316	Not Applicable	-75,507	-130,521	**-8,765,841**
RCHRES 15 (2893E, 2893D)	1997	3,899,324	375,211**	111,450	55,675	Not Applicable	-60,138	83,723	**-4,297,799**
RCHRES 15 (2893E, 2893D)	1998	9,308,958	976,644**	188,410	78,331	Not Applicable	-59,787	40,798	**-10,451,758**
RCHRES 15 (2893E, 2893D)	1999	3,295,074	46,006**	126,306	56,672	Not Applicable	-65,496	-41,689	**-3,500,251**
RCHRES 15 (2893E, 2893D)	2000	4,989,188	541,233**	110,660	51,105	Not Applicable	-52,932	55,997	**-5,583,256**
RCHRES 15 (2893E, 2893D)	2001	3,797,851	-274,352**	123,940	57,946	Not Applicable	-69,681	-11,968	**-3,647,672**
RCHRES 15 (2893E, 2893D)	2002	9,045,212	762,653**	185,274	72,560	Not Applicable	-93,156	-27,427	**-9,999,970**
RCHRES 15 (2893E, 2893D)	2003	5,553,556	929,145**	220,893	72,937	Not Applicable	-77,415	-19,064	**-6,718,179**
RCHRES 15 (2893E, 2893D)	**Mean**	**5,908,976**	**551,383****	**157,910**	**65,318**	**Not Applicable**	**-69,264**	**-6,269**	**-6,620,591**
RCHRES 20 (2893C)	1996	8,765,841	Not Applicable	65,608	9,668	49,889	-14,014	-18,327	**-8,845,430**
RCHRES 20 (2893C)	1997	4,297,799	Not Applicable	40,062	7,376	18,026	-11,843	10,587	**-4,322,807**
RCHRES 20 (2893C)	1998	10,451,758	Not Applicable	82,056	10,541	18,004	-13,080	4,778	**-10,526,497**
RCHRES 20 (2893C)	1999	3,500,251	Not Applicable	45,973	6,552	7,269	-12,250	-4,682	**-3,545,208**
RCHRES 20 (2893C)	2000	5,583,256	Not Applicable	45,895	6,303	8,020	-11,382	7,004	**-5,617,068**
RCHRES 20 (2893C)	2001	3,647,672	Not Applicable	47,641	7,156	33,914	-12,487	-2,250	**-3,692,232**
RCHRES 20 (2893C)	2002	9,999,970	Not Applicable	59,865	9,160	54,096	-16,865	-1,362	**-10,053,492**
RCHRES 20 (2893C)	2003	6,718,179	Not Applicable	89,629	9,977	60,358	-17,360	-3,185	**-6,803,609**
RCHRES 20 (2893C)	**Mean**	**6,620,591**	**Not Applicable**	**59,591**	**8,342**	**31,197**	**-13,660**	**-930**	**-6,675,793**

Table 4.13. TP Mass Balance (lbs/yr) for Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only TP loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes loading from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of TP leaving the segment or reduced segment storage.
* Boundary TP loading from Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary TP loading from Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Lost in Segment[3]	Segment Storage Change[3]	Total Output from Segment[3]
RCHRES 8 (2964A)	1996	448,223*	Not Applicable	4,093	2,441	Not Applicable	-1,525	-19,549	**-472,781**
RCHRES 8 (2964A)	1997	223,223*	Not Applicable	2,421	1,849	Not Applicable	-1,932	2,599	**-222,962**
RCHRES 8 (2964A)	1998	408,176*	Not Applicable	3,687	2,557	Not Applicable	-1,095	6,584	**-406,741**
RCHRES 8 (2964A)	1999	182,412*	Not Applicable	2,499	1,692	Not Applicable	-2,506	992	**-183,105**
RCHRES 8 (2964A)	2000	265,098*	Not Applicable	2,561	1,864	Not Applicable	-2,001	-9,745	**-277,267**
RCHRES 8 (2964A)	2001	351,070*	Not Applicable	2,076	1,849	Not Applicable	-2,401	30,992	**-321,603**
RCHRES 8 (2964A)	2002	589,199*	Not Applicable	3,694	2,489	Not Applicable	-1,653	-16,405	**-610,135**
RCHRES 8 (2964A)	2003	351,923*	Not Applicable	5,111	2,274	Not Applicable	-1,678	-5,235	**-362,865**
RCHRES 8 (2964A)	**Mean**	**352,415***	**Not Applicable**	**3,268**	**2,127**	**Not Applicable**	**-1,849**	**-1,221**	**-357,182**
RCHRES 11 (2964, 2893F)	1996	472,781	Not Applicable	53,101	1,067	Not Applicable	-3,783	-8,074	**-531,240**
RCHRES 11 (2964, 2893F)	1997	222,962	Not Applicable	28,683	829	Not Applicable	-2,808	1,230	**-248,436**
RCHRES 11 (2964, 2893F)	1998	406,741	Not Applicable	51,242	1,068	Not Applicable	-2,958	3,134	**-452,959**
RCHRES 11 (2964, 2893F)	1999	183,105	Not Applicable	32,105	769	Not Applicable	-3,501	223	**-212,255**
RCHRES 11 (2964, 2893F)	2000	277,267	Not Applicable	26,509	750	Not Applicable	-2,402	-4,589	**-306,714**
RCHRES 11 (2964, 2893F)	2001	321,603	Not Applicable	43,330	798	Not Applicable	-3,543	12,951	**-349,236**
RCHRES 11 (2964, 2893F)	2002	610,135	Not Applicable	54,955	972	Not Applicable	-3,192	-6,551	**-669,421**
RCHRES 11 (2964, 2893F)	2003	362,865	Not Applicable	71,098	1,030	Not Applicable	-5,389	-2,680	**-432,285**
RCHRES 11 (2964, 2893F)	**Mean**	**357,182**	**Not Applicable**	**45,128**	**910**	**Not Applicable**	**-3,447**	**-544**	**-400,318**

RCHRES (WBID)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Lost in Segment[3]	Segment Storage Change[3]	Total Output from Segment[3]
RCHRES 15 (2893E, 2893D)	1996	531,240	64,829**	24,660	3,479	Not Applicable	-9,280	-15,869	**-630,797**
RCHRES 15 (2893E, 2893D)	1997	248,436	22,680**	14,552	2,858	Not Applicable	-7,805	1,471	**-279,250**
RCHRES 15 (2893E, 2893D)	1998	452,959	56,134**	22,324	3,522	Not Applicable	-7,831	2,403	**-524,705**
RCHRES 15 (2893E, 2893D)	1999	212,255	8,250**	16,179	2,832	Not Applicable	-8,660	2,020	**-228,835**
RCHRES 15 (2893E, 2893D)	2000	306,714	18,946**	12,530	2,755	Not Applicable	-6,865	-5,945	**-340,026**
RCHRES 15 (2893E, 2893D)	2001	349,236	-10,066**	15,684	2,864	Not Applicable	-8,890	31,352	**-317,477**
RCHRES 15 (2893E, 2893D)	2002	669,421	55,608**	22,245	3,349	Not Applicable	-8,870	-18,104	**-759,856**
RCHRES 15 (2893E, 2893D)	2003	432,285	81,847**	25,653	3,341	Not Applicable	-10,701	-8,746	**-541,172**
RCHRES 15 (2893E, 2893D)	**Mean**	**400,318**	**37,279****	**19,228**	**3,125**	**Not Applicable**	**-8,613**	**-1,427**	**-452,765**
RCHRES 20 (2893C)	1996	630,797	Not Applicable	7,008	456	4,847	-1,434	-2,161	**-638,988**
RCHRES 20 (2893C)	1997	279,250	Not Applicable	4,639	368	2,099	-1,220	209	**-282,828**
RCHRES 20 (2893C)	1998	524,705	Not Applicable	8,130	474	1,606	-1,303	210	**-531,796**
RCHRES 20 (2893C)	1999	228,835	Not Applicable	5,211	339	729	-1,326	324	**-232,735**
RCHRES 20 (2893C)	2000	340,026	Not Applicable	4,700	343	560	-1,079	-749	**-344,739**
RCHRES 20 (2893C)	2001	317,477	Not Applicable	5,464	352	4,056	-1,347	4,172	**-317,774**
RCHRES 20 (2893C)	2002	759,856	Not Applicable	6,607	434	6,009	-1,348	-2,391	**-767,940**
RCHRES 20 (2893C)	2003	541,172	Not Applicable	8,937	454	7,683	-1,713	-1,160	**-550,010**
RCHRES 20 (2893C)	**Mean**	**452,765**	**Not Applicable**	**6,337**	**403**	**3,449**	**-1,346**	**-193**	**-458,351**

Table 4.14. Summary of Water Balance (ac-ft/yr) for Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only flow from the immediate upstream main stem segment. Tributary inflow is not included.
[2] Watershed Input includes flow (runoff, interflow, and baseflow) from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of water leaving the segment or reduced segment volume.
[4] Percent flow represents percentage of flow from each source in the total flow that enters the segment under question.
* Boundary flow from Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary flow from Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Type	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Loss through Evaporation[3]	Segment Volume Change[3]	Total Outflow from Segment[3]
RCHRES 8 (2964A)	Flow	1,391,193*	Not Applicable	21,770	30,197	Not Applicable	-27,468	-2,104	-1,417,796
RCHRES 8 (2964A)	% Flow[4]	96.4%*	Not Applicable	1.5%	2.1%	Not Applicable	-1.9%	-0.1%	-98.2%
RCHRES 11 (2964, 2893F)	Flow	1,417,796	Not Applicable	133,356	13,099	Not Applicable	-11,651	-828	-1,553,429
RCHRES 11 (2964, 2893F)	% Flow[4]	90.6%	Not Applicable	8.5%	0.8%	Not Applicable	-0.7%	-0.1%	-99.3%
RCHRES 15 (2893E, 2893D)	Flow	1,553,429	96,306**	43,162	42,837	Not Applicable	-40,589	2,147	-1,696,323
RCHRES 15 (2893E, 2893D)	% Flow[4]	89.5%	5.5%**	2.5%	2.5%	Not Applicable	-2.3%	0.1%	-97.7%
RCHRES 20 (2893C)	Flow	1,696,323	Not Applicable	19,609	5,435	1,445	-5,317	-92	-1,717,021
RCHRES 20 (2893C)	% Flow[4]	98.5%	Not Applicable	1.1%	0.3%	0.1%	-0.3%	0.0%	-99.7%

Table 4.15. Summary of TN Mass Balance (lbs/yr) for Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only TN loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes loading from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of TN leaving the segment or reduced segment storage.
[4] Percent load represents percentage of the load from each source in the total load that enters the segment under question.
* Boundary TN loading from Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary TN loading from Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Type	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Loss in Segment[3]	Segment Storage Change[3]	Total Output from Segment[3]
RCHRES 8 (2964A)	Load	5,419,279*	Not Applicable	58,918	45,309	Not Applicable	-41,483	-5,249	-5,487,271
RCHRES 8 (2964A)	% Load[4]	98.1%*	Not Applicable	1.1%	0.8%	Not Applicable	-0.8%	-0.1%	-99.3%
RCHRES 11 (2964, 2893F)	Load	5,487,271	Not Applicable	442,488	19,663	Not Applicable	-42,496	-2,050	-5,908,976
RCHRES 11 (2964, 2893F)	% Load[4]	92.2%	Not Applicable	7.4%	0.3%	Not Applicable	-0.7%	0.0%	-99.3%
RCHRES 15 (2893E, 2893D)	Load	5,908,976	551,383**	157,910	65,318	Not Applicable	-69,264	-6,269	-6,620,591
RCHRES 15 (2893E, 2893D)	% Load[4]	88.4%	8.2%**	2.4%	1.0%	Not Applicable	-1.0%	-0.1%	-99.1%
RCHRES 20 (2893C)	Load	6,620,591	Not Applicable	59,591	8,342	31,197	-13,660	-930	-6,675,793
RCHRES 20 (2893C)	% Load[4]	99.0%	Not Applicable	0.9%	0.1%	0.5%	-0.2%	0.0%	-99.8%

Table 4.16. Summary of TP Mass Balance (lbs/yr) for Impaired Middle St. Johns River Segments

[1] Main Stem Upstream Input includes only TP loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes loading from the sub-basins directly discharging to the river segment under question.
[3] Minus sign indicates amount of TP leaving the segment or reduced segment storage.
[4] Percent load represents percentage of the load from each source in the total load that enters the segment under question.
* Boundary TP loading from the Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary TP loading from the Lake Jesup outlet (green highlighting).

RCHRES (WBID)	Type	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Loss through Evaporation[3]	Segment Volume Change[3]	Total Outflow from Segment[3]
RCHRES 8 (2964A)	Load	352,415*	Not Applicable	3,268	2,127	Not Applicable	-1,849	-1,221	-357,182
RCHRES 8 (2964A)	% Load[4]	98.5%*	Not Applicable	0.9%	0.6%	Not Applicable	-0.5%	-0.3%	-99.8%
RCHRES 11 (2964, 2893F)	Load	357,182	Not Applicable	45,128	910	Not Applicable	-3,447	-544	-400,318
RCHRES 11 (2964, 2893F)	% Load[4]	88.6%	Not Applicable	11.2%	0.2%	Not Applicable	-0.9%	-0.1%	-99.3%
RCHRES 15 (2893E, 2893D)	Load	400,318	37,279**	19,228	3,125	Not Applicable	-8,613	-1,427	-452,765
RCHRES 15 (2893E, 2893D)	% Load[4]	87.0%	8.1%**	4.2%	0.7%	Not Applicable	-1.9%	-0.3%	-98.4%
RCHRES 20 (2893C)	Load	452,765	Not Applicable	6,337	403	3,449	-1,346	-193	-458,351
RCHRES 20 (2893C)	% Load[4]	97.8%	Not Applicable	1.4%	0.1%	0.7%	-0.3%	0.0%	-99.0%

Table 4.17. Summary of Relative Contributions of Flow and TN and TP Loadings from Different Sources

[1] The upstream contribution strictly represents the contribution from the boundary contribution from the Upper St. Johns River and the Econlockhatchee River basins.

Parameter	Upstream[1]	Lake Jesup	Watershed	Direct Rainfall	Point Source	Total
Flow (ac-ft)	1,391,193	96,306	217,897	91,568	1,445	**1,798,409**
Flow (%)	77.4%	5.4%	12.1%	5.1%	0.1%	**100.0%**
TN Loading (lbs/yr)	5,419,279	551,383	718,907	138,632	31,197	**6,859,398**
TN Loading (%)	79.0%	8.0%	10.5%	2.0%	0.5%	**100.0%**
TP Loading (lbs/yr)	352,415	37,279	73,961	6,565	3,449	**473,669**
TP Loading (%)	74.4%	7.9%	15.6%	1.4%	0.7%	**100.0%**

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Overall Approach

The calibrated HSPF Model described in Chapter 4 was used to estimate the target TN and TP loadings into the impaired Middle St. Johns River segments that will produce the target TN and TP concentrations. To achieve the target concentrations in these impaired segments, the required percent reductions of TN and TP loadings to achieve the Lake Jesup nutrient TMDLs—i.e., a 50 percent reduction in TN and a 34 percent reduction in TP—were applied to the boundary loadings of TN and TP, respectively, from the Lake Jesup outlet. Pollutant loadings were adjusted at the upstream boundary where the Upper St. Johns River and the Econlockhatchee River discharge into the impaired Middle St. Johns River segments.

The percent reductions applied to the upstream boundary were also applied to loadings from the human land use areas located in all the immediate watersheds. These human land uses include low-, medium-, and high-density residential; industrial; and agricultural. The loadings from failed septic tanks within 50 feet of receiving waters were set to 0 under the target condition. The loading adjustment was reiterated until annual average TN and TP concentrations in all the impaired segments met the TN and TP concentration targets (1.18 mg/L for TN and 0.07 mg/L for TP) for the modeled period from 1996 through 2003. The final nutrient loadings that met the water column nutrient targets were considered the TMDLs for these impaired segments.

Nutrient loading limits were also established for the Sanford/North WWTF. Although the long-term annual nutrient loadings from the facility only account for less than 1 percent of the total loadings received by St. Johns River above Wekiva River, the amount of nutrient loading from the facility was comparable to the pollutant loading created from the watershed immediately adjacent to this river segment (**Tables 4.15** and **4.16**). Therefore, the same percent reduction rates applied to human land uses in the watershed were also applied to the discharge from the facility. Nutrient loadings from precipitation falling directly onto the surface of receiving waters were kept the same as the loadings for the existing condition.

Tables 5.1 and **5.2** list the target nutrient loadings from different sources for each segment for the model simulation period (1996–2003). Long-term average annual loadings from all the sources are also listed for each impaired segment. **Table 5.3** compares the existing loadings and target loadings for TN and TP from nonpoint sources and lists the percent reductions needed to achieve the target TN and TP concentrations in the impaired segments. Based on **Table 5.3**, the TN from nonpoint sources needs to be reduced by about 37 to 39 percent to achieve the TN target of 1.18 mg/L in the impaired segments. The TP from nonpoint sources needs to be reduced by about 37 to 39 percent to achieve the TP target concentration of 0.07 mg/L in the impaired segments. The average needed reductions of 38 and 32 percent in nonpoint source TN and TP loadings, respectively, were applied as the needed reductions to the discharge from the Sanford/North WWTP. The loading limits for the facility are therefore 19,342 and 2,345 lbs/yr for TN and TP, respectively.

Table 5.1. TN Target Loads (lbs/yr) from Different Sources

[1] Main Stem Upstream Input includes only the TN loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes the loading from the sub-basins directly discharging to the river segment under question.
* Boundary TN loading from the Upper St. Johns River and the Econlockhatchee River (yellow highlighting).
** Boundary TN loading from the Lake Jesup outlet (green highlighting).

RCHRES (WBIDs)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Total Nonpoint Source Loading	Total Load
RCHRES 8 (2964A)	1996	3,931,454*	Not Applicable	80,135	53,861	Not Applicable	4,065,450	4,065,450
RCHRES 8 (2964A)	1997	2,221,019*	Not Applicable	36,511	37,371	Not Applicable	2,294,901	2,294,901
RCHRES 8 (2964A)	1998	5,267,240*	Not Applicable	62,839	56,743	Not Applicable	5,386,822	5,386,822
RCHRES 8 (2964A)	1999	1,776,338*	Not Applicable	37,294	34,053	Not Applicable	1,847,685	1,847,685
RCHRES 8 (2964A)	2000	2,720,575*	Not Applicable	52,447	35,703	Not Applicable	2,808,725	2,808,725
RCHRES 8 (2964A)	2001	2,211,812*	Not Applicable	34,450	39,331	Not Applicable	2,285,593	2,285,593
RCHRES 8 (2964A)	2002	4,992,861*	Not Applicable	70,052	55,789	Not Applicable	5,118,702	5,118,702
RCHRES 8 (2964A)	2003	2,891,238*	Not Applicable	95,818	49,623	Not Applicable	3,036,679	3,036,679
RCHRES 8 (2964A)	**Mean**	**3,251,567***	**Not Applicable**	**58,693**	**45,309**	**Not Applicable**	**3,355,569**	**3,355,569**
RCHRES 11 (2964, 2893F)	1996	4,132,245	Not Applicable	472,942	23,812	Not Applicable	4,628,999	4,628,999
RCHRES 11 (2964, 2893F)	1997	2,223,664	Not Applicable	251,787	17,123	Not Applicable	2,492,574	2,492,574
RCHRES 11 (2964, 2893F)	1998	5,333,093	Not Applicable	468,608	24,167	Not Applicable	5,825,868	5,825,868
RCHRES 11 (2964, 2893F)	1999	1,824,201	Not Applicable	269,852	15,523	Not Applicable	2,109,576	2,109,576
RCHRES 11 (2964, 2893F)	2000	2,830,927	Not Applicable	272,945	14,812	Not Applicable	3,118,684	3,118,684
RCHRES 11 (2964, 2893F)	2001	2,131,726	Not Applicable	331,172	17,056	Not Applicable	2,479,954	2,479,954
RCHRES 11 (2964, 2893F)	2002	5,143,589	Not Applicable	480,024	21,728	Not Applicable	5,645,341	5,645,341
RCHRES 11 (2964, 2893F)	2003	2,988,619	Not Applicable	623,218	23,084	Not Applicable	3,634,921	3,634,921

RCHRES (WBIDs)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Total Nonpoint Source Loading	Total Load
RCHRES 11 (2964, 2893F)	**Mean**	**3,326,008**	**Not Applicable**	**396,319**	**19,663**	**Not Applicable**	**3,741,990**	**3,741,990**
RCHRES 15 (2893E, 2893D)	1996	4,632,049	527,261**	148,821	77,316	Not Applicable	5,385,447	5,385,447
RCHRES 15 (2893E, 2893D)	1997	2,444,072	187,606**	82,866	55,675	Not Applicable	2,770,219	2,770,219
RCHRES 15 (2893E, 2893D)	1998	5,775,293	488,322**	145,607	78,331	Not Applicable	6,487,553	6,487,553
RCHRES 15 (2893E, 2893D)	1999	2,081,972	23,003**	95,115	56,672	Not Applicable	2,256,762	2,256,762
RCHRES 15 (2893E, 2893D)	2000	3,124,862	270,617**	88,179	51,104	Not Applicable	3,534,762	3,534,762
RCHRES 15 (2893E, 2893D)	2001	2,399,787	-137,176**	93,099	57,947	Not Applicable	2,413,657	2,413,657
RCHRES 15 (2893E, 2893D)	2002	5,627,534	381,327**	144,183	72,560	Not Applicable	6,225,604	6,225,604
RCHRES 15 (2893E, 2893D)	2003	3,585,671	464,573**	172,858	72,937	Not Applicable	4,296,039	4,296,039
RCHRES 15 (2893E, 2893D)	**Mean**	**3,708,905**	**275,692****	**121,341**	**65,318**	**Not Applicable**	**4,171,256**	**4,171,256**
RCHRES 20 (2893C)	1996	5,406,656	Not Applicable	54,513	9,668	33,426	5,470,837	5,504,263
RCHRES 20 (2893C)	1997	2,683,691	Not Applicable	32,077	7,376	12,077	2,723,144	2,735,221
RCHRES 20 (2893C)	1998	6,412,823	Not Applicable	69,135	10,541	12,063	6,492,499	6,504,562
RCHRES 20 (2893C)	1999	2,216,414	Not Applicable	37,198	6,552	4,870	2,260,164	2,265,034
RCHRES 20 (2893C)	2000	3,492,545	Not Applicable	38,267	6,303	5,373	3,537,115	3,542,488
RCHRES 20 (2893C)	2001	2,345,559	Not Applicable	38,858	7,156	22,722	2,391,573	2,414,295
RCHRES 20 (2893C)	2002	6,189,716	Not Applicable	49,403	9,160	36,244	6,248,279	6,284,523
RCHRES 20 (2893C)	2003	4,254,424	Not Applicable	75,972	9,977	40,440	4,340,373	4,380,813
RCHRES 20 (2893C)	**Mean**	**4,125,229**	**Not Applicable**	**49,428**	**8,342**	**20,902**	**4,182,998**	**4,203,901**

Table 5.2. TP Target Loads (lbs/yr) from Different Sources

[1] Main Stem Upstream Input includes only TP loading from the immediate upstream main stem segment. Loading through tributary inflow is not included.
[2] Watershed Input includes loading from the sub-basins directly discharging to the river segment under question.
* Boundary TP loading from the Upper St. Johns River and Econlockhatchee River (yellow highlighting).
** Boundary TP loading from the Lake Jesup outlet (green highlighting).

RCHRES (WBIDs)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Total Nonpoint Source Loading	Total Load
RCHRES 8 (2964A)	1996	300,309*	Not Applicable	3,555	2,441	Not Applicable	306,305	306,305
RCHRES 8 (2964A)	1997	149,559*	Not Applicable	1,977	1,849	Not Applicable	153,385	153,385
RCHRES 8 (2964A)	1998	273,478*	Not Applicable	3,142	2,557	Not Applicable	279,177	279,177
RCHRES 8 (2964A)	1999	122,216*	Not Applicable	2,018	1,692	Not Applicable	125,926	125,926
RCHRES 8 (2964A)	2000	177,616*	Not Applicable	2,275	1,864	Not Applicable	181,755	181,755
RCHRES 8 (2964A)	2001	235,217*	Not Applicable	1,708	1,849	Not Applicable	238,774	238,774
RCHRES 8 (2964A)	2002	394,763*	Not Applicable	3,200	2,489	Not Applicable	400,452	400,452
RCHRES 8 (2964A)	2003	235,788*	Not Applicable	4,374	2,274	Not Applicable	242,436	242,436
RCHRES 8 (2964A)	**Mean**	**236,118***	**Not Applicable**	**2,781**	**2,127**	**Not Applicable**	**241,026**	**241,026**
RCHRES 11 (2964, 2893F)	1996	318,582	Not Applicable	40,471	1,067	Not Applicable	360,120	360,120
RCHRES 11 (2964, 2893F)	1997	150,637	Not Applicable	21,741	829	Not Applicable	173,207	173,207
RCHRES 11 (2964, 2893F)	1998	274,167	Not Applicable	39,185	1,068	Not Applicable	314,420	314,420
RCHRES 11 (2964, 2893F)	1999	123,773	Not Applicable	24,012	769	Not Applicable	148,554	148,554
RCHRES 11 (2964, 2893F)	2000	187,035	Not Applicable	20,794	750	Not Applicable	208,579	208,579

RCHRES (WBIDs)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Total Nonpoint Source Loading	Total Load
RCHRES 11 (2964, 2893F)	2001	216,657	Not Applicable	32,333	798	Not Applicable	249,788	249,788
RCHRES 11 (2964, 2893F)	2002	410,570	Not Applicable	42,305	972	Not Applicable	453,847	453,847
RCHRES 11 (2964, 2893F)	2003	245,048	Not Applicable	54,536	1,030	Not Applicable	300,614	300,614
RCHRES 11 (2964, 2893F)	**Mean**	**240,809**	**Not Applicable**	**34,422**	**910**	**Not Applicable**	**276,141**	**276,141**
RCHRES 15 (2893E, 2893D)	1996	362,952	42,787**	17,387	3,479	Not Applicable	426,605	426,605
RCHRES 15 (2893E, 2893D)	1997	170,537	14,969**	10,303	2,858	Not Applicable	198,667	198,667
RCHRES 15 (2893E, 2893D)	1998	310,097	37,048**	15,958	3,522	Not Applicable	366,625	366,625
RCHRES 15 (2893E, 2893D)	1999	145,913	5,445**	11,470	2,832	Not Applicable	165,660	165,660
RCHRES 15 (2893E, 2893D)	2000	210,163	12,504**	9,063	2,755	Not Applicable	234,485	234,485
RCHRES 15 (2893E, 2893D)	2001	238,639	-6,644**	10,949	2,864	Not Applicable	245,808	245,808
RCHRES 15 (2893E, 2893D)	2002	456,112	36,701**	15,756	3,349	Not Applicable	511,918	511,918
RCHRES 15 (2893E, 2893D)	2003	298,648	54,019**	18,319	3,341	Not Applicable	374,327	374,327
RCHRES 15 (2893E, 2893D)	**Mean**	**274,133**	**24,604****	**13,650**	**3,125**	**Not Applicable**	**315,512**	**315,512**
RCHRES 20 (2893C)	1996	431,075	Not Applicable	5,297	456	3,248	436,828	440,076
RCHRES 20 (2893C)	1997	192,762	Not Applicable	3,450	368	1,406	196,580	197,986
RCHRES 20 (2893C)	1998	359,532	Not Applicable	6,224	474	1,076	366,230	367,306
RCHRES 20 (2893C)	1999	157,937	Not Applicable	3,890	339	488	162,166	162,654

RCHRES (WBIDs)	Year	Main Stem Upstream Input[1]	Lake Jesup Input	Watershed Input[2]	Direct Rainfall	Point Source Contribution	Total Nonpoint Source Loading	Total Load
RCHRES 20 (2893C)	2000	234,067	Not Applicable	3,564	343	375	237,974	238,349
RCHRES 20 (2893C)	2001	218,445	Not Applicable	4,102	352	2,718	222,899	225,617
RCHRES 20 (2893C)	2002	518,773	Not Applicable	4,961	434	4,026	524,168	528,194
RCHRES 20 (2893C)	2003	373,005	Not Applicable	6,821	454	5,148	380,280	385,428
RCHRES 20 (2893C)	**Mean**	**310,700**	**Not Applicable**	**4,789**	**403**	**2,311**	**315,891**	**318,203**

Table 5.3. Comparison of Existing and Target Loadings TN and TP Loadings from Nonpoint Sources

WBID	Existing TN Loading (lbs/yr)	Target TN Loading (lbs/yr)	% TN Reduction	Existing TP Loading (lbs/yr)	Target TP Loading (lbs/yr)	% TP Reduction
2964A	5,523,505	3,355,570	39%	357,810	241,026	33%
2964 + 2893F	5,949,422	3,741,990	37%	403,221	276,141	32%
2893E + 2893D	6,683,586	4,171,255	38%	459,950	315,512	31%
2893C	6,688,523	4,182,998	37%	459,504	315,891	31%

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (wasteload allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\text{TMDL} \cong \sum \text{WLAs}_{\text{wastewater}} + \sum \text{WLAs}_{\text{NPDES Stormwater}} + \sum \text{LAs} + \text{MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (1) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (2) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as percent reduction because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish the loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the “maximum extent practical” through the implementation of BMPs.

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or other appropriate measure. TMDLs for the impaired Middle St. Johns River segments are expressed in terms of lbs/yr and percent reduction of TN and TP, and represent the long-term average TN and TP loadings that these river segments can assimilate and maintain balanced aquatic flora and fauna (**Table 6.1**).

Based on a recent EPA memorandum (2006), daily loads of TN and TP from point and nonpoint sources were also calculated (**Table 6.2**). These daily loads were calculated by dividing the annual loads by 365 days/yr and are only provided in this report for informational purposes. The implementation of the TMDLs in this report should be carried out using an annual time scale.

Table 6.1. TMDL Components for Nutrient-Impaired Segments of the Middle St. Johns River

[1] The required percent reduction for WLA$_{\text{NPDES Stormwater}}$ was considered the same as the required percent reduction for nonpoint source loading (**Table 6.3**). Refer to the discussion in **Section 6.3.2** for details.

WBID	Parameter	TMDL (lbs/yr)	WLA$_{\text{NPDES}}$ wastewater (lbs/yr)	WLA$_{\text{NPDES}}$ Stormwater [1]	LA (lbs/yr)	MOS
2964A	TN	3,355,570	0	39%	3,355,570	Implicit
2964A	TP	241,026	0	33%	241,026	Implicit
2964 + 2893F	TN	3,741,990	0	37%	3,741,990	Implicit
2964 + 2893F	TP	276,141	0	32%	276,141	Implicit
2893D + 2893E	TN	4,171,255	0	38%	4,171,255	Implicit
2893D + 2893E	TP	315,512	0	31%	315,512	Implicit
2893C	TN	4,202,340	19,342	37%	4,182,998	Implicit
2893C	TP	318,236	2,345	31%	315,891	Implicit

Table 6.2. TMDL Daily Load for Nutrient-Impaired Segments of the Middle St. Johns River

[1] The required percent reduction for WLA$_{\text{NPDES Stormwater}}$ was considered the same as the required percent reduction for nonpoint source loading (**Table 6.3**). Refer to the discussion in **Section 6.3.2** for details.

WBID	Parameter	TMDL (lbs/day)	WLA$_{\text{NPDES}}$ wastewater (lbs/day)	WLA$_{\text{NPDES}}$ Stormwater [1]	LA (lbs/day)	MOS
2964A	TN	9,193	0	39%	9,193	Implicit
2964A	TP	660	0	33%	660	Implicit
2964 + 2893F	TN	10,252	0	37%	10,252	Implicit
2964 + 2893F	TP	757	0	32%	757	Implicit
2893D + 2893E	TN	11,428	0	38%	11,428	Implicit
2893D + 2893E	TP	864	0	31%	864	Implicit
2893C	TN	11,513	53	37%	11,460	Implicit
2893C	TP	872	6	31%	865	Implicit

6.2 Load Allocation

As shown in the loading estimates in Chapter 5, the vast majority of TN and TP loadings discharged into the impaired Middle St. Johns River segments come from nonpoint sources. Point source discharges of TN and TP account for less than 1 percent of the total nutrient loadings from all sources. Major sources of nonpoint nutrient loadings include watershed contributions (surface runoff, interflow, and baseflow), upstream contributions, and direct atmospheric deposition onto these river segments. In most cases, nonpoint sources of TN and TP loadings were dominated by the upstream contributions.

As discussed in previous sections, the SJRWMD's HSPF Model treated the Middle St. Johns River from the inlet of Lake Harney to the confluence of the Wekiva River and the St. Johns River as four separate model segments: RCHRES 8, RCHRES 11, RCHRES 15, and RCHRES 20. Each of these segments includes either one or two WBIDs, which are listed in **Table 6.3**. The table also lists the existing loadings, load allocation, and percent reduction needed to achieve the target TN and TP concentrations in the impaired Middle St. Johns River segments.

Table 6.3. Required Percent Reductions of TN and TP Loads, by WBID, To Achieve Restoration Targets (Excluding Atmospheric Deposition)

WBID	TN Existing Nonpoint Load (lbs/yr)	TN LA (lbs/yr)	TN % Reduction	TP Existing Nonpoint Load (lbs/yr)	TP LA (lbs/yr)	TP % Reduction
2964A (RCHRES8)	5,523,505	3,355,570	39%	357,810	241,026	33%
2964 + 2893F (RCHRES11)	5,949,422	3,741,990	37%	403,221	276,141	32%
2893E + 2893D (RCHRES15)	6,683,586	4,171,255	38%	459,950	315,512	31%
2893C (RCHRES20)	6,688,523	4,182,998	37%	459,504	315,891	31%

As listed in **Table 6.3**, the percent reduction of TN to achieve the target TN concentration of 1.18 mg/L in the impaired Middle St. Johns River segments ranges from 37 to 39 percent, averaging about 38 percent. About 31 to 33 percent of the nonpoint source TP should be reduced in order to achieve the target TP concentration of 0.07 mg/L in the impaired segments.

It should be noted that these percent reductions are for the total loadings from all nonpoint sources, including upstream contributions, loadings from the watersheds immediately adjacent to the impaired segments, and atmospheric deposition. The percent reductions applied to the loadings from the watersheds upstream of Lake Harney, including the Upper St. Johns Basin and the Econlockhatchee Basin, are 40 percent for TN and 35 percent for TP.

TN and TP loadings coming from the Lake Jesup watershed are another upstream contribution to all the impaired segments downstream of the Lake Jesup outlet (WBIDs 2893E, 2893D, and 2893C). The percent reductions applied to the Lake Jesup outlet loadings are consistent with the Lake Jesup nutrient TMDLs, which are 50 percent for TN and 34 percent for TP. The 40 percent and 35 percent reductions for TN and TP, respectively, applied to the nutrient contributions upstream of Lake Harney were also applied to the loadings coming from all the human land uses in adjacent watersheds, which include low-, medium-, and high-density residential; industrial; and agricultural areas. These nutrient reductions are all needed to achieve the target TN and TP concentrations in the impaired Middle St. Johns River segments.

6.3 Wasteload Allocation

6.3.1 NPDES Wastewater Discharges

Within the watersheds of the impaired Middle St. Johns River segments, only one NPDES-permitted facility, Sanford/North WWTF, was considered a major contributor of nutrients to the impaired river segments. The facility discharges to the farthest downstream impaired segment (WBID 2893C) included in this TMDL report. Although TN and TP loadings from the facility only account for less than 1 percent of the total TN and TP loadings received by this segment, the facility is currently not at the advanced wastewater treatment (AWT) level. In addition, the annual nutrient loadings from the facility are comparable to the total loadings created from the entire watershed immediately adjacent to WBID 2893C. Therefore, reductions in TN and TP loadings from the facility of 38 and 32 percent, respectively, are recommended. These are averages of the needed percent reductions of TN and TP applied to the nonpoint source loadings in all the impaired segments. The final wasteload allocations of TN and TP to the facility are 19,342 and 2,345 lbs/yr, respectively.

6.3.2 NPDES Stormwater Discharges

Because no information was available to the Department when this analysis was conducted on the boundaries and locations of all the NPDES stormwater dischargers, the exact stormwater TN and TP loadings from MS4 areas were not explicitly estimated. The wasteload allocations for each of the MS4s are the same percent TN and TP reductions required for the LA assigned to the nonpoint sources in the river segments that belong to each county and municipality. **Table 4.2** lists the MS4 permits that will be influenced by the TMDLs covered in this report. It should be noted that any MS4 permittee is only responsible for reducing the loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Department, 2001), an implicit MOS was provided in the development of this TMDL by the conservative decisions associated with a number of modeling assumptions, the development of site-specific alternative water quality targets, and the development of assimilative capacity.

The Middle St. Johns River TMDLs were developed using an implicit MOS. As discussed in **Section 4.2.2.4**, when this report was written, no data were available to show the exact contribution from the Floridan aquifer through upwelling. A significant Floridan aquifer contribution through seepage is possible because the potentiometric head of the aquifer is at or higher than the water surface elevation in this area (Gardner et al., 1991). In addition, salinity observed in the Lake Harney and Lake Monroe areas also suggests a Floridan aquifer contribution (Department, 2005). In this TMDL report, because of the lack of ground water data, the possible ground water flow was attributed to the watershed flow during the hydrology calibration. This assumption overestimates the contribution from human sources and therefore adds to the MOS. In addition, the HSPF Model setup by the SJRWMD assumes no sediment nutrient flux from most of the river and lake segments included in the model. This assumption also emphasizes the watershed loading estimates, adding to the MOS of this TMDL.

Chapter 7: TMDL IMPLEMENTATION

7.1 Basin Management Action Plan

Following the adoption of these TMDLs by rule, the Department will determine the best course of action regarding their implementation. Depending on the pollutant(s) causing the waterbody impairment and the significance of the waterbody, the Department will select the best course of action leading to the development of a plan to restore the waterbody. Often this will be accomplished cooperatively with stakeholders by creating a Basin Management Action Plan, referred to as the BMAP. BMAPs are the primary mechanism through which TMDLs are implemented in Florida (see Subsection 403.067[7], F.S.). A single BMAP may provide the conceptual plan for the restoration of one or many impaired waterbodies.

If the Department determines that a BMAP is needed to support the implementation of these TMDLs, a BMAP will be developed through a transparent, stakeholder-driven process intended to result in a plan that is cost-effective, technically feasible, and meets the restoration needs of the applicable waterbodies. Once adopted by order of the Department Secretary, BMAPs are enforceable through wastewater and municipal stormwater permits for point sources and through BMP implementation for nonpoint sources. Among other components, BMAPs typically include the following:

- *Water quality goals (based directly on the TMDLs);*
- *Refined source identification;*
- *Load reduction requirements for stakeholders (quantitative detailed allocations, if technically feasible);*
- *A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;*
- *A description of further research, data collection, or source identification needed in order to achieve the TMDLs;*
- *Timetables for implementation;*
- *Implementation funding mechanisms;*
- *An evaluation of future increases in pollutant loading due to population growth;*
- *Implementation milestones, project tracking, water quality monitoring, and adaptive management procedures; and*
- *Stakeholder statements of commitment (typically a local government resolution).*

BMAPs are updated through annual meetings and may be officially revised every five years. Completed BMAPs in the state have improved communication and cooperation among local stakeholders and state agencies; improved internal communication within local governments; applied high-quality science and local information in managing water resources; clarified the obligations of wastewater point source, MS4, and non-MS4 stakeholders in TMDL implementation; enhanced transparency in the Department's decision making; and built strong relationships between the Department and local stakeholders that have benefited other program areas.

7.2 Other TMDL Implementation Tools

However, in some basins, and for some parameters, particularly those with fecal coliform impairments, the development of a BMAP using the process described above will not be the most efficient way to restore a waterbody, such that it meets its designated uses. This is because fecal coliform impairments result from the cumulative effects of a multitude of potential sources, both natural and anthropogenic. Addressing these problems requires good old-fashioned detective work that is best done by those in the area.

A multitude of assessment tools is available to assist local governments and interested stakeholders in this detective work. The tools range from the simple (such as Walk the WBIDs and GIS mapping) to the complex (such as bacteria source tracking). Department staff will provide technical assistance, guidance, and oversight of local efforts to identify and minimize fecal coliform sources of pollution. Based on work in the Lower St Johns River tributaries and the Hillsborough Basin, the Department and local stakeholders have developed a logical process and tools to serve as a foundation for this detective work. In the near future, the Department will be releasing these tools to assist local stakeholders with the development of local implementation plans to address fecal coliform impairments. In such cases, the Department will rely on these local initiatives as a more cost-effective and simplified approach to identify the actions needed to put in place a road map for restoration activities, while still meeting the requirements of Subsection 403.067(7), F.S.

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Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C. In 1994, the Department's stormwater treatment requirements were integrated with the stormwater flood control requirements of the state's water management districts, along with wetland protection requirements, into the Environmental Resource Permit regulations.

Rule 62-40, F.A.C., also requires the water management districts to establish stormwater Pollutant Load Reduction Goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES permitting program to designate certain stormwater discharges as "point sources" of pollution. The EPA promulgated regulations and began implementing the Phase I NPDES Stormwater Program in 1990. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific standard industrial classification (SIC) codes, construction sites disturbing 5 or more acres of land, and the master drainage systems of local governments with a population above 100,000, which are better known as MS4s. However, because the master drainage systems of most local governments in Florida are interconnected, the EPA implemented Phase I of the MS4 permitting program on a countywide basis, which brought in all cities (incorporated areas), Chapter 298 urban water control districts, and the FDOT throughout the 15 counties meeting the population criteria. EPA authorized the Department to implement the NPDES Stormwater Program (except for tribal lands) in October 2000.

An important difference between the federal NPDES and the state's stormwater/environmental resource permitting programs is that the NPDES Program covers both new and existing discharges, while the state's program focuses on new discharges only. Additionally, Phase II of the NPDES Program, implemented in 2003, expands the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 1,000 people. The revised rules require that these additional activities obtain permits by 2003.

While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution such as domestic and industrial wastewater discharges. It should be noted that all MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs when the implementation plan is formally adopted.

Appendix B: HSPF Model UCI File from the SJRWMD

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RUN
*** Lake Harney watershed: perlnd 101 - 313, implnd 101 - 304, rchres 1 - 11
*** Lake Monroe watershed: perlnd 501 - 673, implnd 501 - 664, rchres 12 - 20
*** rchres 116 and 117 are dry and wet ponds drain to rchres 1,
***       rchres 126 and 127 -> rchres 2,
***       ...,
***       rchres 306 and 307 -> rchres 20


GLOBAL
  UCI for Hydrologic Calibration at Deep Creep/Lake Harney
  START       1995/01/01 00:00  END    2003/09/30 24:00
  RUN INTERP OUTPT LEVELS    1    0
  RESUME     0 RUN     1                         UNITS      1
END GLOBAL

FILES
<FILE>  <UN#>***<----FILE NAME------------------------------------------------->
MESSU      24   harney_monroe.ech
           30   harney_monroe.out
WDM1       25   harney_monroe.wdm
WDM2       26   MSJR_NEX_W.wdm
BINO       27   h_m_lands.hbn
BINO       28   h_m_rchres.hbn
END FILES

OPN SEQUENCE
    INGRP              INDELT 01:00
*** harney subw 10&9
      PERLND     281
      PERLND     282
      PERLND     283
      PERLND     284
      PERLND     285
      PERLND     286
      PERLND     287
      PERLND     288
      PERLND     289
      PERLND     290
      PERLND     291
      PERLND     292
      PERLND     293
      IMPLND     281
      IMPLND     282
      IMPLND     283
      IMPLND     284
      RCHRES     206
      RCHRES     207
      RCHRES      10
      PERLND     261
      PERLND     262
      PERLND     263
      PERLND     264
      PERLND     265
      PERLND     266
      PERLND     267
      PERLND     268
      PERLND     269
```

```
      PERLND     270
      PERLND     271
      PERLND     272
      PERLND     273
      IMPLND     261
      IMPLND     262
      IMPLND     263
      IMPLND     264
      RCHRES     196
      RCHRES     197
      RCHRES       9
*** harney subw 7&8
      PERLND     221
      PERLND     222
      PERLND     223
      PERLND     224
      PERLND     225
      PERLND     226
      PERLND     227
      PERLND     228
      PERLND     229
      PERLND     230
      PERLND     231
      PERLND     232
      PERLND     233
      IMPLND     221
      IMPLND     222
      IMPLND     223
      IMPLND     224
      RCHRES       7
      PERLND     241
      PERLND     242
      PERLND     243
      PERLND     244
      PERLND     245
      PERLND     246
      PERLND     247
      PERLND     248
      PERLND     249
      PERLND     250
      PERLND     251
      PERLND     252
      PERLND     253
      IMPLND     241
      IMPLND     242
      IMPLND     243
      IMPLND     244
      RCHRES     186
      RCHRES     187
      RCHRES       8
*** harney subw 2&4
      PERLND     121
      PERLND     122
      PERLND     123
      PERLND     124
      PERLND     125
      PERLND     126
      PERLND     127
      PERLND     128
      PERLND     129
      PERLND     130
      PERLND     131
```

```
    PERLND    132
    PERLND    133
    IMPLND   121
    IMPLND   122
    IMPLND   123
    IMPLND   124
    RCHRES     127
    RCHRES       2
    PERLND    161
    PERLND    162
    PERLND    163
    PERLND    164
    PERLND    165
    PERLND    166
    PERLND    167
    PERLND    168
    PERLND    169
    PERLND    170
    PERLND    171
    PERLND    172
    PERLND    173
    IMPLND   161
    IMPLND   162
    IMPLND   163
    IMPLND   164
    RCHRES     147
    RCHRES       4
*** harney subw 6&5
    PERLND    201
    PERLND    202
    PERLND    203
    PERLND    204
    PERLND    205
    PERLND    206
    PERLND    207
    PERLND    208
    PERLND    209
    PERLND    210
    PERLND    211
    PERLND    212
    PERLND    213
    IMPLND   201
    IMPLND   202
    IMPLND   203
    IMPLND   204
    RCHRES     167
    RCHRES       6
    PERLND    181
    PERLND    182
    PERLND    183
    PERLND    184
    PERLND    185
    PERLND    186
    PERLND    187
    PERLND    188
    PERLND    189
    PERLND    190
    PERLND    191
    PERLND    192
    PERLND    193
    IMPLND   181
    IMPLND   182
```

```
    IMPLND   183
    IMPLND   184
    RCHRES     5
*** harney subw 1&3
    PERLND   101
    PERLND   102
    PERLND   103
    PERLND   104
    PERLND   105
    PERLND   106
    PERLND   107
    PERLND   108
    PERLND   109
    PERLND   110
    PERLND   111
    PERLND   112
    PERLND   113
    IMPLND   101
    IMPLND   102
    IMPLND   103
    IMPLND   104
    RCHRES   116
    RCHRES   117
    RCHRES     1
    PERLND   141
    PERLND   142
    PERLND   143
    PERLND   144
    PERLND   145
    PERLND   146
    PERLND   147
    PERLND   148
    PERLND   149
    PERLND   150
    PERLND   151
    PERLND   152
    PERLND   153
    IMPLND   141
    IMPLND   142
    IMPLND   143
    IMPLND   144
    RCHRES   136
    RCHRES   137
    RCHRES     3
*** septic tanks
    COPY       3
*** harney subw 11
    PERLND   301
    PERLND   302
    PERLND   303
    PERLND   304
    PERLND   305
    PERLND   306
    PERLND   307
    PERLND   308
    PERLND   309
    PERLND   310
    PERLND   311
    PERLND   312
    PERLND   313
    IMPLND   301
    IMPLND   302
```

```
      IMPLND     303
      IMPLND     304
      RCHRES     216
      RCHRES     217
      RCHRES      11
*** monroe subw 1&2
      PERLND     501
      PERLND     502
      PERLND     503
      PERLND     504
      PERLND     505
      PERLND     506
      PERLND     507
      PERLND     508
      PERLND     509
      PERLND     510
      PERLND     511
      PERLND     512
      PERLND     513
      IMPLND     501
      IMPLND     502
      IMPLND     503
      IMPLND     504
      RCHRES     226
      RCHRES     227
      RCHRES      12
      PERLND     521
      PERLND     522
      PERLND     523
      PERLND     524
      PERLND     525
      PERLND     526
      PERLND     527
      PERLND     528
      PERLND     529
      PERLND     530
      PERLND     531
      PERLND     532
      PERLND     533
      IMPLND     521
      IMPLND     522
      IMPLND     523
      IMPLND     524
      RCHRES     236
      RCHRES     237
      RCHRES      13
*** monroe subw 3
      PERLND     541
      PERLND     542
      PERLND     543
      PERLND     544
      PERLND     545
      PERLND     546
      PERLND     547
      PERLND     548
      PERLND     549
      PERLND     550
      PERLND     551
      PERLND     552
      PERLND     553
      IMPLND     541
      IMPLND     542
```

```
      IMPLND    543
      IMPLND    544
      RCHRES    246
      RCHRES    247
      RCHRES     14
*** monroe subw 5&4
      PERLND    581
      PERLND    582
      PERLND    583
      PERLND    584
      PERLND    585
      PERLND    586
      PERLND    587
      PERLND    588
      PERLND    589
      PERLND    590
      PERLND    591
      PERLND    592
      PERLND    593
      IMPLND    581
      IMPLND    582
      IMPLND    583
      IMPLND    584
      RCHRES    266
      RCHRES    267
      RCHRES     16
      PERLND    561
      PERLND    562
      PERLND    563
      PERLND    564
      PERLND    565
      PERLND    566
      PERLND    567
      PERLND    568
      PERLND    569
      PERLND    570
      PERLND    571
      PERLND    572
      PERLND    573
      IMPLND    561
      IMPLND    562
      IMPLND    563
      IMPLND    564
      RCHRES    256
      RCHRES    257
      RCHRES     15
*** monroe subw 6&7
      PERLND    601
      PERLND    602
      PERLND    603
      PERLND    604
      PERLND    605
      PERLND    606
      PERLND    607
      PERLND    608
      PERLND    609
      PERLND    610
      PERLND    611
      PERLND    612
      PERLND    613
      IMPLND    601
      IMPLND    602
```

```
     IMPLND    603
     IMPLND    604
     RCHRES    276
     RCHRES    277
     RCHRES     17
     PERLND    621
     PERLND    622
     PERLND    623
     PERLND    624
     PERLND    625
     PERLND    626
     PERLND    627
     PERLND    628
     PERLND    629
     PERLND    630
     PERLND    631
     PERLND    632
     PERLND    633
     IMPLND    621
     IMPLND    622
     IMPLND    623
     IMPLND    624
     RCHRES    286
     RCHRES    287
     RCHRES     18
*** monroe subw 8&9
     PERLND    641
     PERLND    642
     PERLND    643
     PERLND    644
     PERLND    645
     PERLND    646
     PERLND    647
     PERLND    648
     PERLND    649
     PERLND    650
     PERLND    651
     PERLND    652
     PERLND    653
     IMPLND    641
     IMPLND    642
     IMPLND    643
     IMPLND    644
*** FPL pond constantly withdraws and discharges water from and back to SJR.
*** Its net impact assumed to be negligible.
*** If it need to be explicitly modeled, RCHRES 19 should be added.
     PERLND    661
     PERLND    662
     PERLND    663
     PERLND    664
     PERLND    665
     PERLND    666
     PERLND    667
     PERLND    668
     PERLND    669
     PERLND    670
     PERLND    671
     PERLND    672
     PERLND    673
     IMPLND    661
     IMPLND    662
     IMPLND    663
```

```
    IMPLND    664
    RCHRES     306
    RCHRES     307
    RCHRES      20
   END INGRP
END OPN SEQUENCE

PERLND
  ACTIVITY
*** <PLS >             Active Sections                         ***
*** x -  x ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  101  673    1    0    1    1    1    1    1    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
*** < PLS>                    Print-flags                      PIVL  PYR
*** x  - x ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
  101  673    6    6    5    6    6    6    6    6    6    6    6    6    1    9
  END PRINT-INFO

  BINARY-INFO
*** < PLS>                    Print-flags                      PIVL  PYR
*** x  - x ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC
  101  673    5    6    5    5    5    5    5    6    6    6    6    6    1    9
  END BINARY-INFO

  GEN-INFO
***            Name                Unit-systems   Printer BinaryOut
*** <PLS >                           t-series Engl Metr Engl Metr
*** x -  x                          in  out
  101     LDR                          1    1    0    0   27    0
  102     MDR                          1    1    0    0   27    0
  103     HDR                          1    1    0    0   27    0
  104     IND                          1    1    0    0   27    0
  105     MIN                          1    1    0    0   27    0
  106     OPE                          1    1    0    0   27    0
  107     ANI                          1    1    0    0   27    0
  108     AGR                          1    1    0    0   27    0
  109     AGT                          1    1    0    0   27    0
  110     RAN                          1    1    0    0   27    0
  111     FOR                          1    1    0    0   27    0
  112     WAT                          1    1    0    0   27    0
  113     WET                          1    1    0    0   27    0
  121     LDR                          1    1    0    0   27    0
  122     MDR                          1    1    0    0   27    0
  123     HDR                          1    1    0    0   27    0
  124     IND                          1    1    0    0   27    0
  125     MIN                          1    1    0    0   27    0
  126     OPE                          1    1    0    0   27    0
  127     ANI                          1    1    0    0   27    0
  128     AGR                          1    1    0    0   27    0
  129     AGT                          1    1    0    0   27    0
  130     RAN                          1    1    0    0   27    0
  131     FOR                          1    1    0    0   27    0
  132     WAT                          1    1    0    0   27    0
  133     WET                          1    1    0    0   27    0
  141     LDR                          1    1    0    0   27    0
  142     MDR                          1    1    0    0   27    0
  143     HDR                          1    1    0    0   27    0
  144     IND                          1    1    0    0   27    0
  145     MIN                          1    1    0    0   27    0
  146     OPE                          1    1    0    0   27    0
```

147	ANI	1	1	0	0	27	0
148	AGR	1	1	0	0	27	0
149	AGT	1	1	0	0	27	0
150	RAN	1	1	0	0	27	0
151	FOR	1	1	0	0	27	0
152	WAT	1	1	0	0	27	0
153	WET	1	1	0	0	27	0
161	LDR	1	1	0	0	27	0
162	MDR	1	1	0	0	27	0
163	HDR	1	1	0	0	27	0
164	IND	1	1	0	0	27	0
165	MIN	1	1	0	0	27	0
166	OPE	1	1	0	0	27	0
167	ANI	1	1	0	0	27	0
168	AGR	1	1	0	0	27	0
169	AGT	1	1	0	0	27	0
170	RAN	1	1	0	0	27	0
171	FOR	1	1	0	0	27	0
172	WAT	1	1	0	0	27	0
173	WET	1	1	0	0	27	0
181	LDR	1	1	0	0	27	0
182	MDR	1	1	0	0	27	0
183	HDR	1	1	0	0	27	0
184	IND	1	1	0	0	27	0
185	MIN	1	1	0	0	27	0
186	OPE	1	1	0	0	27	0
187	ANI	1	1	0	0	27	0
188	AGR	1	1	0	0	27	0
189	AGT	1	1	0	0	27	0
190	RAN	1	1	0	0	27	0
191	FOR	1	1	0	0	27	0
192	WAT	1	1	0	0	27	0
193	WET	1	1	0	0	27	0
201	LDR	1	1	0	0	27	0
202	MDR	1	1	0	0	27	0
203	HDR	1	1	0	0	27	0
204	IND	1	1	0	0	27	0
205	MIN	1	1	0	0	27	0
206	OPE	1	1	0	0	27	0
207	ANI	1	1	0	0	27	0
208	AGR	1	1	0	0	27	0
209	AGT	1	1	0	0	27	0
210	RAN	1	1	0	0	27	0
211	FOR	1	1	0	0	27	0
212	WAT	1	1	0	0	27	0
213	WET	1	1	0	0	27	0
221	LDR	1	1	0	0	27	0
222	MDR	1	1	0	0	27	0
223	HDR	1	1	0	0	27	0
224	IND	1	1	0	0	27	0
225	MIN	1	1	0	0	27	0
226	OPE	1	1	0	0	27	0
227	ANI	1	1	0	0	27	0
228	AGR	1	1	0	0	27	0
229	AGT	1	1	0	0	27	0
230	RAN	1	1	0	0	27	0
231	FOR	1	1	0	0	27	0
232	WAT	1	1	0	0	27	0
233	WET	1	1	0	0	27	0
241	LDR	1	1	0	0	27	0
242	MDR	1	1	0	0	27	0
243	HDR	1	1	0	0	27	0

