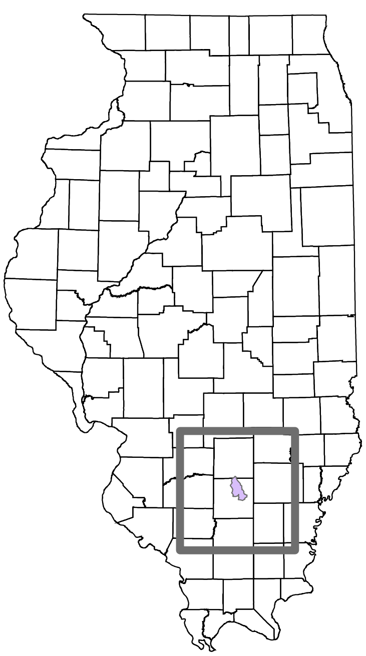
Illinois
Environmental
Protection Agency