```
  244   IND             1   1   0   0  27   0
  245   MIN             1   1   0   0  27   0
  246   OPE             1   1   0   0  27   0
  247   ANI             1   1   0   0  27   0
  248   AGR             1   1   0   0  27   0
  249   AGT             1   1   0   0  27   0
  250   RAN             1   1   0   0  27   0
  251   FOR             1   1   0   0  27   0
  252   WAT             1   1   0   0  27   0
  253   WET             1   1   0   0  27   0
  261   LDR             1   1   0   0  27   0
  262   MDR             1   1   0   0  27   0
  263   HDR             1   1   0   0  27   0
  264   IND             1   1   0   0  27   0
  265   MIN             1   1   0   0  27   0
  266   OPE             1   1   0   0  27   0
  267   ANI             1   1   0   0  27   0
  268   AGR             1   1   0   0  27   0
  269   AGT             1   1   0   0  27   0
  270   RAN             1   1   0   0  27   0
  271   FOR             1   1   0   0  27   0
  272   WAT             1   1   0   0  27   0
  273   WET             1   1   0   0  27   0
  281   LDR             1   1   0   0  27   0
  282   MDR             1   1   0   0  27   0
  283   HDR             1   1   0   0  27   0
  284   IND             1   1   0   0  27   0
  285   MIN             1   1   0   0  27   0
  286   OPE             1   1   0   0  27   0
  287   ANI             1   1   0   0  27   0
  288   AGR             1   1   0   0  27   0
  289   AGT             1   1   0   0  27   0
  290   RAN             1   1   0   0  27   0
  291   FOR             1   1   0   0  27   0
  292   WAT             1   1   0   0  27   0
  293   WET             1   1   0   0  27   0
  301   LDR             1   1   0   0  27   0
  302   MDR             1   1   0   0  27   0
  303   HDR             1   1   0   0  27   0
  304   IND             1   1   0   0  27   0
  305   MIN             1   1   0   0  27   0
  306   OPE             1   1   0   0  27   0
  307   ANI             1   1   0   0  27   0
  308   AGR             1   1   0   0  27   0
  309   AGT             1   1   0   0  27   0
  310   RAN             1   1   0   0  27   0
  311   FOR             1   1   0   0  27   0
  312   WAT             1   1   0   0  27   0
  313   WET             1   1   0   0  27   0
***
  501   LDR             1   1   0   0  27   0
  502   MDR             1   1   0   0  27   0
  503   HDR             1   1   0   0  27   0
  504   IND             1   1   0   0  27   0
  505   MIN             1   1   0   0  27   0
  506   OPE             1   1   0   0  27   0
  507   ANI             1   1   0   0  27   0
  508   AGR             1   1   0   0  27   0
  509   AGT             1   1   0   0  27   0
  510   RAN             1   1   0   0  27   0
  511   FOR             1   1   0   0  27   0
  512   WAT             1   1   0   0  27   0
```

513	WET	1	1	0	0	27	0
521	LDR	1	1	0	0	27	0
522	MDR	1	1	0	0	27	0
523	HDR	1	1	0	0	27	0
524	IND	1	1	0	0	27	0
525	MIN	1	1	0	0	27	0
526	OPE	1	1	0	0	27	0
527	ANI	1	1	0	0	27	0
528	AGR	1	1	0	0	27	0
529	AGT	1	1	0	0	27	0
530	RAN	1	1	0	0	27	0
531	FOR	1	1	0	0	27	0
532	WAT	1	1	0	0	27	0
533	WET	1	1	0	0	27	0
541	LDR	1	1	0	0	27	0
542	MDR	1	1	0	0	27	0
543	HDR	1	1	0	0	27	0
544	IND	1	1	0	0	27	0
545	MIN	1	1	0	0	27	0
546	OPE	1	1	0	0	27	0
547	ANI	1	1	0	0	27	0
548	AGR	1	1	0	0	27	0
549	AGT	1	1	0	0	27	0
550	RAN	1	1	0	0	27	0
551	FOR	1	1	0	0	27	0
552	WAT	1	1	0	0	27	0
553	WET	1	1	0	0	27	0
561	LDR	1	1	0	0	27	0
562	MDR	1	1	0	0	27	0
563	HDR	1	1	0	0	27	0
564	IND	1	1	0	0	27	0
565	MIN	1	1	0	0	27	0
566	OPE	1	1	0	0	27	0
567	ANI	1	1	0	0	27	0
568	AGR	1	1	0	0	27	0
569	AGT	1	1	0	0	27	0
570	RAN	1	1	0	0	27	0
571	FOR	1	1	0	0	27	0
572	WAT	1	1	0	0	27	0
573	WET	1	1	0	0	27	0
581	LDR	1	1	0	0	27	0
582	MDR	1	1	0	0	27	0
583	HDR	1	1	0	0	27	0
584	IND	1	1	0	0	27	0
585	MIN	1	1	0	0	27	0
586	OPE	1	1	0	0	27	0
587	ANI	1	1	0	0	27	0
588	AGR	1	1	0	0	27	0
589	AGT	1	1	0	0	27	0
590	RAN	1	1	0	0	27	0
591	FOR	1	1	0	0	27	0
592	WAT	1	1	0	0	27	0
593	WET	1	1	0	0	27	0
601	LDR	1	1	0	0	27	0
602	MDR	1	1	0	0	27	0
603	HDR	1	1	0	0	27	0
604	IND	1	1	0	0	27	0
605	MIN	1	1	0	0	27	0
606	OPE	1	1	0	0	27	0
607	ANI	1	1	0	0	27	0
608	AGR	1	1	0	0	27	0
609	AGT	1	1	0	0	27	0

```
  610   RAN          1   1   0   0  27   0
  611   FOR          1   1   0   0  27   0
  612   WAT          1   1   0   0  27   0
  613   WET          1   1   0   0  27   0
  621   LDR          1   1   0   0  27   0
  622   MDR          1   1   0   0  27   0
  623   HDR          1   1   0   0  27   0
  624   IND          1   1   0   0  27   0
  625   MIN          1   1   0   0  27   0
  626   OPE          1   1   0   0  27   0
  627   ANI          1   1   0   0  27   0
  628   AGR          1   1   0   0  27   0
  629   AGT          1   1   0   0  27   0
  630   RAN          1   1   0   0  27   0
  631   FOR          1   1   0   0  27   0
  632   WAT          1   1   0   0  27   0
  633   WET          1   1   0   0  27   0
  641   LDR          1   1   0   0  27   0
  642   MDR          1   1   0   0  27   0
  643   HDR          1   1   0   0  27   0
  644   IND          1   1   0   0  27   0
  645   MIN          1   1   0   0  27   0
  646   OPE          1   1   0   0  27   0
  647   ANI          1   1   0   0  27   0
  648   AGR          1   1   0   0  27   0
  649   AGT          1   1   0   0  27   0
  650   RAN          1   1   0   0  27   0
  651   FOR          1   1   0   0  27   0
  652   WAT          1   1   0   0  27   0
  653   WET          1   1   0   0  27   0
  661   LDR          1   1   0   0  27   0
  662   MDR          1   1   0   0  27   0
  663   HDR          1   1   0   0  27   0
  664   IND          1   1   0   0  27   0
  665   MIN          1   1   0   0  27   0
  666   OPE          1   1   0   0  27   0
  667   ANI          1   1   0   0  27   0
  668   AGR          1   1   0   0  27   0
  669   AGT          1   1   0   0  27   0
  670   RAN          1   1   0   0  27   0
  671   FOR          1   1   0   0  27   0
  672   WAT          1   1   0   0  27   0
  673   WET          1   1   0   0  27   0
  END GEN-INFO

  ATEMP-DAT
*** <PLS >     ELDAT    AIRTEMP
*** x -  x      (ft)    (deg F)
  ***
  101  673      -60.       32.
  END ATEMP-DAT

  PWAT-PARM1
*** <PLS >                  Flags
*** x -  x CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE IFFC  HWT IRRG
  101  673    0    0    0    1    0    0    0    0    1    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
*** < PLS>    FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
*** x  - x                (in)   (in/hr)      (ft)               (1/in)   (1/day)
  101             0.       5.0      0.05      300.     0.007       2.0     0.960
```

102	0.	5.0	0.05	300.	0.007	2.0	0.960
103	0.	5.0	0.05	300.	0.007	2.0	0.960
104	0.	5.0	0.05	300.	0.007	2.0	0.960
105	0.	5.0	0.06	300.	0.007	2.0	0.960
106	0.	5.0	0.06	300.	0.007	2.0	0.960
107	0.	5.0	0.06	300.	0.007	2.0	0.960
108	0.	6.0	0.06	300.	0.007	2.0	0.960
109	0.	6.0	0.06	300.	0.007	2.0	0.960
110	0.	5.0	0.06	300.	0.007	2.0	0.960
111	0.	8.0	0.06	300.	0.007	2.0	0.960
112	0.	2.5	0.50	300.	0.001	2.0	0.995
113	0.	2.5	0.50	300.	0.001	2.0	0.995
121	0.	5.0	0.05	300.	0.006	2.0	0.960
122	0.	5.0	0.05	300.	0.006	2.0	0.960
123	0.	5.0	0.05	300.	0.006	2.0	0.960
124	0.	5.0	0.05	300.	0.006	2.0	0.960
125	0.	5.0	0.06	300.	0.006	2.0	0.960
126	0.	5.0	0.06	300.	0.006	2.0	0.960
127	0.	5.0	0.06	300.	0.006	2.0	0.960
128	0.	6.0	0.06	300.	0.006	2.0	0.960
129	0.	6.0	0.06	300.	0.006	2.0	0.960
130	0.	5.0	0.06	300.	0.006	2.0	0.960
131	0.	8.0	0.06	300.	0.006	2.0	0.960
132	0.	2.5	0.50	300.	0.001	2.0	0.995
133	0.	2.5	0.50	300.	0.001	2.0	0.995
141	0.	5.0	0.05	300.	0.012	2.0	0.960
142	0.	5.0	0.05	300.	0.012	2.0	0.960
143	0.	5.0	0.05	300.	0.012	2.0	0.960
144	0.	5.0	0.05	300.	0.012	2.0	0.960
145	0.	5.0	0.06	300.	0.012	2.0	0.960
146	0.	5.0	0.06	300.	0.012	2.0	0.960
147	0.	5.0	0.06	300.	0.012	2.0	0.960
148	0.	6.0	0.06	300.	0.012	2.0	0.960
149	0.	6.0	0.06	300.	0.012	2.0	0.960
150	0.	5.0	0.06	300.	0.012	2.0	0.960
151	0.	8.0	0.06	300.	0.012	2.0	0.960
152	0.	2.5	0.50	300.	0.001	2.0	0.995
153	0.	2.5	0.50	300.	0.001	2.0	0.995
161	0.	5.0	0.05	300.	0.005	2.0	0.960
162	0.	5.0	0.05	300.	0.005	2.0	0.960
163	0.	5.0	0.05	300.	0.005	2.0	0.960
164	0.	5.0	0.05	300.	0.005	2.0	0.960
165	0.	5.0	0.06	300.	0.005	2.0	0.960
166	0.	5.0	0.06	300.	0.005	2.0	0.960
167	0.	5.0	0.06	300.	0.005	2.0	0.960
168	0.	6.0	0.06	300.	0.005	2.0	0.960
169	0.	6.0	0.06	300.	0.005	2.0	0.960
170	0.	5.0	0.06	300.	0.005	2.0	0.960
171	0.	8.0	0.06	300.	0.005	2.0	0.960
172	0.	2.5	0.50	300.	0.001	2.0	0.995
173	0.	2.5	0.50	300.	0.001	2.0	0.995
181	0.	5.0	0.05	300.	0.007	2.0	0.960
182	0.	5.0	0.05	300.	0.007	2.0	0.960
183	0.	5.0	0.05	300.	0.007	2.0	0.960
184	0.	5.0	0.05	300.	0.007	2.0	0.960
185	0.	5.0	0.06	300.	0.007	2.0	0.960
186	0.	5.0	0.06	300.	0.007	2.0	0.960
187	0.	5.0	0.06	300.	0.007	2.0	0.960
188	0.	6.0	0.06	300.	0.007	2.0	0.960
189	0.	6.0	0.06	300.	0.007	2.0	0.960
190	0.	5.0	0.06	300.	0.007	2.0	0.960
191	0.	8.0	0.06	300.	0.007	2.0	0.960

192	0.	2.5	0.50	300.	0.001	2.0	0.995
193	0.	2.5	0.50	300.	0.001	2.0	0.995
201	0.	5.0	0.05	300.	0.003	2.0	0.960
202	0.	5.0	0.05	300.	0.003	2.0	0.960
203	0.	5.0	0.05	300.	0.003	2.0	0.960
204	0.	5.0	0.05	300.	0.003	2.0	0.960
205	0.	5.0	0.06	300.	0.003	2.0	0.960
206	0.	5.0	0.06	300.	0.003	2.0	0.960
207	0.	5.0	0.06	300.	0.003	2.0	0.960
208	0.	6.0	0.06	300.	0.003	2.0	0.960
209	0.	6.0	0.06	300.	0.003	2.0	0.960
210	0.	5.0	0.06	300.	0.003	2.0	0.960
211	0.	8.0	0.06	300.	0.003	2.0	0.960
212	0.	2.5	0.50	300.	0.001	2.0	0.995
213	0.	2.5	0.50	300.	0.001	2.0	0.995
221	0.	5.0	0.05	300.	0.005	2.0	0.960
222	0.	5.0	0.05	300.	0.005	2.0	0.960
223	0.	5.0	0.05	300.	0.005	2.0	0.960
224	0.	5.0	0.05	300.	0.005	2.0	0.960
225	0.	5.0	0.06	300.	0.005	2.0	0.960
226	0.	5.0	0.06	300.	0.005	2.0	0.960
227	0.	5.0	0.06	300.	0.005	2.0	0.960
228	0.	6.0	0.06	300.	0.005	2.0	0.960
229	0.	6.0	0.06	300.	0.005	2.0	0.960
230	0.	5.0	0.06	300.	0.005	2.0	0.960
231	0.	8.0	0.06	300.	0.005	2.0	0.960
232	0.	2.5	0.50	300.	0.001	2.0	0.995
233	0.	2.5	0.50	300.	0.001	2.0	0.995
241	0.	5.0	0.05	300.	0.006	2.0	0.960
242	0.	5.0	0.05	300.	0.006	2.0	0.960
243	0.	5.0	0.05	300.	0.006	2.0	0.960
244	0.	5.0	0.05	300.	0.006	2.0	0.960
245	0.	5.0	0.06	300.	0.006	2.0	0.960
246	0.	5.0	0.06	300.	0.006	2.0	0.960
247	0.	5.0	0.06	300.	0.006	2.0	0.960
248	0.	6.0	0.06	300.	0.006	2.0	0.960
249	0.	6.0	0.06	300.	0.006	2.0	0.960
250	0.	5.0	0.06	300.	0.006	2.0	0.960
251	0.	8.0	0.06	300.	0.006	2.0	0.960
252	0.	2.5	0.50	300.	0.001	2.0	0.995
253	0.	2.5	0.50	300.	0.001	2.0	0.995
261	0.	5.0	0.05	300.	0.007	2.0	0.960
262	0.	5.0	0.05	300.	0.007	2.0	0.960
263	0.	5.0	0.05	300.	0.007	2.0	0.960
264	0.	5.0	0.05	300.	0.007	2.0	0.960
265	0.	5.0	0.06	300.	0.007	2.0	0.960
266	0.	5.0	0.06	300.	0.007	2.0	0.960
267	0.	5.0	0.06	300.	0.007	2.0	0.960
268	0.	6.0	0.06	300.	0.007	2.0	0.960
269	0.	6.0	0.06	300.	0.007	2.0	0.960
270	0.	5.0	0.06	300.	0.007	2.0	0.960
271	0.	8.0	0.06	300.	0.007	2.0	0.960
272	0.	2.5	0.50	300.	0.001	2.0	0.995
273	0.	2.5	0.50	300.	0.001	2.0	0.995
281	0.	5.0	0.05	300.	0.039	2.0	0.960
282	0.	5.0	0.05	300.	0.039	2.0	0.960
283	0.	5.0	0.05	300.	0.039	2.0	0.960
284	0.	5.0	0.05	300.	0.039	2.0	0.960
285	0.	5.0	0.06	300.	0.039	2.0	0.960
286	0.	5.0	0.06	300.	0.039	2.0	0.960
287	0.	5.0	0.06	300.	0.039	2.0	0.960
288	0.	6.0	0.06	300.	0.039	2.0	0.960

```
  289        0.    6.0   0.06    300.   0.039    2.0   0.960
  290        0.    5.0   0.06    300.   0.039    2.0   0.960
  291        0.    8.0   0.06    300.   0.039    2.0   0.960
  292        0.    2.5   0.50    300.   0.001    2.0   0.995
  293        0.    2.5   0.50    300.   0.001    2.0   0.995
  301        0.    5.0   0.05    300.   0.014    2.0   0.960
  302        0.    5.0   0.05    300.   0.014    2.0   0.960
  303        0.    5.0   0.05    300.   0.014    2.0   0.960
  304        0.    5.0   0.05    300.   0.014    2.0   0.960
  305        0.    5.0   0.06    300.   0.014    2.0   0.960
  306        0.    5.0   0.06    300.   0.014    2.0   0.960
  307        0.    5.0   0.06    300.   0.014    2.0   0.960
  308        0.    6.0   0.06    300.   0.014    2.0   0.960
  309        0.    6.0   0.06    300.   0.014    2.0   0.960
  310        0.    5.0   0.06    300.   0.014    2.0   0.960
  311        0.    8.0   0.06    300.   0.014    2.0   0.960
  312        0.    2.5   0.50    300.   0.001    2.0   0.995
  313        0.    2.5   0.50    300.   0.001    2.0   0.995
***
  501        0.    5.0   0.05    300.   0.013    2.0   0.960
  502        0.    5.0   0.05    300.   0.013    2.0   0.960
  503        0.    5.0   0.05    300.   0.013    2.0   0.960
  504        0.    5.0   0.05    300.   0.013    2.0   0.960
  505        0.    5.0   0.06    300.   0.013    2.0   0.960
  506        0.    5.0   0.06    300.   0.013    2.0   0.960
  507        0.    5.0   0.06    300.   0.013    2.0   0.960
  508        0.    6.0   0.06    300.   0.013    2.0   0.960
  509        0.    6.0   0.06    300.   0.013    2.0   0.960
  510        0.    5.0   0.06    300.   0.013    2.0   0.960
  511        0.    8.0   0.06    300.   0.013    2.0   0.960
  512        0.    2.5   0.50    300.   0.001    2.0   0.995
  513        0.    2.5   0.50    300.   0.001    2.0   0.995
  521        0.    5.0   0.05    300.   0.058    2.0   0.960
  522        0.    5.0   0.05    300.   0.058    2.0   0.960
  523        0.    5.0   0.05    300.   0.058    2.0   0.960
  524        0.    5.0   0.05    300.   0.058    2.0   0.960
  525        0.    5.0   0.06    300.   0.058    2.0   0.960
  526        0.    5.0   0.06    300.   0.058    2.0   0.960
  527        0.    5.0   0.06    300.   0.058    2.0   0.960
  528        0.    6.0   0.06    300.   0.058    2.0   0.960
  529        0.    6.0   0.06    300.   0.058    2.0   0.960
  530        0.    5.0   0.06    300.   0.058    2.0   0.960
  531        0.    8.0   0.06    300.   0.058    2.0   0.960
  532        0.    2.5   0.50    300.   0.001    2.0   0.995
  533        0.    2.5   0.50    300.   0.001    2.0   0.995
  541        0.    5.0   0.05    300.   0.063    2.0   0.960
  542        0.    5.0   0.05    300.   0.063    2.0   0.960
  543        0.    5.0   0.05    300.   0.063    2.0   0.960
  544        0.    5.0   0.05    300.   0.063    2.0   0.960
  545        0.    5.0   0.06    300.   0.063    2.0   0.960
  546        0.    5.0   0.06    300.   0.063    2.0   0.960
  547        0.    5.0   0.06    300.   0.063    2.0   0.960
  548        0.    6.0   0.06    300.   0.063    2.0   0.960
  549        0.    6.0   0.06    300.   0.063    2.0   0.960
  550        0.    5.0   0.06    300.   0.063    2.0   0.960
  551        0.    8.0   0.06    300.   0.063    2.0   0.960
  552        0.    2.5   0.50    300.   0.001    2.0   0.995
  553        0.    2.5   0.50    300.   0.001    2.0   0.995
  561        0.    5.0   0.05    300.   0.020    2.0   0.960
  562        0.    5.0   0.05    300.   0.020    2.0   0.960
  563        0.    5.0   0.05    300.   0.020    2.0   0.960
  564        0.    5.0   0.05    300.   0.020    2.0   0.960
```

565	0.	5.0	0.06	300.	0.020	2.0	0.960
566	0.	5.0	0.06	300.	0.020	2.0	0.960
567	0.	5.0	0.06	300.	0.020	2.0	0.960
568	0.	6.0	0.06	300.	0.020	2.0	0.960
569	0.	6.0	0.06	300.	0.020	2.0	0.960
570	0.	5.0	0.06	300.	0.020	2.0	0.960
571	0.	8.0	0.06	300.	0.020	2.0	0.960
572	0.	2.5	0.50	300.	0.001	2.0	0.995
573	0.	2.5	0.50	300.	0.001	2.0	0.995
581	0.	5.0	0.05	300.	0.061	2.0	0.960
582	0.	5.0	0.05	300.	0.061	2.0	0.960
583	0.	5.0	0.05	300.	0.061	2.0	0.960
584	0.	5.0	0.05	300.	0.061	2.0	0.960
585	0.	5.0	0.06	300.	0.061	2.0	0.960
586	0.	5.0	0.06	300.	0.061	2.0	0.960
587	0.	5.0	0.06	300.	0.061	2.0	0.960
588	0.	6.0	0.06	300.	0.061	2.0	0.960
589	0.	6.0	0.06	300.	0.061	2.0	0.960
590	0.	5.0	0.06	300.	0.061	2.0	0.960
591	0.	8.0	0.06	300.	0.061	2.0	0.960
592	0.	2.5	0.50	300.	0.001	2.0	0.995
593	0.	2.5	0.50	300.	0.001	2.0	0.995
601	0.	5.0	0.05	300.	0.053	2.0	0.960
602	0.	5.0	0.05	300.	0.053	2.0	0.960
603	0.	5.0	0.05	300.	0.053	2.0	0.960
604	0.	5.0	0.05	300.	0.053	2.0	0.960
605	0.	5.0	0.06	300.	0.053	2.0	0.960
606	0.	5.0	0.06	300.	0.053	2.0	0.960
607	0.	5.0	0.06	300.	0.053	2.0	0.960
608	0.	6.0	0.06	300.	0.053	2.0	0.960
609	0.	6.0	0.06	300.	0.053	2.0	0.960
610	0.	5.0	0.06	300.	0.053	2.0	0.960
611	0.	8.0	0.06	300.	0.053	2.0	0.960
612	0.	2.5	0.50	300.	0.001	2.0	0.995
613	0.	2.5	0.50	300.	0.001	2.0	0.995
621	0.	5.0	0.05	300.	0.033	2.0	0.960
622	0.	5.0	0.05	300.	0.033	2.0	0.960
623	0.	5.0	0.05	300.	0.033	2.0	0.960
624	0.	5.0	0.05	300.	0.033	2.0	0.960
625	0.	5.0	0.06	300.	0.033	2.0	0.960
626	0.	5.0	0.06	300.	0.033	2.0	0.960
627	0.	5.0	0.06	300.	0.033	2.0	0.960
628	0.	6.0	0.06	300.	0.033	2.0	0.960
629	0.	6.0	0.06	300.	0.033	2.0	0.960
630	0.	5.0	0.06	300.	0.033	2.0	0.960
631	0.	8.0	0.06	300.	0.033	2.0	0.960
632	0.	2.5	0.50	300.	0.001	2.0	0.995
633	0.	2.5	0.50	300.	0.001	2.0	0.995
641	0.	5.0	0.05	300.	0.009	2.0	0.960
642	0.	5.0	0.05	300.	0.009	2.0	0.960
643	0.	5.0	0.05	300.	0.009	2.0	0.960
644	0.	5.0	0.05	300.	0.009	2.0	0.960
645	0.	5.0	0.06	300.	0.009	2.0	0.960
646	0.	5.0	0.06	300.	0.009	2.0	0.960
647	0.	5.0	0.06	300.	0.009	2.0	0.960
648	0.	6.0	0.06	300.	0.009	2.0	0.960
649	0.	6.0	0.06	300.	0.009	2.0	0.960
650	0.	5.0	0.06	300.	0.009	2.0	0.960
651	0.	8.0	0.06	300.	0.009	2.0	0.960
652	0.	2.5	0.50	300.	0.001	2.0	0.995
653	0.	2.5	0.50	300.	0.001	2.0	0.995
661	0.	5.0	0.05	300.	0.015	2.0	0.960

```
  662         0.     5.0    0.05    300.    0.015      2.0    0.960
  663         0.     5.0    0.05    300.    0.015      2.0    0.960
  664         0.     5.0    0.05    300.    0.015      2.0    0.960
  665         0.     5.0    0.06    300.    0.015      2.0    0.960
  666         0.     5.0    0.06    300.    0.015      2.0    0.960
  667         0.     5.0    0.06    300.    0.015      2.0    0.960
  668         0.     6.0    0.06    300.    0.015      2.0    0.960
  669         0.     6.0    0.06    300.    0.015      2.0    0.960
  670         0.     5.0    0.06    300.    0.015      2.0    0.960
  671         0.     8.0    0.06    300.    0.015      2.0    0.960
  672         0.     2.5    0.50    300.    0.001      2.0    0.995
  673         0.     2.5    0.50    300.    0.001      2.0    0.995
  END PWAT-PARM2

  PWAT-PARM3
*** < PLS>    PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
*** x  - x   (deg F)   (deg F)
  101  111      40.       35.        2.        2.     0.00      0.03      0.00
  112  113      40.       35.       10.        2.      0.00      0.03      0.20
  121  131      40.       35.        2.        2.     0.00      0.03      0.00
  132  133      40.       35.       10.        2.      0.00      0.03      0.20
  141  151      40.       35.        2.        2.     0.00      0.03      0.00
  152  153      40.       35.       10.        2.      0.00      0.03      0.20
  161  171      40.       35.        2.        2.     0.00      0.03      0.00
  172  173      40.       35.       10.        2.      0.00      0.03      0.20
  181  191      40.       35.        2.        2.     0.00      0.03      0.00
  192  193      40.       35.       10.        2.      0.00      0.03      0.20
  201  211      40.       35.        2.        2.     0.00      0.03      0.00
  212  213      40.       35.       10.        2.      0.00      0.03      0.20
  221  231      40.       35.        2.        2.     0.00      0.03      0.00
  232  233      40.       35.       10.        2.      0.00      0.03      0.20
  241  251      40.       35.        2.        2.     0.00      0.03      0.00
  252  253      40.       35.       10.        2.      0.00      0.03      0.20
  261  271      40.       35.        2.        2.     0.00      0.03      0.00
  272  273      40.       35.       10.        2.      0.00      0.03      0.20
  281  291      40.       35.        2.        2.     0.00      0.03      0.00
  292  293      40.       35.       10.        2.      0.00      0.03      0.20
  301  311      40.       35.        2.        2.     0.00      0.03      0.00
  312  313      40.       35.       10.        2.      0.00      0.03      0.20
***
  501  511      40.       35.        2.        2.     0.00      0.03      0.00
  512  513      40.       35.       10.        2.      0.00      0.03      0.20
  521  531      40.       35.        2.        2.     0.95      0.03      0.00
  532  533      40.       35.       10.        2.      0.95      0.03      0.20
  541  551      40.       35.        2.        2.     0.00      0.03      0.00
  552  553      40.       35.       10.        2.      0.00      0.03      0.20
  561  571      40.       35.        2.        2.     0.20      0.03      0.00
  572  573      40.       35.       10.        2.      0.20      0.03      0.20
  581  591      40.       35.        2.        2.     0.95      0.03      0.00
  592  593      40.       35.       10.        2.      0.95      0.03      0.20
  601  611      40.       35.        2.        2.     0.50      0.03      0.00
  612  613      40.       35.       10.        2.      0.50      0.03      0.20
  621  631      40.       35.        2.        2.     0.30      0.03      0.00
  632  633      40.       35.       10.        2.      0.30      0.03      0.20
  641  651      40.       35.        2.        2.     0.00      0.03      0.00
  652  653      40.       35.       10.        2.      0.00      0.03      0.20
  661  671      40.       35.        2.        2.     0.00      0.03      0.00
  672  673      40.       35.       10.        2.      0.00      0.03      0.20
  END PWAT-PARM3

  PWAT-PARM4
*** <PLS >     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP
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```
*** x -  x    (in)     (in)              (1/day)
  101  102     0.10      0.5     0.20      1.0      0.7      0.1
  103         0.05      0.5     0.20      1.0      0.7      0.1
  104         0.05      0.5     0.15      1.0      0.7      0.1
  105  106     0.05      0.6     0.25      1.0      0.7      0.1
  107         0.10      0.6     0.25      1.0      0.7      0.1
  108  109     0.12      0.6     0.25      1.0      0.7      0.1
  110         0.10      0.6     0.25      1.0      0.7      0.1
  111         0.15      0.7     0.25      1.0      0.7      0.1
  112  113     0.05      2.0     0.40      0.0      0.8      0.1
  121  122     0.10      0.5     0.20      1.0      0.7      0.1
  123         0.05      0.5     0.20      1.0      0.7      0.1
  124         0.05      0.5     0.15      1.0      0.7      0.1
  125  126     0.05      0.6     0.25      1.0      0.7      0.1
  127         0.10      0.6     0.25      1.0      0.7      0.1
  128  129     0.12      0.6     0.25      1.0      0.7      0.1
  130         0.10      0.6     0.25      1.0      0.7      0.1
  131         0.15      0.7     0.25      1.0      0.7      0.1
  132  133     0.05      2.0     0.40      0.0      0.8      0.1
  141  142     0.10      0.5     0.20      1.0      0.7      0.1
  143         0.05      0.5     0.20      1.0      0.7      0.1
  144         0.05      0.5     0.15      1.0      0.7      0.1
  145  146     0.05      0.6     0.25      1.0      0.7      0.1
  147         0.10      0.6     0.25      1.0      0.7      0.1
  148  149     0.12      0.6     0.25      1.0      0.7      0.1
  150         0.10      0.6     0.25      1.0      0.7      0.1
  151         0.15      0.7     0.25      1.0      0.7      0.1
  152  153     0.05      2.0     0.40      0.0      0.8      0.1
  161  162     0.10      0.5     0.20      1.0      0.7      0.1
  163         0.05      0.5     0.20      1.0      0.7      0.1
  164         0.05      0.5     0.15      1.0      0.7      0.1
  165  166     0.05      0.6     0.25      1.0      0.7      0.1
  167         0.10      0.6     0.25      1.0      0.7      0.1
  168  169     0.12      0.6     0.25      1.0      0.7      0.1
  170         0.10      0.6     0.25      1.0      0.7      0.1
  171         0.15      0.7     0.25      1.0      0.7      0.1
  172  173     0.05      2.0     0.40      0.0      0.8      0.1
  181  182     0.10      0.5     0.20      1.0      0.7      0.1
  183         0.05      0.5     0.20      1.0      0.7      0.1
  184         0.05      0.5     0.15      1.0      0.7      0.1
  185  186     0.05      0.6     0.25      1.0      0.7      0.1
  187         0.10      0.6     0.25      1.0      0.7      0.1
  188  189     0.12      0.6     0.25      1.0      0.7      0.1
  190         0.10      0.6     0.25      1.0      0.7      0.1
  191         0.15      0.7     0.25      1.0      0.7      0.1
  192  193     0.05      2.0     0.40      0.0      0.8      0.1
  201  202     0.10      0.5     0.20      1.0      0.7      0.1
  203         0.05      0.5     0.20      1.0      0.7      0.1
  204         0.05      0.5     0.15      1.0      0.7      0.1
  205  206     0.05      0.6     0.25      1.0      0.7      0.1
  207         0.10      0.6     0.25      1.0      0.7      0.1
  208  209     0.12      0.6     0.25      1.0      0.7      0.1
  210         0.10      0.6     0.25      1.0      0.7      0.1
  211         0.15      0.7     0.25      1.0      0.7      0.1
  212  213     0.05      2.0     0.40      0.0      0.8      0.1
  221  222     0.10      0.5     0.20      1.0      0.7      0.1
  223         0.05      0.5     0.20      1.0      0.7      0.1
  224         0.05      0.5     0.15      1.0      0.7      0.1
  225  226     0.05      0.6     0.25      1.0      0.7      0.1
  227         0.10      0.6     0.25      1.0      0.7      0.1
  228  229     0.12      0.6     0.25      1.0      0.7      0.1
  230         0.10      0.6     0.25      1.0      0.7      0.1
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 231         0.15      0.7    0.25      1.0     0.7     0.1
 232  233      0.05      2.0    0.40      0.0     0.8      0.1
 241  242      0.10      0.5    0.20      1.0     0.7      0.1
 243         0.05      0.5    0.20      1.0     0.7     0.1
 244         0.05      0.5    0.15      1.0     0.7     0.1
 245  246      0.05      0.6    0.25      1.0     0.7      0.1
 247         0.10      0.6    0.25      1.0     0.7     0.1
 248  249      0.12      0.6    0.25      1.0     0.7      0.1
 250         0.10      0.6    0.25      1.0     0.7     0.1
 251         0.15      0.7    0.25      1.0     0.7     0.1
 252  253      0.05      2.0    0.40      0.0     0.8      0.1
 261  262      0.10      0.5    0.20      1.0     0.7      0.1
 263         0.05      0.5    0.20      1.0     0.7     0.1
 264         0.05      0.5    0.15      1.0     0.7     0.1
 265  266      0.05      0.6    0.25      1.0     0.7      0.1
 267         0.10      0.6    0.25      1.0     0.7     0.1
 268  269      0.12      0.6    0.25      1.0     0.7      0.1
 270         0.10      0.6    0.25      1.0     0.7     0.1
 271         0.15      0.7    0.25      1.0     0.7     0.1
 272  273      0.05      2.0    0.40      0.0     0.8      0.1
 281  282      0.10      0.5    0.20      1.0     0.7      0.1
 283         0.05      0.5    0.20      1.0     0.7     0.1
 284         0.05      0.5    0.15      1.0     0.7     0.1
 285  286      0.05      0.6    0.25      1.0     0.7      0.1
 287         0.10      0.6    0.25      1.0     0.7     0.1
 288  289      0.12      0.6    0.25      1.0     0.7      0.1
 290         0.10      0.6    0.25      1.0     0.7     0.1
 291         0.15      0.7    0.25      1.0     0.7     0.1
 292  293      0.05      2.0    0.40      0.0     0.8      0.1
 301  302      0.10      0.5    0.20      1.0     0.7      0.1
 303         0.05      0.5    0.20      1.0     0.7     0.1
 304         0.05      0.5    0.15      1.0     0.7     0.1
 305  306      0.05      0.6    0.25      1.0     0.7      0.1
 307         0.10      0.6    0.25      1.0     0.7     0.1
 308  309      0.12      0.6    0.25      1.0     0.7      0.1
 310         0.10      0.6    0.25      1.0     0.7     0.1
 311         0.15      0.7    0.25      1.0     0.7     0.1
 312  313      0.05      2.0    0.40      0.0     0.8      0.1
***
 501  502      0.10      0.5    0.20      1.0     0.7      0.1
 503         0.05      0.5    0.20      1.0     0.7     0.1
 504         0.05      0.5    0.15      1.0     0.7     0.1
 505  506      0.05      0.6    0.25      1.0     0.7      0.1
 507         0.10      0.6    0.25      1.0     0.7     0.1
 508  509      0.12      0.6    0.25      1.0     0.7      0.1
 510         0.10      0.6    0.25      1.0     0.7     0.1
 511         0.15      0.7    0.25      1.0     0.7     0.1
 512  513      0.05      2.0    0.40      0.0     0.8      0.1
 521  522      0.10      0.5    0.20      1.0     0.7      0.1
 523         0.05      0.5    0.20      1.0     0.7     0.1
 524         0.05      0.5    0.15      1.0     0.7     0.1
 525  526      0.05      0.6    0.25      1.0     0.7      0.1
 527         0.10      0.6    0.25      1.0     0.7     0.1
 528  529      0.12      0.6    0.25      1.0     0.7      0.1
 530         0.10      0.6    0.25      1.0     0.7     0.1
 531         0.15      0.7    0.25      1.0     0.7     0.1
 532  533      0.05      2.0    0.40      0.0     0.8      0.1
 541  542      0.10      0.5    0.20      1.0     0.7      0.1
 543         0.05      0.5    0.20      1.0     0.7     0.1
 544         0.05      0.5    0.15      1.0     0.7     0.1
 545  546      0.05      0.6    0.25      1.0     0.7      0.1
 547         0.10      0.6    0.25      1.0     0.7     0.1
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  548  549    0.12     0.6    0.25     1.0     0.7     0.1
  550       0.10    0.6    0.25    1.0     0.7    0.1
  551       0.15    0.7    0.25    1.0     0.7    0.1
  552  553    0.05     2.0    0.40     0.0     0.8     0.1
  561  562    0.10     0.5    0.20     1.0     0.7     0.1
  563       0.05    0.5    0.20    1.0     0.7    0.1
  564       0.05    0.5    0.15    1.0     0.7    0.1
  565  566    0.05     0.6    0.25     1.0     0.7     0.1
  567       0.10    0.6    0.25    1.0     0.7    0.1
  568  569    0.12     0.6    0.25     1.0     0.7     0.1
  570       0.10    0.6    0.25    1.0     0.7    0.1
  571       0.15    0.7    0.25    1.0     0.7    0.1
  572  573    0.05     2.0    0.40     0.0     0.8     0.1
  581  582    0.10     0.5    0.20     1.0     0.7     0.1
  583       0.05    0.5    0.20    1.0     0.7    0.1
  584       0.05    0.5    0.15    1.0     0.7    0.1
  585  586    0.05     0.6    0.25     1.0     0.7     0.1
  587       0.10    0.6    0.25    1.0     0.7    0.1
  588  589    0.12     0.6    0.25     1.0     0.7     0.1
  590       0.10    0.6    0.25    1.0     0.7    0.1
  591       0.15    0.7    0.25    1.0     0.7    0.1
  592  593    0.05     2.0    0.40     0.0     0.8     0.1
  601  602    0.10     0.5    0.20     1.0     0.7     0.1
  603       0.05    0.5    0.20    1.0     0.7    0.1
  604       0.05    0.5    0.15    1.0     0.7    0.1
  605  606    0.05     0.6    0.25     1.0     0.7     0.1
  607       0.10    0.6    0.25    1.0     0.7    0.1
  608  609    0.12     0.6    0.25     1.0     0.7     0.1
  610       0.10    0.6    0.25    1.0     0.7    0.1
  611       0.15    0.7    0.25    1.0     0.7    0.1
  612  613    0.05     2.0    0.40     0.0     0.8     0.1
  621  622    0.10     0.5    0.20     1.0     0.7     0.1
  623       0.05    0.5    0.20    1.0     0.7    0.1
  624       0.05    0.5    0.15    1.0     0.7    0.1
  625  626    0.05     0.6    0.25     1.0     0.7     0.1
  627       0.10    0.6    0.25    1.0     0.7    0.1
  628  629    0.12     0.6    0.25     1.0     0.7     0.1
  630       0.10    0.6    0.25    1.0     0.7    0.1
  631       0.15    0.7    0.25    1.0     0.7    0.1
  632  633    0.05     2.0    0.40     0.0     0.8     0.1
  641  642    0.10     0.5    0.20     1.0     0.7     0.1
  643       0.05    0.5    0.20    1.0     0.7    0.1
  644       0.05    0.5    0.15    1.0     0.7    0.1
  645  646    0.05     0.6    0.25     1.0     0.7     0.1
  647       0.10    0.6    0.25    1.0     0.7    0.1
  648  649    0.12     0.6    0.25     1.0     0.7     0.1
  650       0.10    0.6    0.25    1.0     0.7    0.1
  651       0.15    0.7    0.25    1.0     0.7    0.1
  652  653    0.05     2.0    0.40     0.0     0.8     0.1
  661  662    0.10     0.5    0.20     1.0     0.7     0.1
  663       0.05    0.5    0.20    1.0     0.7    0.1
  664       0.05    0.5    0.15    1.0     0.7    0.1
  665  666    0.05     0.6    0.25     1.0     0.7     0.1
  667       0.10    0.6    0.25    1.0     0.7    0.1
  668  669    0.12     0.6    0.25     1.0     0.7     0.1
  670       0.10    0.6    0.25    1.0     0.7    0.1
  671       0.15    0.7    0.25    1.0     0.7    0.1
  672  673    0.05     2.0    0.40     0.0     0.8     0.1
  END PWAT-PARM4

  PWAT-STATE1
*** < PLS>  PWATER state variables (in)
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```
*** x  - x      CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
  101  673        0.        0.      0.25     0.005       3.3       0.8        0.
  END PWAT-STATE1

  MON-INTERCEP
*** <PLS >  Interception storage capacity at start of each month (in)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  104 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  105  106 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  107      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  108  109 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  110      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  111      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  112  113 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  121  124 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  125  126 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  127      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  128  129 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  130      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  131      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  132  133 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  141  144 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  145  146 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  147      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  148  149 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  150      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  151      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  152  153 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  161  164 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  165  166 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  167      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  168  169 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  170      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  171      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  172  173 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  181  184 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  185  186 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  187      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  188  189 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  190      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  191      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  192  193 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  201  204 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  205  206 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  207      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  208  209 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  210      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  211      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  212  213 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  221  224 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  225  226 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  227      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  228  229 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  230      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  231      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  232  233 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  241  244 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  245  246 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  247      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  248  249 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  250      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  251      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
```

```
252  253 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
261  264 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
265  266 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
267      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
268  269 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
270      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
271      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
272  273 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
281  284 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
285  286 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
287      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
288  289 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
290      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
291      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
292  293 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
301  304 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
305  306 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
307      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
308  309 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
310      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
311      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
312  313 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03

501  504 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
505  506 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
507      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
508  509 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
510      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
511      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
512  513 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
521  524 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
525  526 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
527      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
528  529 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
530      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
531      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
532  533 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
541  544 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
545  546 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
547      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
548  549 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
550      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
551      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
552  553 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
561  564 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
565  566 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
567      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
568  569 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
570      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
571      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
572  573 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
581  584 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
585  586 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
587      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
588  589 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
590      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
591      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
592  593 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
601  604 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
605  606 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
607      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
608  609 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
```

```
  610      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  611      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  612  613 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  621  624 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  625  626 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  627      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  628  629 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  630      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  631      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  632  633 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  641  644 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  645  646 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  647      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  648  649 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  650      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  651      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  652  653 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  661  664 0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  665  666 0.03 0.03 0.03 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.03 0.03
  667      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  668  669 0.05 0.05 0.07 0.08 0.10 0.15 0.15 0.15 0.15 0.10 0.07 0.05
  670      0.06 0.06 0.06 0.06 0.08 0.10 0.10 0.10 0.10 0.08 0.06 0.06
  671      0.09 0.09 0.09 0.09 0.12 0.15 0.15 0.15 0.15 0.12 0.09 0.09
  672  673 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03
  END MON-INTERCEP

  MON-LZETPARM
*** <PLS >  Lower zone evapotransp   parm at start of each month
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  104  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  105  106  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  107  111  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  112  113  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  121  124  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  125  126  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  127  131  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  132  133  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  141  144  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  145  146  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  147  151  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  152  153  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  161  164  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  165  166  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  167  171  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  172  173  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  181  184  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  185  186  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  187  191  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  192  193  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  201  204  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  205  206  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  207  211  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  212  213  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  221  224  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  225  226  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  227  231  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  232  233  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  241  244  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  245  246  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  247  251  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  252  253  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  261  264  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
```

```
  265  266  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  267  271  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  272  273  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  281  284  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  285  286  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  287  291  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  292  293  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  301  304  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  305  306  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  307  311  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  312  313  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
***
  501  504  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  505  506  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  507  511  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  512  513  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  521  524  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  525  526  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  527  531  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  532  533  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  541  544  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  545  546  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  547  551  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  552  553  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  561  564  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  565  566  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  567  571  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  572  573  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  581  584  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  585  586  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  587  591  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  592  593  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  601  604  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  605  606  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  607  611  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  612  613  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  621  624  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  625  626  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  627  631  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  632  633  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  641  644  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  645  646  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  647  651  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  652  653  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  661  664  0.1  0.2  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.2  0.1
  665  666  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.1
  667  671  0.2  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.3  0.2
  672  673  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  END MON-LZETPARM

  SED-PARM1
*** <PLS >  Sediment parameters 1
*** x -  x  CRV VSIV SDOP
  101  673    0    0    0
  END SED-PARM1

  SED-PARM2
*** <PLS >      SMPF      KRER      JRER     AFFIX     COVER      NVSI
*** x -  x                          (/day)         lb/ac-day
  101  103        1.       0.1        2.      0.01       0.9        1.
  104           1.       0.1        2.      0.01       0.6        1.
  105  106        1.       0.1        2.      0.01       0.3        1.
```

```
107  109    1.    0.1    2.    0.01    0.7    1.
110       1.    0.1    2.    0.01    0.9    1.
111       1.    0.1    2.    0.01    0.95    1.
112  113    1.    0.1    2.    0.05    0.98    1.
121  123    1.    0.1    2.    0.01    0.9    1.
124       1.    0.1    2.    0.01    0.6    1.
125  126    1.    0.1    2.    0.01    0.3    1.
127  129    1.    0.1    2.    0.01    0.7    1.
130       1.    0.1    2.    0.01    0.9    1.
131       1.    0.1    2.    0.01    0.95    1.
132  133    1.    0.1    2.    0.05    0.98    1.
141  143    1.    0.1    2.    0.01    0.9    1.
144       1.    0.1    2.    0.01    0.6    1.
145  146    1.    0.1    2.    0.01    0.3    1.
147  149    1.    0.1    2.    0.01    0.7    1.
150       1.    0.1    2.    0.01    0.9    1.
151       1.    0.1    2.    0.01    0.95    1.
152  153    1.    0.1    2.    0.05    0.98    1.
161  163    1.    0.1    2.    0.01    0.9    1.
164       1.    0.1    2.    0.01    0.6    1.
165  166    1.    0.1    2.    0.01    0.3    1.
167  169    1.    0.1    2.    0.01    0.7    1.
170       1.    0.1    2.    0.01    0.9    1.
171       1.    0.1    2.    0.01    0.95    1.
172  173    1.    0.1    2.    0.05    0.98    1.
181  183    1.    0.1    2.    0.01    0.9    1.
184       1.    0.1    2.    0.01    0.6    1.
185  186    1.    0.1    2.    0.01    0.3    1.
187  189    1.    0.1    2.    0.01    0.7    1.
190       1.    0.1    2.    0.01    0.9    1.
191       1.    0.1    2.    0.01    0.95    1.
192  193    1.    0.1    2.    0.05    0.98    1.

201  203    1.    0.1    2.    0.01    0.9    1.
204       1.    0.1    2.    0.01    0.6    1.
205  206    1.    0.1    2.    0.01    0.3    1.
207  209    1.    0.1    2.    0.01    0.7    1.
210       1.    0.1    2.    0.01    0.9    1.
211       1.    0.1    2.    0.01    0.95    1.
212  213    1.    0.1    2.    0.05    0.98    1.
221  223    1.    0.1    2.    0.01    0.9    1.
224       1.    0.1    2.    0.01    0.6    1.
225  226    1.    0.1    2.    0.01    0.3    1.
227  229    1.    0.1    2.    0.01    0.7    1.
230       1.    0.1    2.    0.01    0.9    1.
231       1.    0.1    2.    0.01    0.95    1.
232  233    1.    0.1    2.    0.05    0.98    1.
241  243    1.    0.1    2.    0.01    0.9    1.
244       1.    0.1    2.    0.01    0.6    1.
245  246    1.    0.1    2.    0.01    0.3    1.
247  249    1.    0.1    2.    0.01    0.7    1.
250       1.    0.1    2.    0.01    0.9    1.
251       1.    0.1    2.    0.01    0.95    1.
252  253    1.    0.1    2.    0.05    0.98    1.
261  263    1.    0.1    2.    0.01    0.9    1.
264       1.    0.1    2.    0.01    0.6    1.
265  266    1.    0.1    2.    0.01    0.3    1.
267  269    1.    0.1    2.    0.01    0.7    1.
270       1.    0.1    2.    0.01    0.9    1.
271       1.    0.1    2.    0.01    0.95    1.
272  273    1.    0.1    2.    0.05    0.98    1.
281  283    1.    0.1    2.    0.01    0.9    1.
```

```
  284         1.    0.1     2.    0.01     0.6     1.
  285  286      1.    0.1     2.    0.01     0.3     1.
  287  289      1.    0.1     2.    0.01     0.7     1.
  290         1.    0.1     2.    0.01     0.9     1.
  291         1.    0.1     2.    0.01    0.95     1.
  292  293      1.    0.1     2.    0.05    0.98     1.

  301  303      1.    0.1     2.    0.01     0.9     1.
  304         1.    0.1     2.    0.01     0.6     1.
  305  306      1.    0.1     2.    0.01     0.3     1.
  307  309      1.    0.1     2.    0.01     0.7     1.
  310         1.    0.1     2.    0.01     0.9     1.
  311         1.    0.1     2.    0.01    0.95     1.
  312  313      1.    0.1     2.    0.05    0.98     1.
***
  501  503      1.    0.1     2.    0.01     0.9     1.
  504         1.    0.1     2.    0.01     0.6     1.
  505  506      1.    0.1     2.    0.01     0.3     1.
  507  509      1.    0.1     2.    0.01     0.7     1.
  510         1.    0.1     2.    0.01     0.9     1.
  511         1.    0.1     2.    0.01    0.95     1.
  512  513      1.    0.1     2.    0.05    0.98     1.
  521  523      1.    0.1     2.    0.01     0.9     1.
  524         1.    0.1     2.    0.01     0.6     1.
  525  526      1.    0.1     2.    0.01     0.3     1.
  527  529      1.    0.1     2.    0.01     0.7     1.
  530         1.    0.1     2.    0.01     0.9     1.
  531         1.    0.1     2.    0.01    0.95     1.
  532  533      1.    0.1     2.    0.05    0.98     1.
  541  543      1.    0.1     2.    0.01     0.9     1.
  544         1.    0.1     2.    0.01     0.6     1.
  545  546      1.    0.1     2.    0.01     0.3     1.
  547  549      1.    0.1     2.    0.01     0.7     1.
  550         1.    0.1     2.    0.01     0.9     1.
  551         1.    0.1     2.    0.01    0.95     1.
  552  553      1.    0.1     2.    0.05    0.98     1.
  561  563      1.    0.1     2.    0.01     0.9     1.
  564         1.    0.1     2.    0.01     0.6     1.
  565  566      1.    0.1     2.    0.01     0.3     1.
  567  569      1.    0.1     2.    0.01     0.7     1.
  570         1.    0.1     2.    0.01     0.9     1.
  571         1.    0.1     2.    0.01    0.95     1.
  572  573      1.    0.1     2.    0.05    0.98     1.
  581  583      1.    0.1     2.    0.01     0.9     1.
  584         1.    0.1     2.    0.01     0.6     1.
  585  586      1.    0.1     2.    0.01     0.3     1.
  587  589      1.    0.1     2.    0.01     0.7     1.
  590         1.    0.1     2.    0.01     0.9     1.
  591         1.    0.1     2.    0.01    0.95     1.
  592  593      1.    0.1     2.    0.05    0.98     1.

  601  603      1.    0.1     2.    0.01     0.9     1.
  604         1.    0.1     2.    0.01     0.6     1.
  605  606      1.    0.1     2.    0.01     0.3     1.
  607  609      1.    0.1     2.    0.01     0.7     1.
  610         1.    0.1     2.    0.01     0.9     1.
  611         1.    0.1     2.    0.01    0.95     1.
  612  613      1.    0.1     2.    0.05    0.98     1.
  621  623      1.    0.1     2.    0.01     0.9     1.
  624         1.    0.1     2.    0.01     0.6     1.
  625  626      1.    0.1     2.    0.01     0.3     1.
  627  629      1.    0.1     2.    0.01     0.7     1.
```

```
  630          1.      0.1       2.     0.01      0.9       1.
  631          1.      0.1       2.     0.01     0.95       1.
  632  633       1.      0.1       2.     0.05     0.98       1.
  641  643       1.      0.1       2.     0.01      0.9       1.
  644          1.      0.1       2.     0.01      0.6       1.
  645  646       1.      0.1       2.     0.01      0.3       1.
  647  649       1.      0.1       2.     0.01      0.7       1.
  650          1.      0.1       2.     0.01      0.9       1.
  651          1.      0.1       2.     0.01     0.95       1.
  652  653       1.      0.1       2.     0.05     0.98       1.
  661  663       1.      0.1       2.     0.01      0.9       1.
  664          1.      0.1       2.     0.01      0.6       1.
  665  666       1.      0.1       2.     0.01      0.3       1.
  667  669       1.      0.1       2.     0.01      0.7       1.
  670          1.      0.1       2.     0.01      0.9       1.
  671          1.      0.1       2.     0.01     0.95       1.
  672  673       1.      0.1       2.     0.05     0.98       1.
  END SED-PARM2

  SED-PARM3
*** <PLS >  Sediment parameter 3
*** x -  x      KSER      JSER      KGER      JGER
  101         0.01       2.       0.       2.
  102         0.02       2.       0.       2.
  103         0.18       2.       0.       2.
  104         0.20       2.       0.       2.
  105         0.06       2.       0.       2.
  106         0.02       2.       0.       2.
  107         0.05       2.       0.       2.
  108         0.10       2.       0.       2.
  109         0.06       2.       0.       2.
  110         0.01       2.       0.       2.
  111         0.01       2.       0.       2.
  112  113      0.01       2.       0.       2.
  121         0.01       2.       0.       2.
  122         0.02       2.       0.       2.
  123         0.18       2.       0.       2.
  124         0.20       2.       0.       2.
  125         0.06       2.       0.       2.
  126         0.02       2.       0.       2.
  127         0.05       2.       0.       2.
  128         0.10       2.       0.       2.
  129         0.06       2.       0.       2.
  130         0.01       2.       0.       2.
  131         0.01       2.       0.       2.
  132  133      0.01       2.       0.       2.
  141         0.01       2.       0.       2.
  142         0.02       2.       0.       2.
  143         0.18       2.       0.       2.
  144         0.20       2.       0.       2.
  145         0.06       2.       0.       2.
  146         0.02       2.       0.       2.
  147         0.05       2.       0.       2.
  148         0.10       2.       0.       2.
  149         0.06       2.       0.       2.
  150         0.01       2.       0.       2.
  151         0.01       2.       0.       2.
  152  153      0.01       2.       0.       2.
  161         0.01       2.       0.       2.
  162         0.02       2.       0.       2.
  163         0.18       2.       0.       2.
  164         0.20       2.       0.       2.
```

165		0.06	2.	0.	2.
166		0.02	2.	0.	2.
167		0.05	2.	0.	2.
168		0.10	2.	0.	2.
169		0.06	2.	0.	2.
170		0.01	2.	0.	2.
171		0.01	2.	0.	2.
172	173	0.01	2.	0.	2.
181		0.01	2.	0.	2.
182		0.02	2.	0.	2.
183		0.18	2.	0.	2.
184		0.20	2.	0.	2.
185		0.06	2.	0.	2.
186		0.02	2.	0.	2.
187		0.05	2.	0.	2.
188		0.10	2.	0.	2.
189		0.06	2.	0.	2.
190		0.01	2.	0.	2.
191		0.01	2.	0.	2.
192	193	0.01	2.	0.	2.
201		0.01	2.	0.	2.
202		0.02	2.	0.	2.
203		0.18	2.	0.	2.
204		0.20	2.	0.	2.
205		0.06	2.	0.	2.
206		0.02	2.	0.	2.
207		0.05	2.	0.	2.
208		0.10	2.	0.	2.
209		0.06	2.	0.	2.
210		0.01	2.	0.	2.
211		0.01	2.	0.	2.
212	213	0.01	2.	0.	2.
221		0.01	2.	0.	2.
222		0.02	2.	0.	2.
223		0.18	2.	0.	2.
224		0.20	2.	0.	2.
225		0.06	2.	0.	2.
226		0.02	2.	0.	2.
227		0.05	2.	0.	2.
228		0.10	2.	0.	2.
229		0.06	2.	0.	2.
230		0.01	2.	0.	2.
231		0.01	2.	0.	2.
232	233	0.01	2.	0.	2.
241		0.01	2.	0.	2.
242		0.02	2.	0.	2.
243		0.18	2.	0.	2.
244		0.20	2.	0.	2.
245		0.06	2.	0.	2.
246		0.02	2.	0.	2.
247		0.05	2.	0.	2.
248		0.10	2.	0.	2.
249		0.06	2.	0.	2.
250		0.01	2.	0.	2.
251		0.01	2.	0.	2.
252	253	0.01	2.	0.	2.
261		0.01	2.	0.	2.
262		0.02	2.	0.	2.
263		0.18	2.	0.	2.
264		0.20	2.	0.	2.
265		0.06	2.	0.	2.

```
 266       0.02    2.     0.     2.
 267       0.05    2.     0.     2.
 268       0.10    2.     0.     2.
 269       0.06    2.     0.     2.
 270       0.01    2.     0.     2.
 271       0.01    2.     0.     2.
 272  273    0.01     2.     0.     2.
 281       0.01    2.     0.     2.
 282       0.02    2.     0.     2.
 283       0.18    2.     0.     2.
 284       0.20    2.     0.     2.
 285       0.06    2.     0.     2.
 286       0.02    2.     0.     2.
 287       0.05    2.     0.     2.
 288       0.10    2.     0.     2.
 289       0.06    2.     0.     2.
 290       0.01    2.     0.     2.
 291       0.01    2.     0.     2.
 292  293    0.01     2.     0.     2.

 301       0.01    2.     0.     2.
 302       0.02    2.     0.     2.
 303       0.18    2.     0.     2.
 304       0.20    2.     0.     2.
 305       0.06    2.     0.     2.
 306       0.02    2.     0.     2.
 307       0.05    2.     0.     2.
 308       0.10    2.     0.     2.
 309       0.06    2.     0.     2.
 310       0.01    2.     0.     2.
 311       0.01    2.     0.     2.
 312  313    0.01     2.     0.     2.
***
 501       0.01    2.     0.     2.
 502       0.02    2.     0.     2.
 503       0.18    2.     0.     2.
 504       0.20    2.     0.     2.
 505       0.06    2.     0.     2.
 506       0.02    2.     0.     2.
 507       0.05    2.     0.     2.
 508       0.10    2.     0.     2.
 509       0.06    2.     0.     2.
 510       0.01    2.     0.     2.
 511       0.01    2.     0.     2.
 512  513    0.01     2.     0.     2.
 521       0.01    2.     0.     2.
 522       0.02    2.     0.     2.
 523       0.18    2.     0.     2.
 524       0.20    2.     0.     2.
 525       0.06    2.     0.     2.
 526       0.02    2.     0.     2.
 527       0.05    2.     0.     2.
 528       0.10    2.     0.     2.
 529       0.06    2.     0.     2.
 530       0.01    2.     0.     2.
 531       0.01    2.     0.     2.
 532  533    0.01     2.     0.     2.
 541       0.01    2.     0.     2.
 542       0.02    2.     0.     2.
 543       0.18    2.     0.     2.
 544       0.20    2.     0.     2.
 545       0.06    2.     0.     2.
```

546		0.02	2.	0.	2.
547		0.05	2.	0.	2.
548		0.10	2.	0.	2.
549		0.06	2.	0.	2.
550		0.01	2.	0.	2.
551		0.01	2.	0.	2.
552	553	0.01	2.	0.	2.
561		0.01	2.	0.	2.
562		0.02	2.	0.	2.
563		0.18	2.	0.	2.
564		0.20	2.	0.	2.
565		0.06	2.	0.	2.
566		0.02	2.	0.	2.
567		0.05	2.	0.	2.
568		0.10	2.	0.	2.
569		0.06	2.	0.	2.
570		0.01	2.	0.	2.
571		0.01	2.	0.	2.
572	573	0.01	2.	0.	2.
581		0.01	2.	0.	2.
582		0.02	2.	0.	2.
583		0.18	2.	0.	2.
584		0.20	2.	0.	2.
585		0.06	2.	0.	2.
586		0.02	2.	0.	2.
587		0.05	2.	0.	2.
588		0.10	2.	0.	2.
589		0.06	2.	0.	2.
590		0.01	2.	0.	2.
591		0.01	2.	0.	2.
592	593	0.01	2.	0.	2.

601		0.01	2.	0.	2.
602		0.02	2.	0.	2.
603		0.18	2.	0.	2.
604		0.20	2.	0.	2.
605		0.06	2.	0.	2.
606		0.02	2.	0.	2.
607		0.05	2.	0.	2.
608		0.10	2.	0.	2.
609		0.06	2.	0.	2.
610		0.01	2.	0.	2.
611		0.01	2.	0.	2.
612	613	0.01	2.	0.	2.
621		0.01	2.	0.	2.
622		0.02	2.	0.	2.
623		0.18	2.	0.	2.
624		0.20	2.	0.	2.
625		0.06	2.	0.	2.
626		0.02	2.	0.	2.
627		0.05	2.	0.	2.
628		0.10	2.	0.	2.
629		0.06	2.	0.	2.
630		0.01	2.	0.	2.
631		0.01	2.	0.	2.
632	633	0.01	2.	0.	2.
641		0.01	2.	0.	2.
642		0.02	2.	0.	2.
643		0.18	2.	0.	2.
644		0.20	2.	0.	2.
645		0.06	2.	0.	2.
646		0.02	2.	0.	2.

```
  647        0.05      2.      0.      2.
  648        0.10      2.      0.      2.
  649        0.06      2.      0.      2.
  650        0.01      2.      0.      2.
  651        0.01      2.      0.      2.
  652  653     0.01      2.      0.      2.
  661        0.01      2.      0.      2.
  662        0.02      2.      0.      2.
  663        0.18      2.      0.      2.
  664        0.20      2.      0.      2.
  665        0.06      2.      0.      2.
  666        0.02      2.      0.      2.
  667        0.05      2.      0.      2.
  668        0.10      2.      0.      2.
  669        0.06      2.      0.      2.
  670        0.01      2.      0.      2.
  671        0.01      2.      0.      2.
  672  673     0.01      2.      0.      2.
  END SED-PARM3

  SED-STOR
*** <PLS >  Detached sediment storage (tons/acre)
*** x -  x      DETS
  101  673       0.2
  END SED-STOR

  PSTEMP-PARM1
*** <PLS >  Flags for section PSTEMP
*** x -  x SLTV ULTV LGTV TSOP
  101  673    1    1    1    1
  END PSTEMP-PARM1

  PSTEMP-PARM2
*** <PLS >      ASLT      BSLT     ULTP1     ULTP2     LGTP1     LGTP2
*** x -  x   (deg F)   (deg F)             (deg F)             (deg F)
  101  673       45.      0.15       45.      0.15       50.        0.
  END PSTEMP-PARM2

  MON-ASLT
*** <PLS >  Value of ASLT at start of each month (deg F)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673 49.0 49.0 50.0 59.0 60.0 63.0 67.0 67.0 65.0 59.0 53.0 46.0
  END MON-ASLT

  MON-BSLT
*** <PLS >  Value of BSLT at start of each month (deg F/F)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2
  END MON-BSLT

  MON-ULTP1
*** <PLS >  Value of ULTP1 at start of each month in deg F (TSOPFG=1)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673 45.0 45.0 46.0 55.0 56.0 60.0 63.0 63.0 61.0 56.0 49.0 43.0
  END MON-ULTP1

  MON-ULTP2
*** <PLS >  Value of ULTP2 at start of each month in Deg F/F (TSOPFG=1)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2
  END MON-ULTP2
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  MON-LGTP1
*** <PLS >  Value of LGTP1 at start of each month in Deg F (TSOPFG=1)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673 53.0 53.0 54.0 62.0 64.0 71.0 73.0 75.0 70.0 64.0 59.0 51.0
  END MON-LGTP1

  PSTEMP-TEMPS
*** <PLS >  Initial temperatures (deg F)
*** x -  x     AIRTC     SLTMP     ULTMP     LGTMP
  101  673      56.0      56.0      56.0      68.0
  END PSTEMP-TEMPS

  PWT-PARM1
*** <PLS >  Flags for section PWTGAS
*** x -  x  IDV  ICV  GDV  GVC
  101  673    1    0    1    0
  END PWT-PARM1

  PWT-PARM2
***         Second group of PWTGAS parms
*** <PLS >      ELEV     IDOXP     ICO2P     ADOXP     ACO2P
*** x -  x      (ft)    (mg/l)  (mg C/l)    (mg/l)  (mg C/l)
  101  673       50.       8.0        0.       6.0        0.
  END PWT-PARM2

  MON-IFWDOX
*** <PLS > Value at start of each month for interflow DO concentration (mg/l)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673  6.0  6.0  5.5  5.0  5.0  4.5  4.5  4.5  5.0  5.5  6.0  6.0
  END MON-IFWDOX

  MON-GRNDDOX
*** <PLS >Value at start of each month for groundwater DO concentration (mg/l)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  673  5.5  5.5  5.0  4.5  4.5  4.0  4.0  4.0  4.5  5.0  5.5  5.5
  END MON-GRNDDOX

  PWT-GASES
***                 Initial DO and CO2 concentrations
*** <PLS >     SODOX     SOCO2     IODOX     IOCO2     AODOX     AOCO2
*** x -  x    (mg/l)  (mg C/l)    (mg/l)  (mg C/l)    (mg/l)  (mg C/l)
  101  673      10.0       0.0       8.0       0.0       6.0       0.0
  END PWT-GASES

  NQUALS
*** <PLS >
*** x -  xNQUAL
  101  673    4
  END NQUALS

  QUAL-PROPS
*** <PLS >  Identifiers and Flags
*** x -  x    QUALID      QTID  QSD VPFW VPFS  QSO  VQO QIFW VIQC QAGW VAQC
  101  673NH3             LBS     0    0    0    1    1    1    3    1    3
  END QUAL-PROPS

  QUAL-INPUT
***         Storage on surface and nonseasonal parameters
***            SQO   POTFW   POTFS   ACQOP  SQOLIM   WSQOP    IOQC    AOQC
*** <PLS >  qty/ac qty/ton qty/ton    qty/  qty/ac   in/hr qty/ft3 qty/ft3
*** x -  x                          ac.day
  101         0.01      0.      0.   0.010   0.025     0.6      0.      0.
```

102	0.01	0.	0.	0.015	0.038	0.6	0.	0.
103	0.01	0.	0.	0.020	0.050	0.6	0.	0.
104	0.01	0.	0.	0.020	0.050	0.6	0.	0.
105	0.01	0.	0.	0.007	0.020	0.6	0.	0.
106	0.01	0.	0.	0.005	0.015	0.6	0.	0.
107	0.01	0.	0.	0.010	0.030	0.6	0.	0.
108	0.01	0.	0.	0.020	0.060	0.6	0.	0.
109	0.01	0.	0.	0.015	0.045	0.6	0.	0.
110	0.01	0.	0.	0.012	0.035	0.6	0.	0.
111	0.01	0.	0.	0.006	0.015	0.6	0.	0.
112	0.01	0.	0.	0.001	0.005	0.3	0.	0.
113	0.01	0.	0.	0.001	0.005	0.3	0.	0.
121	0.01	0.	0.	0.010	0.025	0.6	0.	0.
122	0.01	0.	0.	0.015	0.038	0.6	0.	0.
123	0.01	0.	0.	0.020	0.050	0.6	0.	0.
124	0.01	0.	0.	0.020	0.050	0.6	0.	0.
125	0.01	0.	0.	0.007	0.020	0.6	0.	0.
126	0.01	0.	0.	0.005	0.015	0.6	0.	0.
127	0.01	0.	0.	0.010	0.030	0.6	0.	0.
128	0.01	0.	0.	0.020	0.060	0.6	0.	0.
129	0.01	0.	0.	0.015	0.045	0.6	0.	0.
130	0.01	0.	0.	0.012	0.035	0.6	0.	0.
131	0.01	0.	0.	0.006	0.015	0.6	0.	0.
132	0.01	0.	0.	0.001	0.005	0.3	0.	0.
133	0.01	0.	0.	0.001	0.005	0.3	0.	0.
141	0.01	0.	0.	0.010	0.025	0.6	0.	0.
142	0.01	0.	0.	0.015	0.038	0.6	0.	0.
143	0.01	0.	0.	0.020	0.050	0.6	0.	0.
144	0.01	0.	0.	0.020	0.050	0.6	0.	0.
145	0.01	0.	0.	0.007	0.020	0.6	0.	0.
146	0.01	0.	0.	0.005	0.015	0.6	0.	0.
147	0.01	0.	0.	0.010	0.030	0.6	0.	0.
148	0.01	0.	0.	0.020	0.060	0.6	0.	0.
149	0.01	0.	0.	0.015	0.045	0.6	0.	0.
150	0.01	0.	0.	0.012	0.035	0.6	0.	0.
151	0.01	0.	0.	0.006	0.015	0.6	0.	0.
152	0.01	0.	0.	0.001	0.005	0.3	0.	0.
153	0.01	0.	0.	0.001	0.005	0.3	0.	0.
161	0.01	0.	0.	0.010	0.025	0.6	0.	0.
162	0.01	0.	0.	0.015	0.038	0.6	0.	0.
163	0.01	0.	0.	0.020	0.050	0.6	0.	0.
164	0.01	0.	0.	0.020	0.050	0.6	0.	0.
165	0.01	0.	0.	0.007	0.020	0.6	0.	0.
166	0.01	0.	0.	0.005	0.015	0.6	0.	0.
167	0.01	0.	0.	0.010	0.030	0.6	0.	0.
168	0.01	0.	0.	0.020	0.060	0.6	0.	0.
169	0.01	0.	0.	0.015	0.045	0.6	0.	0.
170	0.01	0.	0.	0.012	0.035	0.6	0.	0.
171	0.01	0.	0.	0.006	0.015	0.6	0.	0.
172	0.01	0.	0.	0.001	0.005	0.3	0.	0.
173	0.01	0.	0.	0.001	0.005	0.3	0.	0.
181	0.01	0.	0.	0.010	0.025	0.6	0.	0.
182	0.01	0.	0.	0.015	0.038	0.6	0.	0.
183	0.01	0.	0.	0.020	0.050	0.6	0.	0.
184	0.01	0.	0.	0.020	0.050	0.6	0.	0.
185	0.01	0.	0.	0.007	0.020	0.6	0.	0.
186	0.01	0.	0.	0.005	0.015	0.6	0.	0.
187	0.01	0.	0.	0.010	0.030	0.6	0.	0.
188	0.01	0.	0.	0.020	0.060	0.6	0.	0.
189	0.01	0.	0.	0.015	0.045	0.6	0.	0.
190	0.01	0.	0.	0.012	0.035	0.6	0.	0.
191	0.01	0.	0.	0.006	0.015	0.6	0.	0.

192	0.01	0.	0.	0.001	0.005	0.3	0.	0.
193	0.01	0.	0.	0.001	0.005	0.3	0.	0.

201	0.01	0.	0.	0.010	0.025	0.6	0.	0.
202	0.01	0.	0.	0.015	0.038	0.6	0.	0.
203	0.01	0.	0.	0.020	0.050	0.6	0.	0.
204	0.01	0.	0.	0.020	0.050	0.6	0.	0.
205	0.01	0.	0.	0.007	0.020	0.6	0.	0.
206	0.01	0.	0.	0.005	0.015	0.6	0.	0.
207	0.01	0.	0.	0.010	0.030	0.6	0.	0.
208	0.01	0.	0.	0.020	0.060	0.6	0.	0.
209	0.01	0.	0.	0.015	0.045	0.6	0.	0.
210	0.01	0.	0.	0.012	0.035	0.6	0.	0.
211	0.01	0.	0.	0.006	0.015	0.6	0.	0.
212	0.01	0.	0.	0.001	0.005	0.3	0.	0.
213	0.01	0.	0.	0.001	0.005	0.3	0.	0.
221	0.01	0.	0.	0.010	0.025	0.6	0.	0.
222	0.01	0.	0.	0.015	0.038	0.6	0.	0.
223	0.01	0.	0.	0.020	0.050	0.6	0.	0.
224	0.01	0.	0.	0.020	0.050	0.6	0.	0.
225	0.01	0.	0.	0.007	0.020	0.6	0.	0.
226	0.01	0.	0.	0.005	0.015	0.6	0.	0.
227	0.01	0.	0.	0.010	0.030	0.6	0.	0.
228	0.01	0.	0.	0.020	0.060	0.6	0.	0.
229	0.01	0.	0.	0.015	0.045	0.6	0.	0.
230	0.01	0.	0.	0.012	0.035	0.6	0.	0.
231	0.01	0.	0.	0.006	0.015	0.6	0.	0.
232	0.01	0.	0.	0.001	0.005	0.3	0.	0.
233	0.01	0.	0.	0.001	0.005	0.3	0.	0.
241	0.01	0.	0.	0.010	0.025	0.6	0.	0.
242	0.01	0.	0.	0.015	0.038	0.6	0.	0.
243	0.01	0.	0.	0.020	0.050	0.6	0.	0.
244	0.01	0.	0.	0.020	0.050	0.6	0.	0.
245	0.01	0.	0.	0.007	0.020	0.6	0.	0.
246	0.01	0.	0.	0.005	0.015	0.6	0.	0.
247	0.01	0.	0.	0.010	0.030	0.6	0.	0.
248	0.01	0.	0.	0.020	0.060	0.6	0.	0.
249	0.01	0.	0.	0.015	0.045	0.6	0.	0.
250	0.01	0.	0.	0.012	0.035	0.6	0.	0.
251	0.01	0.	0.	0.006	0.015	0.6	0.	0.
252	0.01	0.	0.	0.001	0.005	0.3	0.	0.
253	0.01	0.	0.	0.001	0.005	0.3	0.	0.
261	0.01	0.	0.	0.010	0.025	0.6	0.	0.
262	0.01	0.	0.	0.015	0.038	0.6	0.	0.
263	0.01	0.	0.	0.020	0.050	0.6	0.	0.
264	0.01	0.	0.	0.020	0.050	0.6	0.	0.
265	0.01	0.	0.	0.007	0.020	0.6	0.	0.
266	0.01	0.	0.	0.005	0.015	0.6	0.	0.
267	0.01	0.	0.	0.010	0.030	0.6	0.	0.
268	0.01	0.	0.	0.020	0.060	0.6	0.	0.
269	0.01	0.	0.	0.015	0.045	0.6	0.	0.
270	0.01	0.	0.	0.012	0.035	0.6	0.	0.
271	0.01	0.	0.	0.006	0.015	0.6	0.	0.
272	0.01	0.	0.	0.001	0.005	0.3	0.	0.
273	0.01	0.	0.	0.001	0.005	0.3	0.	0.
281	0.01	0.	0.	0.010	0.025	0.6	0.	0.
282	0.01	0.	0.	0.015	0.038	0.6	0.	0.
283	0.01	0.	0.	0.020	0.050	0.6	0.	0.
284	0.01	0.	0.	0.020	0.050	0.6	0.	0.
285	0.01	0.	0.	0.007	0.020	0.6	0.	0.
286	0.01	0.	0.	0.005	0.015	0.6	0.	0.
287	0.01	0.	0.	0.010	0.030	0.6	0.	0.

```
 288     0.01   0.    0.  0.020  0.060   0.6    0.    0.
 289     0.01   0.    0.  0.015  0.045   0.6    0.    0.
 290     0.01   0.    0.  0.012  0.035   0.6    0.    0.
 291     0.01   0.    0.  0.006  0.015   0.6    0.    0.
 292     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 293     0.01   0.    0.  0.001  0.005   0.3    0.    0.

 301     0.01   0.    0.  0.010  0.025   0.6    0.    0.
 302     0.01   0.    0.  0.015  0.038   0.6    0.    0.
 303     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 304     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 305     0.01   0.    0.  0.007  0.020   0.6    0.    0.
 306     0.01   0.    0.  0.005  0.015   0.6    0.    0.
 307     0.01   0.    0.  0.010  0.030   0.6    0.    0.
 308     0.01   0.    0.  0.020  0.060   0.6    0.    0.
 309     0.01   0.    0.  0.015  0.045   0.6    0.    0.
 310     0.01   0.    0.  0.012  0.035   0.6    0.    0.
 311     0.01   0.    0.  0.006  0.015   0.6    0.    0.
 312     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 313     0.01   0.    0.  0.001  0.005   0.3    0.    0.
***
 501     0.01   0.    0.  0.010  0.025   0.6    0.    0.
 502     0.01   0.    0.  0.015  0.038   0.6    0.    0.
 503     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 504     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 505     0.01   0.    0.  0.007  0.020   0.6    0.    0.
 506     0.01   0.    0.  0.005  0.015   0.6    0.    0.
 507     0.01   0.    0.  0.010  0.030   0.6    0.    0.
 508     0.01   0.    0.  0.020  0.060   0.6    0.    0.
 509     0.01   0.    0.  0.015  0.045   0.6    0.    0.
 510     0.01   0.    0.  0.012  0.035   0.6    0.    0.
 511     0.01   0.    0.  0.006  0.015   0.6    0.    0.
 512     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 513     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 521     0.01   0.    0.  0.010  0.025   0.6    0.    0.
 522     0.01   0.    0.  0.015  0.038   0.6    0.    0.
 523     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 524     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 525     0.01   0.    0.  0.007  0.020   0.6    0.    0.
 526     0.01   0.    0.  0.005  0.015   0.6    0.    0.
 527     0.01   0.    0.  0.010  0.030   0.6    0.    0.
 528     0.01   0.    0.  0.020  0.060   0.6    0.    0.
 529     0.01   0.    0.  0.015  0.045   0.6    0.    0.
 530     0.01   0.    0.  0.012  0.035   0.6    0.    0.
 531     0.01   0.    0.  0.006  0.015   0.6    0.    0.
 532     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 533     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 541     0.01   0.    0.  0.010  0.025   0.6    0.    0.
 542     0.01   0.    0.  0.015  0.038   0.6    0.    0.
 543     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 544     0.01   0.    0.  0.020  0.050   0.6    0.    0.
 545     0.01   0.    0.  0.007  0.020   0.6    0.    0.
 546     0.01   0.    0.  0.005  0.015   0.6    0.    0.
 547     0.01   0.    0.  0.010  0.030   0.6    0.    0.
 548     0.01   0.    0.  0.020  0.060   0.6    0.    0.
 549     0.01   0.    0.  0.015  0.045   0.6    0.    0.
 550     0.01   0.    0.  0.012  0.035   0.6    0.    0.
 551     0.01   0.    0.  0.006  0.015   0.6    0.    0.
 552     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 553     0.01   0.    0.  0.001  0.005   0.3    0.    0.
 561     0.01   0.    0.  0.010  0.025   0.6    0.    0.
 562     0.01   0.    0.  0.015  0.038   0.6    0.    0.
```

563	0.01	0.	0.	0.020	0.050	0.6	0.	0.
564	0.01	0.	0.	0.020	0.050	0.6	0.	0.
565	0.01	0.	0.	0.007	0.020	0.6	0.	0.
566	0.01	0.	0.	0.005	0.015	0.6	0.	0.
567	0.01	0.	0.	0.010	0.030	0.6	0.	0.
568	0.01	0.	0.	0.020	0.060	0.6	0.	0.
569	0.01	0.	0.	0.015	0.045	0.6	0.	0.
570	0.01	0.	0.	0.012	0.035	0.6	0.	0.
571	0.01	0.	0.	0.006	0.015	0.6	0.	0.
572	0.01	0.	0.	0.001	0.005	0.3	0.	0.
573	0.01	0.	0.	0.001	0.005	0.3	0.	0.
581	0.01	0.	0.	0.010	0.025	0.6	0.	0.
582	0.01	0.	0.	0.015	0.038	0.6	0.	0.
583	0.01	0.	0.	0.020	0.050	0.6	0.	0.
584	0.01	0.	0.	0.020	0.050	0.6	0.	0.
585	0.01	0.	0.	0.007	0.020	0.6	0.	0.
586	0.01	0.	0.	0.005	0.015	0.6	0.	0.
587	0.01	0.	0.	0.010	0.030	0.6	0.	0.
588	0.01	0.	0.	0.020	0.060	0.6	0.	0.
589	0.01	0.	0.	0.015	0.045	0.6	0.	0.
590	0.01	0.	0.	0.012	0.035	0.6	0.	0.
591	0.01	0.	0.	0.006	0.015	0.6	0.	0.
592	0.01	0.	0.	0.001	0.005	0.3	0.	0.
593	0.01	0.	0.	0.001	0.005	0.3	0.	0.
601	0.01	0.	0.	0.010	0.025	0.6	0.	0.
602	0.01	0.	0.	0.015	0.038	0.6	0.	0.
603	0.01	0.	0.	0.020	0.050	0.6	0.	0.
604	0.01	0.	0.	0.020	0.050	0.6	0.	0.
605	0.01	0.	0.	0.007	0.020	0.6	0.	0.
606	0.01	0.	0.	0.005	0.015	0.6	0.	0.
607	0.01	0.	0.	0.010	0.030	0.6	0.	0.
608	0.01	0.	0.	0.020	0.060	0.6	0.	0.
609	0.01	0.	0.	0.015	0.045	0.6	0.	0.
610	0.01	0.	0.	0.012	0.035	0.6	0.	0.
611	0.01	0.	0.	0.006	0.015	0.6	0.	0.
612	0.01	0.	0.	0.001	0.005	0.3	0.	0.
613	0.01	0.	0.	0.001	0.005	0.3	0.	0.
621	0.01	0.	0.	0.010	0.025	0.6	0.	0.
622	0.01	0.	0.	0.015	0.038	0.6	0.	0.
623	0.01	0.	0.	0.020	0.050	0.6	0.	0.
624	0.01	0.	0.	0.020	0.050	0.6	0.	0.
625	0.01	0.	0.	0.007	0.020	0.6	0.	0.
626	0.01	0.	0.	0.005	0.015	0.6	0.	0.
627	0.01	0.	0.	0.010	0.030	0.6	0.	0.
628	0.01	0.	0.	0.020	0.060	0.6	0.	0.
629	0.01	0.	0.	0.015	0.045	0.6	0.	0.
630	0.01	0.	0.	0.012	0.035	0.6	0.	0.
631	0.01	0.	0.	0.006	0.015	0.6	0.	0.
632	0.01	0.	0.	0.001	0.005	0.3	0.	0.
633	0.01	0.	0.	0.001	0.005	0.3	0.	0.
641	0.01	0.	0.	0.010	0.025	0.6	0.	0.
642	0.01	0.	0.	0.015	0.038	0.6	0.	0.
643	0.01	0.	0.	0.020	0.050	0.6	0.	0.
644	0.01	0.	0.	0.020	0.050	0.6	0.	0.
645	0.01	0.	0.	0.007	0.020	0.6	0.	0.
646	0.01	0.	0.	0.005	0.015	0.6	0.	0.
647	0.01	0.	0.	0.010	0.030	0.6	0.	0.
648	0.01	0.	0.	0.020	0.060	0.6	0.	0.
649	0.01	0.	0.	0.015	0.045	0.6	0.	0.
650	0.01	0.	0.	0.012	0.035	0.6	0.	0.
651	0.01	0.	0.	0.006	0.015	0.6	0.	0.

```
  652       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  653       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  661       0.01    0.     0.  0.010  0.025    0.6     0.     0.
  662       0.01    0.     0.  0.015  0.038    0.6     0.     0.
  663       0.01    0.     0.  0.020  0.050    0.6     0.     0.
  664       0.01    0.     0.  0.020  0.050    0.6     0.     0.
  665       0.01    0.     0.  0.007  0.020    0.6     0.     0.
  666       0.01    0.     0.  0.005  0.015    0.6     0.     0.
  667       0.01    0.     0.  0.010  0.030    0.6     0.     0.
  668       0.01    0.     0.  0.020  0.060    0.6     0.     0.
  669       0.01    0.     0.  0.015  0.045    0.6     0.     0.
  670       0.01    0.     0.  0.012  0.035    0.6     0.     0.
  671       0.01    0.     0.  0.006  0.015    0.6     0.     0.
  672       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  673       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  END QUAL-INPUT

  MON-ACCUM
*** <PLS >  Value at start of each month for accum rate of QUALOF (lb/ac.day)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  102     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  103  104 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  105     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  106     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  107     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  108     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  109     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  110  1110.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  112  1130.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
***
  121     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  122     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  123  124 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  125     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  126     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  127     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  128     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  129     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  130  1310.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  132  1330.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
***
  141     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  142     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  143  144 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  145     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  146     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  147     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  148     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  149     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  150  1510.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  152  1530.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  161     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  162     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  163  164 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  165     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  166     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  167     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  168     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  169     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  170  1710.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  172  1730.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
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181    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
182    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
183  184 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
185    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
186    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
187    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
188    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
189    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
190  1910.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
192  1930.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003

201    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
202    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
203  204 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
205    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
206    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
207    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
208    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
209    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
210  2110.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
212  2130.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
221    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
222    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
223  224 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
225    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
226    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
227    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
228    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
229    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
230  2310.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
232  2330.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
241    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
242    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
243  244 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
245    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
246    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
247    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
248    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
249    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
250  2510.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
252  2530.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
261    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
262    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
263  264 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
265    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
266    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
267    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
268    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
269    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
270  2710.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
272  2730.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
281    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
282    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
283  284 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
285    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
286    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
287    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
288    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
289    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
290  2910.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
292  2930.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
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  301    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  302    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  303  304 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  305    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  306    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  307    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  308    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  309    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  310  3110.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  312  3130.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
***
  501    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  502    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  503  504 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  505    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  506    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  507    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  508    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  509    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  510  5110.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  512  5130.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  521    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  522    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  523  524 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  525    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  526    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  527    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  528    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  529    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  530  5310.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  532  5330.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  541    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  542    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  543  544 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  545    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  546    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  547    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  548    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  549    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  550  5510.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  552  5530.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  561    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  562    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  563  564 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  565    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  566    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  567    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  568    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  569    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  570  5710.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  572  5730.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  581    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  582    0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  583  584 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  585    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  586    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  587    0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  588    0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  589    0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  590  5910.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  592  5930.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
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  601     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  602     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  603  604 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  605     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  606     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  607     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  608     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  609     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  610  6110.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  612  6130.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  621     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  622     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  623  624 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  625     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  626     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  627     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  628     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  629     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  630  6310.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  632  6330.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  641     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  642     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  643  644 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  645     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  646     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  647     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  648     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  649     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  650  6510.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  652  6530.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  661     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  662     0.0080.008 0.010.0150.0150.0150.0150.0150.015 0.010.0080.008
  663  664 0.01 0.010.015 0.02 0.02 0.02 0.02 0.02 0.020.015 0.01 0.01
  665     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  666     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  667     0.0060.0060.008 0.01 0.01 0.01 0.01 0.01 0.010.0080.0060.006
  668     0.0150.0150.020 0.03 0.03 0.03 0.03 0.03 0.030.0200.0150.015
  669     0.0120.0120.0120.0150.0150.0150.0150.0150.0150.0120.0120.012
  670  6710.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  672  6730.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  END MON-ACCUM

  MON-SQOLIM
*** <PLS >  Value at start of month for limiting storage of QUALOF (lb/ac)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  102      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  103  1040.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  105     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  106     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  107     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  108      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  109     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  110  1110.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  112  1130.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
***
  121     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  122      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  123  1240.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  125     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  126     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  127     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
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  128     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  129    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  130  1310.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  132  1330.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
***
  141    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  142     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  143  1440.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  145    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  146    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  147    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  148     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  149    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  150  1510.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  152  1530.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  161    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  162     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  163  1640.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  165    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  166    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  167    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  168     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  169    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  170  1710.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  172  1730.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  181    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  182     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  183  1840.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  185    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  186    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  187    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  188     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  189    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  190  1910.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  192  1930.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006

  201    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  202     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  203  2040.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  205    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  206    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  207    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  208     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  209    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  210  2110.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  212  2130.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  221    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  222     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  223  2240.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  225    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  226    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  227    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  228     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  229    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  230  2310.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  232  2330.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  241    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  242     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  243  2440.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  245    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  246    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  247    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
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  248     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  249    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  250  2510.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  252  2530.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  261    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  262     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  263  2640.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  265    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  266    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  267    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  268     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  269    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  270  2710.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  272  2730.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  281    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  282     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  283  2840.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  285    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  286    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  287    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  288     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  289    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  290  2910.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  292  2930.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006

  301    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  302     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  303  3040.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  305    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  306    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  307    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  308     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  309    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  310  3110.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  312  3130.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
***
  501    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  502     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  503  5040.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  505    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  506    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  507    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  508     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  509    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  510  5110.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  512  5130.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  521    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  522     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  523  5240.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  525    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  526    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  527    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
  528     0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
  529    0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  530  5310.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  532  5330.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  541    0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
  542     0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
  543  5440.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
  545    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  546    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  547    0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
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548      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
549     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
550  5510.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
552  5530.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
561     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
562      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
563  5640.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
565     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
566     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
567     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
568      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
569     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
570  5710.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
572  5730.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
581     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
582      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
583  5840.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
585     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
586     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
587     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
588      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
589     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
590  5910.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
592  5930.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006

601     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
602      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
603  6040.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
605     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
606     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
607     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
608      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
609     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
610  6110.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
612  6130.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
621     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
622      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
623  6240.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
625     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
626     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
627     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
628      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
629     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
630  6310.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
632  6330.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
641     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
642      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
643  6440.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
645     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
646     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
647     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
648      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
649     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
650  6510.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
652  6530.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
661     0.0150.015 0.020.0250.0250.0250.0250.0250.025 0.020.0150.015
662      0.02 0.020.0250.0380.0380.0380.0380.0380.0380.025 0.02 0.02
663  6640.0250.0250.038 0.05 0.05 0.05 0.05 0.05 0.050.0380.0250.025
665     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
666     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
667     0.0120.0120.0160.0200.0200.0200.0200.0200.0200.0160.0120.012
668      0.03 0.030.040 0.06 0.06 0.06 0.06 0.06 0.060.040 0.03 0.03
```

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  669     0.0240.0240.024 0.03 0.03 0.03 0.03 0.03 0.030.0240.0240.024
  670  6710.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  672  6730.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  END MON-SQOLIM

  MON-IFLW-CONC
*** <PLS >  Conc of QUAL in interflow outflow for each month (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  102  104 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  105  106  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  107      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  108  109 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  110       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  111       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  112  113  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  121      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  122  124 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  125  126  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  127      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  128  129 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  130       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  131       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  132  133  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  141      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  142  144 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  145  146  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  147      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  148  149 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  150       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  151       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  152  153  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  161      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  162  164 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  165  166  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  167      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  168  169 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  170       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  171       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  172  173  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  181      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  182  184 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  185  186  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  187      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  188  189 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  190       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  191       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  192  193  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

  201      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  202  204 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  205  206  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  207      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  208  209 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  210       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  211       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  212  213  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  221      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  222  224 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  225  226  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  227      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  228  229 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
```

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 230      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 231      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 232  233  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 241     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 242  244 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 245  246  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 247     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 248  249 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 250      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 251      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 252  253  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 261     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 262  264 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 265  266  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 267     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 268  269 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 270      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 271      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 272  273  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 281     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 282  284 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 285  286  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 287     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 288  289 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 290      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 291      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 292  293  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 301     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 302  304 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 305  306  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 307     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 308  309 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 310      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 311      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 312  313  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
***
 501     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 502  504 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 505  506  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 507     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 508  509 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 510      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 511      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 512  513  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 521     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 522  524 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 525  526  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 527     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 528  529 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 530      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 531      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 532  533  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 541     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 542  544 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 545  546  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 547     0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 548  549 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 550      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 551      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 552  553  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 561     0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
```

```
  562  564 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  565  566  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  567      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  568  569 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  570       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  571       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  572  573  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  581      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  582  584 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  585  586  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  587      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  588  589 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  590       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  591       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  592  593  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

  601      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  602  604 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  605  606  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  607      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  608  609 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  610       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  611       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  612  613  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  621      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  622  624 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  625  626  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  627      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  628  629 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  630       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  631       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  632  633  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  641      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  642  644 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  645  646  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  647      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  648  649 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  650       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  651       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  652  653  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  661      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  662  664 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  665  666  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  667      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  668  669 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  670       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  671       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  672  673  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  END MON-IFLW-CONC

  MON-GRND-CONC
*** <PLS >  Value at start of month for conc of QUAL in groundwater (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  102  104 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  105  106  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  107      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  108  109 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  110       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  111       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  112  113  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  121      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
```

```
122  124 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
125  126  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
127      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
128  129 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
130       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
131       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
132  133  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
141      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
142  144 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
145  146  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
147      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
148  149 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
150       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
151       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
152  153  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
161      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
162  164 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
165  166  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
167      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
168  169 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
170       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
171       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
172  173  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
181      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
182  184 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
185  186  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
187      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
188  189 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
190       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
191       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
192  193  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

201      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
202  204 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
205  206  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
207      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
208  209 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
210       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
211       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
212  213  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
221      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
222  224 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
225  226  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
227      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
228  229 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
230       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
231       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
232  233  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
241      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
242  244 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
245  246  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
247      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
248  249 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
250       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
251       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
252  253  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
261      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
262  264 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
265  266  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
267      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
268  269 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
270       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
```

```
 271      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 272  273  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 281      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 282  284 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 285  286  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 287      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 288  289 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 290      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 291      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 292  293  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 301      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 302  304 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 305  306  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 307      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 308  309 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 310      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 311      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 312  313  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
***
 501      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 502  504 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 505  506  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 507      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 508  509 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 510      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 511      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 512  513  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 521      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 522  524 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
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 527      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 528  529 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 530      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 531      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
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 541      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 542  544 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 545  546  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 547      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 548  549 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 550      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 551      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 552  553  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 561      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 562  564 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 565  566  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 567      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 568  569 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 570      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
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 572  573  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 581      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
 582  584 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
 585  586  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 587      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
 588  589 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
 590      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 591      .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 592  593  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 601      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
```

```
  602  604 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  605  606  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  607      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  608  609 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  610       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  611       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  612  613  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  621      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  622  624 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  625  626  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  627      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  628  629 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  630       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  631       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  632  633  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  641      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  642  644 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  645  646  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  647      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  648  649 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  650       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  651       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
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  661      0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07 0.07
  662  664 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09 0.09
  665  666  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  667      0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05
  668  669 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15
  670       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  671       .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  672  673  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  END MON-GRND-CONC

  QUAL-PROPS
*** <PLS >  Identifiers and Flags
*** x -  x    QUALID      QTID  QSD VPFW VPFS  QSO  VQO QIFW VIQC QAGW VAQC
  101  673NO23            LBS     0    0    0    1    1    1    3    1    3
  END QUAL-PROPS

  QUAL-INPUT
***        Storage on surface and nonseasonal parameters
***          SQO   POTFW   POTFS   ACQOP  SQOLIM   WSQOP    IOQC    AOQC
*** <PLS >  qty/ac qty/ton qty/ton    qty/  qty/ac   in/hr qty/ft3 qty/ft3
*** x -  x                      ac.day
  101         0.01      0.      0.  0.010   0.025     0.6      0.      0.
  102         0.01      0.      0.  0.015   0.038     0.6      0.      0.
  103         0.01      0.      0.  0.020   0.050     0.6      0.      0.
  104         0.01      0.      0.  0.020   0.050     0.6      0.      0.
  105         0.01      0.      0.  0.007   0.020     0.6      0.      0.
  106         0.01      0.      0.  0.005   0.015     0.6      0.      0.
  107         0.01      0.      0.  0.010   0.030     0.6      0.      0.
  108         0.01      0.      0.  0.020   0.060     0.6      0.      0.
  109         0.01      0.      0.  0.015   0.045     0.6      0.      0.
  110         0.01      0.      0.  0.012   0.035     0.6      0.      0.
  111         0.01      0.      0.  0.006   0.015     0.6      0.      0.
  112         0.01      0.      0.  0.001   0.005     0.3      0.      0.
  113         0.01      0.      0.  0.001   0.005     0.3      0.      0.
  121         0.01      0.      0.  0.010   0.025     0.6      0.      0.
  122         0.01      0.      0.  0.015   0.038     0.6      0.      0.
  123         0.01      0.      0.  0.020   0.050     0.6      0.      0.
  124         0.01      0.      0.  0.020   0.050     0.6      0.      0.
  125         0.01      0.      0.  0.007   0.020     0.6      0.      0.
```

126	0.01	0.	0.	0.005	0.015	0.6	0.	0.
127	0.01	0.	0.	0.010	0.030	0.6	0.	0.
128	0.01	0.	0.	0.020	0.060	0.6	0.	0.
129	0.01	0.	0.	0.015	0.045	0.6	0.	0.
130	0.01	0.	0.	0.012	0.035	0.6	0.	0.
131	0.01	0.	0.	0.006	0.015	0.6	0.	0.
132	0.01	0.	0.	0.001	0.005	0.3	0.	0.
133	0.01	0.	0.	0.001	0.005	0.3	0.	0.
141	0.01	0.	0.	0.010	0.025	0.6	0.	0.
142	0.01	0.	0.	0.015	0.038	0.6	0.	0.
143	0.01	0.	0.	0.020	0.050	0.6	0.	0.
144	0.01	0.	0.	0.020	0.050	0.6	0.	0.
145	0.01	0.	0.	0.007	0.020	0.6	0.	0.
146	0.01	0.	0.	0.005	0.015	0.6	0.	0.
147	0.01	0.	0.	0.010	0.030	0.6	0.	0.
148	0.01	0.	0.	0.020	0.060	0.6	0.	0.
149	0.01	0.	0.	0.015	0.045	0.6	0.	0.
150	0.01	0.	0.	0.012	0.035	0.6	0.	0.
151	0.01	0.	0.	0.006	0.015	0.6	0.	0.
152	0.01	0.	0.	0.001	0.005	0.3	0.	0.
153	0.01	0.	0.	0.001	0.005	0.3	0.	0.
161	0.01	0.	0.	0.010	0.025	0.6	0.	0.
162	0.01	0.	0.	0.015	0.038	0.6	0.	0.
163	0.01	0.	0.	0.020	0.050	0.6	0.	0.
164	0.01	0.	0.	0.020	0.050	0.6	0.	0.
165	0.01	0.	0.	0.007	0.020	0.6	0.	0.
166	0.01	0.	0.	0.005	0.015	0.6	0.	0.
167	0.01	0.	0.	0.010	0.030	0.6	0.	0.
168	0.01	0.	0.	0.020	0.060	0.6	0.	0.
169	0.01	0.	0.	0.015	0.045	0.6	0.	0.
170	0.01	0.	0.	0.012	0.035	0.6	0.	0.
171	0.01	0.	0.	0.006	0.015	0.6	0.	0.
172	0.01	0.	0.	0.001	0.005	0.3	0.	0.
173	0.01	0.	0.	0.001	0.005	0.3	0.	0.
181	0.01	0.	0.	0.010	0.025	0.6	0.	0.
182	0.01	0.	0.	0.015	0.038	0.6	0.	0.
183	0.01	0.	0.	0.020	0.050	0.6	0.	0.
184	0.01	0.	0.	0.020	0.050	0.6	0.	0.
185	0.01	0.	0.	0.007	0.020	0.6	0.	0.
186	0.01	0.	0.	0.005	0.015	0.6	0.	0.
187	0.01	0.	0.	0.010	0.030	0.6	0.	0.
188	0.01	0.	0.	0.020	0.060	0.6	0.	0.
189	0.01	0.	0.	0.015	0.045	0.6	0.	0.
190	0.01	0.	0.	0.012	0.035	0.6	0.	0.
191	0.01	0.	0.	0.006	0.015	0.6	0.	0.
192	0.01	0.	0.	0.001	0.005	0.3	0.	0.
193	0.01	0.	0.	0.001	0.005	0.3	0.	0.
201	0.01	0.	0.	0.010	0.025	0.6	0.	0.
202	0.01	0.	0.	0.015	0.038	0.6	0.	0.
203	0.01	0.	0.	0.020	0.050	0.6	0.	0.
204	0.01	0.	0.	0.020	0.050	0.6	0.	0.
205	0.01	0.	0.	0.007	0.020	0.6	0.	0.
206	0.01	0.	0.	0.005	0.015	0.6	0.	0.
207	0.01	0.	0.	0.010	0.030	0.6	0.	0.
208	0.01	0.	0.	0.020	0.060	0.6	0.	0.
209	0.01	0.	0.	0.015	0.045	0.6	0.	0.
210	0.01	0.	0.	0.012	0.035	0.6	0.	0.
211	0.01	0.	0.	0.006	0.015	0.6	0.	0.
212	0.01	0.	0.	0.001	0.005	0.3	0.	0.
213	0.01	0.	0.	0.001	0.005	0.3	0.	0.
221	0.01	0.	0.	0.010	0.025	0.6	0.	0.

222	0.01	0.	0.	0.015	0.038	0.6	0.	0.
223	0.01	0.	0.	0.020	0.050	0.6	0.	0.
224	0.01	0.	0.	0.020	0.050	0.6	0.	0.
225	0.01	0.	0.	0.007	0.020	0.6	0.	0.
226	0.01	0.	0.	0.005	0.015	0.6	0.	0.
227	0.01	0.	0.	0.010	0.030	0.6	0.	0.
228	0.01	0.	0.	0.020	0.060	0.6	0.	0.
229	0.01	0.	0.	0.015	0.045	0.6	0.	0.
230	0.01	0.	0.	0.012	0.035	0.6	0.	0.
231	0.01	0.	0.	0.006	0.015	0.6	0.	0.
232	0.01	0.	0.	0.001	0.005	0.3	0.	0.
233	0.01	0.	0.	0.001	0.005	0.3	0.	0.
241	0.01	0.	0.	0.010	0.025	0.6	0.	0.
242	0.01	0.	0.	0.015	0.038	0.6	0.	0.
243	0.01	0.	0.	0.020	0.050	0.6	0.	0.
244	0.01	0.	0.	0.020	0.050	0.6	0.	0.
245	0.01	0.	0.	0.007	0.020	0.6	0.	0.
246	0.01	0.	0.	0.005	0.015	0.6	0.	0.
247	0.01	0.	0.	0.010	0.030	0.6	0.	0.
248	0.01	0.	0.	0.020	0.060	0.6	0.	0.
249	0.01	0.	0.	0.015	0.045	0.6	0.	0.
250	0.01	0.	0.	0.012	0.035	0.6	0.	0.
251	0.01	0.	0.	0.006	0.015	0.6	0.	0.
252	0.01	0.	0.	0.001	0.005	0.3	0.	0.
253	0.01	0.	0.	0.001	0.005	0.3	0.	0.
261	0.01	0.	0.	0.010	0.025	0.6	0.	0.
262	0.01	0.	0.	0.015	0.038	0.6	0.	0.
263	0.01	0.	0.	0.020	0.050	0.6	0.	0.
264	0.01	0.	0.	0.020	0.050	0.6	0.	0.
265	0.01	0.	0.	0.007	0.020	0.6	0.	0.
266	0.01	0.	0.	0.005	0.015	0.6	0.	0.
267	0.01	0.	0.	0.010	0.030	0.6	0.	0.
268	0.01	0.	0.	0.020	0.060	0.6	0.	0.
269	0.01	0.	0.	0.015	0.045	0.6	0.	0.
270	0.01	0.	0.	0.012	0.035	0.6	0.	0.
271	0.01	0.	0.	0.006	0.015	0.6	0.	0.
272	0.01	0.	0.	0.001	0.005	0.3	0.	0.
273	0.01	0.	0.	0.001	0.005	0.3	0.	0.
281	0.01	0.	0.	0.010	0.025	0.6	0.	0.
282	0.01	0.	0.	0.015	0.038	0.6	0.	0.
283	0.01	0.	0.	0.020	0.050	0.6	0.	0.
284	0.01	0.	0.	0.020	0.050	0.6	0.	0.
285	0.01	0.	0.	0.007	0.020	0.6	0.	0.
286	0.01	0.	0.	0.005	0.015	0.6	0.	0.
287	0.01	0.	0.	0.010	0.030	0.6	0.	0.
288	0.01	0.	0.	0.020	0.060	0.6	0.	0.
289	0.01	0.	0.	0.015	0.045	0.6	0.	0.
290	0.01	0.	0.	0.012	0.035	0.6	0.	0.
291	0.01	0.	0.	0.006	0.015	0.6	0.	0.
292	0.01	0.	0.	0.001	0.005	0.3	0.	0.
293	0.01	0.	0.	0.001	0.005	0.3	0.	0.
301	0.01	0.	0.	0.010	0.025	0.6	0.	0.
302	0.01	0.	0.	0.015	0.038	0.6	0.	0.
303	0.01	0.	0.	0.020	0.050	0.6	0.	0.
304	0.01	0.	0.	0.020	0.050	0.6	0.	0.
305	0.01	0.	0.	0.007	0.020	0.6	0.	0.
306	0.01	0.	0.	0.005	0.015	0.6	0.	0.
307	0.01	0.	0.	0.010	0.030	0.6	0.	0.
308	0.01	0.	0.	0.020	0.060	0.6	0.	0.
309	0.01	0.	0.	0.015	0.045	0.6	0.	0.
310	0.01	0.	0.	0.012	0.035	0.6	0.	0.

```
  311      0.01     0.     0.  0.006  0.015    0.6     0.     0.
  312      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  313      0.01     0.     0.  0.001  0.005    0.3     0.     0.
***
  501      0.01     0.     0.  0.010  0.025    0.6     0.     0.
  502      0.01     0.     0.  0.015  0.038    0.6     0.     0.
  503      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  504      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  505      0.01     0.     0.  0.007  0.020    0.6     0.     0.
  506      0.01     0.     0.  0.005  0.015    0.6     0.     0.
  507      0.01     0.     0.  0.010  0.030    0.6     0.     0.
  508      0.01     0.     0.  0.020  0.060    0.6     0.     0.
  509      0.01     0.     0.  0.015  0.045    0.6     0.     0.
  510      0.01     0.     0.  0.012  0.035    0.6     0.     0.
  511      0.01     0.     0.  0.006  0.015    0.6     0.     0.
  512      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  513      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  521      0.01     0.     0.  0.010  0.025    0.6     0.     0.
  522      0.01     0.     0.  0.015  0.038    0.6     0.     0.
  523      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  524      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  525      0.01     0.     0.  0.007  0.020    0.6     0.     0.
  526      0.01     0.     0.  0.005  0.015    0.6     0.     0.
  527      0.01     0.     0.  0.010  0.030    0.6     0.     0.
  528      0.01     0.     0.  0.020  0.060    0.6     0.     0.
  529      0.01     0.     0.  0.015  0.045    0.6     0.     0.
  530      0.01     0.     0.  0.012  0.035    0.6     0.     0.
  531      0.01     0.     0.  0.006  0.015    0.6     0.     0.
  532      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  533      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  541      0.01     0.     0.  0.010  0.025    0.6     0.     0.
  542      0.01     0.     0.  0.015  0.038    0.6     0.     0.
  543      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  544      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  545      0.01     0.     0.  0.007  0.020    0.6     0.     0.
  546      0.01     0.     0.  0.005  0.015    0.6     0.     0.
  547      0.01     0.     0.  0.010  0.030    0.6     0.     0.
  548      0.01     0.     0.  0.020  0.060    0.6     0.     0.
  549      0.01     0.     0.  0.015  0.045    0.6     0.     0.
  550      0.01     0.     0.  0.012  0.035    0.6     0.     0.
  551      0.01     0.     0.  0.006  0.015    0.6     0.     0.
  552      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  553      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  561      0.01     0.     0.  0.010  0.025    0.6     0.     0.
  562      0.01     0.     0.  0.015  0.038    0.6     0.     0.
  563      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  564      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  565      0.01     0.     0.  0.007  0.020    0.6     0.     0.
  566      0.01     0.     0.  0.005  0.015    0.6     0.     0.
  567      0.01     0.     0.  0.010  0.030    0.6     0.     0.
  568      0.01     0.     0.  0.020  0.060    0.6     0.     0.
  569      0.01     0.     0.  0.015  0.045    0.6     0.     0.
  570      0.01     0.     0.  0.012  0.035    0.6     0.     0.
  571      0.01     0.     0.  0.006  0.015    0.6     0.     0.
  572      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  573      0.01     0.     0.  0.001  0.005    0.3     0.     0.
  581      0.01     0.     0.  0.010  0.025    0.6     0.     0.
  582      0.01     0.     0.  0.015  0.038    0.6     0.     0.
  583      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  584      0.01     0.     0.  0.020  0.050    0.6     0.     0.
  585      0.01     0.     0.  0.007  0.020    0.6     0.     0.
  586      0.01     0.     0.  0.005  0.015    0.6     0.     0.
```

```
587    0.01   0.   0.  0.010  0.030  0.6   0.   0.
588    0.01   0.   0.  0.020  0.060  0.6   0.   0.
589    0.01   0.   0.  0.015  0.045  0.6   0.   0.
590    0.01   0.   0.  0.012  0.035  0.6   0.   0.
591    0.01   0.   0.  0.006  0.015  0.6   0.   0.
592    0.01   0.   0.  0.001  0.005  0.3   0.   0.
593    0.01   0.   0.  0.001  0.005  0.3   0.   0.

601    0.01   0.   0.  0.010  0.025  0.6   0.   0.
602    0.01   0.   0.  0.015  0.038  0.6   0.   0.
603    0.01   0.   0.  0.020  0.050  0.6   0.   0.
604    0.01   0.   0.  0.020  0.050  0.6   0.   0.
605    0.01   0.   0.  0.007  0.020  0.6   0.   0.
606    0.01   0.   0.  0.005  0.015  0.6   0.   0.
607    0.01   0.   0.  0.010  0.030  0.6   0.   0.
608    0.01   0.   0.  0.020  0.060  0.6   0.   0.
609    0.01   0.   0.  0.015  0.045  0.6   0.   0.
610    0.01   0.   0.  0.012  0.035  0.6   0.   0.
611    0.01   0.   0.  0.006  0.015  0.6   0.   0.
612    0.01   0.   0.  0.001  0.005  0.3   0.   0.
613    0.01   0.   0.  0.001  0.005  0.3   0.   0.
621    0.01   0.   0.  0.010  0.025  0.6   0.   0.
622    0.01   0.   0.  0.015  0.038  0.6   0.   0.
623    0.01   0.   0.  0.020  0.050  0.6   0.   0.
624    0.01   0.   0.  0.020  0.050  0.6   0.   0.
625    0.01   0.   0.  0.007  0.020  0.6   0.   0.
626    0.01   0.   0.  0.005  0.015  0.6   0.   0.
627    0.01   0.   0.  0.010  0.030  0.6   0.   0.
628    0.01   0.   0.  0.020  0.060  0.6   0.   0.
629    0.01   0.   0.  0.015  0.045  0.6   0.   0.
630    0.01   0.   0.  0.012  0.035  0.6   0.   0.
631    0.01   0.   0.  0.006  0.015  0.6   0.   0.
632    0.01   0.   0.  0.001  0.005  0.3   0.   0.
633    0.01   0.   0.  0.001  0.005  0.3   0.   0.
641    0.01   0.   0.  0.010  0.025  0.6   0.   0.
642    0.01   0.   0.  0.015  0.038  0.6   0.   0.
643    0.01   0.   0.  0.020  0.050  0.6   0.   0.
644    0.01   0.   0.  0.020  0.050  0.6   0.   0.
645    0.01   0.   0.  0.007  0.020  0.6   0.   0.
646    0.01   0.   0.  0.005  0.015  0.6   0.   0.
647    0.01   0.   0.  0.010  0.030  0.6   0.   0.
648    0.01   0.   0.  0.020  0.060  0.6   0.   0.
649    0.01   0.   0.  0.015  0.045  0.6   0.   0.
650    0.01   0.   0.  0.012  0.035  0.6   0.   0.
651    0.01   0.   0.  0.006  0.015  0.6   0.   0.
652    0.01   0.   0.  0.001  0.005  0.3   0.   0.
653    0.01   0.   0.  0.001  0.005  0.3   0.   0.
661    0.01   0.   0.  0.010  0.025  0.6   0.   0.
662    0.01   0.   0.  0.015  0.038  0.6   0.   0.
663    0.01   0.   0.  0.020  0.050  0.6   0.   0.
664    0.01   0.   0.  0.020  0.050  0.6   0.   0.
665    0.01   0.   0.  0.007  0.020  0.6   0.   0.
666    0.01   0.   0.  0.005  0.015  0.6   0.   0.
667    0.01   0.   0.  0.010  0.030  0.6   0.   0.
668    0.01   0.   0.  0.020  0.060  0.6   0.   0.
669    0.01   0.   0.  0.015  0.045  0.6   0.   0.
670    0.01   0.   0.  0.012  0.035  0.6   0.   0.
671    0.01   0.   0.  0.006  0.015  0.6   0.   0.
672    0.01   0.   0.  0.001  0.005  0.3   0.   0.
673    0.01   0.   0.  0.001  0.005  0.3   0.   0.
END QUAL-INPUT
```

```
  MON-ACCUM
*** <PLS >  Value at start of each month for accum rate of QUALOF (lb/ac.day)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  102      0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  103  104 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  105      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  106      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  107       0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  108       0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  109       0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  110      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  111      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  112  1130.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
***
  121       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  122      0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  123  124 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  125      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  126      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  127       0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  128       0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  129       0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  130      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  131      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  132  1330.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
***
  141       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  142      0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  143  144 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  145      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  146      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  147       0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  148       0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  149       0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  150      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  151      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  152  1530.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  161       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  162      0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  163  164 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  165      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  166      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  167       0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  168       0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  169       0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  170      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  171      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  172  1730.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  181       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  182      0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  183  184 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  185      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  186      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  187       0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  188       0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  189       0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  190      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  191      0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  192  1930.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003

  201       0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
```

```
202    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
203  204 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
205    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
206    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
207     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
208     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
209     0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
210    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
211    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
212  2130.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
221     0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
222    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
223  224 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
225    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
226    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
227     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
228     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
229     0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
230    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
231    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
232  2330.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
241     0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
242    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
243  244 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
245    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
246    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
247     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
248     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
249     0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
250    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
251    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
252  2530.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
261     0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
262    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
263  264 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
265    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
266    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
267     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
268     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
269     0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
270    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
271    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
272  2730.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
281     0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
282    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
283  284 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
285    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
286    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
287     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
288     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
289     0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
290    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
291    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
292  2930.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003

301     0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
302    0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
303  304 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
305    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
306    0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
307     0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
308     0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
```

```
  309      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  310     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  311     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  312  3130.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
***
  501      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  502     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  503  504 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  505     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  506     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  507      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  508      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  509      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  510     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  511     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  512  5130.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  521      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  522     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  523  524 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  525     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  526     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  527      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  528      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  529      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  530     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  531     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  532  5330.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  541      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  542     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  543  544 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  545     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  546     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  547      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  548      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  549      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  550     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  551     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  552  5530.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  561      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  562     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  563  564 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  565     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  566     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  567      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  568      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  569      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  570     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  571     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  572  5730.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  581      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  582     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  583  584 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  585     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  586     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  587      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  588      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  589      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  590     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  591     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  592  5930.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003

  601      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
```

```
  602     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  603  604 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  605     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  606     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  607      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  608      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  609      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  610     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  611     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  612  6130.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  621      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  622     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  623  624 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  625     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  626     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  627      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  628      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  629      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  630     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  631     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  632  6330.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  641      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  642     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  643  644 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  645     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  646     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  647      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  648      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  649      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  650     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  651     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  652  6530.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  661      0.02 0.020.025 0.03 0.03 0.03 0.03 0.03 0.030.025 0.02 0.02
  662     0.0250.0250.0300.0450.0450.0450.0450.0450.0450.0300.0250.025
  663  664 0.03 0.030.045 0.06 0.06 0.06 0.06 0.06 0.060.045 0.03 0.03
  665     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  666     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  667      0.01 0.010.0120.0150.0150.0150.0150.0150.0150.012 0.01 0.01
  668      0.05 0.05 0.07 0.09 0.09 0.09 0.09 0.09 0.09 0.07 0.05 0.05
  669      0.04 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.05 0.04 0.04
  670     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  671     0.0030.0030.0040.0060.0060.0060.0060.0060.0060.0040.0030.003
  672  6730.0030.0030.0040.0040.0040.0040.0040.0040.0040.0040.0030.003
  END MON-ACCUM

  MON-SQOLIM
*** <PLS >  Value at start of month for limiting storage of QUALOF (lb/ac)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  102     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  103  1040.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  105     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  106     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  107      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  108       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  109      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  110     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  111     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  112  1130.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
***
  121     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  122     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
```

```
  123  1240.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  125     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  126     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  127      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  128       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  129      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  130     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  131     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  132  1330.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
***
  141     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  142     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  143  1440.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  145     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  146     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  147      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  148       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  149      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  150     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  151     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  152  1530.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  161     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  162     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  163  1640.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  165     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  166     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  167      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  168       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  169      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  170     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  171     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  172  1730.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  181     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  182     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  183  1840.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  185     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  186     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  187      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  188       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  189      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  190     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  191     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  192  1930.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006

  201     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  202     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  203  2040.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  205     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  206     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  207      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  208       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  209      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  210     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  211     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  212  2130.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  221     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  222     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  223  2240.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  225     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  226     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  227      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  228       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
```

```
  229     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  230    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  231    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  232  2330.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  241    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  242    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  243  2440.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  245    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  246    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  247     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  248      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  249     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  250    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  251    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  252  2530.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  261    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  262    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  263  2640.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  265    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  266    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  267     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  268      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  269     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  270    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  271    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  272  2730.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  281    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  282    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  283  2840.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  285    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  286    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  287     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  288      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  289     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  290    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  291    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  292  2930.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006

  301    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  302    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  303  3040.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  305    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  306    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  307     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  308      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  309     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  310    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  311    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  312  3130.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
***
  501    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  502    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  503  5040.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  505    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  506    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  507     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  508      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  509     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  510    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  511    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  512  5130.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  521    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
```

```
522    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
523  5240.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
525    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
526    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
527     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
528      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
529     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
530    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
531    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
532  5330.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
541    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
542    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
543  5440.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
545    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
546    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
547     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
548      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
549     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
550    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
551    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
552  5530.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
561    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
562    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
563  5640.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
565    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
566    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
567     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
568      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
569     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
570    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
571    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
572  5730.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
581    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
582    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
583  5840.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
585    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
586    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
587     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
588      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
589     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
590    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
591    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
592  5930.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006

601    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
602    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
603  6040.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
605    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
606    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
607     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
608      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
609     0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
610    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
611    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
612  6130.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
621    0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
622    0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
623  6240.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
625    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
626    0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
627     0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
628      0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
```

```
  629      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  630     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  631     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  632  6330.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  641     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  642     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  643  6440.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  645     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  646     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  647      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  648       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  649      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  650     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  651     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  652  6530.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  661     0.0450.0450.0600.0750.0750.0750.0750.0750.0750.0600.0450.045
  662     0.0600.0600.0750.1130.1130.1130.1130.1130.1130.0750.0600.060
  663  6640.0750.0750.1130.1500.1500.1500.1500.1500.1500.1130.0750.075
  665     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  666     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  667      0.02 0.020.024 0.03 0.03 0.03 0.03 0.03 0.030.024 0.02 0.02
  668       0.1  0.1 0.14  0.2  0.2  0.2  0.2  0.2  0.2 0.14  0.1  0.1
  669      0.08 0.08 0.10 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.08 0.08
  670     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  671     0.0060.0060.0080.0120.0120.0120.0120.0120.0120.0080.0060.006
  672  6730.0060.0060.0080.0080.0080.0080.0080.0080.0080.0080.0060.006
  END MON-SQOLIM

  MON-IFLW-CONC
*** <PLS >  Conc of QUAL in interflow outflow for each month (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  102  104 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  105  106 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  107       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  108  109  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  110      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  111      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  112  113  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  121       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  122  124 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  125  126 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  127       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  128  129  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  130      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  131      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  132  133  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  141       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  142  144 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  145  146 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  147       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  148  149  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  150      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  151      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  152  153  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  161       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  162  164 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  165  166 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  167       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  168  169  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  170      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  171      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
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 172  173  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 181       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 182  184 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 185  186 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 187       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 188  189  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 190      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 191      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 192  193  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 201       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 202  204 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 205  206 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 207       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 208  209  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 210      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 211      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 212  213  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 221       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 222  224 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 225  226 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 227       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 228  229  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 230      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 231      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 232  233  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 241       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 242  244 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 245  246 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 247       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 248  249  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 250      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 251      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 252  253  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 261       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 262  264 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 265  266 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 267       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 268  269  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 270      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 271      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 272  273  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 281       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 282  284 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 285  286 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 287       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 288  289  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 290      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 291      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 292  293  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 301       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 302  304 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 305  306 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 307       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 308  309  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 310      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 311      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 312  313  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
***
 501       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 502  504 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
```

```
505  506 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
507       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
508  509  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
510      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
511      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
512  513  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
521       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
522  524 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
525  526 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
527       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
528  529  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
530      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
531      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
532  533  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
541       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
542  544 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
545  546 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
547       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
548  549  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
550      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
551      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
552  553  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
561       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
562  564 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
565  566 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
567       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
568  569  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
570      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
571      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
572  573  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
581       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
582  584 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
585  586 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
587       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
588  589  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
590      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
591      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
592  593  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

601       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
602  604 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
605  606 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
607       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
608  609  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
610      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
611      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
612  613  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
621       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
622  624 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
625  626 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
627       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
628  629  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
630      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
631      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
632  633  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
641       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
642  644 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
645  646 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
647       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
648  649  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
650      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
651      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
```

```
  652  653  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  661       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  662  664 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  665  666 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  667       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  668  669  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  670      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  671      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  672  673  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  END MON-IFLW-CONC

  MON-GRND-CONC
*** <PLS >  Value at start of month for conc of QUAL in groundwater (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  102  104 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  105  106 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  107       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  108  109  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  110      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  111      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  112  113  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  121       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  122  124 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  125  126 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  127       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  128  129  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  130      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  131      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  132  133  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  141       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  142  144 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  145  146 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  147       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  148  149  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  150      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  151      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  152  153  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  161       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  162  164 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  165  166 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  167       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  168  169  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  170      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  171      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  172  173  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  181       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  182  184 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  185  186 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  187       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  188  189  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  190      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  191      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  192  193  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

  201       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  202  204 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  205  206 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  207       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  208  209  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  210      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  211      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
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```
 212  213  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 221       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 222  224 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 225  226 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 227       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 228  229  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 230      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 231      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 232  233  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 241       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 242  244 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 245  246 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 247       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 248  249  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 250      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 251      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 252  253  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 261       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 262  264 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 265  266 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 267       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 268  269  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 270      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 271      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 272  273  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 281       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 282  284 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 285  286 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 287       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 288  289  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 290      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 291      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 292  293  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

 301       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 302  304 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 305  306 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 307       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 308  309  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 310      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 311      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 312  313  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
***
 501       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 502  504 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 505  506 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 507       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 508  509  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 510      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 511      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 512  513  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 521       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 522  524 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 525  526 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 527       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
 528  529  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
 530      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 531      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
 532  533  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 541       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
 542  544 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
 545  546 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
```

```
  547       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  548  549  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  550      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  551      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  552  553  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  561       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  562  564 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  565  566 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  567       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  568  569  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  570      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  571      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  572  573  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  581       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  582  584 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  585  586 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  587       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  588  589  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  590      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  591      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  592  593  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01

  601       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  602  604 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  605  606 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  607       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  608  609  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  610      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  611      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  612  613  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  621       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  622  624 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  625  626 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  627       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  628  629  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  630      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  631      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  632  633  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  641       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  642  644 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  645  646 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  647       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  648  649  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  650      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  651      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  652  653  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  661       0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  662  664 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25
  665  666 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  667       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  668  669  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  670      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  671      .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015 .015
  672  673  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
  END MON-GRND-CONC

  QUAL-PROPS
*** <PLS >  Identifiers and Flags
*** x -  x    QUALID      QTID  QSD VPFW VPFS  QSO  VQO QIFW VIQC QAGW VAQC
  101  673ORTHO P        LBS     0    0    0    1    1    1    3    1    3
  END QUAL-PROPS
```

```
  QUAL-INPUT
***        Storage on surface and nonseasonal parameters
***          SQO   POTFW   POTFS   ACQOP  SQOLIM   WSQOP    IOQC    AOQC
*** <PLS >  qty/ac qty/ton qty/ton    qty/  qty/ac   in/hr qty/ft3 qty/ft3
*** x -  x                    ac.day
  101        0.01      0.      0.  0.010  0.025     0.6      0.      0.
  102        0.01      0.      0.  0.015  0.038     0.6      0.      0.
  103        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  104        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  105        0.01      0.      0.  0.007  0.020     0.6      0.      0.
  106        0.01      0.      0.  0.005  0.015     0.6      0.      0.
  107        0.01      0.      0.  0.010  0.030     0.6      0.      0.
  108        0.01      0.      0.  0.020  0.060     0.6      0.      0.
  109        0.01      0.      0.  0.015  0.045     0.6      0.      0.
  110        0.01      0.      0.  0.012  0.035     0.6      0.      0.
  111        0.01      0.      0.  0.006  0.015     0.6      0.      0.
  112        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  113        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  121        0.01      0.      0.  0.010  0.025     0.6      0.      0.
  122        0.01      0.      0.  0.015  0.038     0.6      0.      0.
  123        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  124        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  125        0.01      0.      0.  0.007  0.020     0.6      0.      0.
  126        0.01      0.      0.  0.005  0.015     0.6      0.      0.
  127        0.01      0.      0.  0.010  0.030     0.6      0.      0.
  128        0.01      0.      0.  0.020  0.060     0.6      0.      0.
  129        0.01      0.      0.  0.015  0.045     0.6      0.      0.
  130        0.01      0.      0.  0.012  0.035     0.6      0.      0.
  131        0.01      0.      0.  0.006  0.015     0.6      0.      0.
  132        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  133        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  141        0.01      0.      0.  0.010  0.025     0.6      0.      0.
  142        0.01      0.      0.  0.015  0.038     0.6      0.      0.
  143        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  144        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  145        0.01      0.      0.  0.007  0.020     0.6      0.      0.
  146        0.01      0.      0.  0.005  0.015     0.6      0.      0.
  147        0.01      0.      0.  0.010  0.030     0.6      0.      0.
  148        0.01      0.      0.  0.020  0.060     0.6      0.      0.
  149        0.01      0.      0.  0.015  0.045     0.6      0.      0.
  150        0.01      0.      0.  0.012  0.035     0.6      0.      0.
  151        0.01      0.      0.  0.006  0.015     0.6      0.      0.
  152        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  153        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  161        0.01      0.      0.  0.010  0.025     0.6      0.      0.
  162        0.01      0.      0.  0.015  0.038     0.6      0.      0.
  163        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  164        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  165        0.01      0.      0.  0.007  0.020     0.6      0.      0.
  166        0.01      0.      0.  0.005  0.015     0.6      0.      0.
  167        0.01      0.      0.  0.010  0.030     0.6      0.      0.
  168        0.01      0.      0.  0.020  0.060     0.6      0.      0.
  169        0.01      0.      0.  0.015  0.045     0.6      0.      0.
  170        0.01      0.      0.  0.012  0.035     0.6      0.      0.
  171        0.01      0.      0.  0.006  0.015     0.6      0.      0.
  172        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  173        0.01      0.      0.  0.001  0.005     0.3      0.      0.
  181        0.01      0.      0.  0.010  0.025     0.6      0.      0.
  182        0.01      0.      0.  0.015  0.038     0.6      0.      0.
  183        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  184        0.01      0.      0.  0.020  0.050     0.6      0.      0.
  185        0.01      0.      0.  0.007  0.020     0.6      0.      0.
```

186	0.01	0.	0.	0.005	0.015	0.6	0.	0.
187	0.01	0.	0.	0.010	0.030	0.6	0.	0.
188	0.01	0.	0.	0.020	0.060	0.6	0.	0.
189	0.01	0.	0.	0.015	0.045	0.6	0.	0.
190	0.01	0.	0.	0.012	0.035	0.6	0.	0.
191	0.01	0.	0.	0.006	0.015	0.6	0.	0.
192	0.01	0.	0.	0.001	0.005	0.3	0.	0.
193	0.01	0.	0.	0.001	0.005	0.3	0.	0.

201	0.01	0.	0.	0.010	0.025	0.6	0.	0.
202	0.01	0.	0.	0.015	0.038	0.6	0.	0.
203	0.01	0.	0.	0.020	0.050	0.6	0.	0.
204	0.01	0.	0.	0.020	0.050	0.6	0.	0.
205	0.01	0.	0.	0.007	0.020	0.6	0.	0.
206	0.01	0.	0.	0.005	0.015	0.6	0.	0.
207	0.01	0.	0.	0.010	0.030	0.6	0.	0.
208	0.01	0.	0.	0.020	0.060	0.6	0.	0.
209	0.01	0.	0.	0.015	0.045	0.6	0.	0.
210	0.01	0.	0.	0.012	0.035	0.6	0.	0.
211	0.01	0.	0.	0.006	0.015	0.6	0.	0.
212	0.01	0.	0.	0.001	0.005	0.3	0.	0.
213	0.01	0.	0.	0.001	0.005	0.3	0.	0.
221	0.01	0.	0.	0.010	0.025	0.6	0.	0.
222	0.01	0.	0.	0.015	0.038	0.6	0.	0.
223	0.01	0.	0.	0.020	0.050	0.6	0.	0.
224	0.01	0.	0.	0.020	0.050	0.6	0.	0.
225	0.01	0.	0.	0.007	0.020	0.6	0.	0.
226	0.01	0.	0.	0.005	0.015	0.6	0.	0.
227	0.01	0.	0.	0.010	0.030	0.6	0.	0.
228	0.01	0.	0.	0.020	0.060	0.6	0.	0.
229	0.01	0.	0.	0.015	0.045	0.6	0.	0.
230	0.01	0.	0.	0.012	0.035	0.6	0.	0.
231	0.01	0.	0.	0.006	0.015	0.6	0.	0.
232	0.01	0.	0.	0.001	0.005	0.3	0.	0.
233	0.01	0.	0.	0.001	0.005	0.3	0.	0.
241	0.01	0.	0.	0.010	0.025	0.6	0.	0.
242	0.01	0.	0.	0.015	0.038	0.6	0.	0.
243	0.01	0.	0.	0.020	0.050	0.6	0.	0.
244	0.01	0.	0.	0.020	0.050	0.6	0.	0.
245	0.01	0.	0.	0.007	0.020	0.6	0.	0.
246	0.01	0.	0.	0.005	0.015	0.6	0.	0.
247	0.01	0.	0.	0.010	0.030	0.6	0.	0.
248	0.01	0.	0.	0.020	0.060	0.6	0.	0.
249	0.01	0.	0.	0.015	0.045	0.6	0.	0.
250	0.01	0.	0.	0.012	0.035	0.6	0.	0.
251	0.01	0.	0.	0.006	0.015	0.6	0.	0.
252	0.01	0.	0.	0.001	0.005	0.3	0.	0.
253	0.01	0.	0.	0.001	0.005	0.3	0.	0.
261	0.01	0.	0.	0.010	0.025	0.6	0.	0.
262	0.01	0.	0.	0.015	0.038	0.6	0.	0.
263	0.01	0.	0.	0.020	0.050	0.6	0.	0.
264	0.01	0.	0.	0.020	0.050	0.6	0.	0.
265	0.01	0.	0.	0.007	0.020	0.6	0.	0.
266	0.01	0.	0.	0.005	0.015	0.6	0.	0.
267	0.01	0.	0.	0.010	0.030	0.6	0.	0.
268	0.01	0.	0.	0.020	0.060	0.6	0.	0.
269	0.01	0.	0.	0.015	0.045	0.6	0.	0.
270	0.01	0.	0.	0.012	0.035	0.6	0.	0.
271	0.01	0.	0.	0.006	0.015	0.6	0.	0.
272	0.01	0.	0.	0.001	0.005	0.3	0.	0.
273	0.01	0.	0.	0.001	0.005	0.3	0.	0.
281	0.01	0.	0.	0.010	0.025	0.6	0.	0.

```
  282      0.01    0.     0.  0.015  0.038   0.6    0.    0.
  283      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  284      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  285      0.01    0.     0.  0.007  0.020   0.6    0.    0.
  286      0.01    0.     0.  0.005  0.015   0.6    0.    0.
  287      0.01    0.     0.  0.010  0.030   0.6    0.    0.
  288      0.01    0.     0.  0.020  0.060   0.6    0.    0.
  289      0.01    0.     0.  0.015  0.045   0.6    0.    0.
  290      0.01    0.     0.  0.012  0.035   0.6    0.    0.
  291      0.01    0.     0.  0.006  0.015   0.6    0.    0.
  292      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  293      0.01    0.     0.  0.001  0.005   0.3    0.    0.

  301      0.01    0.     0.  0.010  0.025   0.6    0.    0.
  302      0.01    0.     0.  0.015  0.038   0.6    0.    0.
  303      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  304      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  305      0.01    0.     0.  0.007  0.020   0.6    0.    0.
  306      0.01    0.     0.  0.005  0.015   0.6    0.    0.
  307      0.01    0.     0.  0.010  0.030   0.6    0.    0.
  308      0.01    0.     0.  0.020  0.060   0.6    0.    0.
  309      0.01    0.     0.  0.015  0.045   0.6    0.    0.
  310      0.01    0.     0.  0.012  0.035   0.6    0.    0.
  311      0.01    0.     0.  0.006  0.015   0.6    0.    0.
  312      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  313      0.01    0.     0.  0.001  0.005   0.3    0.    0.
***
  501      0.01    0.     0.  0.010  0.025   0.6    0.    0.
  502      0.01    0.     0.  0.015  0.038   0.6    0.    0.
  503      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  504      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  505      0.01    0.     0.  0.007  0.020   0.6    0.    0.
  506      0.01    0.     0.  0.005  0.015   0.6    0.    0.
  507      0.01    0.     0.  0.010  0.030   0.6    0.    0.
  508      0.01    0.     0.  0.020  0.060   0.6    0.    0.
  509      0.01    0.     0.  0.015  0.045   0.6    0.    0.
  510      0.01    0.     0.  0.012  0.035   0.6    0.    0.
  511      0.01    0.     0.  0.006  0.015   0.6    0.    0.
  512      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  513      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  521      0.01    0.     0.  0.010  0.025   0.6    0.    0.
  522      0.01    0.     0.  0.015  0.038   0.6    0.    0.
  523      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  524      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  525      0.01    0.     0.  0.007  0.020   0.6    0.    0.
  526      0.01    0.     0.  0.005  0.015   0.6    0.    0.
  527      0.01    0.     0.  0.010  0.030   0.6    0.    0.
  528      0.01    0.     0.  0.020  0.060   0.6    0.    0.
  529      0.01    0.     0.  0.015  0.045   0.6    0.    0.
  530      0.01    0.     0.  0.012  0.035   0.6    0.    0.
  531      0.01    0.     0.  0.006  0.015   0.6    0.    0.
  532      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  533      0.01    0.     0.  0.001  0.005   0.3    0.    0.
  541      0.01    0.     0.  0.010  0.025   0.6    0.    0.
  542      0.01    0.     0.  0.015  0.038   0.6    0.    0.
  543      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  544      0.01    0.     0.  0.020  0.050   0.6    0.    0.
  545      0.01    0.     0.  0.007  0.020   0.6    0.    0.
  546      0.01    0.     0.  0.005  0.015   0.6    0.    0.
  547      0.01    0.     0.  0.010  0.030   0.6    0.    0.
  548      0.01    0.     0.  0.020  0.060   0.6    0.    0.
  549      0.01    0.     0.  0.015  0.045   0.6    0.    0.
```

550	0.01	0.	0.	0.012	0.035	0.6	0.	0.
551	0.01	0.	0.	0.006	0.015	0.6	0.	0.
552	0.01	0.	0.	0.001	0.005	0.3	0.	0.
553	0.01	0.	0.	0.001	0.005	0.3	0.	0.
561	0.01	0.	0.	0.010	0.025	0.6	0.	0.
562	0.01	0.	0.	0.015	0.038	0.6	0.	0.
563	0.01	0.	0.	0.020	0.050	0.6	0.	0.
564	0.01	0.	0.	0.020	0.050	0.6	0.	0.
565	0.01	0.	0.	0.007	0.020	0.6	0.	0.
566	0.01	0.	0.	0.005	0.015	0.6	0.	0.
567	0.01	0.	0.	0.010	0.030	0.6	0.	0.
568	0.01	0.	0.	0.020	0.060	0.6	0.	0.
569	0.01	0.	0.	0.015	0.045	0.6	0.	0.
570	0.01	0.	0.	0.012	0.035	0.6	0.	0.
571	0.01	0.	0.	0.006	0.015	0.6	0.	0.
572	0.01	0.	0.	0.001	0.005	0.3	0.	0.
573	0.01	0.	0.	0.001	0.005	0.3	0.	0.
581	0.01	0.	0.	0.010	0.025	0.6	0.	0.
582	0.01	0.	0.	0.015	0.038	0.6	0.	0.
583	0.01	0.	0.	0.020	0.050	0.6	0.	0.
584	0.01	0.	0.	0.020	0.050	0.6	0.	0.
585	0.01	0.	0.	0.007	0.020	0.6	0.	0.
586	0.01	0.	0.	0.005	0.015	0.6	0.	0.
587	0.01	0.	0.	0.010	0.030	0.6	0.	0.
588	0.01	0.	0.	0.020	0.060	0.6	0.	0.
589	0.01	0.	0.	0.015	0.045	0.6	0.	0.
590	0.01	0.	0.	0.012	0.035	0.6	0.	0.
591	0.01	0.	0.	0.006	0.015	0.6	0.	0.
592	0.01	0.	0.	0.001	0.005	0.3	0.	0.
593	0.01	0.	0.	0.001	0.005	0.3	0.	0.
601	0.01	0.	0.	0.010	0.025	0.6	0.	0.
602	0.01	0.	0.	0.015	0.038	0.6	0.	0.
603	0.01	0.	0.	0.020	0.050	0.6	0.	0.
604	0.01	0.	0.	0.020	0.050	0.6	0.	0.
605	0.01	0.	0.	0.007	0.020	0.6	0.	0.
606	0.01	0.	0.	0.005	0.015	0.6	0.	0.
607	0.01	0.	0.	0.010	0.030	0.6	0.	0.
608	0.01	0.	0.	0.020	0.060	0.6	0.	0.
609	0.01	0.	0.	0.015	0.045	0.6	0.	0.
610	0.01	0.	0.	0.012	0.035	0.6	0.	0.
611	0.01	0.	0.	0.006	0.015	0.6	0.	0.
612	0.01	0.	0.	0.001	0.005	0.3	0.	0.
613	0.01	0.	0.	0.001	0.005	0.3	0.	0.
621	0.01	0.	0.	0.010	0.025	0.6	0.	0.
622	0.01	0.	0.	0.015	0.038	0.6	0.	0.
623	0.01	0.	0.	0.020	0.050	0.6	0.	0.
624	0.01	0.	0.	0.020	0.050	0.6	0.	0.
625	0.01	0.	0.	0.007	0.020	0.6	0.	0.
626	0.01	0.	0.	0.005	0.015	0.6	0.	0.
627	0.01	0.	0.	0.010	0.030	0.6	0.	0.
628	0.01	0.	0.	0.020	0.060	0.6	0.	0.
629	0.01	0.	0.	0.015	0.045	0.6	0.	0.
630	0.01	0.	0.	0.012	0.035	0.6	0.	0.
631	0.01	0.	0.	0.006	0.015	0.6	0.	0.
632	0.01	0.	0.	0.001	0.005	0.3	0.	0.
633	0.01	0.	0.	0.001	0.005	0.3	0.	0.
641	0.01	0.	0.	0.010	0.025	0.6	0.	0.
642	0.01	0.	0.	0.015	0.038	0.6	0.	0.
643	0.01	0.	0.	0.020	0.050	0.6	0.	0.
644	0.01	0.	0.	0.020	0.050	0.6	0.	0.
645	0.01	0.	0.	0.007	0.020	0.6	0.	0.

```
  646       0.01    0.     0.  0.005  0.015    0.6     0.     0.
  647       0.01    0.     0.  0.010  0.030    0.6     0.     0.
  648       0.01    0.     0.  0.020  0.060    0.6     0.     0.
  649       0.01    0.     0.  0.015  0.045    0.6     0.     0.
  650       0.01    0.     0.  0.012  0.035    0.6     0.     0.
  651       0.01    0.     0.  0.006  0.015    0.6     0.     0.
  652       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  653       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  661       0.01    0.     0.  0.010  0.025    0.6     0.     0.
  662       0.01    0.     0.  0.015  0.038    0.6     0.     0.
  663       0.01    0.     0.  0.020  0.050    0.6     0.     0.
  664       0.01    0.     0.  0.020  0.050    0.6     0.     0.
  665       0.01    0.     0.  0.007  0.020    0.6     0.     0.
  666       0.01    0.     0.  0.005  0.015    0.6     0.     0.
  667       0.01    0.     0.  0.010  0.030    0.6     0.     0.
  668       0.01    0.     0.  0.020  0.060    0.6     0.     0.
  669       0.01    0.     0.  0.015  0.045    0.6     0.     0.
  670       0.01    0.     0.  0.012  0.035    0.6     0.     0.
  671       0.01    0.     0.  0.006  0.015    0.6     0.     0.
  672       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  673       0.01    0.     0.  0.001  0.005    0.3     0.     0.
  END QUAL-INPUT

  MON-ACCUM
*** <PLS >  Value at start of each month for accum rate of QUALOF (lb/ac.day)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101     0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  102     0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  103  1040.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  105     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  106     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  107      0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  108     0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  109      0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  110     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  111     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  112  1130.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
***
  121     0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  122     0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  123  1240.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  125     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  126     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  127      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  128      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  129      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  130     0.0200.0200.0250.0300.0300.0300.0300.0300.0300.0250.0200.020
  131     0.0200.0200.0250.0300.0300.0300.0300.0300.0300.0250.0200.020
  132  1330.0200.0200.0250.0300.0300.0300.0300.0300.0300.0250.0200.020
***
  141     0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  142     0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  143  1440.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  145     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  146     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  147      0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  148     0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  149      0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  150     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  151     0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  152  1530.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
***
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  161    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  162    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  163  1640.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  165    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  166    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  167     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  168     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  169     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.03 0.03
  170    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  171    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  172  1730.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
***
  181    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  182    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  183  1840.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  185    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  186    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  187     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  188    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  189     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  190    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  191    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  192  1930.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002

  201    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  202    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  203  2040.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  205    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  206    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  207     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  208    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  209     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  210    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  211    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  212  2130.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  221    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  222    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  223  2240.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  225    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  226    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  227     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  228    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  229     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  230    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  231    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  232  2330.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  241    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  242    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  243  2440.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  245    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  246    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  247     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  248    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  249     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  250    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
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  252  2530.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  261    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  262    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  263  2640.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  265    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
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```

```
  267     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  268    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  269     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  270    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  271    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  272  2730.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  281    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  282    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
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  285    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  286    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  287     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  288    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  289     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  290    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  291    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  292  2930.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002

  301    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  302    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
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  305    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  306    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  307     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  308    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  309     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  310    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  311    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  312  3130.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
***
  501    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  502    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  503  5040.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  505    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  506    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  507     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  508    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  509     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  510    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  511    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  512  5130.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  521    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  522    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  523  5240.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  525    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  526    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  527     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  528    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  529     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  530    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  531    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  532  5330.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  541    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
  542    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
  543  5440.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
  545    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  546    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  547     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  548    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  549     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  550    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  551    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
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552  5530.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
561    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
562    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
563  5640.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
565    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
566    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
567     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
568    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
569     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
570    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
571    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
572  5730.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
581    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
582    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
583  5840.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
585    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
586    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
587     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
588    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
589     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
590    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
591    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
592  5930.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002

601    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
602    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
603  6040.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
605    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
606    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
607     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
608    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
609     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
610    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
611    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
612  6130.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
621    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
622    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
623  6240.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
625    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
626    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
627     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
628    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
629     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
630    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
631    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
632  6330.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
641    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
642    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
643  6440.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
645    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
646    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
647     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
648    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
649     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
650    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
651    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
652  6530.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
661    0.0060.0060.0100.0150.0150.0150.0150.0150.0150.0100.0060.006
662    0.0090.0090.0150.0250.0250.0250.0250.0250.0250.0150.0090.009
663  6640.0120.0120.0250.0400.0400.0400.0400.0400.0400.0250.0120.012
665    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
666    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
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  667     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  668    0.0150.015 0.03 0.05 0.05 0.05 0.05 0.05 0.05 0.030.0150.015
  669     0.01 0.01 0.02 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.01 0.01
  670    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  671    0.0020.0020.0030.0040.0040.0040.0040.0040.0040.0030.0020.002
  672  6730.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.0020.002
  END MON-ACCUM

  MON-SQOLIM
*** <PLS >  Value at start of month for limiting storage of QUALOF (lb/ac)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  102    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  103  1040.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  105    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  106    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  107     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  108     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  109     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  110    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  111    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  112  1130.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
***
  121    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  122    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  123  1240.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  125    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  126    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  127     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  128     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  129     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  130    0.0400.0400.0500.0600.0600.0600.0600.0600.0600.0500.0400.040
  131    0.0400.0400.0500.0600.0600.0600.0600.0600.0600.0500.0400.040
  132  1330.0400.0400.0500.0600.0600.0600.0600.0600.0600.0500.0400.040
***
  141    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  142    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  143  1440.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  145    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  146    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  147     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  148     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  149     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  150    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  151    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  152  1530.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
***
  161    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  162    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  163  1640.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  165    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  166    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  167     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  168     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  169     0.06 0.06 0.12 0.20 0.20 0.20 0.20 0.20 0.20 0.12 0.06 0.06
  170    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  171    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  172  1730.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
***
  181    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  182    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  183  1840.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
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185    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
186    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
187     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
188     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
189     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
190    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
191    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
192  1930.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004

201    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
202    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
203  2040.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
205    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
206    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
207     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
208     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
209     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
210    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
211    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
212  2130.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
221    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
222    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
223  2240.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
225    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
226    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
227     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
228     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
229     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
230    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
231    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
232  2330.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
241    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
242    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
243  2440.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
245    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
246    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
247     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
248     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
249     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
250    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
251    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
252  2530.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
261    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
262    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
263  2640.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
265    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
266    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
267     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
268     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
269     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
270    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
271    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
272  2730.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
281    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
282    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
283  2840.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
285    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
286    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
287     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
288     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
289     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
290    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
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  291    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  292  2930.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004

  301    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  302    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  303  3040.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  305    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  306    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  307     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  308     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  309     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  310    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  311    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  312  3130.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
***
  501    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  502    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  503  5040.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  505    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  506    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  507     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  508     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  509     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  510    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  511    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  512  5130.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  521    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  522    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  523  5240.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  525    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  526    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  527     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  528     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  529     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  530    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  531    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  532  5330.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  541    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  542    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  543  5440.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  545    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  546    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  547     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  548     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  549     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  550    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  551    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  552  5530.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  561    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  562    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  563  5640.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  565    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  566    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  567     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  568     0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  569     0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  570    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  571    0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  572  5730.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  581    0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  582    0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  583  5840.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
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  585     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  586     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  587      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  588      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  589      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  590     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  591     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  592  5930.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004

  601     0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  602     0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  603  6040.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  605     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  606     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  607      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  608      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  609      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  610     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  611     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  612  6130.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  621     0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  622     0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  623  6240.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  625     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  626     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  627      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  628      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  629      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  630     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  631     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  632  6330.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  641     0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  642     0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  643  6440.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  645     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  646     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  647      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  648      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  649      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  650     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  651     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  652  6530.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  661     0.0150.0150.0250.0380.0380.0380.0380.0380.0380.0250.0150.015
  662     0.0250.0250.0380.0630.0630.0630.0630.0630.0630.0380.0250.025
  663  6640.0300.0300.0630.1000.1000.1000.1000.1000.1000.0630.0300.030
  665     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  666     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  667      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  668      0.03 0.03 0.06 0.10 0.10 0.10 0.10 0.10 0.10 0.06 0.06 0.03
  669      0.02 0.02 0.04 0.06 0.06 0.06 0.06 0.06 0.06 0.04 0.02 0.02
  670     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  671     0.0040.0040.0060.0080.0080.0080.0080.0080.0080.0060.0040.004
  672  6730.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.0040.004
  END MON-SQOLIM

  MON-IFLW-CONC
*** <PLS >  Conc of QUAL in interflow outflow for each month (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  102  104 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  105  106 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  107      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
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  108  109 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  110  111 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  112  113 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  121      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  122  124 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  125  126 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  127      0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  128  129 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  130  131 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  132  133 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  141      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  142  144 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  145  146 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  147      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  148  149 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  150  151 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  152  153 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  161      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  162  164 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  165  166 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  167      0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  168  169 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  170  171 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  172  173 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  181      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  182  184 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  185  186 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  187      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  188  189 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  190  191 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  192  193 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  201      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  202  204 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  205  206 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  207      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  208  209 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  210  211 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  212  213 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  221      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  222  224 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  225  226 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  227      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  228  229 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  230  231 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  232  233 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  241      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  242  244 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  245  246 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  247      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  248  249 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  250  251 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  252  253 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  261      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  262  264 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  265  266 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  267      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  268  269 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
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  270  271 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  272  273 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  281      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  282  284 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  285  286 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  287      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  288  289 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  290  291 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  292  293 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  301      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  302  304 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  305  306 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  307      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  308  309 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  310  311 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  312  313 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  501      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  502  504 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  505  506 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  507      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  508  509 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  510  511 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  512  513 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  521      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  522  524 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  525  526 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  527      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  528  529 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  530  531 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  532  533 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  541      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  542  544 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  545  546 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  547      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
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  552  553 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  561      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  562  564 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  565  566 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  567      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  568  569 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  570  571 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  572  573 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  581      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  582  584 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  585  586 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  587      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  588  589 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  590  591 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  592  593 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  601      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  602  604 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  605  606 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  607      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  608  609 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  610  611 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  612  613 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  621      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
```

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  622  624 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  625  626 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  627      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  628  629 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  630  631 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  632  633 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  641      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  642  644 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  645  646 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  647      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  648  649 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  650  651 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  652  653 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  661      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  662  664 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  665  666 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  667      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  668  669 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  670  671 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  672  673 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  END MON-IFLW-CONC

  MON-GRND-CONC
*** <PLS >  Value at start of month for conc of QUAL in groundwater (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  102  104 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  105  106 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  107      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  108  109 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  110  111 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  112  113 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  121      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  122  124 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  125  126 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  127      0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  128  129 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  130  131 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  132  133 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  141      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  142  144 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  145  146 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  147      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  148  149 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  150  151 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  152  153 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  161      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  162  164 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  165  166 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  167      0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  168  169 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24
  170  171 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  172  173 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  181      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  182  184 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  185  186 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  187      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  188  189 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
```

```
  190  191 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  192  193 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  201      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  202  204 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  205  206 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  207      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  208  209 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  210  211 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  212  213 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  221      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  222  224 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  225  226 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  227      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  228  229 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  230  231 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  232  233 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  241      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  242  244 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  245  246 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  247      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  248  249 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  250  251 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  252  253 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  261      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  262  264 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  265  266 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  267      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  268  269 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  270  271 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  272  273 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  281      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  282  284 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  285  286 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  287      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  288  289 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  290  291 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  292  293 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  301      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  302  304 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  305  306 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  307      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  308  309 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  310  311 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  312  313 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
***
  501      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  502  504 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  505  506 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  507      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  508  509 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  510  511 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  512  513 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  521      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  522  524 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  525  526 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  527      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  528  529 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  530  531 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  532  533 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  541      0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
```

```
  542  544 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  545  546 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  547     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  548  549 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  550  551 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  552  553 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  561     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  562  564 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  565  566 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  567     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  568  569 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  570  571 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  572  573 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  581     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  582  584 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  585  586 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
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  590  591 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  592  593 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01

  601     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  602  604 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  605  606 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  607     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  608  609 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  610  611 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  612  613 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  621     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  622  624 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  625  626 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  627     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  628  629 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  630  631 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  632  633 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  641     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  642  644 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  645  646 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  647     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  648  649 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  650  651 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  652  653 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  661     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  662  664 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10
  665  666 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  667     0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08
  668  669 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18
  670  671 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  672  673 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
  END MON-GRND-CONC

  QUAL-PROPS
*** <PLS >  Identifiers and Flags
*** x -  x    QUALID      QTID  QSD VPFW VPFS  QSO  VQO QIFW VIQC QAGW VAQC
  101  673BOD           LBS     0    0    0    1    1    1    3    1    3
  END QUAL-PROPS

  QUAL-INPUT
***         Storage on surface and nonseasonal parameters
***            SQO   POTFW   POTFS   ACQOP  SQOLIM   WSQOP    IOQC    AOQC
*** <PLS >  qty/ac qty/ton qty/ton    qty/  qty/ac   in/hr qty/ft3 qty/ft3
*** x -  x                         ac.day
```

101	0.01	0.	0.	0.010	0.025	0.6	0.	0.
102	0.01	0.	0.	0.015	0.038	0.6	0.	0.
103	0.01	0.	0.	0.020	0.050	0.6	0.	0.
104	0.01	0.	0.	0.020	0.050	0.6	0.	0.
105	0.01	0.	0.	0.007	0.020	0.6	0.	0.
106	0.01	0.	0.	0.005	0.015	0.6	0.	0.
107	0.01	0.	0.	0.010	0.030	0.6	0.	0.
108	0.01	0.	0.	0.020	0.060	0.6	0.	0.
109	0.01	0.	0.	0.015	0.045	0.6	0.	0.
110	0.01	0.	0.	0.012	0.035	0.6	0.	0.
111	0.01	0.	0.	0.006	0.015	0.6	0.	0.
112	0.01	0.	0.	0.001	0.005	0.3	0.	0.
113	0.01	0.	0.	0.001	0.005	0.3	0.	0.
121	0.01	0.	0.	0.010	0.025	0.6	0.	0.
122	0.01	0.	0.	0.015	0.038	0.6	0.	0.
123	0.01	0.	0.	0.020	0.050	0.6	0.	0.
124	0.01	0.	0.	0.020	0.050	0.6	0.	0.
125	0.01	0.	0.	0.007	0.020	0.6	0.	0.
126	0.01	0.	0.	0.005	0.015	0.6	0.	0.
127	0.01	0.	0.	0.010	0.030	0.6	0.	0.
128	0.01	0.	0.	0.020	0.060	0.6	0.	0.
129	0.01	0.	0.	0.015	0.045	0.6	0.	0.
130	0.01	0.	0.	0.012	0.035	0.6	0.	0.
131	0.01	0.	0.	0.006	0.015	0.6	0.	0.
132	0.01	0.	0.	0.001	0.005	0.3	0.	0.
133	0.01	0.	0.	0.001	0.005	0.3	0.	0.
141	0.01	0.	0.	0.010	0.025	0.6	0.	0.
142	0.01	0.	0.	0.015	0.038	0.6	0.	0.
143	0.01	0.	0.	0.020	0.050	0.6	0.	0.
144	0.01	0.	0.	0.020	0.050	0.6	0.	0.
145	0.01	0.	0.	0.007	0.020	0.6	0.	0.
146	0.01	0.	0.	0.005	0.015	0.6	0.	0.
147	0.01	0.	0.	0.010	0.030	0.6	0.	0.
148	0.01	0.	0.	0.020	0.060	0.6	0.	0.
149	0.01	0.	0.	0.015	0.045	0.6	0.	0.
150	0.01	0.	0.	0.012	0.035	0.6	0.	0.
151	0.01	0.	0.	0.006	0.015	0.6	0.	0.
152	0.01	0.	0.	0.001	0.005	0.3	0.	0.
153	0.01	0.	0.	0.001	0.005	0.3	0.	0.
161	0.01	0.	0.	0.010	0.025	0.6	0.	0.
162	0.01	0.	0.	0.015	0.038	0.6	0.	0.
163	0.01	0.	0.	0.020	0.050	0.6	0.	0.
164	0.01	0.	0.	0.020	0.050	0.6	0.	0.
165	0.01	0.	0.	0.007	0.020	0.6	0.	0.
166	0.01	0.	0.	0.005	0.015	0.6	0.	0.
167	0.01	0.	0.	0.010	0.030	0.6	0.	0.
168	0.01	0.	0.	0.020	0.060	0.6	0.	0.
169	0.01	0.	0.	0.015	0.045	0.6	0.	0.
170	0.01	0.	0.	0.012	0.035	0.6	0.	0.
171	0.01	0.	0.	0.006	0.015	0.6	0.	0.
172	0.01	0.	0.	0.001	0.005	0.3	0.	0.
173	0.01	0.	0.	0.001	0.005	0.3	0.	0.
181	0.01	0.	0.	0.010	0.025	0.6	0.	0.
182	0.01	0.	0.	0.015	0.038	0.6	0.	0.
183	0.01	0.	0.	0.020	0.050	0.6	0.	0.
184	0.01	0.	0.	0.020	0.050	0.6	0.	0.
185	0.01	0.	0.	0.007	0.020	0.6	0.	0.
186	0.01	0.	0.	0.005	0.015	0.6	0.	0.
187	0.01	0.	0.	0.010	0.030	0.6	0.	0.
188	0.01	0.	0.	0.020	0.060	0.6	0.	0.
189	0.01	0.	0.	0.015	0.045	0.6	0.	0.
190	0.01	0.	0.	0.012	0.035	0.6	0.	0.

191	0.01	0.	0.	0.006	0.015	0.6	0.	0.
192	0.01	0.	0.	0.001	0.005	0.3	0.	0.
193	0.01	0.	0.	0.001	0.005	0.3	0.	0.
201	0.01	0.	0.	0.010	0.025	0.6	0.	0.
202	0.01	0.	0.	0.015	0.038	0.6	0.	0.
203	0.01	0.	0.	0.020	0.050	0.6	0.	0.
204	0.01	0.	0.	0.020	0.050	0.6	0.	0.
205	0.01	0.	0.	0.007	0.020	0.6	0.	0.
206	0.01	0.	0.	0.005	0.015	0.6	0.	0.
207	0.01	0.	0.	0.010	0.030	0.6	0.	0.
208	0.01	0.	0.	0.020	0.060	0.6	0.	0.
209	0.01	0.	0.	0.015	0.045	0.6	0.	0.
210	0.01	0.	0.	0.012	0.035	0.6	0.	0.
211	0.01	0.	0.	0.006	0.015	0.6	0.	0.
212	0.01	0.	0.	0.001	0.005	0.3	0.	0.
213	0.01	0.	0.	0.001	0.005	0.3	0.	0.
221	0.01	0.	0.	0.010	0.025	0.6	0.	0.
222	0.01	0.	0.	0.015	0.038	0.6	0.	0.
223	0.01	0.	0.	0.020	0.050	0.6	0.	0.
224	0.01	0.	0.	0.020	0.050	0.6	0.	0.
225	0.01	0.	0.	0.007	0.020	0.6	0.	0.
226	0.01	0.	0.	0.005	0.015	0.6	0.	0.
227	0.01	0.	0.	0.010	0.030	0.6	0.	0.
228	0.01	0.	0.	0.020	0.060	0.6	0.	0.
229	0.01	0.	0.	0.015	0.045	0.6	0.	0.
230	0.01	0.	0.	0.012	0.035	0.6	0.	0.
231	0.01	0.	0.	0.006	0.015	0.6	0.	0.
232	0.01	0.	0.	0.001	0.005	0.3	0.	0.
233	0.01	0.	0.	0.001	0.005	0.3	0.	0.
241	0.01	0.	0.	0.010	0.025	0.6	0.	0.
242	0.01	0.	0.	0.015	0.038	0.6	0.	0.
243	0.01	0.	0.	0.020	0.050	0.6	0.	0.
244	0.01	0.	0.	0.020	0.050	0.6	0.	0.
245	0.01	0.	0.	0.007	0.020	0.6	0.	0.
246	0.01	0.	0.	0.005	0.015	0.6	0.	0.
247	0.01	0.	0.	0.010	0.030	0.6	0.	0.
248	0.01	0.	0.	0.020	0.060	0.6	0.	0.
249	0.01	0.	0.	0.015	0.045	0.6	0.	0.
250	0.01	0.	0.	0.012	0.035	0.6	0.	0.
251	0.01	0.	0.	0.006	0.015	0.6	0.	0.
252	0.01	0.	0.	0.001	0.005	0.3	0.	0.
253	0.01	0.	0.	0.001	0.005	0.3	0.	0.
261	0.01	0.	0.	0.010	0.025	0.6	0.	0.
262	0.01	0.	0.	0.015	0.038	0.6	0.	0.
263	0.01	0.	0.	0.020	0.050	0.6	0.	0.
264	0.01	0.	0.	0.020	0.050	0.6	0.	0.
265	0.01	0.	0.	0.007	0.020	0.6	0.	0.
266	0.01	0.	0.	0.005	0.015	0.6	0.	0.
267	0.01	0.	0.	0.010	0.030	0.6	0.	0.
268	0.01	0.	0.	0.020	0.060	0.6	0.	0.
269	0.01	0.	0.	0.015	0.045	0.6	0.	0.
270	0.01	0.	0.	0.012	0.035	0.6	0.	0.
271	0.01	0.	0.	0.006	0.015	0.6	0.	0.
272	0.01	0.	0.	0.001	0.005	0.3	0.	0.
273	0.01	0.	0.	0.001	0.005	0.3	0.	0.
281	0.01	0.	0.	0.010	0.025	0.6	0.	0.
282	0.01	0.	0.	0.015	0.038	0.6	0.	0.
283	0.01	0.	0.	0.020	0.050	0.6	0.	0.
284	0.01	0.	0.	0.020	0.050	0.6	0.	0.
285	0.01	0.	0.	0.007	0.020	0.6	0.	0.
286	0.01	0.	0.	0.005	0.015	0.6	0.	0.

```
  287      0.01   0.    0.  0.010  0.030   0.6   0.   0.
  288      0.01   0.    0.  0.020  0.060   0.6   0.   0.
  289      0.01   0.    0.  0.015  0.045   0.6   0.   0.
  290      0.01   0.    0.  0.012  0.035   0.6   0.   0.
  291      0.01   0.    0.  0.006  0.015   0.6   0.   0.
  292      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  293      0.01   0.    0.  0.001  0.005   0.3   0.   0.

  301      0.01   0.    0.  0.010  0.025   0.6   0.   0.
  302      0.01   0.    0.  0.015  0.038   0.6   0.   0.
  303      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  304      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  305      0.01   0.    0.  0.007  0.020   0.6   0.   0.
  306      0.01   0.    0.  0.005  0.015   0.6   0.   0.
  307      0.01   0.    0.  0.010  0.030   0.6   0.   0.
  308      0.01   0.    0.  0.020  0.060   0.6   0.   0.
  309      0.01   0.    0.  0.015  0.045   0.6   0.   0.
  310      0.01   0.    0.  0.012  0.035   0.6   0.   0.
  311      0.01   0.    0.  0.006  0.015   0.6   0.   0.
  312      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  313      0.01   0.    0.  0.001  0.005   0.3   0.   0.
***
  501      0.01   0.    0.  0.010  0.025   0.6   0.   0.
  502      0.01   0.    0.  0.015  0.038   0.6   0.   0.
  503      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  504      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  505      0.01   0.    0.  0.007  0.020   0.6   0.   0.
  506      0.01   0.    0.  0.005  0.015   0.6   0.   0.
  507      0.01   0.    0.  0.010  0.030   0.6   0.   0.
  508      0.01   0.    0.  0.020  0.060   0.6   0.   0.
  509      0.01   0.    0.  0.015  0.045   0.6   0.   0.
  510      0.01   0.    0.  0.012  0.035   0.6   0.   0.
  511      0.01   0.    0.  0.006  0.015   0.6   0.   0.
  512      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  513      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  521      0.01   0.    0.  0.010  0.025   0.6   0.   0.
  522      0.01   0.    0.  0.015  0.038   0.6   0.   0.
  523      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  524      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  525      0.01   0.    0.  0.007  0.020   0.6   0.   0.
  526      0.01   0.    0.  0.005  0.015   0.6   0.   0.
  527      0.01   0.    0.  0.010  0.030   0.6   0.   0.
  528      0.01   0.    0.  0.020  0.060   0.6   0.   0.
  529      0.01   0.    0.  0.015  0.045   0.6   0.   0.
  530      0.01   0.    0.  0.012  0.035   0.6   0.   0.
  531      0.01   0.    0.  0.006  0.015   0.6   0.   0.
  532      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  533      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  541      0.01   0.    0.  0.010  0.025   0.6   0.   0.
  542      0.01   0.    0.  0.015  0.038   0.6   0.   0.
  543      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  544      0.01   0.    0.  0.020  0.050   0.6   0.   0.
  545      0.01   0.    0.  0.007  0.020   0.6   0.   0.
  546      0.01   0.    0.  0.005  0.015   0.6   0.   0.
  547      0.01   0.    0.  0.010  0.030   0.6   0.   0.
  548      0.01   0.    0.  0.020  0.060   0.6   0.   0.
  549      0.01   0.    0.  0.015  0.045   0.6   0.   0.
  550      0.01   0.    0.  0.012  0.035   0.6   0.   0.
  551      0.01   0.    0.  0.006  0.015   0.6   0.   0.
  552      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  553      0.01   0.    0.  0.001  0.005   0.3   0.   0.
  561      0.01   0.    0.  0.010  0.025   0.6   0.   0.
```

562	0.01	0.	0.	0.015	0.038	0.6	0.	0.
563	0.01	0.	0.	0.020	0.050	0.6	0.	0.
564	0.01	0.	0.	0.020	0.050	0.6	0.	0.
565	0.01	0.	0.	0.007	0.020	0.6	0.	0.
566	0.01	0.	0.	0.005	0.015	0.6	0.	0.
567	0.01	0.	0.	0.010	0.030	0.6	0.	0.
568	0.01	0.	0.	0.020	0.060	0.6	0.	0.
569	0.01	0.	0.	0.015	0.045	0.6	0.	0.
570	0.01	0.	0.	0.012	0.035	0.6	0.	0.
571	0.01	0.	0.	0.006	0.015	0.6	0.	0.
572	0.01	0.	0.	0.001	0.005	0.3	0.	0.
573	0.01	0.	0.	0.001	0.005	0.3	0.	0.
581	0.01	0.	0.	0.010	0.025	0.6	0.	0.
582	0.01	0.	0.	0.015	0.038	0.6	0.	0.
583	0.01	0.	0.	0.020	0.050	0.6	0.	0.
584	0.01	0.	0.	0.020	0.050	0.6	0.	0.
585	0.01	0.	0.	0.007	0.020	0.6	0.	0.
586	0.01	0.	0.	0.005	0.015	0.6	0.	0.
587	0.01	0.	0.	0.010	0.030	0.6	0.	0.
588	0.01	0.	0.	0.020	0.060	0.6	0.	0.
589	0.01	0.	0.	0.015	0.045	0.6	0.	0.
590	0.01	0.	0.	0.012	0.035	0.6	0.	0.
591	0.01	0.	0.	0.006	0.015	0.6	0.	0.
592	0.01	0.	0.	0.001	0.005	0.3	0.	0.
593	0.01	0.	0.	0.001	0.005	0.3	0.	0.
601	0.01	0.	0.	0.010	0.025	0.6	0.	0.
602	0.01	0.	0.	0.015	0.038	0.6	0.	0.
603	0.01	0.	0.	0.020	0.050	0.6	0.	0.
604	0.01	0.	0.	0.020	0.050	0.6	0.	0.
605	0.01	0.	0.	0.007	0.020	0.6	0.	0.
606	0.01	0.	0.	0.005	0.015	0.6	0.	0.
607	0.01	0.	0.	0.010	0.030	0.6	0.	0.
608	0.01	0.	0.	0.020	0.060	0.6	0.	0.
609	0.01	0.	0.	0.015	0.045	0.6	0.	0.
610	0.01	0.	0.	0.012	0.035	0.6	0.	0.
611	0.01	0.	0.	0.006	0.015	0.6	0.	0.
612	0.01	0.	0.	0.001	0.005	0.3	0.	0.
613	0.01	0.	0.	0.001	0.005	0.3	0.	0.
621	0.01	0.	0.	0.010	0.025	0.6	0.	0.
622	0.01	0.	0.	0.015	0.038	0.6	0.	0.
623	0.01	0.	0.	0.020	0.050	0.6	0.	0.
624	0.01	0.	0.	0.020	0.050	0.6	0.	0.
625	0.01	0.	0.	0.007	0.020	0.6	0.	0.
626	0.01	0.	0.	0.005	0.015	0.6	0.	0.
627	0.01	0.	0.	0.010	0.030	0.6	0.	0.
628	0.01	0.	0.	0.020	0.060	0.6	0.	0.
629	0.01	0.	0.	0.015	0.045	0.6	0.	0.
630	0.01	0.	0.	0.012	0.035	0.6	0.	0.
631	0.01	0.	0.	0.006	0.015	0.6	0.	0.
632	0.01	0.	0.	0.001	0.005	0.3	0.	0.
633	0.01	0.	0.	0.001	0.005	0.3	0.	0.
641	0.01	0.	0.	0.010	0.025	0.6	0.	0.
642	0.01	0.	0.	0.015	0.038	0.6	0.	0.
643	0.01	0.	0.	0.020	0.050	0.6	0.	0.
644	0.01	0.	0.	0.020	0.050	0.6	0.	0.
645	0.01	0.	0.	0.007	0.020	0.6	0.	0.
646	0.01	0.	0.	0.005	0.015	0.6	0.	0.
647	0.01	0.	0.	0.010	0.030	0.6	0.	0.
648	0.01	0.	0.	0.020	0.060	0.6	0.	0.
649	0.01	0.	0.	0.015	0.045	0.6	0.	0.
650	0.01	0.	0.	0.012	0.035	0.6	0.	0.

```
  651        0.01      0.      0.   0.006   0.015     0.6      0.      0.
  652        0.01      0.      0.   0.001   0.005     0.3      0.      0.
  653        0.01      0.      0.   0.001   0.005     0.3      0.      0.
  661        0.01      0.      0.   0.010   0.025     0.6      0.      0.
  662        0.01      0.      0.   0.015   0.038     0.6      0.      0.
  663        0.01      0.      0.   0.020   0.050     0.6      0.      0.
  664        0.01      0.      0.   0.020   0.050     0.6      0.      0.
  665        0.01      0.      0.   0.007   0.020     0.6      0.      0.
  666        0.01      0.      0.   0.005   0.015     0.6      0.      0.
  667        0.01      0.      0.   0.010   0.030     0.6      0.      0.
  668        0.01      0.      0.   0.020   0.060     0.6      0.      0.
  669        0.01      0.      0.   0.015   0.045     0.6      0.      0.
  670        0.01      0.      0.   0.012   0.035     0.6      0.      0.
  671        0.01      0.      0.   0.006   0.015     0.6      0.      0.
  672        0.01      0.      0.   0.001   0.005     0.3      0.      0.
  673        0.01      0.      0.   0.001   0.005     0.3      0.      0.
  END QUAL-INPUT

  MON-ACCUM
*** <PLS >  Value at start of each month for accum rate of QUALOF (lb/ac.day)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  102      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  103  104  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  105       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  106      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  107       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  108       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  109       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  110     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  111     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  112  1130.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  121      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  122      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  123  124  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  125       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  126      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  127       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  128       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  129       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  130     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  131     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  132  1330.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  141      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  142      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  143  144  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  145       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  146      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  147       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  148       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  149       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  150     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  151     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  152  1530.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  161      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  162      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  163  164  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  165       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  166      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  167       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  168       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  169       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
```

```
170     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
171     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
172  1730.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
181      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
182      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
183  184  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
185       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
186      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
187       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
188       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
189       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
190     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
191     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
192  1930.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075

201      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
202      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
203  204  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
205       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
206      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
207       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
208       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
209       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
210     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
211     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
212  2130.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
221      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
222      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
223  224  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
225       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
226      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
227       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
228       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
229       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
230     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
231     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
232  2330.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
241      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
242      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
243  244  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
245       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
246      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
247       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
248       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
249       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
250     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
251     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
252  2530.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
261      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
262      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
263  264  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
265       0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
266      0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
267       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
268       1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
269       0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
270     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
271     0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
272  2730.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
281      0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
282      0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
283  284  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
```

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  285     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  286    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  287     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  288     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  289     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  290   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  291   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  292  2930.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075

  301    0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  302    0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  303  304  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  305     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  306    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  307     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  308     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  309     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  310   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  311   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  312  3130.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
***
  501    0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  502    0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  503  504  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  505     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  506    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  507     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  508     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  509     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  510   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  511   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  512  5130.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  521    0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  522    0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  523  524  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  525     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  526    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  527     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  528     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  529     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  530   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  531   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  532  5330.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  541    0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  542    0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  543  544  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  545     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  546    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  547     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  548     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  549     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
  550   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  551   0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  552  5530.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
  561    0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
  562    0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
  563  564  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
  565     0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
  566    0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
  567     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  568     1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
  569     0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
```

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570    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
571    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
572  5730.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
581     0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
582     0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
583  584  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
585      0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
586     0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
587      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
588      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
589      0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
590    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
591    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
592  5930.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075

601     0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
602     0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
603  604  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
605      0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
606     0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
607      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
608      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
609      0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
610    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
611    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
612  6130.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
621     0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
622     0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
623  624  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
625      0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
626     0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
627      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
628      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
629      0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
630    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
631    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
632  6330.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
641     0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
642     0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
643  644  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
645      0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
646     0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
647      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
648      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
649      0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
650    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
651    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
652  6530.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
661     0.32 0.32 0.35  0.4  0.4  0.4  0.4  0.4  0.4 0.35 0.32 0.32
662     0.56 0.56 0.62  0.7  0.7  0.7  0.7  0.7  0.7 0.62 0.56 0.56
663  664  0.8  0.8  0.9  1.0  1.0  1.0  1.0  1.0  1.0  0.9  0.8  0.8
665      0.1  0.1 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.15  0.1  0.1
666     0.05 0.050.0750.0750.0750.0750.0750.0750.0750.075 0.05 0.05
667      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
668      1.0  1.0  1.2  1.5  1.5  1.5  1.5  1.5  1.5  1.2  1.0  1.0
669      0.4  0.4  0.6  0.8  0.8  0.8  0.8  0.8  0.8  0.6  0.4  0.4
670    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
671    0.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
672  6730.0750.075  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.10.0750.075
END MON-ACCUM

MON-SQOLIM
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*** <PLS >  Value at start of month for limiting storage of QUALOF (lb/ac)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  102        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  103  104  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  105        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  106        0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  107       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  108       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  109        4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  110       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  111       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  112  113 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  121        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  122        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  123  124  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  125        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  126        0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  127       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  128       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  129        4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  130       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  131       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  132  133 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  141        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  142        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  143  144  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  145        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  146        0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  147       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  148       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  149        4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  150       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  151       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  152  153 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  161        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  162        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  163  164  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  165        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  166        0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  167       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  168       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  169        4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  170       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  171       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  172  173 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  181        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  182        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  183  184  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  185        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  186        0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  187       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  188       10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  189        4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  190       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  191       0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  192  193 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75

  201        3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  202        5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  203  204  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  205        1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
```

```
206      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
207     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
208     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
209      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
210     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
211     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
212  213 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
221      3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
222      5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
223  224  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
225      1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
226      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
227     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
228     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
229      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
230     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
231     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
232  233 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
241      3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
242      5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
243  244  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
245      1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
246      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
247     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
248     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
249      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
250     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
251     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
252  253 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
261      3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
262      5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
263  264  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
265      1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
266      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
267     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
268     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
269      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
270     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
271     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
272  273 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
281      3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
282      5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
283  284  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
285      1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
286      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
287     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
288     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
289      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
290     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
291     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
292  293 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75

301      3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
302      5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
303  304  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
305      1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
306      0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
307     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
308     10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
309      4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
310     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
311     0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
```

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  312  313 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
***
  501       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  502       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  503  504  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  505       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  506       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  507      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  508      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  509       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  510      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  511      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  512  513 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  521       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  522       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  523  524  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  525       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  526       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  527      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  528      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  529       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  530      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  531      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  532  533 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  541       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  542       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  543  544  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  545       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  546       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  547      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  548      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  549       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  550      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  551      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  552  553 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  561       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  562       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  563  564  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  565       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  566       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  567      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  568      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  569       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  570      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  571      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  572  573 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  581       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  582       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  583  584  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  585       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  586       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  587      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  588      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  589       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  590      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  591      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  592  593 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75

  601       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  602       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  603  604  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  605       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
```

```
  606       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  607      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  608      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  609       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  610      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  611      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  612  613 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  621       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  622       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  623  624  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  625       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  626       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  627      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  628      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  629       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  630      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  631      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  632  633 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  641       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  642       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  643  644  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  645       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  646       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  647      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  648      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  649       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  650      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  651      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  652  653 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  661       3.2  3.2  3.5  4.0  4.0  4.0  4.0  4.0  4.0  3.5  3.2  3.2
  662       5.6  5.6  6.2  7.0  7.0  7.0  7.0  7.0  7.0  6.2  5.6  5.6
  663  664  8.0  8.0  9.0 10.0 10.0 10.0 10.0 10.0 10.0  9.0  8.0  8.0
  665       1.0  1.0  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.5  1.0  1.0
  666       0.5  0.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75  0.5  0.5
  667      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  668      10.0 10.0 12.0 15.0 15.0 15.0 15.0 15.0 15.0 12.0 10.0 10.0
  669       4.0  4.0  6.0  8.0  8.0  8.0  8.0  8.0  8.0  6.0  4.0  4.0
  670      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  671      0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  672  673 0.75 0.75  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.0 0.75 0.75
  END MON-SQOLIM

  MON-IFLW-CONC
*** <PLS >  Conc of QUAL in interflow outflow for each month (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  102  104   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  105        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  106        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  107       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  108       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  109        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  110  111   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  112  113   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  121        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  122  124   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  125        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  126        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  127       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  128       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  129        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  130  131   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
```

```
132  133   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
141        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
142  144   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
145        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
146        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
147       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
148       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
149        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
150  151   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
152  153   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
161        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
162  164   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
165        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
166        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
167       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
168       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
169        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
170  171   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
172  173   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
181        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
182  184   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
185        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
186        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
187       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
188       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
189        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
190  191   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
192  193   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

201        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
202  204   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
205        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
206        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
207       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
208       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
209        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
210  211   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
212  213   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
221        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
222  224   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
225        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
226        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
227       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
228       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
229        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
230  231   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
232  233   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
241        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
242  244   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
245        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
246        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
247       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
248       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
249        6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
250  251   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
252  253   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
261        5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
262  264   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
265        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
266        2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
267       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
268       10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
```

```
 269      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 270  271  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 272  273  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 281      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 282  284  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 285      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 286      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 287     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 288     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 289      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 290  291  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 292  293  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.

 301      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 302  304  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 305      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 306      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 307     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 308     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 309      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 310  311  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 312  313  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
***
 501      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 502  504  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 505      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 506      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 507     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 508     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 509      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 510  511  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 512  513  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 521      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 522  524  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 525      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 526      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 527     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 528     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 529      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 530  531  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 532  533  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 541      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 542  544  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 545      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 546      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 547     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 548     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 549      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 550  551  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 552  553  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 561      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 562  564  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 565      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 566      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 567     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 568     10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
 569      6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.  6.
 570  571  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 572  573  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
 581      5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.  5.
 582  584  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.  7.
 585      2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.  2.
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  586       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  587      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  588      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  589       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  590  591   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  592  593   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

  601       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  602  604   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  605       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  606       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  607      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  608      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  609       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  610  611   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  612  613   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  621       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  622  624   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  625       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  626       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  627      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  628      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  629       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  630  631   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  632  633   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  641       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  642  644   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  645       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  646       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  647      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  648      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  649       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  650  651   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  652  653   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  661       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  662  664   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  665       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  666       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  667      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  668      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  669       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  670  671   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  672  673   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  END MON-IFLW-CONC

  MON-GRND-CONC
*** <PLS >  Value at start of month for conc of QUAL in groundwater (qty/ft3)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  102  104   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  105       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  106       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  107      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  108      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  109       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  110  111   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  112  113   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  121       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  122  124   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  125       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  126       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  127      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
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128      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
129       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
130  131   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
132  133   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
141       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
142  144   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
145       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
146       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
147      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
148      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
149       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
150  151   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
152  153   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
161       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
162  164   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
165       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
166       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
167      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
168      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
169       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
170  171   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
172  173   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
181       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
182  184   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
185       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
186       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
187      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
188      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
189       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
190  191   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
192  193   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

201       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
202  204   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
205       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
206       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
207      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
208      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
209       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
210  211   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
212  213   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
221       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
222  224   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
225       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
226       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
227      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
228      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
229       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
230  231   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
232  233   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
241       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
242  244   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
245       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
246       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
247      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
248      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
249       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
250  251   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
252  253   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
261       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
262  264   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
265       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
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  266       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  267      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  268      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  269       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  270  271  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  272  273  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  281       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  282  284  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  285       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  286       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  287      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  288      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  289       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  290  291  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  292  293  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

  301       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  302  304  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  305       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  306       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  307      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  308      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  309       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  310  311  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  312  313  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
***
  501       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  502  504  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  505       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  506       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  507      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  508      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  509       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  510  511  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  512  513  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  521       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  522  524  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  525       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  526       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  527      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  528      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  529       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  530  531  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  532  533  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  541       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  542  544  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  545       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  546       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  547      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  548      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  549       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  550  551  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  552  553  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  561       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  562  564  7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  565       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  566       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  567      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  568      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  569       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  570  571  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  572  573  2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
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  581       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  582  584   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  585       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  586       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  587      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  588      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  589       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  590  591   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  592  593   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

  601       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  602  604   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  605       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  606       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  607      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  608      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  609       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  610  611   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  612  613   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  621       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  622  624   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  625       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  626       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  627      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  628      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  629       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  630  631   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  632  633   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  641       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  642  644   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  645       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  646       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  647      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  648      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  649       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  650  651   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  652  653   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  661       5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.   5.
  662  664   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.   7.
  665       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  666       2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  667      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  668      10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.  10.
  669       6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.   6.
  670  671   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  672  673   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.
  END MON-GRND-CONC

END PERLND

IMPLND
  ACTIVITY
*** <ILS >              Active Sections
*** x -  x ATMP SNOW IWAT  SLD  IWG IQAL
  101  664    1    0    1    1    1    1
  END ACTIVITY

  PRINT-INFO
*** <ILS > ******** Print-flags ******** PIVL  PYR
*** x -  x ATMP SNOW IWAT  SLD  IWG IQAL *********
  101  664    6    6    5    6    6    6    1    9
  END PRINT-INFO
```

```
  BINARY-INFO
*** <ILS > ******** Print-flags ******** PIVL  PYR
*** x -  x ATMP SNOW IWAT  SLD  IWG IQAL *********
  101  664    5    6    5    5    5    5    1    9
  END BINARY-INFO

  GEN-INFO
***           Name           Unit-systems   Printer BinaryOut
*** <ILS >                     t-series Engl Metr Engl Metr
*** x -  x                     in  out
  101     LDR                      1    1    0    0   27    0
  102     MDR                      1    1    0    0   27    0
  103     HDR                      1    1    0    0   27    0
  104     IND                      1    1    0    0   27    0
  121     LDR                      1    1    0    0   27    0
  122     MDR                      1    1    0    0   27    0
  123     HDR                      1    1    0    0   27    0
  124     IND                      1    1    0    0   27    0
  141     LDR                      1    1    0    0   27    0
  142     MDR                      1    1    0    0   27    0
  143     HDR                      1    1    0    0   27    0
  144     IND                      1    1    0    0   27    0
  161     LDR                      1    1    0    0   27    0
  162     MDR                      1    1    0    0   27    0
  163     HDR                      1    1    0    0   27    0
  164     IND                      1    1    0    0   27    0
  181     LDR                      1    1    0    0   27    0
  182     MDR                      1    1    0    0   27    0
  183     HDR                      1    1    0    0   27    0
  184     IND                      1    1    0    0   27    0
  201     LDR                      1    1    0    0   27    0
  202     MDR                      1    1    0    0   27    0
  203     HDR                      1    1    0    0   27    0
  204     IND                      1    1    0    0   27    0
  221     LDR                      1    1    0    0   27    0
  222     MDR                      1    1    0    0   27    0
  223     HDR                      1    1    0    0   27    0
  224     IND                      1    1    0    0   27    0
  241     LDR                      1    1    0    0   27    0
  242     MDR                      1    1    0    0   27    0
  243     HDR                      1    1    0    0   27    0
  244     IND                      1    1    0    0   27    0
  261     LDR                      1    1    0    0   27    0
  262     MDR                      1    1    0    0   27    0
  263     HDR                      1    1    0    0   27    0
  264     IND                      1    1    0    0   27    0
  281     LDR                      1    1    0    0   27    0
  282     MDR                      1    1    0    0   27    0
  283     HDR                      1    1    0    0   27    0
  284     IND                      1    1    0    0   27    0
  301     LDR                      1    1    0    0   27    0
  302     MDR                      1    1    0    0   27    0
  303     HDR                      1    1    0    0   27    0
  304     IND                      1    1    0    0   27    0
***
  501     LDR                      1    1    0    0   27    0
  502     MDR                      1    1    0    0   27    0
  503     HDR                      1    1    0    0   27    0
  504     IND                      1    1    0    0   27    0
  521     LDR                      1    1    0    0   27    0
  522     MDR                      1    1    0    0   27    0
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  523    HDR                   1    1    0    0   27    0
  524    IND                  1    1    0    0   27    0
  541    LDR                   1    1    0    0   27    0
  542    MDR                   1    1    0    0   27    0
  543    HDR                   1    1    0    0   27    0
  544    IND                  1    1    0    0   27    0
  561    LDR                   1    1    0    0   27    0
  562    MDR                   1    1    0    0   27    0
  563    HDR                   1    1    0    0   27    0
  564    IND                  1    1    0    0   27    0
  581    LDR                   1    1    0    0   27    0
  582    MDR                   1    1    0    0   27    0
  583    HDR                   1    1    0    0   27    0
  584    IND                  1    1    0    0   27    0
  601    LDR                   1    1    0    0   27    0
  602    MDR                   1    1    0    0   27    0
  603    HDR                   1    1    0    0   27    0
  604    IND                  1    1    0    0   27    0
  621    LDR                   1    1    0    0   27    0
  622    MDR                   1    1    0    0   27    0
  623    HDR                   1    1    0    0   27    0
  624    IND                  1    1    0    0   27    0
  641    LDR                   1    1    0    0   27    0
  642    MDR                   1    1    0    0   27    0
  643    HDR                   1    1    0    0   27    0
  644    IND                  1    1    0    0   27    0
  661    LDR                   1    1    0    0   27    0
  662    MDR                   1    1    0    0   27    0
  663    HDR                   1    1    0    0   27    0
  664    IND                  1    1    0    0   27    0
  END GEN-INFO

  ATEMP-DAT
*** <ILS >     ELDAT    AIRTEMP
*** x -  x      (ft)    (deg F)
  ***
  101  664      -60.        32.
  END ATEMP-DAT

  IWAT-PARM1
*** <ILS >        Flags
*** x -  x CSNO RTOP  VRS  VNN RTLI
  101  664    0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
*** <ILS >     LSUR     SLSUR     NSUR     RETSC
*** x -  x      (ft)                        (in)
  101  104      200.     0.007     0.015     0.05
  121  124      200.     0.006     0.015     0.05
  141  144      200.     0.012     0.015     0.05
  161  164      200.     0.005     0.015     0.05
  181  184      200.     0.007     0.015     0.05
  201  204      200.     0.003     0.015     0.05
  221  224      200.     0.005     0.015     0.05
  241  244      200.     0.006     0.015     0.05
  261  264      200.     0.007     0.015     0.05
  281  284      200.     0.039     0.015     0.05
  301  304      200.     0.014     0.015     0.05
***
  501  504      200.     0.013     0.015     0.05
  521  524      200.     0.058     0.015     0.05
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  541  544     200.    0.063    0.015     0.05
  561  564     200.    0.020    0.015     0.05
  581  584     200.    0.061    0.015     0.05
  601  604     200.    0.053    0.015     0.05
  621  624     200.    0.033    0.015     0.05
  641  644     200.    0.009    0.015     0.05
  661  664     200.    0.015    0.015     0.05
  END IWAT-PARM2

  IWAT-PARM3
*** <ILS >    PETMAX    PETMIN
*** x -  x   (deg F)   (deg F)
  101  664       40.       35.
  END IWAT-PARM3

  IWAT-STATE1
*** <ILS >  IWATER state variables (inches)
*** x -  x      RETS      SURS
  101  664        0.        0.
  END IWAT-STATE1

  SLD-PARM1
*** <PLS >  Sediment parameters 1
*** x -  x VASD VRSD SDOP
  101  664    0    0    0
  END SLD-PARM1

  SLD-PARM2
***            KEIM      JEIM    ACCSDP    REMSDP
*** <ILS >                        tons/      /day
*** x -  x                       ac.day
  101         0.050       2.    0.0010     0.083
  102         0.085       2.    0.0020     0.083
  103         0.095       2.    0.0025     0.083
  104         0.095       2.    0.0025     0.083
  121         0.050       2.    0.0010     0.083
  122         0.085       2.    0.0020     0.083
  123         0.095       2.    0.0025     0.083
  124         0.095       2.    0.0025     0.083
  141         0.050       2.    0.0010     0.083
  142         0.085       2.    0.0020     0.083
  143         0.095       2.    0.0025     0.083
  144         0.095       2.    0.0025     0.083
  161         0.050       2.    0.0010     0.083
  162         0.085       2.    0.0020     0.083
  163         0.095       2.    0.0025     0.083
  164         0.095       2.    0.0025     0.083
  181         0.050       2.    0.0010     0.083
  182         0.085       2.    0.0020     0.083
  183         0.095       2.    0.0025     0.083
  184         0.095       2.    0.0025     0.083

  201         0.050       2.    0.0010     0.083
  202         0.085       2.    0.0020     0.083
  203         0.095       2.    0.0025     0.083
  204         0.095       2.    0.0025     0.083
  221         0.050       2.    0.0010     0.083
  222         0.085       2.    0.0020     0.083
  223         0.095       2.    0.0025     0.083
  224         0.095       2.    0.0025     0.083
  241         0.050       2.    0.0010     0.083
  242         0.085       2.    0.0020     0.083
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  243        0.095       2.   0.0025    0.083
  244        0.095       2.   0.0025    0.083
  261        0.050       2.   0.0010    0.083
  262        0.085       2.   0.0020    0.083
  263        0.095       2.   0.0025    0.083
  264        0.095       2.   0.0025    0.083
  281        0.050       2.   0.0010    0.083
  282        0.085       2.   0.0020    0.083
  283        0.095       2.   0.0025    0.083
  284        0.095       2.   0.0025    0.083

  301        0.050       2.   0.0010    0.083
  302        0.085       2.   0.0020    0.083
  303        0.095       2.   0.0025    0.083
  304        0.095       2.   0.0025    0.083
***
  501        0.050       2.   0.0010    0.083
  502        0.085       2.   0.0020    0.083
  503        0.095       2.   0.0025    0.083
  504        0.095       2.   0.0025    0.083
  521        0.050       2.   0.0010    0.083
  522        0.085       2.   0.0020    0.083
  523        0.095       2.   0.0025    0.083
  524        0.095       2.   0.0025    0.083
  541        0.050       2.   0.0010    0.083
  542        0.085       2.   0.0020    0.083
  543        0.095       2.   0.0025    0.083
  544        0.095       2.   0.0025    0.083
  561        0.050       2.   0.0010    0.083
  562        0.085       2.   0.0020    0.083
  563        0.095       2.   0.0025    0.083
  564        0.095       2.   0.0025    0.083
  581        0.050       2.   0.0010    0.083
  582        0.085       2.   0.0020    0.083
  583        0.095       2.   0.0025    0.083
  584        0.095       2.   0.0025    0.083

  601        0.050       2.   0.0010    0.083
  602        0.085       2.   0.0020    0.083
  603        0.095       2.   0.0025    0.083
  604        0.095       2.   0.0025    0.083
  621        0.050       2.   0.0010    0.083
  622        0.085       2.   0.0020    0.083
  623        0.095       2.   0.0025    0.083
  624        0.095       2.   0.0025    0.083
  641        0.050       2.   0.0010    0.083
  642        0.085       2.   0.0020    0.083
  643        0.095       2.   0.0025    0.083
  644        0.095       2.   0.0025    0.083
  661        0.050       2.   0.0010    0.083
  662        0.085       2.   0.0020    0.083
  663        0.095       2.   0.0025    0.083
  664        0.095       2.   0.0025    0.083
  END SLD-PARM2

  SLD-STOR
*** <ILS >  Solids storage (tons/acre)
*** x -  x
  101  664       0.2
  END SLD-STOR

  IWT-PARM1
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*** <ILS >  Flags for section IWTGAS
*** x -  x WTFV CSNO
  101  664    1    0
  END IWT-PARM1

  IWT-PARM2
***         Second group of IWTGAS parms
*** <ILS >      ELEV      AWTF      BWTF
*** x -  x      (ft)   (deg F) (deg F/F)
  101  664       50.       40.      0.55
  END IWT-PARM2

  MON-AWTF
*** <ILS >  Values of AWTF at start of each month (oF)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  664 49.0 49.0 50.0 59.0 60.0 63.0 67.0 67.0 65.0 59.0 53.0 46.0
  END MON-AWTF

  MON-BWTF
*** <ILS >  Values of BWTF at start of each month (F/F)
*** x -  x  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC
  101  664  0.2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2   .2
  END MON-BWTF

  NQUALS
*** <ILS >
*** x -  xNQUAL
  101  664    4
  END NQUALS

  QUAL-PROPS
*** <ILS >    Identifiers and Flags
*** x -  x      QUALID    QTID  QSD VPFW  QSO  VQO
  101  664NH3             LBS     0    0    1    0
  END QUAL-PROPS

  QUAL-INPUT
***         Storage on surface and nonseasonal parameters
***           SQO   POTFW   ACQOP  SQOLIM   WSQOP
*** <ILS >  qty/ac qty/ton    qty/  qty/ac   in/hr
*** x -  x                ac.day
  101        0.039     0.  0.006   0.024     0.5
  102        0.039     0.  0.006   0.024     0.5
  103        0.039     0.  0.006   0.024     0.5
  104        0.039     0.  0.006   0.024     0.5
  121        0.039     0.  0.006   0.024     0.5
  122        0.039     0.  0.006   0.024     0.5
  123        0.039     0.  0.006   0.024     0.5
  124        0.039     0.  0.006   0.024     0.5
  141        0.039     0.  0.006   0.024     0.5
  142        0.039     0.  0.006   0.024     0.5
  143        0.039     0.  0.006   0.024     0.5
  144        0.039     0.  0.006   0.024     0.5
  161        0.039     0.  0.006   0.024     0.5
  162        0.039     0.  0.006   0.024     0.5
  163        0.039     0.  0.006   0.024     0.5
  164        0.039     0.  0.006   0.024     0.5
  181        0.039     0.  0.006   0.024     0.5
  182        0.039     0.  0.006   0.024     0.5
  183        0.039     0.  0.006   0.024     0.5
  184        0.039     0.  0.006   0.024     0.5
```

```
  201      0.039    0.  0.006  0.024    0.5
  202      0.039    0.  0.006  0.024    0.5
  203      0.039    0.  0.006  0.024    0.5
  204      0.039    0.  0.006  0.024    0.5
  221      0.039    0.  0.006  0.024    0.5
  222      0.039    0.  0.006  0.024    0.5
  223      0.039    0.  0.006  0.024    0.5
  224      0.039    0.  0.006  0.024    0.5
  241      0.039    0.  0.006  0.024    0.5
  242      0.039    0.  0.006  0.024    0.5
  243      0.039    0.  0.006  0.024    0.5
  244      0.039    0.  0.006  0.024    0.5
  261      0.039    0.  0.006  0.024    0.5
  262      0.039    0.  0.006  0.024    0.5
  263      0.039    0.  0.006  0.024    0.5
  264      0.039    0.  0.006  0.024    0.5
  281      0.039    0.  0.006  0.024    0.5
  282      0.039    0.  0.006  0.024    0.5
  283      0.039    0.  0.006  0.024    0.5
  284      0.039    0.  0.006  0.024    0.5

  301      0.039    0.  0.006  0.024    0.5
  302      0.039    0.  0.006  0.024    0.5
  303      0.039    0.  0.006  0.024    0.5
  304      0.039    0.  0.006  0.024    0.5
***
  501      0.039    0.  0.006  0.024    0.5
  502      0.039    0.  0.006  0.024    0.5
  503      0.039    0.  0.006  0.024    0.5
  504      0.039    0.  0.006  0.024    0.5
  521      0.039    0.  0.006  0.024    0.5
  522      0.039    0.  0.006  0.024    0.5
  523      0.039    0.  0.006  0.024    0.5
  524      0.039    0.  0.006  0.024    0.5
  541      0.039    0.  0.006  0.024    0.5
  542      0.039    0.  0.006  0.024    0.5
  543      0.039    0.  0.006  0.024    0.5
  544      0.039    0.  0.006  0.024    0.5
  561      0.039    0.  0.006  0.024    0.5
  562      0.039    0.  0.006  0.024    0.5
  563      0.039    0.  0.006  0.024    0.5
  564      0.039    0.  0.006  0.024    0.5
  581      0.039    0.  0.006  0.024    0.5
  582      0.039    0.  0.006  0.024    0.5
  583      0.039    0.  0.006  0.024    0.5
  584      0.039    0.  0.006  0.024    0.5

  601      0.039    0.  0.006  0.024    0.5
  602      0.039    0.  0.006  0.024    0.5
  603      0.039    0.  0.006  0.024    0.5
  604      0.039    0.  0.006  0.024    0.5
  621      0.039    0.  0.006  0.024    0.5
  622      0.039    0.  0.006  0.024    0.5
  623      0.039    0.  0.006  0.024    0.5
  624      0.039    0.  0.006  0.024    0.5
  641      0.039    0.  0.006  0.024    0.5
  642      0.039    0.  0.006  0.024    0.5
  643      0.039    0.  0.006  0.024    0.5
  644      0.039    0.  0.006  0.024    0.5
  661      0.039    0.  0.006  0.024    0.5
  662      0.039    0.  0.006  0.024    0.5
  663      0.039    0.  0.006  0.024    0.5
```

```
  664        0.039     0.   0.006   0.024     0.5
  END QUAL-INPUT

  QUAL-PROPS
*** <ILS >    Identifiers and Flags
*** x -  x      QUALID     QTID  QSD VPFW  QSO  VQO
  101  664NO23           LBS     0    0    1    0
  END QUAL-PROPS

  QUAL-INPUT
***        Storage on surface and nonseasonal parameters
***           SQO   POTFW   ACQOP  SQOLIM   WSQOP
*** <ILS >  qty/ac qty/ton    qty/  qty/ac   in/hr
*** x -  x               ac.day
  101        0.039     0.   0.015   0.045     0.5
  102        0.039     0.   0.015   0.045     0.5
  103        0.039     0.   0.015   0.045     0.5
  104        0.039     0.   0.015   0.045     0.5
  121        0.039     0.   0.015   0.045     0.5
  122        0.039     0.   0.015   0.045     0.5
  123        0.039     0.   0.015   0.045     0.5
  124        0.039     0.   0.015   0.045     0.5
  141        0.039     0.   0.015   0.045     0.5
  142        0.039     0.   0.015   0.045     0.5
  143        0.039     0.   0.015   0.045     0.5
  144        0.039     0.   0.015   0.045     0.5
  161        0.039     0.   0.015   0.045     0.5
  162        0.039     0.   0.015   0.045     0.5
  163        0.039     0.   0.015   0.045     0.5
  164        0.039     0.   0.015   0.045     0.5
  181        0.039     0.   0.015   0.045     0.5
  182        0.039     0.   0.015   0.045     0.5
  183        0.039     0.   0.015   0.045     0.5
  184        0.039     0.   0.015   0.045     0.5

  201        0.039     0.   0.015   0.045     0.5
  202        0.039     0.   0.015   0.045     0.5
  203        0.039     0.   0.015   0.045     0.5
  204        0.039     0.   0.015   0.045     0.5
  221        0.039     0.   0.015   0.045     0.5
  222        0.039     0.   0.015   0.045     0.5
  223        0.039     0.   0.015   0.045     0.5
  224        0.039     0.   0.015   0.045     0.5
  241        0.039     0.   0.015   0.045     0.5
  242        0.039     0.   0.015   0.045     0.5
  243        0.039     0.   0.015   0.045     0.5
  244        0.039     0.   0.015   0.045     0.5
  261        0.039     0.   0.015   0.045     0.5
  262        0.039     0.   0.015   0.045     0.5
  263        0.039     0.   0.015   0.045     0.5
  264        0.039     0.   0.015   0.045     0.5
  281        0.039     0.   0.015   0.045     0.5
  282        0.039     0.   0.015   0.045     0.5
  283        0.039     0.   0.015   0.045     0.5
  284        0.039     0.   0.015   0.045     0.5

  301        0.039     0.   0.015   0.045     0.5
  302        0.039     0.   0.015   0.045     0.5
  303        0.039     0.   0.015   0.045     0.5
  304        0.039     0.   0.015   0.045     0.5
***
  501        0.039     0.   0.015   0.045     0.5
```

```
  502       0.039    0.  0.015  0.045    0.5
  503       0.039    0.  0.015  0.045    0.5
  504       0.039    0.  0.015  0.045    0.5
  521       0.039    0.  0.015  0.045    0.5
  522       0.039    0.  0.015  0.045    0.5
  523       0.039    0.  0.015  0.045    0.5
  524       0.039    0.  0.015  0.045    0.5
  541       0.039    0.  0.015  0.045    0.5
  542       0.039    0.  0.015  0.045    0.5
  543       0.039    0.  0.015  0.045    0.5
  544       0.039    0.  0.015  0.045    0.5
  561       0.039    0.  0.015  0.045    0.5
  562       0.039    0.  0.015  0.045    0.5
  563       0.039    0.  0.015  0.045    0.5
  564       0.039    0.  0.015  0.045    0.5
  581       0.039    0.  0.015  0.045    0.5
  582       0.039    0.  0.015  0.045    0.5
  583       0.039    0.  0.015  0.045    0.5
  584       0.039    0.  0.015  0.045    0.5

  601       0.039    0.  0.015  0.045    0.5
  602       0.039    0.  0.015  0.045    0.5
  603       0.039    0.  0.015  0.045    0.5
  604       0.039    0.  0.015  0.045    0.5
  621       0.039    0.  0.015  0.045    0.5
  622       0.039    0.  0.015  0.045    0.5
  623       0.039    0.  0.015  0.045    0.5
  624       0.039    0.  0.015  0.045    0.5
  641       0.039    0.  0.015  0.045    0.5
  642       0.039    0.  0.015  0.045    0.5
  643       0.039    0.  0.015  0.045    0.5
  644       0.039    0.  0.015  0.045    0.5
  661       0.039    0.  0.015  0.045    0.5
  662       0.039    0.  0.015  0.045    0.5
  663       0.039    0.  0.015  0.045    0.5
  664       0.039    0.  0.015  0.045    0.5
  END QUAL-INPUT

  QUAL-PROPS
*** <ILS >    Identifiers and Flags
*** x -  x      QUALID    QTID  QSD VPFW  QSO  VQO
  101  664ORTHO P         LBS     0    0    1    0
  END QUAL-PROPS

  QUAL-INPUT
***        Storage on surface and nonseasonal parameters
***           SQO   POTFW   ACQOP  SQOLIM   WSQOP
*** <ILS >  qty/ac qty/ton    qty/  qty/ac   in/hr
*** x -  x                  ac.day
  101       0.039    0.  0.005  0.015    0.5
  102       0.039    0.  0.005  0.015    0.5
  103       0.039    0.  0.005  0.015    0.5
  104       0.039    0.  0.005  0.015    0.5
  121       0.039    0.  0.005  0.015    0.5
  122       0.039    0.  0.005  0.015    0.5
  123       0.039    0.  0.005  0.015    0.5
  124       0.039    0.  0.005  0.015    0.5
  141       0.039    0.  0.005  0.015    0.5
  142       0.039    0.  0.005  0.015    0.5
  143       0.039    0.  0.005  0.015    0.5
  144       0.039    0.  0.005  0.015    0.5
  161       0.039    0.  0.005  0.015    0.5
```

```
  162      0.039    0.  0.005  0.015    0.5
  163      0.039    0.  0.005  0.015    0.5
  164      0.039    0.  0.005  0.015    0.5
  181      0.039    0.  0.005  0.015    0.5
  182      0.039    0.  0.005  0.015    0.5
  183      0.039    0.  0.005  0.015    0.5
  184      0.039    0.  0.005  0.015    0.5

  201      0.039    0.  0.005  0.015    0.5
  202      0.039    0.  0.005  0.015    0.5
  203      0.039    0.  0.005  0.015    0.5
  204      0.039    0.  0.005  0.015    0.5
  221      0.039    0.  0.005  0.015    0.5
  222      0.039    0.  0.005  0.015    0.5
  223      0.039    0.  0.005  0.015    0.5
  224      0.039    0.  0.005  0.015    0.5
  241      0.039    0.  0.005  0.015    0.5
  242      0.039    0.  0.005  0.015    0.5
  243      0.039    0.  0.005  0.015    0.5
  244      0.039    0.  0.005  0.015    0.5
  261      0.039    0.  0.005  0.015    0.5
  262      0.039    0.  0.005  0.015    0.5
  263      0.039    0.  0.005  0.015    0.5
  264      0.039    0.  0.005  0.015    0.5
  281      0.039    0.  0.005  0.015    0.5
  282      0.039    0.  0.005  0.015    0.5
  283      0.039    0.  0.005  0.015    0.5
  284      0.039    0.  0.005  0.015    0.5

  301      0.039    0.  0.005  0.015    0.5
  302      0.039    0.  0.005  0.015    0.5
  303      0.039    0.  0.005  0.015    0.5
  304      0.039    0.  0.005  0.015    0.5
***
  501      0.039    0.  0.005  0.015    0.5
  502      0.039    0.  0.005  0.015    0.5
  503      0.039    0.  0.005  0.015    0.5
  504      0.039    0.  0.005  0.015    0.5
  521      0.039    0.  0.005  0.015    0.5
  522      0.039    0.  0.005  0.015    0.5
  523      0.039    0.  0.005  0.015    0.5
  524      0.039    0.  0.005  0.015    0.5
  541      0.039    0.  0.005  0.015    0.5
  542      0.039    0.  0.005  0.015    0.5
  543      0.039    0.  0.005  0.015    0.5
  544      0.039    0.  0.005  0.015    0.5
  561      0.039    0.  0.005  0.015    0.5
  562      0.039    0.  0.005  0.015    0.5
  563      0.039    0.  0.005  0.015    0.5
  564      0.039    0.  0.005  0.015    0.5
  581      0.039    0.  0.005  0.015    0.5
  582      0.039    0.  0.005  0.015    0.5
  583      0.039    0.  0.005  0.015    0.5
  584      0.039    0.  0.005  0.015    0.5

  601      0.039    0.  0.005  0.015    0.5
  602      0.039    0.  0.005  0.015    0.5
  603      0.039    0.  0.005  0.015    0.5
  604      0.039    0.  0.005  0.015    0.5
  621      0.039    0.  0.005  0.015    0.5
  622      0.039    0.  0.005  0.015    0.5
  623      0.039    0.  0.005  0.015    0.5
```

```
  624       0.039     0.  0.005  0.015    0.5
  641       0.039     0.  0.005  0.015    0.5
  642       0.039     0.  0.005  0.015    0.5
  643       0.039     0.  0.005  0.015    0.5
  644       0.039     0.  0.005  0.015    0.5
  661       0.039     0.  0.005  0.015    0.5
  662       0.039     0.  0.005  0.015    0.5
  663       0.039     0.  0.005  0.015    0.5
  664       0.039     0.  0.005  0.015    0.5
  END QUAL-INPUT

  QUAL-PROPS
*** <ILS >    Identifiers and Flags
*** x -  x      QUALID    QTID  QSD VPFW  QSO  VQO
  101  664BOD           LBS     0    0    1    0
  END QUAL-PROPS

  QUAL-INPUT
***        Storage on surface and nonseasonal parameters
***           SQO   POTFW   ACQOP  SQOLIM   WSQOP
*** <ILS >  qty/ac qty/ton    qty/  qty/ac   in/hr
*** x -  x                ac.day
  101       0.039     0.    0.8     8.0     0.5
  102       0.039     0.    0.8     8.0     0.5
  103       0.039     0.    0.8     8.0     0.5
  104       0.039     0.    0.8     8.0     0.5
  121       0.039     0.    0.8     8.0     0.5
  122       0.039     0.    0.8     8.0     0.5
  123       0.039     0.    0.8     8.0     0.5
  124       0.039     0.    0.8     8.0     0.5
  141       0.039     0.    0.8     8.0     0.5
  142       0.039     0.    0.8     8.0     0.5
  143       0.039     0.    0.8     8.0     0.5
  144       0.039     0.    0.8     8.0     0.5
  161       0.039     0.    0.8     8.0     0.5
  162       0.039     0.    0.8     8.0     0.5
  163       0.039     0.    0.8     8.0     0.5
  164       0.039     0.    0.8     8.0     0.5
  181       0.039     0.    0.8     8.0     0.5
  182       0.039     0.    0.8     8.0     0.5
  183       0.039     0.    0.8     8.0     0.5
  184       0.039     0.    0.8     8.0     0.5

  201       0.039     0.    0.8     8.0     0.5
  202       0.039     0.    0.8     8.0     0.5
  203       0.039     0.    0.8     8.0     0.5
  204       0.039     0.    0.8     8.0     0.5
  221       0.039     0.    0.8     8.0     0.5
  222       0.039     0.    0.8     8.0     0.5
  223       0.039     0.    0.8     8.0     0.5
  224       0.039     0.    0.8     8.0     0.5
  241       0.039     0.    0.8     8.0     0.5
  242       0.039     0.    0.8     8.0     0.5
  243       0.039     0.    0.8     8.0     0.5
  244       0.039     0.    0.8     8.0     0.5
  261       0.039     0.    0.8     8.0     0.5
  262       0.039     0.    0.8     8.0     0.5
  263       0.039     0.    0.8     8.0     0.5
  264       0.039     0.    0.8     8.0     0.5
  281       0.039     0.    0.8     8.0     0.5
  282       0.039     0.    0.8     8.0     0.5
  283       0.039     0.    0.8     8.0     0.5
```

```
  284      0.039    0.   0.8   8.0   0.5

  301      0.039    0.   0.8   8.0   0.5
  302      0.039    0.   0.8   8.0   0.5
  303      0.039    0.   0.8   8.0   0.5
  304      0.039    0.   0.8   8.0   0.5
***
  501      0.039    0.   0.8   8.0   0.5
  502      0.039    0.   0.8   8.0   0.5
  503      0.039    0.   0.8   8.0   0.5
  504      0.039    0.   0.8   8.0   0.5
  521      0.039    0.   0.8   8.0   0.5
  522      0.039    0.   0.8   8.0   0.5
  523      0.039    0.   0.8   8.0   0.5
  524      0.039    0.   0.8   8.0   0.5
  541      0.039    0.   0.8   8.0   0.5
  542      0.039    0.   0.8   8.0   0.5
  543      0.039    0.   0.8   8.0   0.5
  544      0.039    0.   0.8   8.0   0.5
  561      0.039    0.   0.8   8.0   0.5
  562      0.039    0.   0.8   8.0   0.5
  563      0.039    0.   0.8   8.0   0.5
  564      0.039    0.   0.8   8.0   0.5
  581      0.039    0.   0.8   8.0   0.5
  582      0.039    0.   0.8   8.0   0.5
  583      0.039    0.   0.8   8.0   0.5
  584      0.039    0.   0.8   8.0   0.5

  601      0.039    0.   0.8   8.0   0.5
  602      0.039    0.   0.8   8.0   0.5
  603      0.039    0.   0.8   8.0   0.5
  604      0.039    0.   0.8   8.0   0.5
  621      0.039    0.   0.8   8.0   0.5
  622      0.039    0.   0.8   8.0   0.5
  623      0.039    0.   0.8   8.0   0.5
  624      0.039    0.   0.8   8.0   0.5
  641      0.039    0.   0.8   8.0   0.5
  642      0.039    0.   0.8   8.0   0.5
  643      0.039    0.   0.8   8.0   0.5
  644      0.039    0.   0.8   8.0   0.5
  661      0.039    0.   0.8   8.0   0.5
  662      0.039    0.   0.8   8.0   0.5
  663      0.039    0.   0.8   8.0   0.5
  664      0.039    0.   0.8   8.0   0.5
  END QUAL-INPUT

END IMPLND

RCHRES
  ACTIVITY
*** RCHRES  Active sections
*** x -  x HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG
    1  20    1    1    0    1    1    0    1    1    1    0
  116  307    1    1    1    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
*** RCHRES  Printout level flags
*** x -  x HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR
    1  20    5    6    6    6    6    6    6    6    6    6    1    9
  116  307    5    6    6    6    6    6    6    6    6    6    1    9
  END PRINT-INFO
```

```
  BINARY-INFO
*** RCHRES  Printout level flags
*** x -  x HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR
    1  20    5    6    6    6    6    6    6    6    6    6    1    9
  116  307    6    6    6    6    6    6    6    6    6    6    1    9
  END BINARY-INFO

  GEN-INFO
***             Name        Nexits   Unit Systems   Printer
*** RCHRES                             t-series  Engl Metr LKFG
*** x -  x                          in  out
    1     Deep Creek 1           1        1    1    0    0    0   28    0
    2     Lake Ashby             1        1    1    0    0    1   28    0
    3     Deep Creek Canal       1        1    1    0    0    0   28    0
    4     Deep Creek 2           1        1    1    0    0    0   28    0
    5     Deep Creek 3           1        1    1    0    0    0   28    0
    6     Cow Creek              1        1    1    0    0    0   28    0
    7     Underhill/Gopher       1        1    1    0    0    1   28    0
    8     Lake Harney            1        1    1    0    0    1   28    0
    9     SJR above Harney       1        1    1    0    0    1   28    0
   10     Chain of Lakes         1        1    1    0    0    1   28    0
   11     SJR below Harney       1        1    1    0    0    1   28    0
***
   12     Unnamed lake/swamp     1        1    1    0    0    1   28    0
   13     Lake Gleason/Big       2        1    1    0    0    1   28    0
   14     Chain of Lakes         1        1    1    0    0    1   28    0
   15     Lake Monroe            1        1    1    0    0    1   28    0
   16     Chain of Lakes         2        1    1    0    0    1   28    0
   17     Crystal Lake           1        1    1    0    0    1   28    0
   18     Lockhart-S Canal       1        1    1    0    0    0   28    0
   20     SJR below Monroe       1        1    1    0    0    1   28    0
***
  116     D1                     1        1    1    0    0    1    0    0
  117     W1                     1        1    1    0    0    1    0    0
  127     W2                     1        1    1    0    0    1    0    0
  136     D3                     1        1    1    0    0    1    0    0
  137     W3                     1        1    1    0    0    1    0    0
  147     W4                     1        1    1    0    0    1    0    0
  167     W6                     1        1    1    0    0    1    0    0
  186     D8                     1        1    1    0    0    1    0    0
  187     W8                     1        1    1    0    0    1    0    0
  196     D9                     1        1    1    0    0    1    0    0
  197     W9                     1        1    1    0    0    1    0    0
  206     D10                    1        1    1    0    0    1    0    0
  207     W10                    1        1    1    0    0    1    0    0
  216     D11                    1        1    1    0    0    1    0    0
  217     W11                    1        1    1    0    0    1    0    0
***
  226     D12                    1        1    1    0    0    1    0    0
  227     W12                    1        1    1    0    0    1    0    0
  236     D13                    1        1    1    0    0    1    0    0
  237     W13                    1        1    1    0    0    1    0    0
  246     D14                    1        1    1    0    0    1    0    0
  247     W14                    1        1    1    0    0    1    0    0
  256     D15                    1        1    1    0    0    1    0    0
  257     W15                    1        1    1    0    0    1    0    0
  266     D16                    1        1    1    0    0    1    0    0
  267     W16                    1        1    1    0    0    1    0    0
  276     D17                    1        1    1    0    0    1    0    0
  277     W17                    1        1    1    0    0    1    0    0
  286     D18                    1        1    1    0    0    1    0    0
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  287    W18              1       1   1   0   0   1   0   0
  306    D20              1       1   1   0   0   1   0   0
  307    W20              1       1   1   0   0   1   0   0
  END GEN-INFO

  HYDR-PARM1
***       Flags for HYDR section
***RC HRES  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
*** x  - x  FG FG FG FG  possible   exit *** possible   exit     possible   exit
    1   12   0  1  1  1    4  0  0  0  0      0  0  0  0  0      1  1  1  1  1
   13        0  1  1  1    4  5  0  0  0      0  0  0  0  0      1  1  1  1  1
   14   15   0  1  1  1    4  0  0  0  0      0  0  0  0  0      1  1  1  1  1
   16        0  1  1  1    4  5  0  0  0      0  0  0  0  0      1  1  1  1  1
   17   20   0  1  1  1    4  0  0  0  0      0  0  0  0  0      1  1  1  1  1
  116  307   0  1  1  1    4  0  0  0  0      0  0  0  0  0      1  1  1  1  1
  END HYDR-PARM1

  HYDR-PARM2
*** RCHRES FTBW FTBU       LEN     DELTH     STCOR        KS      DB50
*** x -  x            (miles)     (ft)     (ft)              (in)
    1      0.   1.      9.5      1.      3.2      0.5     0.01
    2      0.   2.      1.       1.      3.2      0.5     0.01
    3      0.   3.      9.9      20.     3.2      0.5     0.01
    4      0.   4.      5.5      6.      1.2      0.5     0.01
    5      0.   5.      5.0      2.      3.2      0.5     0.01
    6      0.   6.      5.5      15.     3.2      0.5     0.01
    7      0.   7.      1.       1.      3.2      0.5     0.01
    8      0.   8.      1.       1.      3.2      0.5     0.01
    9      0.   9.      1.4      1.      3.2      0.5     0.01
   10      0.  10.      1.       1.      3.2      0.5     0.01
   11      0.  11.      12.4     1.      3.2      0.5     0.01
***
   12      0.  12.      1.       1.      3.2      0.5     0.01
   13      0.  13.      1.       1.      3.2      0.5     0.01
   14      0.  14.      1.       1.      3.2      0.5     0.01
   15      0.  15.      1.       1.     -14.0     0.5     0.01
   16      0.  16.      1.       1.      3.2      0.5     0.01
   17      0.  17.      1.       1.      3.2      0.5     0.01
   18      0.  18.      5.6      30.     3.2      0.5     0.01
   20      0.  20.      5.7      1.      3.2      0.5     0.01
***
  116      0. 116.      1.       1.      3.2      0.5     0.01
  117      0. 117.      1.       1.      3.2      0.5     0.01
  127      0. 127.      1.       1.      3.2      0.5     0.01
  136      0. 136.      1.       1.      3.2      0.5     0.01
  137      0. 137.      1.       1.      3.2      0.5     0.01
  147      0. 147.      1.       1.      3.2      0.5     0.01
  167      0. 167.      1.       1.      3.2      0.5     0.01
  186      0. 186.      1.       1.      3.2      0.5     0.01
  187      0. 187.      1.       1.      3.2      0.5     0.01
  196      0. 196.      1.       1.      3.2      0.5     0.01
  197      0. 197.      1.       1.      3.2      0.5     0.01
  206      0. 206.      1.       1.      3.2      0.5     0.01
  207      0. 207.      1.       1.      3.2      0.5     0.01
  216      0. 216.      1.       1.      3.2      0.5     0.01
  217      0. 217.      1.       1.      3.2      0.5     0.01
***
  226      0. 226.      1.       1.      3.2      0.5     0.01
  227      0. 227.      1.       1.      3.2      0.5     0.01
  236      0. 236.      1.       1.      3.2      0.5     0.01
  237      0. 237.      1.       1.      3.2      0.5     0.01
  246      0. 246.      1.       1.      3.2      0.5     0.01
```

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  247      0. 247.     1.      1.      3.2     0.5     0.01
  256      0. 256.     1.      1.      3.2     0.5     0.01
  257      0. 257.     1.      1.      3.2     0.5     0.01
  266      0. 266.     1.      1.      3.2     0.5     0.01
  267      0. 267.     1.      1.      3.2     0.5     0.01
  276      0. 276.     1.      1.      3.2     0.5     0.01
  277      0. 277.     1.      1.      3.2     0.5     0.01
  286      0. 286.     1.      1.      3.2     0.5     0.01
  287      0. 287.     1.      1.      3.2     0.5     0.01
  306      0. 306.     1.      1.      3.2     0.5     0.01
  307      0. 307.     1.      1.      3.2     0.5     0.01
  END HYDR-PARM2

  HYDR-INIT
***        Initial conditions for HYDR section
***RC HRES       VOL  CAT Initial value  of COLIND     initial  value  of OUTDGT
*** x  - x     ac-ft      for each possible   exit  for each possible exit,ft3
    1        100.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    2        3000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    3         10.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    4         10.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    5         10.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    6         10.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    7        2000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    8      100000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
    9        800.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   10         500.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   11       40000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
***
   12        2000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   13        1500.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   14       15000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   15      100000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   16         800.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   17         800.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   18          10.     4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
   20       14000.      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
***
  116          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  117        200.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  127         35.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  136          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  137        150.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  147         30.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  167         80.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  186          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  187        100.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  196          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  197         20.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  206          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  207          4.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  216          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  217        350.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
***
  226          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  227         50.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  236          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  237         25.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  246          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  247        450.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  256          0.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  257       1000.0      4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
```

```
  266          0.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  267         20.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  276          0.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  277        250.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  286          0.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  287        600.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  306          0.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  307        280.0       4.   4.   4.   4.   4.       1.   1.   1.   1.   1.
  END HYDR-INIT

  NCONS
*** RCHRES BMPs Water Quality
*** x -  xNCONS
  116  307   10
  END NCONS

  CONS-DATA
    RCHRES  BMPs WQ DO as conservative constituent No. 1 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                 DO       7.0      mg/l    16030.        LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ HEAT as conservative constituent No. 2 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307               HEAT      20.0      degC    0.0089       BTU
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ TSS as conservative constituent No. 3 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                TSS       0.1      mg/l 3.534E+07       TON
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ NH4 as conservative constituent No. 4 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                NH4       0.1      mg/l    16030.        LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ NOX as conservative constituent No. 5 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                NOX       0.1      mg/l    16030.        LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ PO4 as conservative constituent No. 6 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                PO4       0.1      mg/l    16030.        LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ BOD as conservative constituent No. 7 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                BOD       0.1      mg/l    16030.        LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ BOD as conservative constituent No. 7 ***
    # -  #       Substance-id      Conc       ID      CONV     QTYID ***
  116  307                ORN       0.1      mg/l    16030.        LB
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  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ BOD as conservative constituent No. 7 ***
    # -  #       Substance-id      Conc        ID      CONV     QTYID ***
  116  307               ORP       0.1      mg/l   16030.       LB
  END CONS-DATA

  CONS-DATA
    RCHRES  BMPs WQ BOD as conservative constituent No. 7 ***
    # -  #       Substance-id      Conc        ID      CONV     QTYID ***
  116  307               ORC       0.1      mg/l   16030.       LB
  END CONS-DATA

  HT-BED-FLAGS
*** RCHRES Bed Heat Conductance Flags
*** x -  x BDFG TGFG TSTP
    1   20    0    3   48
  END HT-BED-FLAGS

  HEAT-PARM
*** RCHRES      ELEV     ELDAT    CFSAEX    KATRAD     KCOND     KEVAP
*** x -  x      (ft)      (ft)
    1   20       30.      -60.       1.0       9.0       10.       2.2
  END HEAT-PARM

  HT-BED-PARM
***        Bed Heat Conduction Parameters for Single and Two-layer Methods
*** RCHRES    MUDDEP     TGRND      KMUD     KGRND
*** x -  x      (ft)   (deg F)      (kcal/m2/C/hr)
    1   20      0.33       59.       50.       1.4
  END HT-BED-PARM

  MON-HT-TGRND
*** RCHRES  Monthly values of ground temperatures (deg F)
*** x -  x  TG1  TG2  TG3  TG4  TG5  TG6  TG7  TG8  TG9 TG10 TG11 TG12
    1   20  43.  46.  53.  62.  70.  77.  79.  79.  77.  66.  53.  45.
  END MON-HT-TGRND

  HEAT-INIT
*** RCHRES        TW    AIRTMP
*** x -  x   (deg F)   (deg F)
    1   20       48.       56.
  END HEAT-INIT

  SANDFG
*** RCHRES
*** x -  x SDFG
    1   20    3
  END SANDFG

  SED-GENPARM
*** RCHRES    BEDWID    BEDWRN       POR
*** x -  x      (ft)      (ft)
    1           800.        2.       0.4
    2          7000.        2.       0.4
    3            20.        2.       0.4
    4            20.        2.       0.4
    5            50.        2.       0.4
    6            20.        2.       0.4
    7          4000.        2.       0.4
    8         60000.        2.       0.4
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   9          40.       2.      0.4
  10        3000.       2.      0.4
  11        2000.       2.      0.4
  12        2000.       2.      0.4
  13        2000.       2.      0.4
  14       20000.       2.      0.4
  15       80000.       2.      0.4
  16        1000.       2.      0.4
  17        5000.       2.      0.4
  18          20.       2.      0.4
  20         600.       2.      0.4
  END SED-GENPARM

  SAND-PM
*** RCHRES        D        W       RHO     KSAND    EXPSND
*** x -  x      (in)  (in/sec)  (gm/cm3)
   1   20     0.005      0.02      2.65      0.3       5.
  END SAND-PM

  SILT-CLAY-PM
*** RCHRES        D        W       RHO     TAUCD     TAUCS         M
*** x -  x      (in)  (in/sec)    gm/cm3    lb/ft2    lb/ft2  lb/ft2.d
   1        0.0004    0.0002      2.5    0.005      0.25      0.06
   2        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
   3        0.0004    0.0002      2.5     0.05      0.25      0.06
   4        0.0004    0.0002      2.5     0.05      0.25      0.06
   5        0.0004    0.0002      2.5    0.005      0.25      0.06
   6        0.0004    0.0002      2.5     0.05      0.25      0.06
   7        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
   8        0.0004    0.0002      2.5   1.0E-9      0.25      0.06
   9        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  10        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  11        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  12        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  13        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  14        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  15        0.0004    0.0002      2.5   1.0E-9      0.25      0.06
  16        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  17        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  18        0.0004    0.0002      2.5    0.005      0.25      0.06
  20        0.0004    0.0002      2.5   1.0E-8      0.25      0.06
  END SILT-CLAY-PM

  SILT-CLAY-PM
*** RCHRES        D        W       RHO     TAUCD     TAUCS         M
*** x -  x      (in)  (in/sec)    gm/cm3    lb/ft2    lb/ft2  lb/ft2.d
   1        0.0001    0.0001      2.2    0.005      0.25     0.065
   2        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
   3        0.0001    0.0001      2.2     0.05      0.25     0.065
   4        0.0001    0.0001      2.2     0.05      0.25     0.065
   5        0.0001    0.0001      2.2    0.005      0.25     0.065
   6        0.0001    0.0001      2.2     0.05      0.25     0.065
   7        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
   8        0.0001    0.0001      2.2   1.0E-9      0.25     0.065
   9        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  10        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  11        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  12        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  13        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  14        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
  15        0.0001    0.0001      2.2   1.0E-9      0.25     0.065
  16        0.0001    0.0001      2.2   1.0E-8      0.25     0.065
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  17        0.0001    0.0001      2.2    1.0E-8      0.25     0.065
  18        0.0001    0.0001      2.2     0.005      0.25     0.065
  20        0.0001    0.0001      2.2    1.0E-8      0.25     0.065
 END SILT-CLAY-PM

 SSED-INIT
*** RCHRES     Suspended sed concs (mg/l)
*** x -  x      Sand      Silt      Clay
   1   20        0.        0.        0.
 END SSED-INIT

 BED-INIT
*** RCHRES    BEDDEP  Initial bed composition
*** x -  x      (ft)      Sand      Silt      Clay
   1   20      0.19      0.38      0.46      0.16
 END BED-INIT

 BENTH-FLAG
*** RCHRES  Benthic release flag
*** x -  x BENF
   1   20    1
 END BENTH-FLAG

 SCOUR-PARMS
*** RCHRES    SCRVEL    SCRMUL
*** x -  x    ft/sec
   1   20        3.        5.
 END SCOUR-PARMS

 OX-FLAGS
*** RCHRES Oxygen flags
*** x -  x REAM
   1   20    3
 END OX-FLAGS

 OX-GENPARM
*** RCHRES    KBOD20     TCBOD    KODSET    SUPSAT
*** x -  x       /hr               ft/hr
   1   20    0.0031     1.074     0.027      1.15
 END OX-GENPARM

*** SOD Measurements
*** 1979 BOD in selected Florida Aquatic Systems
***      Harney 180 mg/m2.hr
***      Monroe 140 mg/m2.hr
***      Jesup  100 mg/m2.hr
*** 2006 Lake Jesup Sediment Nutrient Flux and SOD
***      Jesup 32 - 91 mg/m2.hr varied by time and location

 OX-BENPARM
*** RCHRES     BENOD     TCBEN     EXPOD  BRBOD(1)  BRBOD(2)   EXPREL
*** x -  x  mg/m2.hr                    mg/m2.hr  mg/m2.hr
   1           80.     1.074       1.2    0.0001    0.0001     2.82
   2           20.     1.074       1.2    0.0001    0.0001     2.82
   3           20.     1.074       1.2    0.0001    0.0001     2.82
   4           20.     1.074       1.2    0.0001    0.0001     2.82
   5           20.     1.074       1.2    0.0001    0.0001     2.82
   6           80.     1.074       1.2    0.0001    0.0001     2.82
   7           80.     1.074       1.2    0.0001    0.0001     2.82
   8           90.     1.074       1.2    0.0001    0.0001     2.82
   9           20.     1.074       1.2    0.0001    0.0001     2.82
  10           20.     1.074       1.2    0.0001    0.0001     2.82
```

```
   11      80.   1.074    1.2  0.0001   0.0001    2.82
   12      20.   1.074    1.2  0.0001   0.0001    2.82
   13      20.   1.074    1.2  0.0001   0.0001    2.82
   14      20.   1.074    1.2  0.0001   0.0001    2.82
   15      70.   1.074    1.2  0.0001   0.0001    2.82
   16      20.   1.074    1.2  0.0001   0.0001    2.82
   17      40.   1.074    1.2  0.0001   0.0001    2.82
   18      40.   1.074    1.2  0.0001   0.0001    2.82
   20      70.   1.074    1.2  0.0001   0.0001    2.82
  END OX-BENPARM

  OX-CFOREA
    RCHRES    CFOREA ***
    # -  #          ***
    2          1.0
    7          1.0
    8          2.5
    9          1.0
   10          1.0
   11          1.0
   12          1.0
   13          1.0
   14          1.0
   15          2.5
   16          1.0
   17          1.0
   20          1.0
  END OX-CFOREA

  OX-REAPARM
*** RCHRES    TCGINV     REAK    EXPRED    EXPREV
*** x -  x                /hr
    1   20     1.047     0.10    -1.673     0.969
  END OX-REAPARM

  OX-INIT
*** RCHRES       DOX       BOD     SATDO
*** x -  x      mg/l      mg/l      mg/l
    1   20      12.8       3.5      13.5
  END OX-INIT

  NUT-FLAGS
*** RCHRES  Nutrient flags
*** x -  x  NH3  NO2  PO4  AMV  DEN ADNH ADPO PHFL
    1   20    1    1    1    0    1    0    0    2
  END NUT-FLAGS

  NUT-AD-FLAGS
   Atmospheric Deposition Flags ***
    <PLS >  NO3    NH3    PO4   ***
    x -  x <F><C> <F><C> <F><C> ***
    1   20  10 11  20 21  30 31
  END NUT-AD-FLAGS

  CONV-VAL1
*** RCHRES      CVBO     CVBPC     CVBPN    BPCNTC
*** x -  x     mg/mg  mols/mol  mols/mol
    1   20      1.68      106.       16.       49.
  END CONV-VAL1

  NUT-BENPARM
*** RCHRES  BRTAM(1)  BRTAM(2)  BRPO4(1)  BRPO4(2)     ANAER
```

```
*** x -  x  mg/m2.hr  mg/m2.hr  mg/m2.hr  mg/m2.hr      mg/l
   1          0.0       0.      0.00       0.     0.005
   2         0.12       0.      0.00       0.     0.005
   3    7     0.0       0.      0.00       0.     0.005
   8          0.0       0.      0.00       0.     0.005
   9   20     0.0       0.      0.00       0.     0.005
  END NUT-BENPARM

  NUT-NITDENIT
*** RCHRES    KTAM20    KNO220     TCNIT    KNO320     TCDEN    DENOXT
*** x -  x       /hr       /hr               /hr              mg/l
   1   20    0.005     0.100      1.07     0.002      1.04        5.
  END NUT-NITDENIT

  NUT-DINIT
*** RCHRES       NO3       TAM       NO2       PO4     PHVAL
*** x -  x      mg/l      mg/l      mg/l      mg/l  ph units
   1   20      0.20      0.06        0.      0.08        7.
  END NUT-DINIT

  PLNK-FLAGS
*** RCHRES Plankton flags
*** x -  x PHYF ZOOF BALF SDLT AMRF DECF NSFG ZFOO  BNP
   1   20    1    0    1    0    0    0    1    2    0
  END PLNK-FLAGS

  PLNK-PARM1
***RC HRES    RATCLP    NONREF    LITSED     ALNPR      EXTB     MALGR
*** x  - x                       l/mg.ft                 /ft       /hr
   1          0.82      0.50        0.      0.70      1.20     0.085
   2          0.82      0.50        0.      0.40      1.00     0.085
   3    7     0.82      0.50        0.      0.70      1.20     0.085
   8          0.82      0.50        0.      0.70      1.00     0.085
   9   10     0.82      0.50        0.      0.70      1.20     0.085
  11   12     0.82      0.50        0.      0.70      1.00     0.085
  13   14     0.82      0.50        0.      0.70      0.30     0.085
  15          0.82      0.50        0.      0.70      1.00     0.085
  16   18     0.82      0.50        0.      0.70      0.30     0.085
  20          0.82      0.50        0.      0.70      1.00     0.085
  END PLNK-PARM1

  PLNK-PARM2
***RC HRES     CMMLT      CMMN     CMMNP      CMMP    TALGRH    TALGRL    TALGRM
*** x  - x    ly/min      mg/l      mg/l      mg/l     deg F     deg F     deg F
   1   20     0.033     0.045    0.0284     0.015       95.       38.       75.
  END PLNK-PARM2

  PLNK-PARM3
*** RCHRES     ALR20      ALDH      ALDL     OXALD     NALDH     PALDH
*** x -  x       /hr       /hr       /hr       /hr      mg/l      mg/l
   1         0.005      0.01     0.001      0.03      0.01     0.002
   2         0.005      0.01     0.001      0.03      0.01     0.002
   3   20    0.005      0.01     0.001      0.03      0.01     0.002
  END PLNK-PARM3

  PHYTO-PARM
*** RCHRES      SEED    MXSTAY      OREF    CLALDH    PHYSET    REFSET
*** x -  x      mg/l      mg/l     ft3/s      ug/l     ft/hr     ft/hr
   1          0.04       0.1      100.       50.     0.000     0.000
   2          0.04       0.1      100.       50.     0.001     0.001
   3    7     0.04       0.1      100.       50.     0.000     0.000
   8          0.04       0.1      100.       50.     0.000     0.000
```

```
    9  10     0.04     0.1     100.      50.    0.000    0.000
   11         0.04     0.1     100.      50.    0.000    0.000
   12  14     0.04     0.1     100.      50.    0.000    0.000
   15         0.04     0.1     100.      50.    0.000    0.000
   16         0.04     0.1     100.      50.    0.000    0.000
   17         0.04     0.1     100.      50.    0.000    0.000
   18         0.04     0.1     100.      50.    0.000    0.000
   20         0.04     0.1     100.      50.    0.000    0.000
  END PHYTO-PARM

  BENAL-PARM
    RCHRES     MBAL    CFBALR   CFBALG    ***
    # -  #    mg/m2                   ***
    1  20     1000.     1.00      1.0
  END BENAL-PARM

  PLNK-INIT
*** RCHRES    PHYTO      ZOO    BENAL      ORN      ORP      ORC
*** x -  x     mg/l    org/l    mg/m2     mg/l     mg/l     mg/l
    1  20       0.5     0.03     500.      0.7     0.03      9.5
  END PLNK-INIT

END RCHRES

FTABLES

  FTABLE     1
 rows cols   (Deep Creek Wetland)        ***
   11    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
        1.      25.3      21.2       6.9
        2.      33.3      50.5      24.2
        3.      41.3      87.8      52.5
        4.      49.4     133.1      93.1
        5.      57.4     186.5     147.5
        6.     964.2     697.3     274.4
        7.    1871.0    2114.9     605.5
        8.    2777.8    4439.3    1256.7
        9.    3684.6    7670.5    2323.5
       10.    4591.4   11808.4    3890.9
  END FTABLE  1

  FTABLE   116
 rows cols                         ***
    7    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5       6.5       3.3       1.9
       1.0       6.6       6.5       2.7
       2.0       6.7      13.2       3.8
       3.0       6.9      20.0       8.5
       4.0       7.0      27.0      16.1
       5.0       7.1      34.0      25.7
  END FTABLE116

  FTABLE   117
 rows cols                         ***
    7    4
     depth      area    volume  outflow1 ***
        0.      25.1       0.0       0.0
        8.      27.2     209.2       0.0
```

```
      9.      27.5     236.5       5.7
     10.      27.7     264.1       8.0
     11.      28.0     292.0      25.2
     12.      28.3     320.2      54.8
     13.      28.5     348.6      92.6
  END FTABLE117

  FTABLE      2
 rows cols   (Lake Ashby)              ***
   7    4
    depth      area    volume  outflow1 ***
      0.     578.2       0.0       0.0
     1.0     637.7     607.9       0.0
     3.0     756.9    2002.5       0.0
     5.0     876.0    3635.4       0.0
     6.0     976.0    4561.4     240.0
     7.0    1076.0    5587.4    1500.0
     8.0    1176.0    6713.4    2700.0
  END FTABLE  2

  FTABLE    127
 rows cols                             ***
   7    4
    depth      area    volume  outflow1 ***
      0.       3.7       0.0       0.0
      8.       4.5      32.5       0.0
      9.       4.6      37.1       0.9
     10.       4.7      41.8       1.3
     11.       4.8      46.6       4.3
     12.       4.9      51.5       9.4
     13.       5.0      56.5      15.9
  END FTABLE127

  FTABLE      3
 rows cols   (Deep Creek Diversion)      ***
  10    4
    depth      area    volume  outflow1 ***
      0.        0.        0.        0.
     0.5      20.0       9.5       2.8
     1.0      22.1      20.0       9.2
     2.0      26.3      44.2      30.2
     3.0      30.5      72.6      62.0
     5.0      38.9     142.0     159.3
     8.0      51.4     277.4     399.5
    10.0      59.8     388.6     630.7
    12.0     657.6    1345.0    1203.9
    15.0    1195.6    4124.8    3126.1
  END FTABLE  3

  FTABLE    136
 rows cols                             ***
   7    4
    depth      area    volume  outflow1 ***
      0.        0.        0.        0.
     0.5       9.2       4.6       2.7
     1.0       9.3       9.2       3.8
     2.0       9.4      18.5       5.4
     3.0       9.6      28.0      11.9
     4.0       9.7      37.7      22.5
     5.0       9.9      47.5      35.9
  END FTABLE136
```

```
  FTABLE    137
 rows cols                        ***
   7    4
     depth      area    volume  outflow1 ***
        0.      17.2       0.0       0.0
        8.      19.0     144.8       0.0
        9.      19.2     163.9       4.0
       10.      19.4     183.2       5.6
       11.      19.6     202.7      17.6
       12.      19.9     222.5      38.4
       13.      20.1     242.6      64.9
  END FTABLE137

  FTABLE      4
 rows cols   (Deep Creek 2)            ***
  10    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5      11.5       5.4       0.0
       1.0      12.9      51.5       6.6
       2.0      15.8     175.8      22.1
       3.0      18.7     343.1      46.1
       5.0      24.6     786.4     121.7
       8.0      33.3    2173.2     314.4
      10.0     594.8    4801.4     688.9
      12.0    1156.3    8552.5    1753.6
      15.0    1998.6   12285.0    5482.0
  END FTABLE  4

  FTABLE    147
 rows cols                        ***
   7    4
     depth      area    volume  outflow1 ***
        0.       2.7       0.0       0.0
        8.       3.5      24.7       0.0
        9.       3.5      28.3       0.7
       10.       3.6      31.9       1.0
       11.       3.7      35.6       3.3
       12.       3.8      39.5       7.3
       14.       4.0      47.4      18.4
  END FTABLE147

  FTABLE      5
 rows cols   (Deep Creek 3)            ***
  10    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5      20.3       9.6       2.9
       1.0      22.4      20.3       9.3
       2.0      26.7      44.9      30.9
       3.0      30.9      73.7      63.9
       5.0      39.4     144.0     165.0
       8.0      52.2     281.4     418.1
      10.0      60.7     394.2     662.3
      12.0     667.2    1364.7    1253.3
      15.0    1213.0    4185.0    3207.9
  END FTABLE  5

  FTABLE      6
 rows cols   (Cow Creek)               ***
   8    4
     depth      area    volume  outflow1 ***
```

```
      0.       0.       0.       0.
     1.0      1.0      4.2      0.3
     2.0     13.4     10.0      8.2
     3.0     20.0     26.7     32.0
     4.0    154.9    140.9    170.2
     6.0    411.4    707.2    684.3
     8.0    667.8   1786.4   1883.4
    10.0    924.3   3378.5   4014.7
  END FTABLE  6

  FTABLE    167
 rows cols                          ***
    7    4
     depth      area    volume  outflow1 ***
      0.       8.9      0.0      0.0
      8.      10.2     76.6      0.0
      9.      10.4     86.9      2.1
     10.      10.5     97.3      3.0
     11.      10.7    108.0      9.6
     12.      10.9    118.8     20.9
     13.      11.0    129.8     35.4
  END FTABLE167

  FTABLE      7
 rows cols   (Underhill/Gopher Slough)   ***
    8    4
     depth      area    volume  outflow1 ***
      0.       0.0      0.0       0.
      1.     207.2    186.5       0.
      2.     292.0    412.2      4.2
      3.     743.5    818.7     13.9
      4.    1105.7   1778.3     48.8
      5.    1408.9   2978.6    106.2
      6.    1621.6   4590.1    188.6
      7.    1621.6   6211.7    299.1
  END FTABLE  7

  FTABLE      8
 rows cols   (Lake Harney)              ***
   18    4
     depth      area    volume  outflow1 ***
     0.0     76.7      0.0       0.
     1.0   3031.9   1632.2       0.
     2.0   3727.4   5031.4       0.
     3.0   4170.3   8995.8       0.
     4.0   4461.4  13320.8       0.
     5.0   4701.8  17901.2       0.
     6.0   5056.9  22773.0       0.
     7.0   5477.3  28036.0       0.
     8.0   5855.4  33707.9     400.
     9.0   6216.9  39740.2     900.
    10.0   6620.3  46155.1    1500.
    11.0   7425.0  53101.6    2200.
    12.0   9323.7  61210.5    2900.
    13.0  10856.4  71630.3    3800.
    14.0  11559.9  82830.3    4800.
    15.0  12152.9  94718.3    6300.
    16.0  12746.0 106606.3    8100.
    17.0  13339.1 118494.2   10000.
  END FTABLE  8

  FTABLE    186
```

```
rows cols                          ***
  7    4
   depth      area    volume  outflow1 ***
      0.        0.        0.        0.
     0.5       0.3       0.1       0.1
     1.0       0.3       0.3       0.1
     2.0       0.3       0.6       0.2
     3.0       0.4       0.9       0.4
     4.0       0.4       1.3       0.8
     5.0       0.4       1.7       1.3
 END FTABLE186

 FTABLE    187
rows cols                          ***
  7    4
   depth      area    volume  outflow1 ***
      0.      11.4       0.0       0.0
      8.      12.8      96.9       0.0
      9.      13.0     109.8       2.7
     10.      13.2     122.9       3.8
     11.      13.4     136.3      12.0
     12.      13.6     149.8      26.2
     13.      13.7     163.5      44.2
 END FTABLE187

 FTABLE      9
rows cols   (SJR upstream of Harney)    ***
 27    4
   depth      area    volume  outflow1 ***
      0.       0.4       0.0        0.
      1.       1.2       1.0        0.
      2.       2.7       2.5        0.
      3.       5.3       6.3        0.
      4.       8.5      13.1        0.
      5.      14.3      24.2        0.
      6.      21.4      42.7        0.
      7.      23.8      65.7        0.
      8.      31.8      93.9        0.
      9.      42.0     131.0        0.
     10.      47.2     175.9        0.
     11.      64.6     231.3        0.
     12.      85.6     307.1        0.
     13.     106.2     404.4        0.
     14.     123.4     523.3        0.
     15.     132.3     650.5        0.
     16.     146.3     791.4        0.
     17.     160.1     943.2      400.
     18.     211.5    1127.7      900.
     19.     246.4    1367.0     1500.
     20.     287.2    1617.9     2200.
     21.     336.5    1930.6     2900.
     22.     375.7    2287.2     3800.
     23.     391.5    2672.6     4800.
     24.     398.3    3068.1     6300.
     25.     404.9    3470.9     8100.
     26.     406.8    3876.8    10000.
 END FTABLE  9

 FTABLE    196
rows cols                          ***
  7    4
   depth      area    volume  outflow1 ***
```

```
     0.      0.      0.      0.
     0.5     0.5     0.3     0.2
     1.0     0.6     0.5     0.2
     2.0     0.6     1.1     0.3
     3.0     0.6     1.7     0.7
     4.0     0.7     2.4     1.5
     5.0     0.7     3.1     2.3
  END FTABLE196

  FTABLE    197
 rows cols                    ***
    7    4
     depth     area    volume  outflow1 ***
       0.      2.1      0.0      0.0
       8.      2.8     19.6      0.0
       9.      2.9     22.5      0.6
      10.      2.9     25.4      0.8
      11.      3.0     28.4      2.7
      12.      3.1     31.5      6.0
      13.      3.2     34.7     10.1
  END FTABLE197

  FTABLE     10
 rows cols  (Chain of Lakes)          ***
    8    4
     depth     area    volume  outflow1 ***
       0.       0.      0.       0.
       0.2    394.      79.       0.
       0.5    394.     197.       0.
       1.0    394.     394.       0.
       2.0    394.     788.     40.3
       3.0    394.    1182.    114.9
       4.0    394.    1576.    225.8
       5.0    394.    1970.    373.6
  END FTABLE 10

  FTABLE    206
 rows cols                    ***
    7    4
     depth     area    volume  outflow1 ***
       0.       0.      0.      0.
       0.5      5.3     2.6     1.6
       1.0      5.3     5.3     2.2
       2.0      5.5    10.7     3.1
       3.0      5.6    16.2     6.9
       4.0      5.7    21.8    13.1
       5.0      5.8    27.6    20.8
  END FTABLE206

  FTABLE    207
 rows cols                    ***
    7    4
     depth     area    volume  outflow1 ***
       0.      0.3      0.0      0.0
       8.      0.5      3.0      0.0
       9.      0.5      3.6      0.1
      10.      0.6      4.2      0.2
      11.      0.6      4.8      0.6
      12.      0.7      5.5      1.3
      13.      0.7      6.2      2.1
  END FTABLE207
```

```
  FTABLE     11
 rows cols  (SJR downstream of Harney)    ***
   29    4
     depth      area    volume  outflow1 ***
        0.       4.4       0.0        0.
        1.      12.2      10.0        0.
        2.      26.8      25.4        0.
        3.      52.7      62.8        0.
        4.      85.2     130.8        0.
        5.     142.9     241.9        0.
        6.     214.2     427.2        0.
        7.     238.2     656.8        0.
        8.     318.0     938.9        0.
        9.     420.1    1310.1        0.
       10.     471.6    1758.9        0.
       11.     645.5    2312.5        0.
       12.     856.2    3070.8        0.
       13.    1062.2    4044.2        0.
       14.    1233.6    5233.0        0.
       15.    1323.4    6504.9        0.
       16.    1462.9    7913.8        0.
       17.    1600.6    9431.7        0.
       18.    2115.4   11277.4        0.
       19.    2464.0   13669.9      400.
       20.    2872.5   16179.3      900.
       21.    3365.0   19306.3     1500.
       22.    3757.0   22872.3     2200.
       23.    3914.6   26725.8     2900.
       24.    3982.5   30681.4     3800.
       25.    4049.4   34709.0     4800.
       26.    4067.9   38768.2     6300.
       27.    4067.9   42836.1     8100.
       28.    4067.9   46904.1    10000.
  END FTABLE 11

  FTABLE    216
 rows cols                          ***
    7    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5       5.8       2.9       1.7
       1.0       5.9       5.8       2.4
       2.0       6.0      11.7       3.4
       3.0       6.1      17.8       7.5
       4.0       6.2      23.9      14.3
       5.0       6.4      30.2      22.8
  END FTABLE216

  FTABLE    217
 rows cols                          ***
    7    4
     depth      area    volume  outflow1 ***
        0.      38.9       0.0       0.0
        8.      41.5     321.8       0.0
        9.      41.8     363.5       8.6
       10.      42.2     405.5      12.2
       11.      42.5     447.9      38.3
       12.      42.8     490.6      83.3
       14.      43.5     577.1     207.9
  END FTABLE217
***
```

```
 FTABLE     12
rows cols   (Unnamed wetlands)          ***
   8    4
    depth      area    volume  outflow1 ***
       0.       0.0       0.0        0.
       1.     281.6     274.3        0.
       2.     430.7     604.3       10.
       3.     484.9    1052.8      110.
       4.     556.7    1571.7      310.
       5.     734.6    2188.5      620.
       6.     751.8    2932.6      950.
       7.     758.3    3687.9     1250.
 END FTABLE 12

 FTABLE    226
rows cols                        ***
   7    4
    depth      area    volume  outflow1 ***
       0.        0.        0.        0.
      0.5       0.5       0.2       0.1
      1.0       0.5       0.5       0.2
      2.0       0.5       1.0       0.3
      3.0       0.6       1.6       0.7
      4.0       0.6       2.2       1.3
      5.0       0.7       2.8       2.1
 END FTABLE226

 FTABLE    227
rows cols                        ***
   7    4
    depth      area    volume  outflow1 ***
       0.       4.5       0.0       0.0
       8.       5.5      40.0       0.0
       9.       5.6      45.5       1.2
      10.       5.7      51.2       1.6
      11.       5.8      57.0       5.2
      12.       5.9      62.9      11.4
      14.       6.2      75.1      28.5
 END FTABLE227

 FTABLE     13
rows cols   (Lake Gleason/Big)          ***
   8    5
    depth      area    volume  outflow1  outflow2 *** 50 in/ac.yr
       0.      159.        0.        0.        0.
      1.0      179.      169.        0.      1.03
      5.0      258.     1043.       1.0      1.48
      6.0      278.     1312.       1.5      1.60
      7.0      299.     1600.       2.0      1.72
      8.0      318.     1908.      11.6      1.83
      9.0      338.     2236.      46.3      1.95
     10.0      358.     2584.     192.0      2.06
 END FTABLE 13

 FTABLE    236
rows cols                        ***
   7    4
    depth      area    volume  outflow1 ***
       0.        0.        0.        0.
      0.5       8.5       4.2       2.5
      1.0       8.6       8.5       3.5
      2.0       8.7      17.1       5.0
```

```
      3.0      8.9      25.9      11.0
      4.0      9.0      34.9      20.8
      5.0      9.2      44.0      33.2
 END FTABLE236

 FTABLE    237
rows cols                         ***
   7    4
    depth      area    volume  outflow1 ***
       0.       2.5       0.0       0.0
       8.       3.2      22.6       0.0
       9.       3.3      25.8       0.7
      10.       3.4      29.2       1.0
      11.       3.4      32.6       3.1
      12.       3.5      36.1       6.8
      13.       3.6      39.8      11.4
 END FTABLE237

 FTABLE     14
rows cols   (Lake Chain)              ***
   8    4
    depth      area    volume  outflow1 ***
       0.     2525.        0.        0.
      1.0     2525.     2525.        0.
      5.0     2525.    12625.        0.
      6.0     2525.    15150.       50.
      7.0     2525.    17675.      100.
      8.0     2525.    20200.      300.
      9.0     2525.    22725.      550.
     10.0     2525.    25250.     1950.
 END FTABLE 14

 FTABLE    246
rows cols                         ***
   7    4
    depth      area    volume  outflow1 ***
       0.        0.        0.        0.
      0.5     122.1      61.0      35.6
      1.0     122.4     122.1      50.4
      2.0     123.0     244.8      71.3
      3.0     123.5     368.1     155.1
      4.0     124.1     491.9     292.6
      5.0     124.7     616.3     465.0
 END FTABLE246

 FTABLE    247
rows cols                         ***
   7    4
    depth      area    volume  outflow1 ***
       0.      49.5       0.0       0.0
       8.      52.4     407.5       0.0
       9.      52.8     460.1      10.9
      10.      53.1     513.1      15.4
      11.      53.5     566.5      48.2
      12.      53.9     620.2     104.9
      13.      54.3     674.3     177.0
 END FTABLE247

 FTABLE     15
rows cols   (Lake Monroe)             ***
  23    4
    depth      area    volume  outflow1 ***
```

```
      0.      0.2      0.0       0.
      1.      2.0      1.1       0.
      2.      5.4      4.2       0.
      3.     15.0     14.1        0.
      4.     27.1     33.1        0.
      5.     62.4     69.4        0.
      6.    145.6    164.2         0.
      7.    567.7    391.4         0.
      8.   4512.4   3087.8          0.
      9.   6179.3   8525.2          0.
     10.   6886.8  15060.9           0.
     11.   7365.3  22149.4           0.
     12.   7879.3  29734.6           0.
     13.   8438.8  37861.8           0.
     14.   9464.6  46790.7           0.
     15.  10497.8   56622.6      585.
     16.  11321.1   67564.8     1829.
     17.  11907.0   79138.7     3274.
     18.  12655.5   91373.6     4919.
     19.  13910.6  104357.7     6765.
     20.  15027.8  119152.2     8812.
     21.  15371.5  134310.8    11060.
     22.  15715.2  149469.5    13508.
 END FTABLE 15

 FTABLE    256
rows cols                          ***
   7    4
    depth      area    volume  outflow1 ***
      0.        0.       0.       0.
     0.5      51.7      25.8      15.1
     1.0      51.9      51.7      21.3
     2.0      52.2     103.7      30.2
     3.0      52.6     156.1      65.8
     4.0      53.0     208.9     124.4
     5.0      53.3     262.1     197.8
 END FTABLE256

 FTABLE    257
rows cols                          ***
   7    4
    depth      area    volume  outflow1 ***
      0.     120.3       0.0       0.0
      8.     124.8     980.3       0.0
      9.     125.4    1105.4      25.8
     10.     125.9    1231.1      36.5
     11.     126.5    1357.3     114.2
     12.     127.1    1484.2     248.1
     13.     127.7    1611.6     418.6
 END FTABLE257

 FTABLE     16
rows cols   (Lake Chain)               ***
   8    5
    depth      area    volume  outflow1  outflow2 *** 80 in/ac.yr
      0.      100.       0.        0.       0.
     1.0      110.      105.       0.      1.01
     5.0      150.      625.      1.0      1.38
     6.0      160.      780.      1.5      1.47
     7.0      170.      945.      2.0      1.57
     8.0      180.     1120.     11.6       1.66
     9.0      190.     1305.     26.3       1.75
```

```
    10.0     200.    1500.     150.     1.84
  END FTABLE 16

  FTABLE    266
 rows cols                         ***
    7    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5      28.3      14.1       8.3
       1.0      28.5      28.3      11.7
       2.0      28.8      57.0      16.6
       3.0      29.0      85.9      36.2
       4.0      29.3     115.0      68.5
       5.0      29.6     144.5     109.0
  END FTABLE266

  FTABLE    267
 rows cols                         ***
    7    4
     depth      area    volume  outflow1 ***
        0.       1.6       0.0       0.0
        8.       2.2      15.0       0.0
        9.       2.2      17.2       0.5
       10.       2.3      19.5       0.7
       11.       2.4      21.9       2.1
       12.       2.5      24.3       4.7
       13.       2.5      26.9       7.9
  END FTABLE267

  FTABLE     17
 rows cols   (Crystal Lake Chain)        ***
   14    4
     depth      area    volume  outflow1 ***
        0.      10.0       0.0        0.
        1.      11.2      10.6        0.
        2.      66.3      22.3        0.
        3.     144.9      92.9        0.
        4.     161.7     246.2        0.
        5.     178.4     416.2        0.
        6.     195.2     603.0        0.
        7.     242.2     821.7        0.
        8.     308.0    1096.8        0.
        9.     336.1    1418.8        0.
       10.     364.2    1769.0        0.
       12.     410.7    2544.0       27.
       14.     459.3    3414.0       52.
       16.     537.7    4411.0       70.
  END FTABLE 17

  FTABLE    276
 rows cols                         ***
    7    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5      53.5      26.7      15.6
       1.0      53.6      53.5      22.1
       2.0      54.0     107.3      31.2
       3.0      54.4     161.5      68.1
       4.0      54.8     216.1     128.6
       5.0      55.1     271.0     204.5
  END FTABLE276
```

```
 FTABLE    277
rows cols                        ***
  7    4
    depth      area    volume  outflow1 ***
      0.      28.3      0.0      0.0
      8.      30.5    235.0      0.0
      9.      30.8    265.7      6.3
     10.      31.0    296.6      9.0
     11.      31.3    327.9     28.2
     12.      31.6    359.4     61.4
     13.      31.9    391.2    103.7
 END FTABLE277

 FTABLE     18
rows cols   (Lockhart-Smith Canal)      ***
 12    4
    depth      area    volume  outflow1 ***
      0.        0.       0.       0.
     0.5      11.5      4.6      3.4
      1.      16.2     11.5     12.7
      2.      25.7     32.5     52.6
      3.      35.2     62.9    128.4
      4.      44.7    102.9    248.4
      5.      54.1    152.3    420.0
      6.     178.7    268.7    720.1
      7.     303.2    509.6   1172.6
      8.     427.7    875.1   1834.3
      9.     552.2   1365.0   2752.3
     10.     676.8   1979.5   3968.8
 END FTABLE 18

 FTABLE    286
rows cols                        ***
  7    4
    depth      area    volume  outflow1 ***
      0.        0.       0.       0.
     0.5      34.6     17.3     10.1
     1.0      34.8     34.6     14.3
     2.0      35.1     69.6     20.3
     3.0      35.4    104.8     44.2
     4.0      35.7    140.4     83.6
     5.0      36.3    176.2    133.0
 END FTABLE286

 FTABLE    287
rows cols                        ***
  7    4
    depth      area    volume  outflow1 ***
      0.      71.4      0.0      0.0
      8.      74.8    584.8      0.0
      9.      75.3    659.9     15.5
     10.      75.7    735.5     21.9
     11.      76.2    811.5     68.7
     12.      76.6    887.9    149.3
     13.      77.7    964.8    252.0
 END FTABLE287

 FTABLE     20
rows cols   (SJR below Monroe)          ***
 27    4
    depth      area    volume  outflow1 ***
      0.       2.2      0.0      0.
```

```
      1.      6.1      5.0       0.
      2.     13.4     12.7       0.
      3.     26.3     31.4       0.
      4.     42.6     65.4       0.
      5.     71.4    121.0       0.
      6.    107.1    213.6       0.
      7.    119.1    328.4       0.
      8.    159.0    469.4       0.
      9.    210.0    655.0       0.
     10.    235.8    879.4       0.
     11.    322.8   1156.3       0.
     12.    428.1   1535.4       0.
     13.    531.1   2022.1       0.
     14.    616.8   2616.5       0.
     15.    661.7   3252.4       0.
     16.    731.5   3956.9       0.
     17.    800.3   4715.9       0.
     18.   1057.7   5638.7       0.
     19.   1232.0   6834.9     585.
     20.   1436.2   8089.7    1829.
     21.   1682.5   9653.2    3274.
     22.   1878.5  11436.2    4919.
     23.   1957.3  13362.9    6765.
     24.   1991.3  15340.7    8812.
     25.   2024.7  17354.5   11060.
     26.   2034.0  19384.1   13508.
  END FTABLE 20

  FTABLE    306
 rows cols                               ***
    7    4
     depth      area    volume  outflow1 ***
        0.        0.        0.        0.
       0.5       4.5       2.3       1.3
       1.0       4.6       4.5       1.9
       2.0       4.7       9.2       2.7
       3.0       4.8      13.9       5.9
       4.0       4.9      18.8      11.3
       5.0       5.0      23.8      18.0
  END FTABLE306

  FTABLE    307
 rows cols                               ***
    7    4
     depth      area    volume  outflow1 ***
        0.      31.8       0.0       0.0
        8.      34.1     263.8       0.0
        9.      34.4     298.1       7.1
       10.      34.7     332.7      10.0
       11.      35.0     367.6      31.5
       12.      35.3     402.8      68.6
       13.      35.6     438.4     115.9
  END FTABLE307

END FTABLES

COPY
  TIMESERIES
  Copy-opn***
*** x -  x  NPT  NMN
    3         0    6
  END TIMESERIES
```

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END COPY

MONTH-DATA

  MONTH-DATA      10
***  atmospheric deposition fluxes (lb/acre/day) of NO3-N
0.00270.00270.00270.00270.00270.00270.00270.00270.00270.00270.00270.0027
  END MONTH-DATA  10

  MONTH-DATA      11
***  atmospheric wet deposition conc. (mg/l) of NO3-N
0.32250.32250.32250.32250.32250.32250.32250.32250.32250.32250.32250.3225
  END MONTH-DATA  11

  MONTH-DATA      20
***  atmospheric deposition fluxes (lb/acre/day) of NH3-N
0.00090.00090.00090.00090.00090.00090.00090.00090.00090.00090.00090.0009
  END MONTH-DATA  20

  MONTH-DATA      21
***  atmospheric wet deposition conc. (mg/l) of NH3-N
0.10750.10750.10750.10750.10750.10750.10750.10750.10750.10750.10750.1075
  END MONTH-DATA  21

  MONTH-DATA      30
***  atmospheric deposition fluxes (lb/acre/day) of PO4-P
0.00050.00050.00050.00050.00050.00050.00050.00050.00050.00050.00050.0005
  END MONTH-DATA  30

  MONTH-DATA      31
***  atmospheric wet deposition conc. (mg/l) of PO4-P
 0.009 0.009 0.009 0.009 0.009 0.009 0.009 0.009 0.009 0.009 0.009 0.009
  END MONTH-DATA  31

END MONTH-DATA

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name>   x <Name> x tem strg<-factor->strg <Name>   x   x        <Name> x x ***
*** PERLND
WDM2  4051 PREC     ENGL            SAME PERLND 101 113 EXTNL  PREC
WDM2  4052 PREC     ENGL            SAME PERLND 121 133 EXTNL  PREC
WDM2  4053 PREC     ENGL            SAME PERLND 141 153 EXTNL  PREC
WDM2  4054 PREC     ENGL            SAME PERLND 161 173 EXTNL  PREC
WDM2  4055 PREC     ENGL            SAME PERLND 181 193 EXTNL  PREC
WDM2  4056 PREC     ENGL            SAME PERLND 201 213 EXTNL  PREC
WDM2  4057 PREC     ENGL            SAME PERLND 221 233 EXTNL  PREC
WDM2  4058 PREC     ENGL            SAME PERLND 241 253 EXTNL  PREC
WDM2  4059 PREC     ENGL            SAME PERLND 261 273 EXTNL  PREC
WDM2  4060 PREC     ENGL            SAME PERLND 281 293 EXTNL  PREC
WDM2  4061 PREC     ENGL            SAME PERLND 301 313 EXTNL  PREC
WDM2  4151 PREC     ENGL            SAME PERLND 501 513 EXTNL  PREC
WDM2  4152 PREC     ENGL            SAME PERLND 521 533 EXTNL  PREC
WDM2  4153 PREC     ENGL            SAME PERLND 541 553 EXTNL  PREC
WDM2  4154 PREC     ENGL            SAME PERLND 561 573 EXTNL  PREC
WDM2  4155 PREC     ENGL            SAME PERLND 581 593 EXTNL  PREC
WDM2  4156 PREC     ENGL            SAME PERLND 601 613 EXTNL  PREC
WDM2  4157 PREC     ENGL            SAME PERLND 621 633 EXTNL  PREC
WDM2  4158 PREC     ENGL            SAME PERLND 641 653 EXTNL  PREC
WDM2  4159 PREC     ENGL            SAME PERLND 661 673 EXTNL  PREC
WDM2  4801 ATEM     ENGL            SAME PERLND 101 673 EXTNL  GATMP
WDM2  4803 DEWP     ENGL            SAME PERLND 101 673 EXTNL  DTMPG
```

```
WDM2  4804 WIND     ENGL             SAME PERLND 101 673 EXTNL  WINMOV
WDM2  4811 SOLR     ENGL             SAME PERLND 101 673 EXTNL  SOLRAD
WDM2  4802 CLOU     ENGL             SAME PERLND 101 673 EXTNL  CLOUD
WDM2  4822 EVAP     ENGL         0.76SAME PERLND 101 673 EXTNL  PETINP
*** IMPLND
WDM2  4051 PREC     ENGL             SAME IMPLND 101 104 EXTNL  PREC
WDM2  4052 PREC     ENGL             SAME IMPLND 121 124 EXTNL  PREC
WDM2  4053 PREC     ENGL             SAME IMPLND 141 144 EXTNL  PREC
WDM2  4054 PREC     ENGL             SAME IMPLND 161 164 EXTNL  PREC
WDM2  4055 PREC     ENGL             SAME IMPLND 181 184 EXTNL  PREC
WDM2  4056 PREC     ENGL             SAME IMPLND 201 204 EXTNL  PREC
WDM2  4057 PREC     ENGL             SAME IMPLND 221 224 EXTNL  PREC
WDM2  4058 PREC     ENGL             SAME IMPLND 241 244 EXTNL  PREC
WDM2  4059 PREC     ENGL             SAME IMPLND 261 264 EXTNL  PREC
WDM2  4060 PREC     ENGL             SAME IMPLND 281 284 EXTNL  PREC
WDM2  4061 PREC     ENGL             SAME IMPLND 301 304 EXTNL  PREC
WDM2  4151 PREC     ENGL             SAME IMPLND 501 504 EXTNL  PREC
WDM2  4152 PREC     ENGL             SAME IMPLND 521 524 EXTNL  PREC
WDM2  4153 PREC     ENGL             SAME IMPLND 541 544 EXTNL  PREC
WDM2  4154 PREC     ENGL             SAME IMPLND 561 564 EXTNL  PREC
WDM2  4155 PREC     ENGL             SAME IMPLND 581 584 EXTNL  PREC
WDM2  4156 PREC     ENGL             SAME IMPLND 601 604 EXTNL  PREC
WDM2  4157 PREC     ENGL             SAME IMPLND 621 624 EXTNL  PREC
WDM2  4158 PREC     ENGL             SAME IMPLND 641 644 EXTNL  PREC
WDM2  4159 PREC     ENGL             SAME IMPLND 661 664 EXTNL  PREC
WDM2  4801 ATEM     ENGL             SAME IMPLND 101 664 EXTNL  GATMP
WDM2  4803 DEWP      ENGL             SAME IMPLND 101 664 EXTNL  DTMPG
WDM2  4804 WIND     ENGL             SAME IMPLND 101 664 EXTNL  WINMOV
WDM2  4811 SOLR     ENGL             SAME IMPLND 101 664 EXTNL  SOLRAD
WDM2  4802 CLOU     ENGL             SAME IMPLND 101 664 EXTNL  CLOUD
WDM2  4822 EVAP     ENGL         0.76SAME IMPLND 101 664 EXTNL  PETINP
*** RCHRES
WDM2  4051 PREC     ENGL             SAME RCHRES   1     EXTNL  PREC
WDM2  4051 PREC     ENGL             SAME RCHRES 116 117 EXTNL  PREC
WDM2  4052 PREC     ENGL             SAME RCHRES   2     EXTNL  PREC
WDM2  4052 PREC     ENGL             SAME RCHRES 126 127 EXTNL  PREC
WDM2  4053 PREC     ENGL             SAME RCHRES   3     EXTNL  PREC
WDM2  4053 PREC     ENGL             SAME RCHRES 136 137 EXTNL  PREC
WDM2  4054 PREC     ENGL             SAME RCHRES   4     EXTNL  PREC
WDM2  4054 PREC     ENGL             SAME RCHRES 146 147 EXTNL  PREC
WDM2  4055 PREC     ENGL             SAME RCHRES   5     EXTNL  PREC
WDM2  4055 PREC     ENGL             SAME RCHRES 156 157 EXTNL  PREC
WDM2  4056 PREC     ENGL             SAME RCHRES   6     EXTNL  PREC
WDM2  4056 PREC     ENGL             SAME RCHRES 166 167 EXTNL  PREC
WDM2  4057 PREC     ENGL             SAME RCHRES   7     EXTNL  PREC
WDM2  4057 PREC     ENGL             SAME RCHRES 176 177 EXTNL  PREC
WDM2  4058 PREC     ENGL             SAME RCHRES   8     EXTNL  PREC
WDM2  4058 PREC     ENGL             SAME RCHRES 186 187 EXTNL  PREC
WDM2  4059 PREC     ENGL             SAME RCHRES   9     EXTNL  PREC
WDM2  4059 PREC     ENGL             SAME RCHRES 196 197 EXTNL  PREC
WDM2  4060 PREC     ENGL             SAME RCHRES  10     EXTNL  PREC
WDM2  4060 PREC     ENGL             SAME RCHRES 206 207 EXTNL  PREC
WDM2  4061 PREC     ENGL             SAME RCHRES  11     EXTNL  PREC
WDM2  4061 PREC     ENGL             SAME RCHRES 216 217 EXTNL  PREC
WDM2  4151 PREC     ENGL             SAME RCHRES  12     EXTNL  PREC
WDM2  4151 PREC     ENGL             SAME RCHRES 226 227 EXTNL  PREC
WDM2  4152 PREC     ENGL             SAME RCHRES  13     EXTNL  PREC
WDM2  4152 PREC     ENGL             SAME RCHRES 236 237 EXTNL  PREC
WDM2  4153 PREC     ENGL             SAME RCHRES  14     EXTNL  PREC
WDM2  4153 PREC     ENGL             SAME RCHRES 246 247 EXTNL  PREC
WDM2  4154 PREC     ENGL             SAME RCHRES  15     EXTNL  PREC
WDM2  4154 PREC     ENGL             SAME RCHRES 256 257 EXTNL  PREC
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WDM2  4155 PREC     ENGL            SAME RCHRES  16     EXTNL  PREC
WDM2  4155 PREC     ENGL            SAME RCHRES 266 267 EXTNL  PREC
WDM2  4156 PREC     ENGL            SAME RCHRES  17     EXTNL  PREC
WDM2  4156 PREC     ENGL            SAME RCHRES 276 277 EXTNL  PREC
WDM2  4157 PREC     ENGL            SAME RCHRES  18     EXTNL  PREC
WDM2  4157 PREC     ENGL            SAME RCHRES 286 287 EXTNL  PREC
WDM2  4159 PREC     ENGL            SAME RCHRES  20     EXTNL  PREC
WDM2  4159 PREC     ENGL            SAME RCHRES 306 307 EXTNL  PREC
WDM2  4801 ATEM     ENGL            SAME RCHRES   1 307 EXTNL  GATMP
WDM2  4803 DEWP     ENGL            SAME RCHRES   1 307 EXTNL  DEWTMP
WDM2  4804 WIND     ENGL            SAME RCHRES   1 307 EXTNL  WIND
WDM2  4811 SOLR     ENGL            SAME RCHRES   1 307 EXTNL  SOLRAD
WDM2  4802 CLOU     ENGL            SAME RCHRES   1 307 EXTNL  CLOUD
WDM2  4822 EVAP     ENGL        0.76SAME RCHRES   1 307 EXTNL  POTEV
***
*** Observed flow/loads at SJR above Lake Harney (ac.ft/hr;lb/hr)
WDM1  9002 IVOL     ENGL            SAME RCHRES   8     INFLOW IVOL
WDM1  9011 WT       ENGL            SAME RCHRES   8     INFLOW IHEAT
WDM1  9012 DO       ENGL            SAME RCHRES   8     INFLOW OXIF   1
WDM1  9013 TSS      ENGL         0.5SAME RCHRES   8     INFLOW ISED   2
WDM1  9013 TSS      ENGL         0.5SAME RCHRES   8     INFLOW ISED   3
WDM1  9014 NH4      ENGL            SAME RCHRES   8     INFLOW NUIF1  2
WDM1  9015 NOX      ENGL            SAME RCHRES   8     INFLOW NUIF1  1
WDM1  9016 ORN      ENGL            SAME RCHRES   8     INFLOW PKIF   3
WDM1  9017 PO4      ENGL            SAME RCHRES   8     INFLOW NUIF1  4
WDM1  9018 ORP      ENGL            SAME RCHRES   8     INFLOW PKIF   4
WDM1  9019 ORC      ENGL            SAME RCHRES   8     INFLOW PKIF   5
*** Observed flow/loads at Lake Jesup Outlet to SJR (ac.ft/hr)
WDM1  9102 IVOL     ENGL            SAME RCHRES  15     INFLOW IVOL
WDM1  9121 WT       ENGL            SAME RCHRES  15     INFLOW IHEAT
WDM1  9122 DO       ENGL            SAME RCHRES  15     INFLOW OXIF   1
WDM1  9123 TSS      ENGL         0.5SAME RCHRES  15     INFLOW ISED   2
WDM1  9123 TSS      ENGL         0.5SAME RCHRES  15     INFLOW ISED   3
WDM1  9124 NH4      ENGL            SAME RCHRES  15     INFLOW NUIF1  2
WDM1  9125 NOX      ENGL            SAME RCHRES  15     INFLOW NUIF1  1
WDM1  9126 ORN      ENGL            SAME RCHRES  15     INFLOW PKIF   3
WDM1  9127 PO4      ENGL            SAME RCHRES  15     INFLOW NUIF1  4
WDM1  9128 ORP      ENGL            SAME RCHRES  15     INFLOW PKIF   4
WDM1  9129 ORC      ENGL            SAME RCHRES  15     INFLOW PKIF   5
*** Observed flow/loads at Gemini Springs (ac.ft/hr;lb/hr)
WDM1  9202 IVOL     ENGL            SAME RCHRES  15     INFLOW IVOL
WDM1  9215 NOX      ENGL            SAME RCHRES  15     INFLOW NUIF1  1
WDM1  9217 PO4      ENGL            SAME RCHRES  15     INFLOW NUIF1  4
*** Observed flow/loads at Green Springs (ac.ft/hr;lb/hr)
WDM1  9222 IVOL     ENGL            SAME RCHRES  15     INFLOW IVOL
WDM1  9235 NOX      ENGL            SAME RCHRES  15     INFLOW NUIF1  1
WDM1  9237 PO4      ENGL            SAME RCHRES  15     INFLOW NUIF1  4
*** Point sources
*** Sanford North D-001 to Lake Monroe
*** assume TP = PO4, TAM = 0.2TN, and NOX = 0.8TN
*** other WQ loads (such as DO, BOD, TSS) are small and not simulated
WDM1  8001 FLOW     ENGL            SAME RCHRES  15     INFLOW IVOL
WDM1  8002 NH4      ENGL            SAME RCHRES  15     INFLOW NUIF1  2
WDM1  8003 NOX      ENGL            SAME RCHRES  15     INFLOW NUIF1  1
WDM1  8004 PO4      ENGL            SAME RCHRES  15     INFLOW NUIF1  4
*** Sanford North R-001 goes to Site 10 in the Lake Jesup watershed
*** Deltona Lakes R-001 slow public access to PERLND 562 (2590ac)
*** conversion factor = 1/2590 = 0.0003861(in/hr)
WDM1  8011 FLOW     ENGL   0.0003861SAME PERLND 562     EXTNL  SURLI
*** Deltona Lakes R-002 absorption field system to inactive groundwater
*** Deltona Lakes R-003 rapid infiltration basin to inactive groundwater
*** SCES-Northwest Regional R-001 spray fieldto PERLND 671 (1097ac)
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*** conversion factor = 1/4213 = 0.0009116(in/hr)
WDM1  8011 FLOW     ENGL     0.0009116SAME PERLND 671     EXTNL  SURLI

***Direct Septic Tanks
WDM1  7001 FLOW     ENGL         2.61SAME COPY     3     INPUT  MEAN   1
WDM1  7002 BOD      ENGL         2.61SAME COPY     3     INPUT  MEAN   2
WDM1  7003 TN       ENGL         2.61SAME COPY     3     INPUT  MEAN   3
WDM1  7004 TP       ENGL         2.61SAME COPY     3     INPUT  MEAN   4
WDM1  7005 TSS      ENGL         1.31SAME COPY     3     INPUT  MEAN   5
WDM1  7005 TSS      ENGL         1.30SAME COPY     3     INPUT  MEAN   6
END EXT SOURCES

SCHEMATIC
<-Volume->                  <--Area-->     <-Volume->  <ML#> ***       <sb>
<Name>   x                  <-factor->     <Name>   x        ***        x x
*** NON BMPS PERLND 2, IMPLND 1 (P - 2 AND IMP - 1)
*** DRY PONDS-P   surface/interflow ML# 22, baseflow ML# 23
*** DRY PONDS-IMP surface runoff ML# 21
*** DRY PONDS-RCH ML# 25

*** WET PONDS-P   flow ML# 42
*** WET PONDS-IMP flow ML# 41
*** WET PONDS-RCH ML# 45

*** SWALE    -P   flow/water quality ML# 52
*** SWALE    -IMP flow/water quality ML# 51

*** ROUTING FLOW/QUALITY - 3, 4
PERLND 281                       246     RCHRES  10      2
PERLND 281                        48     RCHRES 206     22
PERLND 281                        48     RCHRES  10     23
PERLND 281                         7     RCHRES 207     42
PERLND 282                         5     RCHRES  10      2
PERLND 282                         5     RCHRES 206     22
PERLND 282                         5     RCHRES  10     23
PERLND 283                         0     RCHRES  10      2
PERLND 284                         3     RCHRES  10      2
PERLND 284                         4     RCHRES 206     22
PERLND 284                         4     RCHRES  10     23
PERLND 285                         0     RCHRES  10      2
PERLND 286                         0     RCHRES  10      4
PERLND 287                       239     RCHRES  10      2
PERLND 287                         1     RCHRES 206     22
PERLND 287                         1     RCHRES  10     23
PERLND 288                        37     RCHRES  10      2
PERLND 289                       119     RCHRES  10      2
PERLND 290                        73     RCHRES  10      4
PERLND 291                       632     RCHRES  10      4
PERLND 291                        15     RCHRES 206     24
PERLND 291                        15     RCHRES  10     25
PERLND 291                         3     RCHRES 207     44
PERLND 292                         0     RCHRES  10      4
PERLND 293                        12     RCHRES  10      4
IMPLND 281                        27     RCHRES  10      1
IMPLND 281                         5     RCHRES 206     21
IMPLND 281                         1     RCHRES 207     41
IMPLND 282                         3     RCHRES  10      1
IMPLND 282                         2     RCHRES 206     21
IMPLND 283                         0     RCHRES  10      1
IMPLND 284                        12     RCHRES  10      1
IMPLND 284                        17     RCHRES 206     21
RCHRES 206                               RCHRES  10     35
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RCHRES 207                 RCHRES  10    45

PERLND 261           81     RCHRES   9     2
PERLND 261            7     RCHRES 196    22
PERLND 261            7     RCHRES   9    23
PERLND 261           41     RCHRES 197    42
PERLND 262            0     RCHRES   9     2
PERLND 263            0     RCHRES   9     2
PERLND 264            3     RCHRES   9     2
PERLND 265            0     RCHRES   9     2
PERLND 266           76     RCHRES   9     4
PERLND 267         1014     RCHRES   9     2
PERLND 268           10     RCHRES   9     2
PERLND 269            0     RCHRES   9     2
PERLND 270          153     RCHRES   9     4
PERLND 270            2     RCHRES 196    24
PERLND 270            2     RCHRES   9    25
PERLND 270            1     RCHRES 197    44
PERLND 271          190     RCHRES   9     4
PERLND 271            2     RCHRES 196    24
PERLND 271            2     RCHRES   9    25
PERLND 271            1     RCHRES 197    44
PERLND 272          121     RCHRES   9     4
PERLND 273         2417     RCHRES   9     4
PERLND 273            3     RCHRES 197    44
IMPLND 261            9     RCHRES   9     1
IMPLND 261            1     RCHRES 196    21
IMPLND 261            5     RCHRES 197    41
IMPLND 262            0     RCHRES   9     1
IMPLND 263            0     RCHRES   9     1
IMPLND 264           11     RCHRES   9     1
IMPLND 264            1     RCHRES 197    41
RCHRES 196                  RCHRES   9    35
RCHRES 197                  RCHRES   9    45
RCHRES  10                  RCHRES   9     3

PERLND 221           12     RCHRES   7     2
PERLND 222            0     RCHRES   7     2
PERLND 223            0     RCHRES   7     2
PERLND 224            0     RCHRES   7     2
PERLND 225            0     RCHRES   7     2
PERLND 226           83     RCHRES   7     4
PERLND 227           21     RCHRES   7     2
PERLND 228           56     RCHRES   7     2
PERLND 229            0     RCHRES   7     2
PERLND 230         1464     RCHRES   7     4
PERLND 231         7089     RCHRES   7     4
PERLND 232            0     RCHRES   7     4
PERLND 233         4598     RCHRES   7     4
IMPLND 221            1     RCHRES   7     1
IMPLND 222            0     RCHRES   7     1
IMPLND 223            0     RCHRES   7     1
IMPLND 224            0     RCHRES   7     1

PERLND 241         1064     RCHRES   8     2
PERLND 241            3     RCHRES 186    22
PERLND 241            3     RCHRES   8    23
PERLND 241          134     RCHRES 187    42
PERLND 242           42     RCHRES   8     2
PERLND 242           12     RCHRES 187    42
PERLND 243            0     RCHRES   8     2
PERLND 244           14     RCHRES   8     2
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PERLND 244              1    RCHRES 186    22
PERLND 244              1    RCHRES   8    23
PERLND 244              8    RCHRES 187    42
PERLND 245             54    RCHRES   8     2
PERLND 245             11    RCHRES 187    42
PERLND 246            168    RCHRES   8     4
PERLND 247            393    RCHRES   8     2
PERLND 247              2    RCHRES 187    42
PERLND 248            119    RCHRES   8     2
PERLND 249            176    RCHRES   8     2
PERLND 250            622    RCHRES   8     4
PERLND 251           2122    RCHRES   8     4
PERLND 251              1    RCHRES 186    24
PERLND 251              1    RCHRES   8    25
PERLND 251              5    RCHRES 187    44
PERLND 252              0    RCHRES   8     4
PERLND 253           3195    RCHRES   8     4
PERLND 253              0    RCHRES 187    44
IMPLND 241            118    RCHRES   8     1
IMPLND 241             15    RCHRES 187    41
IMPLND 242             22    RCHRES   8     1
IMPLND 242              6    RCHRES 187    41
IMPLND 243              0    RCHRES   8     1
IMPLND 244             57    RCHRES   8     1
IMPLND 244              2    RCHRES 186    21
IMPLND 244             33    RCHRES 187    41
RCHRES 186                   RCHRES   8    35
RCHRES 187                   RCHRES   8    45
RCHRES   7                   RCHRES   8     3
***
*** Note that RCHRES 9 discharges to SJR upstream of USGS gage Above Harney
*** The discharge from RCHRES 9 is commented out
***     becuase the observed flow is used as an input series.
*** RCHRES   9                 RCHRES   8     3

PERLND 121            137    RCHRES   2     2
PERLND 121             27    RCHRES 127    42
PERLND 122             12    RCHRES   2     2
PERLND 122              3    RCHRES 127    42
PERLND 123              0    RCHRES   2     2
PERLND 124              1    RCHRES   2     2
PERLND 124              3    RCHRES 127    42
PERLND 125              0    RCHRES   2     2
PERLND 126             74    RCHRES   2     4
PERLND 127           2983    RCHRES   2     2
PERLND 127              9    RCHRES   2    52
PERLND 127              1    RCHRES 127    42
PERLND 128            692    RCHRES   2     2
PERLND 129              5    RCHRES   2     2
PERLND 130           2837    RCHRES   2     4
PERLND 130              9    RCHRES 127    44
PERLND 131           5643    RCHRES   2     4
PERLND 131              6    RCHRES   2    54
PERLND 131             15    RCHRES 127    44
PERLND 132             29    RCHRES   2     4
PERLND 132              0    RCHRES   2    54
PERLND 133           5911    RCHRES   2     4
PERLND 133              4    RCHRES   2    54
PERLND 133              6    RCHRES 127    44
IMPLND 121             15    RCHRES   2     1
IMPLND 121              3    RCHRES 127    41
IMPLND 122              7    RCHRES   2     1
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IMPLND 122	1	RCHRES 127	41
IMPLND 123	0	RCHRES 2	1
IMPLND 124	5	RCHRES 2	1
IMPLND 124	14	RCHRES 127	41
RCHRES 127		RCHRES 2	45
PERLND 161	59	RCHRES 4	2
PERLND 161	4	RCHRES 147	42
PERLND 162	0	RCHRES 4	2
PERLND 163	0	RCHRES 4	2
PERLND 163	18	RCHRES 147	42
PERLND 164	1	RCHRES 4	2
PERLND 165	0	RCHRES 4	2
PERLND 166	23	RCHRES 4	4
PERLND 167	3938	RCHRES 4	2
PERLND 168	751	RCHRES 4	2
PERLND 169	0	RCHRES 4	2
PERLND 170	856	RCHRES 4	4
PERLND 171	4292	RCHRES 4	4
PERLND 171	15	RCHRES 147	44
PERLND 172	0	RCHRES 4	4
PERLND 173	7758	RCHRES 4	4
PERLND 173	0	RCHRES 147	44
IMPLND 161	7	RCHRES 4	1
IMPLND 162	0	RCHRES 4	1
IMPLND 163	0	RCHRES 4	1
IMPLND 163	27	RCHRES 147	41
IMPLND 164	5	RCHRES 4	1
RCHRES 147		RCHRES 4	45
RCHRES 2		RCHRES 4	3
PERLND 201	0	RCHRES 6	2
PERLND 202	19	RCHRES 6	2
PERLND 202	11	RCHRES 167	42
PERLND 203	0	RCHRES 6	2
PERLND 204	0	RCHRES 6	2
PERLND 205	0	RCHRES 6	2
PERLND 206	76	RCHRES 6	4
PERLND 207	0	RCHRES 6	2
PERLND 208	0	RCHRES 6	2
PERLND 209	0	RCHRES 6	2
PERLND 210	121	RCHRES 6	4
PERLND 211	6705	RCHRES 6	4
PERLND 211	164	RCHRES 167	44
PERLND 212	0	RCHRES 6	4
PERLND 213	4245	RCHRES 6	4
PERLND 213	0	RCHRES 167	44
IMPLND 201	0	RCHRES 6	1
IMPLND 202	10	RCHRES 6	1
IMPLND 202	6	RCHRES 167	41
IMPLND 203	0	RCHRES 6	1
IMPLND 204	0	RCHRES 6	1
RCHRES 167		RCHRES 6	45
PERLND 181	4	RCHRES 5	2
PERLND 182	0	RCHRES 5	2
PERLND 183	0	RCHRES 5	2
PERLND 184	0	RCHRES 5	2
PERLND 185	0	RCHRES 5	2
PERLND 186	0	RCHRES 5	4
PERLND 187	206	RCHRES 5	2
PERLND 188	0	RCHRES 5	2

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PERLND 189            0    RCHRES   5      2
PERLND 190          179    RCHRES   5      4
PERLND 191         2083    RCHRES   5      4
PERLND 192            0    RCHRES   5      4
PERLND 193         1474    RCHRES   5      4
IMPLND 181            0    RCHRES   5      1
IMPLND 182            0    RCHRES   5      1
IMPLND 183            0    RCHRES   5      1
IMPLND 184            0    RCHRES   5      1
RCHRES   6                 RCHRES   5      3
RCHRES   4                 RCHRES   5      3

PERLND 101          863    RCHRES   1      2
PERLND 101            9    RCHRES 116     22
PERLND 101            9    RCHRES   1     23
PERLND 101          158    RCHRES 117     42
PERLND 102          308    RCHRES   1      2
PERLND 102           54    RCHRES 116     22
PERLND 102           54    RCHRES   1     23
PERLND 102           80    RCHRES 117     42
PERLND 103           15    RCHRES   1      2
PERLND 104           30    RCHRES   1      2
PERLND 104           31    RCHRES   1     52
PERLND 104            3    RCHRES 116     22
PERLND 104            3    RCHRES   1     23
PERLND 104           24    RCHRES 117     42
PERLND 105           20    RCHRES   1      2
PERLND 106          264    RCHRES   1      4
PERLND 106           23    RCHRES   1     54
PERLND 107         1511    RCHRES   1      2
PERLND 107            5    RCHRES 117     42
PERLND 108           54    RCHRES   1      2
PERLND 109          551    RCHRES   1      2
PERLND 109            8    RCHRES 116     22
PERLND 109            8    RCHRES   1     23
PERLND 109            3    RCHRES 117     42
PERLND 110         2750    RCHRES   1      4
PERLND 110            1    RCHRES   1     54
PERLND 110            9    RCHRES 117     44
PERLND 111         8718    RCHRES   1      4
PERLND 111            3    RCHRES   1     54
PERLND 111            3    RCHRES 116     24
PERLND 111            3    RCHRES   1     25
PERLND 111           29    RCHRES 117     44
PERLND 112          257    RCHRES   1      4
PERLND 113        15878    RCHRES   1      4
PERLND 113            4    RCHRES   1     54
PERLND 113            5    RCHRES 117     44
IMPLND 101           96    RCHRES   1      1
IMPLND 101            1    RCHRES 116     21
IMPLND 101           18    RCHRES 117     41
IMPLND 102          166    RCHRES   1      1
IMPLND 102           29    RCHRES 116     21
IMPLND 102           43    RCHRES 117     41
IMPLND 103           23    RCHRES   1      1
IMPLND 103            1    RCHRES 117     41
IMPLND 104          121    RCHRES   1      1
IMPLND 104          123    RCHRES   1     51
IMPLND 104           12    RCHRES 116     21
IMPLND 104           96    RCHRES 117     41
RCHRES 116                 RCHRES   1     35
RCHRES 117                 RCHRES   1     45
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PERLND 141          290   RCHRES   3    2
PERLND 141           20   RCHRES 136   22
PERLND 141           20   RCHRES   3   23
PERLND 141           14   RCHRES 137   42
PERLND 142          484   RCHRES   3    2
PERLND 142           26   RCHRES 136   22
PERLND 142           26   RCHRES   3   23
PERLND 142          156   RCHRES 137   42
PERLND 143            0   RCHRES   3    2
PERLND 144            5   RCHRES   3    2
PERLND 144           17   RCHRES 136   22
PERLND 144           17   RCHRES   3   23
PERLND 144            8   RCHRES 137   42
PERLND 145           58   RCHRES   3    2
PERLND 145            1   RCHRES 136   22
PERLND 145            1   RCHRES   3   23
PERLND 145            3   RCHRES 137   42
PERLND 146          108   RCHRES   3    4
PERLND 147         2327   RCHRES   3    2
PERLND 148          645   RCHRES   3    2
PERLND 149           10   RCHRES   3    2
PERLND 150         1776   RCHRES   3    4
PERLND 150           12   RCHRES 137   44
PERLND 151         4523   RCHRES   3    4
PERLND 151           18   RCHRES 136   24
PERLND 151           18   RCHRES   3   25
PERLND 151           15   RCHRES 137   44
PERLND 152          225   RCHRES   3    4
PERLND 153         5010   RCHRES   3    4
PERLND 153            5   RCHRES 137   44
IMPLND 141           32   RCHRES   3    1
IMPLND 141            2   RCHRES 136   21
IMPLND 141            2   RCHRES 137   41
IMPLND 142          260   RCHRES   3    1
IMPLND 142           14   RCHRES 136   21
IMPLND 142           84   RCHRES 137   41
IMPLND 143            0   RCHRES   3    1
IMPLND 144           20   RCHRES   3    1
IMPLND 144           67   RCHRES 136   21
IMPLND 144           32   RCHRES 137   41
RCHRES 136                RCHRES   3   35
RCHRES 137                RCHRES   3   45
RCHRES   1                RCHRES   3    3

PERLND 301         1099   RCHRES  11    2
PERLND 301           74   RCHRES 216   22
PERLND 301           74   RCHRES  11   23
PERLND 301          184   RCHRES 217   42
PERLND 302           17   RCHRES  11    2
PERLND 302           58   RCHRES 217   42
PERLND 303           13   RCHRES  11    2
PERLND 303            1   RCHRES 216   22
PERLND 303            1   RCHRES  11   23
PERLND 303            1   RCHRES 217   42
PERLND 304            2   RCHRES  11    2
PERLND 304           67   RCHRES 217   42
PERLND 305           71   RCHRES  11    2
PERLND 305            4   RCHRES 217   42
PERLND 306          174   RCHRES  11    4
PERLND 307         1509   RCHRES  11    2
PERLND 307            4   RCHRES 217   42
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PERLND 308            160    RCHRES  11     2
PERLND 309             95    RCHRES  11     2
PERLND 310           2721    RCHRES  11     4
PERLND 310              4    RCHRES 216    24
PERLND 310              4    RCHRES  11    25
PERLND 310             28    RCHRES 217    44
PERLND 311           5491    RCHRES  11     4
PERLND 311             18    RCHRES 216    24
PERLND 311             18    RCHRES  11    25
PERLND 311             47    RCHRES 217    44
PERLND 312              0    RCHRES  11     4
PERLND 313           4864    RCHRES  11     4
PERLND 313              0    RCHRES 217    44
IMPLND 301            122    RCHRES  11     1
IMPLND 301              8    RCHRES 216    21
IMPLND 301             20    RCHRES 217    41
IMPLND 302              9    RCHRES  11     1
IMPLND 302             31    RCHRES 217    41
IMPLND 303             20    RCHRES  11     1
IMPLND 303              1    RCHRES 216    21
IMPLND 303              2    RCHRES 217    41
IMPLND 304              8    RCHRES  11     1
IMPLND 304            268    RCHRES 217    41
RCHRES 216                   RCHRES  11    35
RCHRES 217                   RCHRES  11    45
COPY     3          1    RCHRES  11    99
RCHRES   8                   RCHRES  11     3
RCHRES   5                   RCHRES  11     3
RCHRES   3                   RCHRES  11     3
***
PERLND 501             52    RCHRES  12     2
PERLND 501              8    RCHRES 226    22
PERLND 501              8    RCHRES  12    23
PERLND 501             88    RCHRES 227    42
PERLND 502              0    RCHRES  12     2
PERLND 503              0    RCHRES  12     2
PERLND 504              0    RCHRES  12     2
PERLND 505              0    RCHRES  12     2
PERLND 506              0    RCHRES  12     4
PERLND 507            413    RCHRES  12     2
PERLND 508              0    RCHRES  12     2
PERLND 509              0    RCHRES  12     2
PERLND 510            432    RCHRES  12     4
PERLND 511            108    RCHRES  12     4
PERLND 511              2    RCHRES 226    24
PERLND 511              2    RCHRES  12    25
PERLND 511              1    RCHRES 227    44
PERLND 512              0    RCHRES  12     4
PERLND 513           1248    RCHRES  12     4
IMPLND 501              6    RCHRES  12     1
IMPLND 501              1    RCHRES 226    21
IMPLND 501             10    RCHRES 227    41
IMPLND 502              0    RCHRES  12     1
IMPLND 503              0    RCHRES  12     1
IMPLND 504              0    RCHRES  12     1
RCHRES 226                   RCHRES  12    35
RCHRES 227                   RCHRES  12    45

PERLND 521            125    RCHRES  13     2
PERLND 521             35    RCHRES 236    22
PERLND 521             35    RCHRES  13    23
PERLND 521             11    RCHRES 237    42
```

PERLND 522	1044	RCHRES 13	2
PERLND 522	31	RCHRES 236	22
PERLND 522	31	RCHRES 13	23
PERLND 522	12	RCHRES 237	42
PERLND 523	2	RCHRES 13	2
PERLND 524	12	RCHRES 13	2
PERLND 524	7	RCHRES 236	22
PERLND 524	7	RCHRES 13	23
PERLND 525	0	RCHRES 13	2
PERLND 526	19	RCHRES 13	4
PERLND 527	0	RCHRES 13	2
PERLND 528	0	RCHRES 13	2
PERLND 529	9	RCHRES 13	2
PERLND 530	103	RCHRES 13	4
PERLND 530	14	RCHRES 236	24
PERLND 530	14	RCHRES 13	25
PERLND 530	6	RCHRES 237	44
PERLND 531	419	RCHRES 13	4
PERLND 531	18	RCHRES 236	24
PERLND 531	18	RCHRES 13	25
PERLND 531	22	RCHRES 237	44
PERLND 532	23	RCHRES 13	4
PERLND 533	161	RCHRES 13	4
IMPLND 521	14	RCHRES 13	1
IMPLND 521	4	RCHRES 236	21
IMPLND 521	1	RCHRES 237	41
IMPLND 522	562	RCHRES 13	1
IMPLND 522	17	RCHRES 236	21
IMPLND 522	7	RCHRES 237	41
IMPLND 523	3	RCHRES 13	1
IMPLND 524	47	RCHRES 13	1
IMPLND 524	27	RCHRES 236	21
RCHRES 236		RCHRES 13	35
RCHRES 237		RCHRES 13	45

PERLND 541	1197	RCHRES 14	2
PERLND 541	144	RCHRES 246	22
PERLND 541	144	RCHRES 14	23
PERLND 541	48	RCHRES 247	42
PERLND 542	5551	RCHRES 14	2
PERLND 542	630	RCHRES 246	22
PERLND 542	630	RCHRES 14	23
PERLND 542	383	RCHRES 247	42
PERLND 543	1	RCHRES 14	2
PERLND 543	94	RCHRES 246	22
PERLND 543	94	RCHRES 14	23
PERLND 543	3	RCHRES 247	42
PERLND 544	47	RCHRES 14	2
PERLND 544	9	RCHRES 14	52
PERLND 544	65	RCHRES 246	22
PERLND 544	65	RCHRES 14	23
PERLND 544	7	RCHRES 247	42
PERLND 545	99	RCHRES 14	2
PERLND 545	3	RCHRES 246	22
PERLND 545	3	RCHRES 14	23
PERLND 545	6	RCHRES 247	42
PERLND 546	221	RCHRES 14	4
PERLND 546	9	RCHRES 246	24
PERLND 546	9	RCHRES 14	25
PERLND 546	1	RCHRES 247	44
PERLND 547	657	RCHRES 14	2
PERLND 547	34	RCHRES 246	22

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PERLND 547          34   RCHRES  14   23
PERLND 547          23   RCHRES 247   42
PERLND 548         209   RCHRES  14    2
PERLND 548           7   RCHRES 246   22
PERLND 548           7   RCHRES  14   23
PERLND 548           1   RCHRES 247   42
PERLND 549         297   RCHRES  14    2
PERLND 549          18   RCHRES 246   22
PERLND 549          18   RCHRES  14   23
PERLND 549           3   RCHRES 247   42
PERLND 550         867   RCHRES  14    4
PERLND 550           1   RCHRES  14   54
PERLND 550          15   RCHRES 246   24
PERLND 550          15   RCHRES  14   25
PERLND 550          13   RCHRES 247   44
PERLND 551        4938   RCHRES  14    4
PERLND 551          15   RCHRES  14   54
PERLND 551         304   RCHRES 246   24
PERLND 551         304   RCHRES  14   25
PERLND 551         167   RCHRES 247   44
PERLND 552           0   RCHRES  14    4
PERLND 553        1098   RCHRES  14    4
PERLND 553           0   RCHRES 246   24
PERLND 553           0   RCHRES  14   25
PERLND 553           0   RCHRES 247   44
IMPLND 541         133   RCHRES  14    1
IMPLND 541          16   RCHRES 246   21
IMPLND 541           5   RCHRES 247   41
IMPLND 542        2989   RCHRES  14    1
IMPLND 542         339   RCHRES 246   21
IMPLND 542         206   RCHRES 247   41
IMPLND 543           1   RCHRES  14    1
IMPLND 543         141   RCHRES 246   21
IMPLND 543           5   RCHRES 247   41
IMPLND 544         188   RCHRES  14    1
IMPLND 544          34   RCHRES  14   51
IMPLND 544         259   RCHRES 246   21
IMPLND 544          27   RCHRES 247   41
RCHRES 246               RCHRES  14   35
RCHRES 247               RCHRES  14   45
COPY     3           1   RCHRES  14   99

PERLND 581          53   RCHRES  16    2
PERLND 581           2   RCHRES 266   22
PERLND 581           2   RCHRES  16   23
PERLND 582         653   RCHRES  16    2
PERLND 582           1   RCHRES  16   52
PERLND 582         177   RCHRES 266   22
PERLND 582         177   RCHRES  16   23
PERLND 582          18   RCHRES 267   42
PERLND 583          18   RCHRES  16    2
PERLND 583           6   RCHRES 266   22
PERLND 583           6   RCHRES  16   23
PERLND 584          23   RCHRES  16    2
PERLND 584           4   RCHRES  16   52
PERLND 584          19   RCHRES 266   22
PERLND 584          19   RCHRES  16   23
PERLND 584           2   RCHRES 267   42
PERLND 585           0   RCHRES  16    2
PERLND 586          31   RCHRES  16    4
PERLND 586           1   RCHRES  16   54
PERLND 586          21   RCHRES 266   24
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PERLND 586	21	RCHRES 16	25
PERLND 587	0	RCHRES 16	2
PERLND 588	93	RCHRES 16	2
PERLND 588	7	RCHRES 266	22
PERLND 588	7	RCHRES 16	23
PERLND 589	0	RCHRES 16	2
PERLND 590	37	RCHRES 16	4
PERLND 590	13	RCHRES 266	24
PERLND 590	13	RCHRES 16	25
PERLND 591	289	RCHRES 16	4
PERLND 591	1	RCHRES 16	54
PERLND 591	69	RCHRES 266	24
PERLND 591	69	RCHRES 16	25
PERLND 591	3	RCHRES 267	44
PERLND 592	0	RCHRES 16	4
PERLND 593	122	RCHRES 16	4
PERLND 593	0	RCHRES 266	24
PERLND 593	0	RCHRES 16	25
IMPLND 581	6	RCHRES 16	1
IMPLND 582	352	RCHRES 16	1
IMPLND 582	1	RCHRES 16	51
IMPLND 582	95	RCHRES 266	21
IMPLND 582	10	RCHRES 267	41
IMPLND 583	27	RCHRES 16	1
IMPLND 583	10	RCHRES 266	21
IMPLND 584	91	RCHRES 16	1
IMPLND 584	17	RCHRES 16	51
IMPLND 584	74	RCHRES 266	21
IMPLND 584	8	RCHRES 267	41
RCHRES 266		RCHRES 16	35
RCHRES 267		RCHRES 16	45

PERLND 561	919	RCHRES 15	2
PERLND 561	254	RCHRES 256	22
PERLND 561	254	RCHRES 15	23
PERLND 561	311	RCHRES 257	42
PERLND 562	2129	RCHRES 15	2
PERLND 562	1	RCHRES 15	52
PERLND 562	227	RCHRES 256	22
PERLND 562	227	RCHRES 15	23
PERLND 562	232	RCHRES 257	42
PERLND 563	135	RCHRES 15	2
PERLND 563	6	RCHRES 256	22
PERLND 563	6	RCHRES 15	23
PERLND 563	86	RCHRES 257	42
PERLND 564	282	RCHRES 15	2
PERLND 564	10	RCHRES 15	52
PERLND 564	17	RCHRES 256	22
PERLND 564	17	RCHRES 15	23
PERLND 564	103	RCHRES 257	42
PERLND 565	49	RCHRES 15	2
PERLND 566	555	RCHRES 15	4
PERLND 566	9	RCHRES 256	24
PERLND 566	9	RCHRES 15	25
PERLND 566	24	RCHRES 257	44
PERLND 567	1528	RCHRES 15	2
PERLND 567	6	RCHRES 15	52
PERLND 567	112	RCHRES 257	42
PERLND 568	571	RCHRES 15	2
PERLND 568	198	RCHRES 257	42
PERLND 569	55	RCHRES 15	2
PERLND 569	5	RCHRES 257	42

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PERLND 570          978   RCHRES  15    4
PERLND 570            9   RCHRES  15   54
PERLND 570            9   RCHRES 256   24
PERLND 570            9   RCHRES  15   25
PERLND 570           66   RCHRES 257   44
PERLND 571         2739   RCHRES  15    4
PERLND 571            4   RCHRES  15   54
PERLND 571          139   RCHRES 256   24
PERLND 571          139   RCHRES  15   25
PERLND 571          282   RCHRES 257   44
PERLND 572            0   RCHRES  15    4
PERLND 572            0   RCHRES  15   54
PERLND 573         7701   RCHRES  15    4
PERLND 573            0   RCHRES  15   54
PERLND 573            0   RCHRES 256   24
PERLND 573            0   RCHRES  15   25
PERLND 573            0   RCHRES 257   44
IMPLND 561          102   RCHRES  15    1
IMPLND 561           28   RCHRES 256   21
IMPLND 561           35   RCHRES 257   41
IMPLND 562         1147   RCHRES  15    1
IMPLND 562            1   RCHRES  15   51
IMPLND 562          122   RCHRES 256   21
IMPLND 562          125   RCHRES 257   41
IMPLND 563          202   RCHRES  15    1
IMPLND 563            9   RCHRES 256   21
IMPLND 563          128   RCHRES 257   41
IMPLND 564         1129   RCHRES  15    1
IMPLND 564           38   RCHRES  15   51
IMPLND 564           69   RCHRES 256   21
IMPLND 564          411   RCHRES 257   41
RCHRES 256                RCHRES  15   35
RCHRES 257                RCHRES  15   45
COPY    3             1   RCHRES  15   99
RCHRES  11                RCHRES  15    3
RCHRES  12                RCHRES  15    3
RCHRES  13                RCHRES  15    6
RCHRES  16                RCHRES  15    6

PERLND 601           31   RCHRES  17    2
PERLND 601          139   RCHRES 276   22
PERLND 601          139   RCHRES  17   23
PERLND 601           71   RCHRES 277   42
PERLND 602          190   RCHRES  17    2
PERLND 602          180   RCHRES 276   22
PERLND 602          180   RCHRES  17   23
PERLND 602          108   RCHRES 277   42
PERLND 603            1   RCHRES  17    2
PERLND 603           95   RCHRES 276   22
PERLND 603           95   RCHRES  17   23
PERLND 603           65   RCHRES 277   42
PERLND 604            3   RCHRES  17    2
PERLND 604           13   RCHRES  17   52
PERLND 604           19   RCHRES 276   22
PERLND 604           19   RCHRES  17   23
PERLND 604           12   RCHRES 277   42
PERLND 605            0   RCHRES  17    2
PERLND 606          119   RCHRES  17    4
PERLND 606            5   RCHRES  17   54
PERLND 606           43   RCHRES 276   24
PERLND 606           43   RCHRES  17   25
PERLND 606           11   RCHRES 277   44
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PERLND 607          7   RCHRES  17    2
PERLND 607         15   RCHRES 277   42
PERLND 608        298   RCHRES  17    2
PERLND 608          2   RCHRES 277   42
PERLND 609         55   RCHRES  17    2
PERLND 609         29   RCHRES 276   22
PERLND 609         29   RCHRES  17   23
PERLND 609         12   RCHRES 277   42
PERLND 610        249   RCHRES  17    4
PERLND 610         53   RCHRES 276   24
PERLND 610         53   RCHRES  17   25
PERLND 610          9   RCHRES 277   44
PERLND 611        300   RCHRES  17    4
PERLND 611         29   RCHRES 276   24
PERLND 611         29   RCHRES  17   25
PERLND 611          9   RCHRES 277   44
PERLND 612          0   RCHRES  17    4
PERLND 613        304   RCHRES  17    4
PERLND 613          0   RCHRES 277   44
IMPLND 601          3   RCHRES  17    1
IMPLND 601         15   RCHRES 276   21
IMPLND 601          8   RCHRES 277   41
IMPLND 602        103   RCHRES  17    1
IMPLND 602         97   RCHRES 276   21
IMPLND 602         58   RCHRES 277   41
IMPLND 603          1   RCHRES  17    1
IMPLND 603        143   RCHRES 276   21
IMPLND 603         97   RCHRES 277   41
IMPLND 604         10   RCHRES  17    1
IMPLND 604         52   RCHRES  17   51
IMPLND 604         77   RCHRES 276   21
IMPLND 604         50   RCHRES 277   41
RCHRES 276              RCHRES  17   35
RCHRES 277              RCHRES  17   45
COPY     3          1   RCHRES  17   99

PERLND 621         85   RCHRES  18    2
PERLND 621         20   RCHRES 286   22
PERLND 621         20   RCHRES  18   23
PERLND 621         15   RCHRES 287   42
PERLND 622        170   RCHRES  18    2
PERLND 622          1   RCHRES  18   52
PERLND 622         66   RCHRES 286   22
PERLND 622         66   RCHRES  18   23
PERLND 622        194   RCHRES 287   42
PERLND 623         43   RCHRES  18    2
PERLND 623         32   RCHRES 286   22
PERLND 623         32   RCHRES  18   23
PERLND 623         62   RCHRES 287   42
PERLND 624         73   RCHRES  18    2
PERLND 624         21   RCHRES  18   52
PERLND 624         18   RCHRES 286   22
PERLND 624         18   RCHRES  18   23
PERLND 624         61   RCHRES 287   42
PERLND 625         31   RCHRES  18    2
PERLND 625          1   RCHRES 286   22
PERLND 625          1   RCHRES  18   23
PERLND 625         23   RCHRES 287   42
PERLND 626         88   RCHRES  18    4
PERLND 626          1   RCHRES  18   54
PERLND 626         35   RCHRES 286   24
PERLND 626         35   RCHRES  18   25
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PERLND 626	30	RCHRES 287	44
PERLND 627	288	RCHRES 18	2
PERLND 627	10	RCHRES 18	52
PERLND 627	52	RCHRES 286	22
PERLND 627	52	RCHRES 18	23
PERLND 627	72	RCHRES 287	42
PERLND 628	73	RCHRES 18	2
PERLND 628	15	RCHRES 286	22
PERLND 628	15	RCHRES 18	23
PERLND 628	16	RCHRES 287	42
PERLND 629	54	RCHRES 18	2
PERLND 629	12	RCHRES 286	22
PERLND 629	12	RCHRES 18	23
PERLND 629	7	RCHRES 287	42
PERLND 630	641	RCHRES 18	4
PERLND 630	8	RCHRES 18	54
PERLND 630	58	RCHRES 286	24
PERLND 630	58	RCHRES 18	25
PERLND 630	66	RCHRES 287	44
PERLND 631	945	RCHRES 18	4
PERLND 631	33	RCHRES 18	54
PERLND 631	128	RCHRES 286	24
PERLND 631	128	RCHRES 18	25
PERLND 631	211	RCHRES 287	44
PERLND 632	119	RCHRES 18	4
PERLND 632	0	RCHRES 287	44
PERLND 633	645	RCHRES 18	4
PERLND 633	23	RCHRES 18	54
PERLND 633	6	RCHRES 286	24
PERLND 633	6	RCHRES 18	25
PERLND 633	75	RCHRES 287	44
IMPLND 621	9	RCHRES 18	1
IMPLND 621	2	RCHRES 286	21
IMPLND 621	2	RCHRES 287	41
IMPLND 622	92	RCHRES 18	1
IMPLND 622	1	RCHRES 18	51
IMPLND 622	36	RCHRES 286	21
IMPLND 622	104	RCHRES 287	41
IMPLND 623	64	RCHRES 18	1
IMPLND 623	48	RCHRES 286	21
IMPLND 623	93	RCHRES 287	41
IMPLND 624	293	RCHRES 18	1
IMPLND 624	85	RCHRES 18	51
IMPLND 624	71	RCHRES 286	21
IMPLND 624	246	RCHRES 287	41
RCHRES 286		RCHRES 18	35
RCHRES 287		RCHRES 18	45
RCHRES 17		RCHRES 18	3

PERLND 641	0	RCHRES 20	2
PERLND 642	23	RCHRES 20	2
PERLND 643	0	RCHRES 20	2
PERLND 644	4	RCHRES 20	2
PERLND 645	142	RCHRES 20	2
PERLND 646	3	RCHRES 20	4
PERLND 647	43	RCHRES 20	2
PERLND 648	0	RCHRES 20	2
PERLND 649	0	RCHRES 20	2
PERLND 650	58	RCHRES 20	4
PERLND 651	159	RCHRES 20	4
PERLND 652	1105	RCHRES 20	4
PERLND 653	99	RCHRES 20	4

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IMPLND 641           0   RCHRES  20    1
IMPLND 642          12   RCHRES  20    1
IMPLND 643           0   RCHRES  20    1
IMPLND 644          14   RCHRES  20    1

PERLND 661           9   RCHRES  20    2
PERLND 661          13   RCHRES 306   22
PERLND 661          13   RCHRES  20   23
PERLND 661           5   RCHRES 307   42
PERLND 662          47   RCHRES  20    2
PERLND 662          26   RCHRES 306   22
PERLND 662          26   RCHRES  20   23
PERLND 662          20   RCHRES 307   42
PERLND 663          26   RCHRES  20    2
PERLND 663           1   RCHRES  20   52
PERLND 663           1   RCHRES 307   42
PERLND 664          18   RCHRES  20    2
PERLND 664           2   RCHRES  20   52
PERLND 664          19   RCHRES 307   42
PERLND 665           0   RCHRES  20    2
PERLND 666          51   RCHRES  20    4
PERLND 666           4   RCHRES 307   44
PERLND 667         373   RCHRES  20    2
PERLND 667          58   RCHRES 307   42
PERLND 668          51   RCHRES  20    2
PERLND 668           2   RCHRES 306   22
PERLND 668           2   RCHRES  20   23
PERLND 668         125   RCHRES 307   42
PERLND 669          10   RCHRES  20    2
PERLND 670         469   RCHRES  20    4
PERLND 670          14   RCHRES 306   24
PERLND 670          14   RCHRES  20   25
PERLND 670          98   RCHRES 307   44
PERLND 671         913   RCHRES  20    4
PERLND 671           3   RCHRES  20   54
PERLND 671          12   RCHRES 306   24
PERLND 671          12   RCHRES  20   25
PERLND 671         169   RCHRES 307   44
PERLND 672           0   RCHRES  20    4
PERLND 673        2149   RCHRES  20    4
PERLND 673           0   RCHRES 307   44
IMPLND 661           1   RCHRES  20    1
IMPLND 661           1   RCHRES 306   21
IMPLND 661           1   RCHRES 307   41
IMPLND 662          25   RCHRES  20    1
IMPLND 662          14   RCHRES 306   21
IMPLND 662          11   RCHRES 307   41
IMPLND 663          39   RCHRES  20    1
IMPLND 663           2   RCHRES  20   51
IMPLND 663           1   RCHRES 306   21
IMPLND 663           2   RCHRES 307   41
IMPLND 664          74   RCHRES  20    1
IMPLND 664           6   RCHRES  20   51
IMPLND 664           1   RCHRES 306   21
IMPLND 664          76   RCHRES 307   41
RCHRES 306               RCHRES  20   35
RCHRES 307               RCHRES  20   45
RCHRES  15               RCHRES  20    3
RCHRES  18               RCHRES  20    3

END SCHEMATIC
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EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Aggr Amd ***
<Name>   x       <Name> x x<-factor->strg <Name>   x <Name>qf  tem strg strg***
RCHRES   7 HYDR   ROVOL  1 1            WDM1   101 FLOW   1 ENGL AGGR REPL
RCHRES   8 HYDR   IVOL   1 1            WDM1   102 FLOW   1 ENGL AGGR REPL
RCHRES   8 HYDR   ROVOL  1 1            WDM1   103 FLOW   1 ENGL AGGR REPL
RCHRES  11 HYDR   IVOL   1 1            WDM1   104 FLOW   1 ENGL AGGR REPL
RCHRES  15 HYDR   IVOL   1 1            WDM1   105 FLOW   1 ENGL AGGR REPL
RCHRES  12 HYDR   ROVOL  1 1            WDM1   106 FLOW   1 ENGL AGGR REPL
RCHRES  13 HYDR   OVOL   1 1            WDM1   107 FLOW   1 ENGL AGGR REPL
RCHRES  16 HYDR   OVOL   1 1            WDM1   108 FLOW   1 ENGL AGGR REPL
RCHRES  18 HYDR   ROVOL  1 1            WDM1   109 FLOW   1 ENGL AGGR REPL
RCHRES  20 HYDR   IVOL   1 1            WDM1   110 FLOW   1 ENGL AGGR REPL

RCHRES  15 HYDR   ROVOL  1 1            WDM1   111 FLOW   1 ENGL AGGR REPL
RCHRES   3 HYDR   ROVOL  1 1            WDM1   112 FLOW   1 ENGL AGGR REPL
RCHRES   5 HYDR   ROVOL  1 1            WDM1   113 FLOW   1 ENGL AGGR REPL
RCHRES  11 HYDR   ROVOL  1 1            WDM1   114 FLOW   1 ENGL AGGR REPL
RCHRES  15 HYDR   RO     1 1            WDM1   115 FLOW   1 ENGL AGGR REPL
RCHRES  16 HYDR   RO     1 1            WDM1   116 FLOW   1 ENGL AGGR REPL
RCHRES  17 HYDR   RO     1 1            WDM1   117 FLOW   1 ENGL AGGR REPL
RCHRES  18 HYDR   RO     1 1            WDM1   118 FLOW   1 ENGL AGGR REPL
RCHRES  19 HYDR   RO     1 1            WDM1   119 FLOW   1 ENGL AGGR REPL
RCHRES  20 HYDR   RO     1 1            WDM1   120 FLOW   1 ENGL AGGR REPL

RCHRES  18 HYDR   VOL    1 1            WDM1   121 FLOW   1 ENGL AGGR REPL
RCHRES  18 HYDR   ROVOL  1 1            WDM1   122 FLOW   1 ENGL AGGR REPL
RCHRES  18 PLANK  PKST4  1 1            WDM1   123 FLOW   1 ENGL AGGR REPL
RCHRES  18 PLANK  TPKCF1 4 1            WDM1   124 FLOW   1 ENGL AGGR REPL
RCHRES  18 PLANK  PKST4  2 1            WDM1   125 FLOW   1 ENGL AGGR REPL
RCHRES  18 PLANK  TPKCF1 5 1            WDM1   126 FLOW   1 ENGL AGGR REPL
END EXT TARGETS

MASS-LINK

  MASS-LINK        2
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>                <Name> x x  ***
PERLND     PWATER PERO       0.0833333     RCHRES         INFLOW IVOL
PERLND     PWTGAS PODOXM                   RCHRES         INFLOW OXIF   1
PERLND     PWTGAS POHT                     RCHRES         INFLOW IHEAT  1
PERLND     SEDMNT SOSED  1         0.2     RCHRES         INFLOW ISED   1
PERLND     SEDMNT SOSED  1         0.4     RCHRES         INFLOW ISED   2
PERLND     SEDMNT SOSED  1         0.4     RCHRES         INFLOW ISED   3
PERLND     PQUAL  POQUAL 1                 RCHRES         INFLOW NUIF1  2
PERLND     PQUAL  POQUAL 2                 RCHRES         INFLOW NUIF1  1
PERLND     PQUAL  POQUAL 3                 RCHRES         INFLOW NUIF1  4
PERLND     PQUAL  POQUAL 4         1.0     RCHRES         INFLOW OXIF   2
PERLND     PQUAL  POQUAL 4     0.01839     RCHRES         INFLOW PKIF   3
PERLND     PQUAL  POQUAL 4     0.00025     RCHRES         INFLOW PKIF   4
PERLND     PQUAL  POQUAL 4     0.68056     RCHRES         INFLOW PKIF   5
  END MASS-LINK    2

  MASS-LINK        4
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>                <Name> x x  ***
PERLND     PWATER PERO       0.0833333     RCHRES         INFLOW IVOL
PERLND     PWTGAS PODOXM                   RCHRES         INFLOW OXIF   1
PERLND     PWTGAS POHT                     RCHRES         INFLOW IHEAT  1
PERLND     SEDMNT SOSED  1         0.2     RCHRES         INFLOW ISED   1
PERLND     SEDMNT SOSED  1         0.4     RCHRES         INFLOW ISED   2
PERLND     SEDMNT SOSED  1         0.4     RCHRES         INFLOW ISED   3
```

```
PERLND     PQUAL  POQUAL 1               RCHRES        INFLOW NUIF1  2
PERLND     PQUAL  POQUAL 2               RCHRES        INFLOW NUIF1  1
PERLND     PQUAL  POQUAL 3               RCHRES        INFLOW NUIF1  4
PERLND     PQUAL  POQUAL 4        1.0     RCHRES        INFLOW OXIF   2
PERLND     PQUAL  POQUAL 4     0.38626     RCHRES        INFLOW PKIF   3
PERLND     PQUAL  POQUAL 4     0.00529     RCHRES        INFLOW PKIF   4
PERLND     PQUAL  POQUAL 4    14.29167     RCHRES        INFLOW PKIF   5
  END MASS-LINK    4

  MASS-LINK       1
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>           <Name> x x<-factor->     <Name>              <Name> x x  ***
IMPLND    IWATER SURO      0.0833333    RCHRES        INFLOW IVOL
IMPLND    IWTGAS SODOXM                 RCHRES        INFLOW OXIF   1
IMPLND    IWTGAS SOHT                 RCHRES        INFLOW IHEAT  1
IMPLND    SOLIDS SOSLD          0.2     RCHRES        INFLOW ISED   1
IMPLND    SOLIDS SOSLD          0.4     RCHRES        INFLOW ISED   2
IMPLND    SOLIDS SOSLD          0.4     RCHRES        INFLOW ISED   3
IMPLND    IQUAL  SOQUAL 1               RCHRES        INFLOW NUIF1  2
IMPLND    IQUAL  SOQUAL 2               RCHRES        INFLOW NUIF1  1
IMPLND    IQUAL  SOQUAL 3               RCHRES        INFLOW NUIF1  4
IMPLND    IQUAL  SOQUAL 4        1.0     RCHRES        INFLOW OXIF   2
IMPLND    IQUAL  SOQUAL 4     0.00424     RCHRES        INFLOW PKIF   3
IMPLND    IQUAL  SOQUAL 4     0.00006     RCHRES        INFLOW PKIF   4
IMPLND    IQUAL  SOQUAL 4     0.15705     RCHRES        INFLOW PKIF   5
  END MASS-LINK    1

  MASS-LINK       3
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>           <Name> x x<-factor->     <Name>              <Name> x x  ***
RCHRES     ROFLOW                          RCHRES        INFLOW
  END MASS-LINK    3

  MASS-LINK       6
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>           <Name> x x<-factor->     <Name>              <Name> x x  ***
RCHRES     OFLOW        1                RCHRES        INFLOW
  END MASS-LINK    6

  MASS-LINK       22
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>           <Name> x x<-factor->     <Name>              <Name> x x  ***
PERLND     PWATER SURO      0.0833333     RCHRES        INFLOW IVOL
PERLND     PWATER IFWO      0.0833333     RCHRES        INFLOW IVOL
PERLND     PWTGAS SODOXM                RCHRES        INFLOW ICON   1
PERLND     PWTGAS IODOXM                RCHRES        INFLOW ICON   1
PERLND     PWTGAS SOHT                  RCHRES        INFLOW ICON   2
PERLND     PWTGAS IOHT                  RCHRES        INFLOW ICON   2
PERLND     SEDMNT SOSED                 RCHRES        INFLOW ICON   3
PERLND     PQUAL  SOQUAL 1              RCHRES        INFLOW ICON   4
PERLND     PQUAL  IOQUAL 1              RCHRES        INFLOW ICON   4
PERLND     PQUAL  SOQUAL 2              RCHRES        INFLOW ICON   5
PERLND     PQUAL  IOQUAL 2              RCHRES        INFLOW ICON   5
PERLND     PQUAL  SOQUAL 3              RCHRES        INFLOW ICON   6
PERLND     PQUAL  IOQUAL 3              RCHRES        INFLOW ICON   6
PERLND     PQUAL  SOQUAL 4       1.00     RCHRES        INFLOW ICON   7
PERLND     PQUAL  IOQUAL 4       1.00     RCHRES        INFLOW ICON   7
PERLND     PQUAL  SOQUAL 4     0.01839     RCHRES        INFLOW ICON   8
PERLND     PQUAL  IOQUAL 4     0.01839     RCHRES        INFLOW ICON   8
PERLND     PQUAL  SOQUAL 4     0.00025     RCHRES        INFLOW ICON   9
PERLND     PQUAL  IOQUAL 4     0.00025     RCHRES        INFLOW ICON   9
PERLND     PQUAL  SOQUAL 4     0.68056     RCHRES        INFLOW ICON  10
```

```
PERLND     PQUAL  IOQUAL 4     0.68056     RCHRES        INFLOW ICON  10
  END MASS-LINK   22

  MASS-LINK       21
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>               <Name> x x  ***
IMPLND     IWATER SURO       0.0833333     RCHRES        INFLOW IVOL
IMPLND     IWTGAS SODOXM                   RCHRES        INFLOW ICON   1
IMPLND     IWTGAS SOHT                     RCHRES        INFLOW ICON   2
IMPLND     SOLIDS SOSLD                    RCHRES        INFLOW ICON   3
IMPLND     IQUAL  SOQUAL 1                 RCHRES        INFLOW ICON   4
IMPLND     IQUAL  SOQUAL 2                 RCHRES        INFLOW ICON   5
IMPLND     IQUAL  SOQUAL 3                 RCHRES        INFLOW ICON   6
IMPLND     IQUAL  SOQUAL 4        1.0      RCHRES        INFLOW ICON   7
IMPLND     IQUAL  SOQUAL 4     0.00424     RCHRES        INFLOW ICON   8
IMPLND     IQUAL  SOQUAL 4     0.00006     RCHRES        INFLOW ICON   9
IMPLND     IQUAL  SOQUAL 4     0.15705     RCHRES        INFLOW ICON  10
  END MASS-LINK   21

  MASS-LINK       23
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>               <Name> x x  ***
PERLND     PWATER AGWO       0.0833333     RCHRES        INFLOW IVOL
PERLND     PWTGAS AODOXM                   RCHRES        INFLOW OXIF   1
PERLND     PWTGAS AOHT                     RCHRES        INFLOW IHEAT  1
PERLND     PQUAL  AOQUAL 1                 RCHRES        INFLOW NUIF1  2
PERLND     PQUAL  AOQUAL 2                 RCHRES        INFLOW NUIF1  1
PERLND     PQUAL  AOQUAL 3                 RCHRES        INFLOW NUIF1  4
PERLND     PQUAL  AOQUAL 4        1.0      RCHRES        INFLOW OXIF   2
PERLND     PQUAL  AOQUAL 4     0.01839     RCHRES        INFLOW PKIF   3
PERLND     PQUAL  AOQUAL 4     0.00025     RCHRES        INFLOW PKIF   4
PERLND     PQUAL  AOQUAL 4     0.68056     RCHRES        INFLOW PKIF   5
  END MASS-LINK   23

  MASS-LINK       24
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>               <Name> x x  ***
PERLND     PWATER SURO       0.0833333     RCHRES        INFLOW IVOL
PERLND     PWATER IFWO       0.0833333     RCHRES        INFLOW IVOL
PERLND     PWTGAS SODOXM                   RCHRES        INFLOW ICON   1
PERLND     PWTGAS IODOXM                   RCHRES        INFLOW ICON   1
PERLND     PWTGAS SOHT                     RCHRES        INFLOW ICON   2
PERLND     PWTGAS IOHT                     RCHRES        INFLOW ICON   2
PERLND     SEDMNT SOSED                    RCHRES        INFLOW ICON   3
PERLND     PQUAL  SOQUAL 1                 RCHRES        INFLOW ICON   4
PERLND     PQUAL  IOQUAL 1                 RCHRES        INFLOW ICON   4
PERLND     PQUAL  SOQUAL 2                 RCHRES        INFLOW ICON   5
PERLND     PQUAL  IOQUAL 2                 RCHRES        INFLOW ICON   5
PERLND     PQUAL  SOQUAL 3                 RCHRES        INFLOW ICON   6
PERLND     PQUAL  IOQUAL 3                 RCHRES        INFLOW ICON   6
PERLND     PQUAL  SOQUAL 4        1.00     RCHRES        INFLOW ICON   7
PERLND     PQUAL  IOQUAL 4        1.00     RCHRES        INFLOW ICON   7
PERLND     PQUAL  SOQUAL 4     0.38626     RCHRES        INFLOW ICON   8
PERLND     PQUAL  IOQUAL 4     0.38626     RCHRES        INFLOW ICON   8
PERLND     PQUAL  SOQUAL 4     0.00529     RCHRES        INFLOW ICON   9
PERLND     PQUAL  IOQUAL 4     0.00529     RCHRES        INFLOW ICON   9
PERLND     PQUAL  SOQUAL 4    14.29167     RCHRES        INFLOW ICON  10
PERLND     PQUAL  IOQUAL 4    14.29167     RCHRES        INFLOW ICON  10
  END MASS-LINK   24

  MASS-LINK       25
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
```

```
<Name>          <Name> x x<-factor->    <Name>            <Name> x x  ***
PERLND    PWATER AGWO      0.0833333     RCHRES        INFLOW IVOL
PERLND    PWTGAS AODOXM                RCHRES        INFLOW OXIF   1
PERLND    PWTGAS AOHT                RCHRES        INFLOW IHEAT  1
PERLND    PQUAL  AOQUAL 1             RCHRES        INFLOW NUIF1  2
PERLND    PQUAL  AOQUAL 2             RCHRES        INFLOW NUIF1  1
PERLND    PQUAL  AOQUAL 3             RCHRES        INFLOW NUIF1  4
PERLND    PQUAL  AOQUAL 4       1.0     RCHRES        INFLOW OXIF   2
PERLND    PQUAL  AOQUAL 4     0.38626     RCHRES        INFLOW PKIF   3
PERLND    PQUAL  AOQUAL 4     0.00529     RCHRES        INFLOW PKIF   4
PERLND    PQUAL  AOQUAL 4    14.29167     RCHRES        INFLOW PKIF   5
  END MASS-LINK   25

  MASS-LINK      35
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>          <Name> x x<-factor->    <Name>            <Name> x x  ***
RCHRES    HYDR   ROVOL               RCHRES        INFLOW IVOL
RCHRES    CONS   ROCON  1             RCHRES        INFLOW OXIF   1
RCHRES    CONS   ROCON  2             RCHRES        INFLOW IHEAT  1
RCHRES    CONS   ROCON  3       0.1     RCHRES        INFLOW ISED   1
RCHRES    CONS   ROCON  3       0.2     RCHRES        INFLOW ISED   2
RCHRES    CONS   ROCON  3       0.2     RCHRES        INFLOW ISED   3
RCHRES    CONS   ROCON  4      0.95     RCHRES        INFLOW NUIF1  2
RCHRES    CONS   ROCON  5      0.95     RCHRES        INFLOW NUIF1  1
RCHRES    CONS   ROCON  6      0.80     RCHRES        INFLOW NUIF1  4
RCHRES    CONS   ROCON  7      0.80     RCHRES        INFLOW OXIF   2
RCHRES    CONS   ROCON  8      0.80     RCHRES        INFLOW PKIF   3
RCHRES    CONS   ROCON  9      0.80     RCHRES        INFLOW PKIF   4
RCHRES    CONS   ROCON 10       0.80     RCHRES        INFLOW PKIF   5
  END MASS-LINK   35

  MASS-LINK      42
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>          <Name> x x<-factor->    <Name>            <Name> x x  ***
PERLND    PWATER PERO      0.0833333     RCHRES        INFLOW IVOL
PERLND    PWTGAS PODOXM                RCHRES        INFLOW ICON   1
PERLND    PWTGAS POHT                RCHRES        INFLOW ICON   2
PERLND    SEDMNT SOSED                RCHRES        INFLOW ICON   3
PERLND    PQUAL  POQUAL 1             RCHRES        INFLOW ICON   4
PERLND    PQUAL  POQUAL 2             RCHRES        INFLOW ICON   5
PERLND    PQUAL  POQUAL 3             RCHRES        INFLOW ICON   6
PERLND    PQUAL  POQUAL 4       1.0     RCHRES        INFLOW ICON   7
PERLND    PQUAL  POQUAL 4     0.01839     RCHRES        INFLOW ICON   8
PERLND    PQUAL  POQUAL 4     0.00025     RCHRES        INFLOW ICON   9
PERLND    PQUAL  POQUAL 4     0.68056     RCHRES        INFLOW ICON  10
  END MASS-LINK   42

  MASS-LINK      41
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>          <Name> x x<-factor->    <Name>            <Name> x x  ***
IMPLND    IWATER SURO      0.0833333     RCHRES        INFLOW IVOL
IMPLND    IWTGAS SODOXM                RCHRES        INFLOW ICON   1
IMPLND    IWTGAS SOHT                RCHRES        INFLOW ICON   2
IMPLND    SOLIDS SOSLD                RCHRES        INFLOW ICON   3
IMPLND    IQUAL  SOQUAL 1             RCHRES        INFLOW ICON   4
IMPLND    IQUAL  SOQUAL 2             RCHRES        INFLOW ICON   5
IMPLND    IQUAL  SOQUAL 3             RCHRES        INFLOW ICON   6
IMPLND    IQUAL  SOQUAL 4       1.0     RCHRES        INFLOW ICON   7
IMPLND    IQUAL  SOQUAL 4     0.00424     RCHRES        INFLOW ICON   8
IMPLND    IQUAL  SOQUAL 4     0.00006     RCHRES        INFLOW ICON   9
IMPLND    IQUAL  SOQUAL 4     0.15705     RCHRES        INFLOW ICON  10
  END MASS-LINK   41
```

```
  MASS-LINK       44
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
PERLND     PWATER PERO       0.0833333     RCHRES        INFLOW IVOL
PERLND     PWTGAS PODOXM                   RCHRES        INFLOW ICON   1
PERLND     PWTGAS POHT                     RCHRES        INFLOW ICON   2
PERLND     SEDMNT SOSED                    RCHRES        INFLOW ICON   3
PERLND     PQUAL  POQUAL 1                 RCHRES        INFLOW ICON   4
PERLND     PQUAL  POQUAL 2                 RCHRES        INFLOW ICON   5
PERLND     PQUAL  POQUAL 3                 RCHRES        INFLOW ICON   6
PERLND     PQUAL  POQUAL 4        1.0      RCHRES        INFLOW ICON   7
PERLND     PQUAL  POQUAL 4     0.38626     RCHRES        INFLOW ICON   8
PERLND     PQUAL  POQUAL 4     0.00529     RCHRES        INFLOW ICON   9
PERLND     PQUAL  POQUAL 4    14.29167     RCHRES        INFLOW ICON  10
  END MASS-LINK   44

  MASS-LINK       45
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
RCHRES     HYDR   ROVOL                    RCHRES        INFLOW IVOL
RCHRES     CONS   ROCON  1                 RCHRES        INFLOW OXIF   1
RCHRES     CONS   ROCON  2                 RCHRES        INFLOW IHEAT  1
RCHRES     CONS   ROCON  3        0.04     RCHRES        INFLOW ISED   1
RCHRES     CONS   ROCON  3        0.08     RCHRES        INFLOW ISED   2
RCHRES     CONS   ROCON  3        0.08     RCHRES        INFLOW ISED   3
RCHRES     CONS   ROCON  4        0.75     RCHRES        INFLOW NUIF1  2
RCHRES     CONS   ROCON  5        0.75     RCHRES        INFLOW NUIF1  1
RCHRES     CONS   ROCON  6        0.45     RCHRES        INFLOW NUIF1  4
RCHRES     CONS   ROCON  7        0.65     RCHRES        INFLOW OXIF   2
RCHRES     CONS   ROCON  8        0.65     RCHRES        INFLOW PKIF   3
RCHRES     CONS   ROCON  9        0.65     RCHRES        INFLOW PKIF   4
RCHRES     CONS   ROCON 10        0.65     RCHRES        INFLOW PKIF   5
  END MASS-LINK   45

  MASS-LINK       52
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
PERLND     PWATER PERO       0.0833333     RCHRES        INFLOW IVOL
PERLND     PWTGAS PODOXM                   RCHRES        INFLOW OXIF   1
PERLND     PWTGAS POHT                     RCHRES        INFLOW IHEAT  1
PERLND     SEDMNT SOSED  1        0.04     RCHRES        INFLOW ISED   1
PERLND     SEDMNT SOSED  1        0.08     RCHRES        INFLOW ISED   2
PERLND     SEDMNT SOSED  1        0.08     RCHRES        INFLOW ISED   3
PERLND     PQUAL  SOQUAL 1        0.85     RCHRES        INFLOW NUIF1  2
PERLND     PQUAL  IOQUAL 1                 RCHRES        INFLOW NUIF1  2
PERLND     PQUAL  AOQUAL 1                 RCHRES        INFLOW NUIF1  2
PERLND     PQUAL  SOQUAL 2        0.85     RCHRES        INFLOW NUIF1  1
PERLND     PQUAL  IOQUAL 2                 RCHRES        INFLOW NUIF1  1
PERLND     PQUAL  AOQUAL 2                 RCHRES        INFLOW NUIF1  1
PERLND     PQUAL  SOQUAL 3        0.70     RCHRES        INFLOW NUIF1  4
PERLND     PQUAL  IOQUAL 3                 RCHRES        INFLOW NUIF1  4
PERLND     PQUAL  AOQUAL 3                 RCHRES        INFLOW NUIF1  4
PERLND     PQUAL  SOQUAL 4        0.70     RCHRES        INFLOW OXIF   2
PERLND     PQUAL  IOQUAL 4        1.00     RCHRES        INFLOW OXIF   2
PERLND     PQUAL  AOQUAL 4        1.00     RCHRES        INFLOW OXIF   2
PERLND     PQUAL  SOQUAL 4    0.012873     RCHRES        INFLOW PKIF   3
PERLND     PQUAL  IOQUAL 4     0.01839     RCHRES        INFLOW PKIF   3
PERLND     PQUAL  AOQUAL 4     0.01839     RCHRES        INFLOW PKIF   3
PERLND     PQUAL  SOQUAL 4    0.000175     RCHRES        INFLOW PKIF   4
PERLND     PQUAL  IOQUAL 4     0.00025     RCHRES        INFLOW PKIF   4
PERLND     PQUAL  AOQUAL 4     0.00025     RCHRES        INFLOW PKIF   4
```

```
PERLND    PQUAL  SOQUAL 4    0.476392    RCHRES        INFLOW PKIF   5
PERLND    PQUAL  IOQUAL 4    0.68056     RCHRES        INFLOW PKIF   5
PERLND    PQUAL  AOQUAL 4    0.68056     RCHRES        INFLOW PKIF   5
  END MASS-LINK   52

  MASS-LINK       51
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
IMPLND    IWATER SURO       0.0833333    RCHRES        INFLOW IVOL
IMPLND    IWTGAS SODOXM                  RCHRES        INFLOW OXIF   1
IMPLND    IWTGAS SOHT                    RCHRES        INFLOW IHEAT  1
IMPLND    SOLIDS SOSLD          0.04     RCHRES        INFLOW ISED   1
IMPLND    SOLIDS SOSLD          0.08     RCHRES        INFLOW ISED   2
IMPLND    SOLIDS SOSLD          0.08     RCHRES        INFLOW ISED   3
IMPLND    IQUAL  SOQUAL 1       0.85     RCHRES        INFLOW NUIF1  2
IMPLND    IQUAL  SOQUAL 2       0.85     RCHRES        INFLOW NUIF1  1
IMPLND    IQUAL  SOQUAL 3       0.70     RCHRES        INFLOW NUIF1  4
IMPLND    IQUAL  SOQUAL 4       0.70     RCHRES        INFLOW OXIF   2
IMPLND    IQUAL  SOQUAL 4    0.002968    RCHRES        INFLOW PKIF   3
IMPLND    IQUAL  SOQUAL 4    0.000042    RCHRES        INFLOW PKIF   4
IMPLND    IQUAL  SOQUAL 4    0.109935    RCHRES        INFLOW PKIF   5
  END MASS-LINK   51

  MASS-LINK       54
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
PERLND    PWATER PERO       0.0833333    RCHRES        INFLOW IVOL
PERLND    PWTGAS PODOXM                  RCHRES        INFLOW OXIF   1
PERLND    PWTGAS POHT                    RCHRES        INFLOW IHEAT  1
PERLND    SEDMNT SOSED  1       0.04     RCHRES        INFLOW ISED   1
PERLND    SEDMNT SOSED  1       0.08     RCHRES        INFLOW ISED   2
PERLND    SEDMNT SOSED  1       0.08     RCHRES        INFLOW ISED   3
PERLND    PQUAL  SOQUAL 1       0.85     RCHRES        INFLOW NUIF1  2
PERLND    PQUAL  IOQUAL 1                RCHRES        INFLOW NUIF1  2
PERLND    PQUAL  AOQUAL 1                RCHRES        INFLOW NUIF1  2
PERLND    PQUAL  SOQUAL 2       0.85     RCHRES        INFLOW NUIF1  1
PERLND    PQUAL  IOQUAL 2                RCHRES        INFLOW NUIF1  1
PERLND    PQUAL  AOQUAL 2                RCHRES        INFLOW NUIF1  1
PERLND    PQUAL  SOQUAL 3       0.70     RCHRES        INFLOW NUIF1  4
PERLND    PQUAL  IOQUAL 3                RCHRES        INFLOW NUIF1  4
PERLND    PQUAL  AOQUAL 3                RCHRES        INFLOW NUIF1  4
PERLND    PQUAL  SOQUAL 4       0.70     RCHRES        INFLOW OXIF   2
PERLND    PQUAL  IOQUAL 4       1.00     RCHRES        INFLOW OXIF   2
PERLND    PQUAL  AOQUAL 4       1.00     RCHRES        INFLOW OXIF   2
PERLND    PQUAL  SOQUAL 4    0.27038     RCHRES        INFLOW PKIF   3
PERLND    PQUAL  IOQUAL 4    0.38626     RCHRES        INFLOW PKIF   3
PERLND    PQUAL  AOQUAL 4    0.38626     RCHRES        INFLOW PKIF   3
PERLND    PQUAL  SOQUAL 4    0.00370     RCHRES        INFLOW PKIF   4
PERLND    PQUAL  IOQUAL 4    0.00529     RCHRES        INFLOW PKIF   4
PERLND    PQUAL  AOQUAL 4    0.00529     RCHRES        INFLOW PKIF   4
PERLND    PQUAL  SOQUAL 4    10.00417    RCHRES        INFLOW PKIF   5
PERLND    PQUAL  IOQUAL 4    14.29167    RCHRES        INFLOW PKIF   5
PERLND    PQUAL  AOQUAL 4    14.29167    RCHRES        INFLOW PKIF   5
  END MASS-LINK   54

  MASS-LINK       99
<-Volume-> <-Grp> <-Member-><--Mult-->     <-Target vols> <-Grp> <-Member->  ***
<Name>            <Name> x x<-factor->     <Name>              <Name> x x  ***
COPY      OUTPUT MEAN   1                RCHRES        INFLOW IVOL
COPY      OUTPUT MEAN   2                RCHRES        INFLOW OXIF   2
COPY      OUTPUT MEAN   3                RCHRES        INFLOW NUIF1  1
COPY      OUTPUT MEAN   4                RCHRES        INFLOW NUIF1  4
```

```
COPY      OUTPUT MEAN   5            RCHRES       INFLOW ISED   2
COPY      OUTPUT MEAN   6            RCHRES       INFLOW ISED   3
  END MASS-LINK   99

END MASS-LINK

END RUN
```

Appendix C: HSPF Model Land Use Classification versus FLUCCS Code

HSPF Model Land Use	FLUCCS Code
Agriculture general	1820
Agriculture general	2140
Agriculture general	2150
Agriculture general	2160
Agriculture general	2310
Agriculture general	2320
Agriculture general	2410
Agriculture general	2430
Agriculture general	2431
Agriculture general	2432
Agriculture general	2510
Agriculture general	2540
Agriculture general	2600
Agriculture general	2610
Agriculture tree crops	2200
Agriculture tree crops	2210
Agriculture tree crops	2240
Forest	4110
Forest	4120
Forest	4130
Forest	4200
Forest	4210
Forest	4280
Forest	4340
Forest	4370
Forest	4410
Forest	4430
High-density residential	1300
Industrial and commercial	1400
Industrial and commercial	1480
Industrial and commercial	1510
Industrial and commercial	1550
Industrial and commercial	1700
Industrial and commercial	1840
Industrial and commercial	8110
Industrial and commercial	8140
Industrial and commercial	8300
Industrial and commercial	8330
Industrial and commercial	8350
Low-density residential	1100

HSPF Model Land Use	FLUCCS Code
Low-density residential	1180
Low-density residential	1190
Medium-density residential	1200
Mining	1600
Mining	1620
Mining	7430
Open land and barren land	1660
Open land and barren land	1890
Open land and barren land	7200
Open land and barren land	7400
Open land and barren land	7410
Open land and barren land	8200
Open land and barren land	8320
Pasture	2110
Pasture	2120
Pasture	2130
Rangeland	3100
Rangeland	3200
Rangeland	3300
Water	5100
Water	5200
Water	5250
Water	5300
Water	5600
Water	8360
Wetlands	6110
Wetlands	6170
Wetlands	6181
Wetlands	6200
Wetlands	6210
Wetlands	6220
Wetlands	6250
Wetlands	6300
Wetlands	6410
Wetlands	6430
Wetlands	6440
Wetlands	6460
Wetlands	6500

Appendix D: Response from the Department to Comments from the SJRWMD on the DO and Nutrient TMDLs for the Main Stem of the Middle St. Johns River

August 6, 2009

Ms. Mary E. Brabham, P.E.
Middle St. Johns River Basin Program Manager
St. Johns River Water Management District
975 Keller Road
Altamonte Springs, FL 32714-1618

Re: Responses from the Florida Department of Environmental Protection (the Department) to comments from the St. Johns River Water Management District (SJRWMD) regarding the TMDLs that the Department proposed in June of 2009 for impaired waters in the Middle St. Johns River basin.

Dear Ms. Brabham:

Thank you very much for your letter dated on July 20, 2009. We appreciate the time and effort that you and your colleagues took to review the draft dissolved oxygen and nutrient TMDLs that we proposed for the impaired river segments of the Middle St. Johns River and to share your opinions and suggestions with us. We are looking forward to continuing to work with the SJRWMD to develop and implement TMDLs and restore impaired waters in the Middle St. Johns River basin. Please see our following responses to your comments.

<u>SJRWMD's Comments by Dr. Sherry Brandt-Williams:</u>

General Comments:

1. I think the target concentrations will be sufficient to minimize or eliminate algal blooms and allow SAV populations to continue to multiply in both lakes and throughout the river channel.
2. Methods for determining these concentrations are well founded on response relationships and historic loading data.
3. Use of Dr. Jia's HSPF model is fully warranted for determination of load reductions because of the good fit to empirical data.
4. I agree that low DO in this entire system is either related to the organic concentration in the water column and that it comes from both anthropogenic loading and from natural humic substances typical in black water systems. I therefore support the decision to allow nutrient TMDLs to provide the necessary DO protection.
5. A table indicating the percentage of load specifically from upstream river sources versus watershed loads would be helpful.
6. This report would benefit from an Executive Summary.

Specific Comments:

1. Why were hurricane and drought years removed from the results? These are normal fluctuations occurring in this system over the longer period of record. Did analysis with these data produce too high a variance in system performance?
2. Figure 1.2 – this does not show the main channel or the diversion channel of Deep Creek into the river.
3. In the initial analysis of water quality, was Chlorophyll a corrected for pheophytin? I see later in the report that one analysis did use corrected, but I am not clear on the remainder of the report.
4. Figure 2.7 – please label axis.

5. Please provide data and calculations for residence times in Harney and Monroe. Our data shows more similar residence times between the two lakes. This does not change any of the overall conclusions. I'm just curious.
6. Typos – pg 33 title change Do to Are different nutrient ….; pag 36 2nd full paragraph: can absorbs light, produce smaller amounts of …, 5th full p … because the ~~later~~ latter has a …; page 41 first heading: … what should be these targets be?; page 47 2nd full paragraph: … manner, to analyzing analyze the DO and …;

Response from the Department to Dr. Brandt-Williams' Comments:

1. For Dr. Brandt-Williams' general comments 1-4, the Department appreciates the support from SJRWMD on the TMDL targets we proposed. We also want to thank SJRWMD, especially Dr. Brandt-Williams, for providing data and information, suggestions, and a field tour through the Middle St. Johns River to help us better understand the system as we were developing the TMDLs.

2. For general comments 5 to 6, we will take Dr. Brandt-Williams' suggestions and add an Executive Summary and more detailed loading estimates to the report.

3. For specific comment 7, we believe that Dr. Brand-Williams raised a very valid question on whether data should be excluded from certain analysis. We agree with Dr. Brand-Williams that dry and hurricane years are normal fluctuations occurring in the system for which we are developing TMDLs. Theoretically, we should include all the data available to us in our analyses. After reanalyzing the flow for the main stem segments and Lake Jesup outlet, we realized that excluding the chl*a*, TN, and TP concentrations from 2003 and 2004 might not be totally supported by the flow data. We therefore decided to add these data back to the analyses for characterizing the functional relationships between chl*a* and nutrients, and then revised **Figures 3.1** and **3.2** of the TMDL report, accordingly. This revision does not influence the nutrient target setting because the chl*a* vs. nutrient functional relationships were not used to develop the nutrient criteria. This revision does cause the "achievable chl*a* concentration" to change based on the target TN and TP concentrations and the chl*a* vs. nutrient functional relationships (**Table 3.6** of the TMDL report). However, the change is relatively minor. Before this revision, the achievable chl*a* concentrations for the upstream and downstream segments were 5.6 μg/L and 9.6 μg/L, respectively. After the revision, the achievable chl*a* concentrations are 5.7 μg/L and 9.1 μg/L, respectively, for the upstream and downstream segments.

   However, after all the reanalyses were conducted, we decided that the chl*a*, TN, and TP concentrations from 2000 still would not be included in the chl*a* vs. nutrient functional relationship analyses. As Dr. Brandt-Williams surmised correctly in her comments, if we add in the data from 2000, the uncertainty of the functional relationship greatly increases. We agree with Dr. Brandt-Williams that the dry year is also part of the natural fluctuation occurring in the main stem of the Middle St. Johns River. However, the goal of the analyses of the functional relationship between chl*a* and nutrients is to find a relatively "typical relationship" that represents the long-term average condition. For the 10-year period that we used in our analysis (1996 through 2007), the total annual flow for 2000 was less than the 5th percentile of all the annual flows during the period. Thus, we believe that this was not a "typical" year. We don't want the functional relationship established using the other 9 years of data to be inappropriately skewed by data from this single year. We feel that it is appropriate to clearly describe what the model cannot do (describing the atypical condition) and focus on the average trend of the relationship.

4. Regarding specific comment 8, we will revise the map to include Deep Creek.

5. For specific comment 9, yes, all the chl*a* values included in the TMDL report are corrected chl*a* values. We will clarify that in Chapter 2 of the TMDL report.

6. We will address all the editing errors raised in specific comments 10 and 12.

7. For specific comment 11, the water residence times for Lake Harney and Lake Monroe were cited from a report provided by BCI for the period from 1995 through 2006. The report does not include the raw data used for the calculation. We will check with the consulting firm and find the raw data that were used for the calculation.

SJRWMD's Comments by Dr. Eric Marzolf:

General Comments:

7. I think the target concentrations are well considered and protective.
8. Express phosphorus concentration with three significant digits. The TP target is displayed as both 0.070 and 0.068 mg/L, but it appears the official target is 0.068. Correct?
9. Correct the GIS layers so that Jesup is spelled correctly.
10. In tables for containing the WBIDs, add the reach names also, see Table 4.6 for a good example.

Specific Comments:

11. Table 2.1 – Spelling typos
12. Figure 2.7 – Missing axis labels
13. Section 3.1 – What are the criteria changing the class of a waterbody from III to I based upon surface water withdrawals?
14. Pg 33 – Statement that data were excluded from 2003 and 2004 due to hurricanes; however the years of higher hurricane activity were 2004 and 2005. Explain?
15. Pg 33 – The Chl:nutrient ratio in Lake Jesup is greater than the SJR mainstem WBIDs due to combination of factors, including longer hydraulic residence times and lower color.
16. Figs 3.1 and 3.2 – Is there a mechanistic reason for the selection equation to fit the data? TP:Chl relationships are typically viewed as linear or logistic curves.
17. Pg 41 – General question about the term "assimilative capacity". It seems to me what we are trying to determine is the system's vulnerability to a pollutant, rather than its ability to assimilate a pollutant. Assimilation to me implies that the pollutant has been converted into a form that is no longer being transported downstream, eg. Sediment storage. I think conceptually it is correct to define targets protective of lakes and assume they will also be protective of river stretches, but not because the lakes assimilate the nutrients, but because the lakes have a lower tolerance for nutrients.
18. Pg 43 & Fig 3.4 – Determination of TN target from TP requires extrapolating beyond the available annual mean data. For comparison, District TP vs. TN data. The TN concentration associated with TP 0.060 ~ 1.5 mg/L, compared to 1.18.
19. Section 4 – I think it would be good to clarify further the relationships between the HSPF sub-basins and the impaired waterbody WBIDs. Some of the WBIDs include only the waterbody, while other include a portion of the watershed. Perhaps a table that lists each WBID and the HSPF basin which make up the watershed contributing to the WBID. Perhaps also a map with arrows indicating the flow paths and a well defined boundary for the watershed over which load reductions will be applicable under this TMDL.
20. Section 4.2.2 – I think this section would benefit from a greater discussion of how loads are calculated based upon land use, soils etc. Perhaps include a table of runoff coefficients used. Discussion of how re-use loads are incorporated.
21. Table 4.4 – Unclear whether this table contains percent total impervious or percent directly connected impervious, which is more important to HSPF when calculating nutrient loads.

22. Table 4.8 – Need to include the units.
23. Fig 4.8C – Show negative flow data.
24. Fig 4.9 – Lable the name of the USGS site and use linear Y-axis in C.
25. Tables 4.11 and others. Suggest replacing N/A with not applicable. N/A can mean either “not applicable” or “not available” and here the meaning is not applicable.
26. Tables 5.1 & 5.2 – Need to add the word “target” to titles
27. Table 6.2 – Title is redundant, TMDL daily load. Also, the units should be /day not /yr.

Response from the Department to Dr. Eric Marzolf’s Comments:

We appreciate Dr. Marzolf’s very thorough review.

1. For Dr. Marzolf’s general comments 13 through 16, we thank him and the SJRWMD’s support of the nutrient targets for the Middle St. Johns River segments. We will address all the editing comments. As for the final nutrient targets, they should be 0.07 mg/L for TP and 1.18 mg/L for TN. While we used three significant digits in deriving the TP target (0.068), because the method detection limit for most commonly used phosphorus analytical method is about 0.01 mg/L, we present the final TP target as 0.07 mg/L.

2. We will revise the TMDL report to address all the editorial comments in the specific comments section (specific comments 17, 18, 28, 31, and 32).

3. For specific comment 19, if we understand Dr. Marzolf’s question correctly, the Class I and Class III freshwater waterbodies have the same DO and nutrient criteria.

4. For specific comment 20, we reanalyzed the flow data for the main stem and Lake Jesup outlet, and found that our original decision to exclude the data from 2003 and 2004 is not totally supported by the flow data distribution. Therefore, we add the chl*a*, TN, and TP concentration data from these two years to the data set we used for chl*a* vs. nutrient relationship analyses.

5. For specific comment 21, we concur.

6. For specific comment 22, the relationship between chl*a* and nutrients in much of the published literature takes the form of a power equation (Baker et al., 1981; Chapra, 1997), which is the type of equation we used in the TMDL report. In fact, most of the early classic chl*a*-nutrient relationship characterized by researchers such as Jones and Bachman (1976) and Sakamoto (1966) all took the form of power equations. That is why we see the relationship between chl*a* and nutrients in the published literature taking the following forms:

   $\log(\mathrm{Chl}a) = a * \log(\mathrm{TP}) - b$
   $\log(\mathrm{Chl}a) = b + a * \log(\mathrm{TN})$

   Of course, when ”a” in the above equation is close to one, we can get a linear model. That represents a special case of the more general power equation.

   A logistic equation is used more often to represent the growth curve of organisms. It is more of a growth time series, with the standing stock being the Y-axis and time lapse the X-axis.

References:

Baker, L.A., P.L. Brezonic, and C.R. Kratzer. 1981. Nutrient loading – Trophic state relationships in Florida lakes.

Chapra, S.C. 1997. Surface water-quality modeling. WCB McGraw-Hill.

Jones, J.R., and R. Bachman. 1976. Prediction of phosphorus and chlorophyll levels in lakes. J Water Pollut Con F 48: 2176-2182.

Sakamoto, M. 1996. Primary production by phytoplankton community in some Japanese lakes and its dependence on depth. Arch. Hydrobiol. 62: 1-28.

7. For specific comment 23, we concur.

8. For specific comment 24, we agree with Dr. Marzolf that calculating the TN target concentration based on the TN/TP correlation slightly extrapolated beyond the available data range. The difference between the SJRWMD's dataset and our dataset is that we used annual average TN and TP concentrations, instead of the monthly averages used by the SJRWMD, to construct the correlation because we handle the nutrient assessment on an annual average basis. Because in our case the predicted target is so close to the lower end of the regression curve (the lowest annual average TP and TN concentrations calculated based on measured data were 0.07 mg/L and 1.32 mg/L, respectively, while the target TP and TN concentrations are 0.07 mg/L and 1.18 mg/L, respectively), we considered that, with such a small difference between the annual average TP and TN concentrations calculated using the measured data and the target TP and TN concentrations, the correlation between TN and TP should hold and a dramatic change in the relationship between the two nutrients is not expected.

9. For specific comments 25 and 26, we will add more information to Chapter 4 to describe the hydrologic connections between different HSPF sub-basins and the way in which HSPF handles the hydrology and water quality simulation. However, for more detailed information, readers probably still need to rely on the HSPF User's Manual.

10. For specific comment 27, the percent impervious areas in **Table 4.4** are DCIAs. In fact, in the text immediately preceding the table, we indicated that:

    For the TMDLs covered in this report, only the DCIAs were modeled as impervious areas. *The impervious areas that were not DCIAs were aggregated into the pervious land areas for model simulation. The following four land use types were considered to have DCIAs: low-, medium-, and high-density residential, and industrial. Percent impervious areas for each land use were assigned based on previous modeling experience in the St. Johns River Basin and finalized through the hydrology calibration.* ***Tables 4.4a*** *and* ***4.4b*** *show the percent areas that were considered impervious areas in the HSPF Model setup by the SJRWMD.*

    We will revise the table heading for **Table 4.4** to make it clearer that the impervious areas included in the table are DCIAs.

11. For specific comment 29, we can revise **Figure 4.8c** to show the negative value. However, it should be noted that the HSPF Model is not a hydrodynamic model and therefore does not handle reverse flow.

12. For specific comment 33, **Table 6.2** was specifically added to the report per EPA's request for a total maximum "daily" load. However, we will correct the typo in the table heading.

SJRWMD's Comments from Dr. Rob Mattson:

28. The targets for TN and TP look adequately protective.
29. My one concern was their use of 1999/2000 landuse & cover. 2004 is available now on our website, so the early land use/land cover data are outdated. They should use 2004 LU/LC.

Response from the Department to Dr. Rob Mattson's Comments:

1. For Dr. Mattson's comment 34, thanks for supporting the nutrient targets.

2. For Dr. Mattson's comment 35, 2000 land use was used in this TMDL because the load simulation was conducted using the HSPF Model set up by the SJRWMD. The model simulation period is 1995 through 2003. The year 2000 land use was chosen for model calibration and validation because 2000 was in the middle of the model simulation period. Using 2004 land use, while more up to date, is beyond the model simulation period, and therefore the land use effects were not reflected in the hydrology and water quality data used for the model calibration.

Again, we sincerely appreciate the input and contribution from the SJRWMD in developing these TMDLs. We will work closely with the water management district in future TMDL development and implementation and restore impaired waters in the Middle St. Johns River Basin.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section

ec: Chris Ferraro/DEP

Appendix E: Response from the Department to Seminole County Comments on the DO and Nutrient TMDLs for the Main Stem of the Middle St. Johns River

August 5, 2009

Ms. Kim Ornberg, PE
Principal Engineer
Water Quality Section
Seminole County Public Works
177 Bush Loop
Sanford, FL 32773

Re: Response to the comments from Seminole County on the Middle St. Johns River TMDLs

Dear Ms. Ornberg,

Thank you for your time and effort in reviewing the TMDLs that the Department recently proposed for impaired waters in the Middle St. Johns River Basin. We appreciate your detailed review and the well-thought-out questions that you presented in your comments.

In the order in which they were presented, the following are the comments from Seminole County and our responses:

Seminole County Comment 1:
Our first comments are general in nature and are questions regarding the decision making process. After Secretarial adoption of the previous Verified Impaired List (2003), there were numerous WBID's identified as "medium" priority; only those waterbodies/WBID's identified as "high" had TMDL's developed (i.e. Lake Jesup and Cranes Strand Drain in Seminole County) during the first cycle. We had thought that many of those "medium" priority WBID's would have TMDL's adopted during this current cycle. County staff was quite surprised to find that none of those WBID's which had been expected to have TMDL's developed had not been developed and that many WBID's which had not expected to have TMDL's developed, such as those impaired for fecal coliforms only (Gee Creek, Soldiers Creek, Smith Canal), did have TMDL's developed this cycle.

We were also under the impression that as stakeholders, the local governments/agencies would be given some input as to what impairments were more critical to us, thereby assisting the Department in the decision making process of what TMDL's to develop during this cycle. After participating in the Lake Jesup TMDL/BMAP, it would seem logical to develop TMDL's and/or BMAP's for nutrient impaired waterbodies upstream of Jesup that discharge directly into it, such as Lake Howell (2997B) and Bear Gully Lake (3009). In a proactive attempt to assist in the upcoming TMDL development, the County funded in-depth nutrient and hydrologic budget studies for each of these waterbodies mentioned, that were completed by Environmental Research & Design, Inc. While the information obtained from these studies is and will continue to be used by the County, it had originally been thought that this information would be provided to the Department for use in TMDL development.

We would respectfully like to request that the Department make available the rationale that was used to determine which impaired WBID would have a TMDL developed this cycle. With so many nutrient impairments in the MSJR Basin, it is very curious as to why the bulk of TMDL's (4 in the MSJR Basin, besides the main stem river & associated lakes) were developed for fecal coliform impairments, when it is well documented that these are very poor indicators of human health risk and there are no conventional stormwater BMP's available to address these questionable impairments. US EPA is actively seeking alternative indicator species and FSA (and others) is (are) currently funding a research project to identify a better, more reliable indicator. This would not seem to be the most cost effective use of limited resources for both the Department and the local government and other affected stakeholders.

Response:
Most of the TMDLs that we developed for the Middle St. Johns River Basin this year were Consent Decree–ordered TMDLs. Several TMDLs were also proposed for non-Consent Decree–listed waters that are hydrologically connected to the Consent Decree waters. These Consent Decree TMDLs have court-ordered legal deadlines that the Department and EPA are obliged to meet. Because of the large number of Consent Decree–listed waters that we needed to deal with this year for the entire state (more than 100), the relatively short time available to develop these TMDLs, limited staff power, and budget reductions, the Department did not have enough resources to tackle those non-Consent Decree waters that were previously verified through the state's IWR assessment process. These are the water segments that are on the Verified List and have a "Medium" priority for TMDL development. However, as most of the remaining Consent Decree TMDLs will be addressed in the next three years, developing TMDLs for state-verified waters will become the focus of the TMDL Program. At that time, we will certainly work very closely with local governments, water management districts, and other local stakeholders to determine the priorities for these waters.

Seminole County Comment 2:
Another process question is this: how can or why would the Department delist two waterbodies (Harney 2964 and Monroe 2893D) off of the adopted verified list for nutrients and then develop TMDL's for them? Why not leave them on the adopted verified list and then develop TMDL's for them?

Response:
Both Lake Harney and Lake Monroe were verified for DO and nutrient impairments in the Department's Cycle 1 assessment. In the Cycle 2 assessment that the Department conducted earlier this year, the impairments of these two waters were confirmed. We never delisted these two waters for the DO and nutrient impairments. Possibly the confusion was caused by the fact that these two waterbodies were not on the Cycle 2 Verified List posted on the Department's Website. In fact, the Cycle 2 Verified List only includes the impairments that the Department newly verified during the Cycle 2 assessment. The waterbody/parameters that were verified in the Cycle 1 assessment were not included on the Cycle 2 Verified List, to avoid having the Secretary sign a Verified List that readopts many verified impairments. Therefore, if a given waterbody-parameter is included in the Cycle 1 Verified List, as long as the particular waterbody-parameter is not included in the Cycle 2 Delist List, the verified impairment remains and we will develop a TMDL for the waterbody.

Seminole County Comment 3:
These are more specific comments:

First the "Nutrient and Dissolved Oxygen TMDLs for the Middle St. Johns River Segments between the Inlet of Lake Harney (2964) and the St. Johns River above the Wekiva River

(2893C)" document was reviewed. The basis for this TMDL report is that FDEP has determined that Lakes Harney and Monroe, as well as that portion of the St. Johns River between Lake Harney and the Wekiva River, are impaired for at least dissolved oxygen (DO). In the case of Lake Harney, Lake Monroe, and that portion of the St. Johns River between the Lake Jesup outfall and the Wekiva River, impairment was noted for nutrients as well.

Overall, the conclusion that nutrients are the basis for DO impairment for any TMDL report is predicated upon the following logic –

☐ DO levels are depressed below appropriate levels
☐ Low levels of DO are related to an increase in fixed organic carbon
☐ Higher levels of fixed organic carbon are related to nutrient supply
☐ Nutrient supply is elevated due to anthropogenic activities

FDEP's TMDL report addresses most of these issues, for most of the WBIDs in the TMDL. However, some concerns and/or areas where further assessments would be appropriate include the following:

1. Water quality influence of Lake Jesup not fully integrated into the TMDL conclusions
   ☐ Nutrient levels (especially TP) are higher for those WBIDs downstream of Lake Jesup compared to WBIDs upstream of Lake Jesup
   ☐ Levels of both chlorophyll-a (chl-a) and biological oxygen demand (BOD) are substantially higher in WBIDs below Lake Jesup (more than can be explained by nutrient levels in those WBIDs alone)
   ☐ The amount of chl-a "produced" per unit amount of nitrogen and phosphorus is higher for WBIDs below Lake Jesup than for WBIDs above Lake Jesup
   ☐ The amount of BOD associated with chl-a is greater in WBIDs below Lake Jesup than in WBIDs above Lake Jesup
2. The use of an appropriate background concentration of dissolved oxygen given the WBIDs proximity to wetlands and the high color present in the St Johns River and its tributaries

Evaluating the upstream and downstream correlations of Lake Jesup suggest that Lake Jesup plays an important role in structuring water quality for WBIDs 2893E, 2893D, and 2893C, which comprise Lake Monroe and portions of the St. Johns River just upstream and downstream of Lake Monroe. The following table displays median values for DO, BOD, chl-a, TN and TP for these WBIDs.

WBID	DO	BOD	Chl-a	TN	TP
2964A	6.9	2.0	4.18	1.42	0.07
2964	6.9	1.9	3.49	1.79	0.09
2893F	6.5	2.2	2.37	1.35	0.07
2893E	6.4	3.0	7.53	1.52	0.10
2893D	7.2	2.7	11.80	1.56	0.09
2893C	7.04	2.8	12.15	1.60	0.09

The average TN value (average of the medians) for those WBIDs above Lake Jesup (2964A, 2964, and 2893F) is 1.52 mg / liter, vs. 1.56 for those WBIDs below Lake Jesup (2893E, 2893D, and 2893C), an increase of less than 3 percent below the lake. For TP, values above Lake

Jesup average 0.077, vs. 0.093 mg / liter below Lake Jesup, an increase of approximately 21 percent below the lake.

Levels of chl-a for WBIDs above Lake Jesup average 3.35 µg / liter, vs. 10.49 for WBIDs below the lake, a more than 3-fold increase below the lake. Levels of BOD above and below Lake Jesup average 2.03 and 2.83 mg / liter, respectively, an increase in BOD of 40 percent below the lake.

The relationship between TN and chl-a and TP and chl-a is such that the same amount of TN and TP results in substantially more phytoplankton abundance in regions below Lake Jesup, as opposed to areas above Lake Jesup. These results were interpreted as evidence that significant amounts of phytoplankton (and apparently TP as well) are discharged into the St. Johns River from Lake Jesup.

When comparing Lake Monroe (below Lake Jesup) and Lake Harney (above Lake Jesup) levels of TN and TP are 7 and 29 percent higher in Lake Monroe, while levels of chl-a are nearly 3-fold higher in Lake Monroe. Levels of BOD are 35 percent higher in Lake Monroe, compared to Lake Harney. Average turnover times for Lakes Monroe and Harney are estimated at 23 and 15 days, respectively, values that could explain differences in chlorophyll-a due to differences in residence time, but which do not explain the difference in levels of TP. In contrast, the turnover time for Lake Jesup averages approximately 90 days. The long turnover time in Lake Jesup can explain some of the elevated levels of chl-a (i.e., longer time for phytoplankton to grow) but it cannot by itself explain the elevated levels of TP in Lake Jesup.

Given its influence on the system it seems appropriate to incorporate the full suite of influences of Lake Jesup discharges on water quality within the St. Johns River, especially for those WBIDs below Lake Jesup, is essential, but not fully investigated in this TMDL. For example, could various restoration activities in Lake Jesup fundamentally affect water quality such that downstream improvements might be noted as well? Could such projects (in Lake Jesup) be more valuable than stormwater retrofit projects within the Lake Monroe watershed, to protect Lake Monroe itself? A more integrated approach to TMDL development would be appropriate, wherein Lake Jesup BMAP projects are fully integrated to determine their potential downstream impacts on the St. Johns River and Lake Monroe.

As is associated with most TMDL efforts, and most water quality modeling efforts, there is large amount of variability associated with relationships between nutrient levels and phytoplankton abundance. For example, the r^2 value found when examining the relationships between chlorophyll-a and levels of TN and TP examined in this report ranged between 0.438 and 0.501. Consequently, approximately half or more of the variability in phytoplankton abundance appears to be due to factors other than nutrient availability alone.

Levels of phytoplankton in these WBIDs appear to be somewhat strongly correlated with BOD, with an additional relationship between BOD and color. As levels of color do not likely represent an anthropogenic influence, it will be important to have a thorough understanding of what is a natural “background” level of DO (based on seasonally changing levels of color) that is appropriate for these WBIDs. For example, the TMDL for Long Branch (in Orange County) uses a site specific alternative criterion (SSAC) for DO of less than 3 mg / liter. Work in the Everglades also suggests that the existing DO criterion for freshwater systems (5 mg / liter) is unattainable and inappropriate in that system. Reference stations used in FDEP’s TMDL for the Gordon River (located in the Picayune Strand in South Florida) also do not meet Florida’s DO standard. As diurnal fluxes in DO concentrations and other factors are a well-documented phenomena in many water bodies throughout Florida, a simple DO standard that does not account for the affects of salinity (when appropriate), water temperature, and time of day is increasingly out of sync with the scientific literature on water quality. The need for a potential SSAC for DO in these WBIDs is worth investigating, prior to pursuing potentially expensive retrofit projects for stormwater loads.

Response:

We are very glad that Seminole County agrees that water quality differs between the St. Johns River segments upstream of the Lake Jesup outlet and downstream of the Lake Jesup outlet. In fact, in Chapter 2 of the TMDL report, we analyze in detail the differences between the upstream and downstream segments. The general conclusion from the data analyses was that, while the nutrient concentrations (TN and TP) were slightly higher in the downstream segments than the upstream segments, the differences were relatively minor (see **Tables 2.5c** and **2.5d** of the TMDL report). What did appear to be dramatically different were the chl*a* concentrations in the upstream and downstream segments (see **Table 2.5a** of the TMDL report). This prompted the questions posed in Chapter 3—i.e., whether the functional relationships between chl*a* and nutrients were different in the upstream and downstream segments and what caused the observed differences.

After comparing all the available hydrologic information and water quality constituents of the upstream and downstream segments (pages 31 to 40 of the TMDL report), we concluded that the small difference in nutrient concentrations and large difference in chl*a* concentrations in the upstream and downstream segments were caused by the fact that the long-term average chl*a* concentration in Lake Jesup was about 6 to 7 times higher than the long-term average chl*a* concentration in the main stem of the St. Johns River (upstream of Lake Jesup), while the long-term average nutrient concentrations of the lake were less than 2 times higher than the nutrient concentrations in the main stem segments of the St. Johns River. The higher chl*a*-to-nutrient ratio in Lake Jesup (compared with those in the river main stem segments) was caused by the longer water residence time of Lake Jesup, which is about 3 months, compared with 15 to 20 days for the main stem lakes (Lake Harney and Lake Monroe).

We also compared the flows at the outlet of Lake Jesup and at the outlet of Lake Monroe and concluded that river dilution of the Lake Jesup discharge alone was mostly responsible for the observed upstream and downstream difference. The final conclusion from all these analyses was that the same TN and TP targets are appropriate for both the upstream and downstream segments, but expectations for the achievable chl*a* concentrations should be different. Even with the same target TN and TP concentrations, the downstream segments should have a higher expected chl*a* concentration because they receive discharge from Lake Jesup, which has a higher chl*a*-to-nutrient ratio due to the longer water residence time. We consider the higher achievable chl*a* concentration in the downstream segments to be a natural condition.

The impact of Lake Jesup on nutrient conditions in the main stem was also considered as part of the HSPF modeling exercise. The discharge of Lake Jesup into the main stem segment was incorporated into the HSPF Model as a boundary condition. When simulating the target loading, we found that, as long as we achieved the TMDL conditions that we developed for Lake Jesup and also applied the appropriate percent reductions to the upstream loads from the Upper St. Johns River and Econlockhatchee River (as well as the point and nonpoint sources in the watersheds immediately adjacent to these impaired waters), we should be able to achieve the main stem nutrient targets (Chapter 5). **In other words, for the Lake Jesup watershed, this TMDL does not ask for higher percent reductions than those established for the Lake Jesup TMDL.** We will add more summary language to Chapter 5 to describe how Lake Jesup loading is handled in the TMDL. In addition, we will create more tabulated information in Chapter 5 to split the needed percent reductions from the upstream loadings and percent reduction needed for the watershed immediately adjacent to the impaired water segments. We believe the added information will clarify the way in which we developed the target loadings.

We agree with you that there are uncertainties associated with the targets that we proposed. This is exactly why we attached the MOS to each TMDL that we develop, making sure that the conservative assumption will be protective enough to address the uncertainty identified in this TMDL report.

Target DO concentration is a complicated issue. Given the short time available to develop these TMDLs, we don't have enough information to identify and quantify the contributions from all the environmental factors that may influence DO concentrations in these main stem segments. These factors include, but are not limited to, DO enrichment through reaeration, DO consumption by water column BOD, DO enrichment through phytoplankton photosynthesis, DO consumption by phytoplankton and bacterioplankton, sediment oxygen demand (SOD), wetland low DO discharge, and the possible inhibitory effects of humic materials on the metabolic activities of bacterioplankton. To understand the DO environment in the Middle St. Johns segments more clearly, we would want to collect more information about these factors from local waters. We suggest that this be the goal of possible future research projects for these waters. For this TMDL, we took the approach of addressing nutrient loadings from anthropogenic sources. Once we achieve the nutrient goals, the resulting DO concentration will be considered the natural DO concentration, even if it is still lower than the existing 5.0 mg/L state criterion.

Seminole County Comment 4:
Second, the "Dissolved Oxygen TMDL for the Smith Canal (WBID 2962)" document was reviewed with the following comments:

1. Smith Canal is an intermittently dry Urban Ditch
   - ☐ Smith Canal was never intended to be swimmable and fishable and is designed, rather to manage and convey stormwater. In parts, it is concrete lined or consists of a manufactured canal cross section. Per the pictures in the TMDL report itself, it is shown to be a drainage ditch with overgrown vegetation.

Response:
There are two aspects to this comment. First, Smith Canal is a stormwater canal and was not built to support the designated use of a Class III water. This issue has been raised on many occasions but is beyond the scope of this TMDL report. For now, the state's water quality standard does not have a designated use classification specifically defined for urban stormwater canals. In other words, there are no water quality criteria specifically established for an urban stormwater conveyance system. Stream water quality criteria are applied to these urban systems. Reclassifying the designated use for the urban canal has been a topic of discussion, but no conclusions have been drawn from these discussions. However, Smith Canal discharges to the main stem of the St. Johns River. To achieve the nutrient targets for the main stem segments, the human land use areas are required to reduce the nitrogen and phosphorus loading by more than 30 percent from the existing condition. The Smith Canal TMDL per se only requires a 26 percent reduction in TP. In other words, the Smith Canal TMDL itself did not ask for a greater load reduction than what is needed to protect water quality in the main stem.

The second aspect of the comment is that factors other than nutrients (for example, overgrown vegetation) may also contribute to the low DO concentration in the canal. In fact, we also realized the uncertainties associated with the nutrient targets established to address the low DO condition in the system. This is why, in **Section 3.2.3** of the TMDL report, we put in a disclaimer, indicating that the TMDL focuses on addressing the anthropogenic TP. If we achieve the nutrient target and the DO concentration still does not meet the criterion, it would be considered natural, due to the input of organic materials from the surrounding woodland and the overgrowtn of emergent aquatic plants in the canal.

Seminole County Comment 5:

2. Inconsistent leap between correlation water quality parameters and a causal relationship.
   - ☐ Typically, high nutrient concentrations would be shown to correlate to chlorophyll-a concentrations. Then the Chlorophyll-a concentrations would correlate to BOD and there is no mention of these correlations in the report. Without this causal relationship it is insufficient to presume that because TP and DO are correlative, it is the nutrients alone is forcing DO levels below water quality standards. Possible alternatives to the correlation as presented include:
     - o High BOD is caused by the in-stream vegetation and the stagnant nature of the system, between storm events. Whereby, perhaps clearing the vegetation would increase water quality from a DO perspective (removing the DO depression during biomass respiration) but it could increase downstream passage of nutrients via removal of a biomass nutrient sink.
     - o High TP could be from release from sediments during low DO periods, rather than low DO being due to high TP.
   - ☐ Alternatively, in Smith Canal the dissolved oxygen standard may not properly account for warm waters with high biomass, similar to data showing that "reference" site stations in drainage ditches in the Everglades fail DO standards, despite the fact that they were used for "background" nutrient levels.

Response:

Nutrients can certainly influence the DO concentration in surface waters by influencing phytoplankton biomass, which, in most cases, can be represented by the chl*a* concentration. However, phytoplankton typically dominate water column communities in lakes and high-order streams and rivers. For example, the Middle St. Johns River main stem segments receive discharges from the Econlockhatchee River, which in turn receives discharges from the Little Econlockhatchee River, which in turn receives discharges from Crane Strand and Crane Strand Drain, so that the main stem segments can be considered a fourth-order stream (river) segments in which we would expect a certain level of phytoplankton. That is why we looked at the relationship between chl*a* and nutrient concentrations when we developed nutrient and DO TMDLs for these segments.

However, Smith Canal is different. It is a first-order flow-through system, which is typically characterized by relatively shallow water and low water residence time. Benthic algae and rooted or emergent aquatic vegetation typically dominate the primary producer communities in this kind of system. Chl*a* concentration is not necessarily the best indicator of the biomass of primary producers. This is one reason that we did not just look at the relationship between chl*a* and nutrient concentrations. In other words, in this kind of system, nutrients can influence DO concentration by influencing the biomass of benthic algae, which is not very well-represented by the chl*a* concentration. In addition, the sediment from the watershed that has accumulated at the canal bottom also provides nutrients to support the growth of aquatic vegetation, which also influences the DO concentration in the canal. This source of TP can also be cut back when the watershed TP loadings into the canal are controlled.

Another source of DO consumption is benthic bacteria. As you mentioned, the canal may receive a lot of organic carbon from riparian vegetation, which represents an important source of organic carbon for bacteria communities in the canal. These bacteria, while using organic carbon to produce their biomass, also need phosphorus for their growth. The excessive input of nutrients into the canal system can stimulate bacteria to take up more organic carbon to produce more bacteria biomass and therefore consume more oxygen in the system. This is another link between nutrient and DO concentration that cannot be manifested through the chl*a* and nutrient relationship. This is why, for Smith Canal, we addressed the impact of nutrients on DO concentration by looking at the DO and TP relationship directly instead of through the phytoplankton pathway.

TP release from sediment is certainly a possible reason for the correlation between DO and TP in some water systems. However, for Smith Canal, sediment nutrient release may not result in a significant correlation between DO and TP. Sediment nutrient release is typically observed when the sediment redox potential drops below -200 mvolt, which is often observed in the hypolimnion of some deep and stratified lakes and rivers. DO in Smith Canal, while lower than 5.0 mg/L on some occasions, has not created a totally anaerobic condition in the canal yet. Therefore, we feel that the significant correlation between DO and TP reflects that TP controls DO, instead of the other way around.

Temperature certainly is another very important factor that may influence the DO concentration in ambient waters, especially in a shallow system such as Smith Canal. However, during our field survey of the canal, the majority of the canal segments appeared to be covered by tree canopy, which may significantly decrease water temperature during the high-temperature summer season. Another interesting observation during the field survey was that the DO concentration was lower in the early morning, when the water temperature was relatively low, and became higher when the water temperature increased around noon. It appears that night-time DO consumption resulted from the respiration of benthic communities, including benthic algae and benthic bacteria, and the root systems of aquatic vegetation may contribute to low DO in the system, while during the daytime, benthic photosynthesis overcompensated the DO consumption by the same communities and caused DO concentrations to increase, even when the temperature was higher. Of course, this was based on a one-time field observation and therefore should only be considered as a hypothesis. We suggest that more studies be conducted for Smith Canal to better understand the factors that control DO concentration in the system. This TMDL addresses the TP loadings coming from anthropogenic sources. Any remaining low DO concentrations measured after the TP loading target is achieved can be considered a natural condition.

Seminole County Comment 6:

3. The impact of the newly constructed Regional Stormwater Facility (RSF) on Smith Canal.
    - ☐ The facility was constructed in 2009 as an online RSF designed to provide treatment for the entire Smith Canal Watershed and significantly alters the watershed hydraulic and water quality conditions of Smith Canal. The site will also include wetland restoration and storm event sampling to calculate stormwater treatment efficiency of the facility.
    - ☐ One of Seminole County’s existing sampling sites is located downstream of the proposed RSF and wetlands and since the construction of the RSF no longer represents the same site conditions as it which could have been influenced by wetlands both on and upstream of the RSF.

Response:
The data used to develop the Smith Canal DO TMDL were collected before 2009. The RSF should not play any role in causing the observed low DO concentration in Smith Canal before the facility was constructed.

Thank you very much for raising these good questions! We appreciate the opportunity to discuss these questions with people like you who are knowledgeable about these waters. We are looking forward to continuing to work with you on TMDL development and implementation. We do intend to work very closely with you and other local governments and stakeholders when we are ready to discuss the priorities for non-Consent Decree waters that were verified by the state.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section
Florida Department of Environmental Protection

ec: Chris Ferraro/DEP

Appendix F: Response from the Department to FDOT Comments from on the DO and Nutrient TMDLs for the Main Stem of the Middle St. Johns River

August 18, 2009

Mr. Joshua Boan
Environmental Process/Natural Sciences Manager
Environmental Research Administrator
605 Suwannee Street, MS 37
Tallahassee, FL 32399

Re: FDOT Comments on Newly Released Draft TMDLs

Dear Mr. Boan:

The Department appreciates the time and effort you and your staff put into reviewing these draft TMDLs. We have made necessary edits to some draft TMDL reports as a result of your comments. Because of your efforts, these final TMDLs will be improved. To aid you in reviewing our responses, we have included your comments, followed by a response to each (in blue), in the order in which they were presented.

Please contact me at Jan.Mandrup-Poulsen@dep.state.fl.us, if you have any further questions.

Sincerely,

Jan Mandrup-Poulsen, Administrator
Watershed Evaluation and TMDL Section
Florida Department of Environmental Protection

ec: Marjorie Bixby/FDOT
John Abendroth

DISTRICT 5 COMMENTS

GENERAL COMMENTS

The following comments relate to multiple TMDLs where specific comments are provided below for each of the TMDL documents.

1. The figures that show the WBIDs and also identify the "FDOT Local Roads" are not an accurate depiction of the roadways that FDOT is responsible for. Please isolate out those roads that are part of FDOTs responsibility from those controlled by the Cities and Counties.

   Response:
   Please specify which figures in the TMDL reports that include the aforementioned WBIDs have the “FDOT Local Roads”? This term does not seem to appear in any of the figures in the TMDL report. However, if we learn of such an instance, a footnote will be added to all such figures to note that the roads are for illustration purposes only and are not meant to be an accurate depiction of roadways for which FDOT is responsible.

The load reductions determined for the non-point sources, which include the WLA for the stormwater (under the MS4 permit) and the LA, have not been allocated but simply applied evenly between the WLA for Stormwater and the LA. Sufficient studies have not have not been presented or have not been completed to determine if an even distribution of the load reductions is justified, therefore some language acknowledging this (within the TMDL and ultimately within the Rule) should be put into both the TMDL documents and ultimately the rules to allow the ability to finalize (and therefore change the assigned reductions) under the BMAP. [WBIDS 2964A, 2964, 2893F, 2893E, 2893D, 2893C and 2962]

Response:
In 2001, the Department submitted to the Governor and Legislature a document outlining the intended process for the allocation of loads under the TMDL Program. One key provision of the proposal was to level the “playing field,” such that once stakeholders have the opportunity to meet and discuss what steps need to be taken and to get appropriate credit for those initiatives already completed, the specific allocations will be set by the agreements reached under the Basin Management Action Plan (BMAP). This process has been successfully used in several adopted BMAPs and has demonstrated the flexibility that remains after setting the initial reductions for stormwater-related allocations (LA and WLA_{sw}) at identical levels.

The laws of Florida form the underlying basis for the initial equal allocations. In particular, Paragraph 403.067(6)(b), Florida Statutes, states in part that:

“Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments. An initial allocation of allowable pollutant loads among point and nonpoint sources may be developed as part of the total maximum daily load. However, in such cases, the detailed allocation to specific point sources and specific categories of nonpoint sources shall be established in the basin management action plan…”

Additionally, each of the draft TMDL reports contains the following language in the NPDES Stormwater Discharges section in Chapter 6 to address the issue of allocation between the WLA for stormwater and the LA portions of the TMDL.

"It should be noted that any MS4 permittee is only responsible for reducing the anthropogenic loads associated with stormwater outfalls that it owns or otherwise has responsible control over, and it is not responsible for reducing other nonpoint source loads in its jurisdiction."

SPECIFIC COMMENTS

The following are specific comments that relate to the individual TMDL documents reviewed.

MIDDLE ST. JOHNS RIVER BASIN

Smith Canal (WBID 2962) DO

1. The modeling doesn't break out highways as a class but takes the 100 or so classes (FLUCCS) and combines them into 13 major classes, based largely on similarity of hydrologic response. Breakdown by basin, land use, etc. isn't presented. Are these types of more detailed land use/ land cover available? If so, have the loads for these land use/land cover breakdowns been computed? This information would be valuable to better assess allocation during BMAP process.

   Responses:
   It is correct that the HSPF Model takes the more than 100 FLUCCS land uses and combines them into 13 major classes based on the similarities of hydrologic response and pollutant dynamics. The aggregation was conducted to improve the efficiency of model setup, reduce the model simulation time, and make pollutant load estimation more efficient. The sub-basin specific land use and nonpoint source load estimates were not provided in the TMDL report because the report focused on the total pollutant loads that the impaired waters receive from the entire basin, instead of the detailed allocation of nonpoint source loads to the sub-basins. In addition, load allocation during the BMAP stage may be based on jurisdictional boundaries instead of hydrologic boundaries. Providing sub-basin specific loads may not be totally useful for the final allocation. However, if the FDOT needs the information, we would be glad to provide the results.

2. It is not clear how the HSPF modeling was performed and the results processed to determine if the target TN and TP concentration for the WBIDs was achieved and how the associated loads were calculated. There is no mention of whether the in-stream kinetics was considered. Were these considered?

   Response:
   We will take FDOT's suggestions to put into the TMDL report more information on how the HSPF Model deals with the in-stream processes of TP and nitrogen. Basically, the HSPF Model simulates the phosphorus and nitrogen dynamics in receiving waters using a RCHRES module. This module receives watershed loadings simulated by PERLND (loading from pervious watershed areas) and IMPLND (loading from impervious areas) modules and simulates the following:

   - *Sedimentation;*
   - *Resuspension;*
   - *Sediment release;*
   - *Uptake by algae, which turns inorganic nutrients into the organic form;*

- *The death and decay of algal cells, which turns organic nutrients back to inorganic forms;*
- *Nitrification, which turns ammonia into nitrate;*
- *Denitrification, which turns nitrate into nitrogen gas and causes the nitrogen to be lost to the atmosphere;*
- *Atmospheric deposition directly onto the surface of the receiving water; and*
- *The output of nutrients into the downstream segments.*

In addition, the impacts of light availability, temperature, and flow velocity on the growth and death of algae, which significantly influence nutrient dynamics in the receiving water, are also considered in the RCHRES module. More detailed descriptions of nutrient kinetics in receiving waters handled by the HSPF Model can be obtained from the following:

Bicknell, B.R., J.C. Imhoff, J.L. Kittle Jr., T.H. Jobes, and A.S. Donigian, Jr. 2004. *Hydrological Simulation Program–Fortran (HSPF): User's manual for Release 12.* U.S. Environmental Protection Agency, National Exposure Research Laboratory, Athens, GA, in cooperation with the U.S. Geological Survey, Water Resources Division, Reston, VA.

Lake Harney, St. Johns River Downstream of Lake Harney, St. Johns River above Lake Jesup , St. Johns River above Lake Monroe, Lake Monroe, St. Johns River above Wekiva River (WBIDS 2964A, 2964, 2893F, 2893E, 2893D and 2893C): DO/Nutrients

1. The modeling doesn't break out highways as a class but takes the 100 or so classes (FLUCCS) and combines them into 13 major classes, based largely on similarity of hydrologic response. Breakdown by basin, land use, etc. isn't presented. Are these types of more detailed land use/ land cover breakdowns available? If so, have the loads for these land use/land cover breakdowns been computed? This information would be valuable to better assess allocation during BMAP process. 2. It is not clear how the HSPF modeling was performed and the results processed to determine if the target TN and TP concentration for the WBIDs was achieved and how the associated loads were calculated. There is no mention of whether the in-stream kinetics was considered nor was there any indication that receiving water assimilation was evaluated. Were these considered? If there is no information or analysis of these instream/lake processes, the approach used may be overly conservative for determining the required load reductions in the upland areas and tributaries to meet the target concentrations of 1.18 mg/l TN and 0.07 mg/l TP.

   Response:
   It is correct that the HSPF Model takes the more than 100 FLUCCS land uses and combines them into 13 major classes based on the similarities of hydrologic response and pollutant dynamics. The aggregation was conducted to improve the efficiency of model setup, reduce the model simulation time, and more efficiently estimate pollutant loads. The sub-basin specific land use and nonpoint source load estimates were not provided in the TMDL report because the report focused on the total pollutant loads that the impaired waters receive from the entire basin, instead of the detailed allocation of nonpoint source loads to the sub-basins. In addition, load allocation during the BMAP stage may be based on jurisdictional boundaries instead of hydrologic boundaries. Providing sub-basin specific loads may not be useful for the final allocation. However, if the FDOT needs the information, we would be glad to provide the results.

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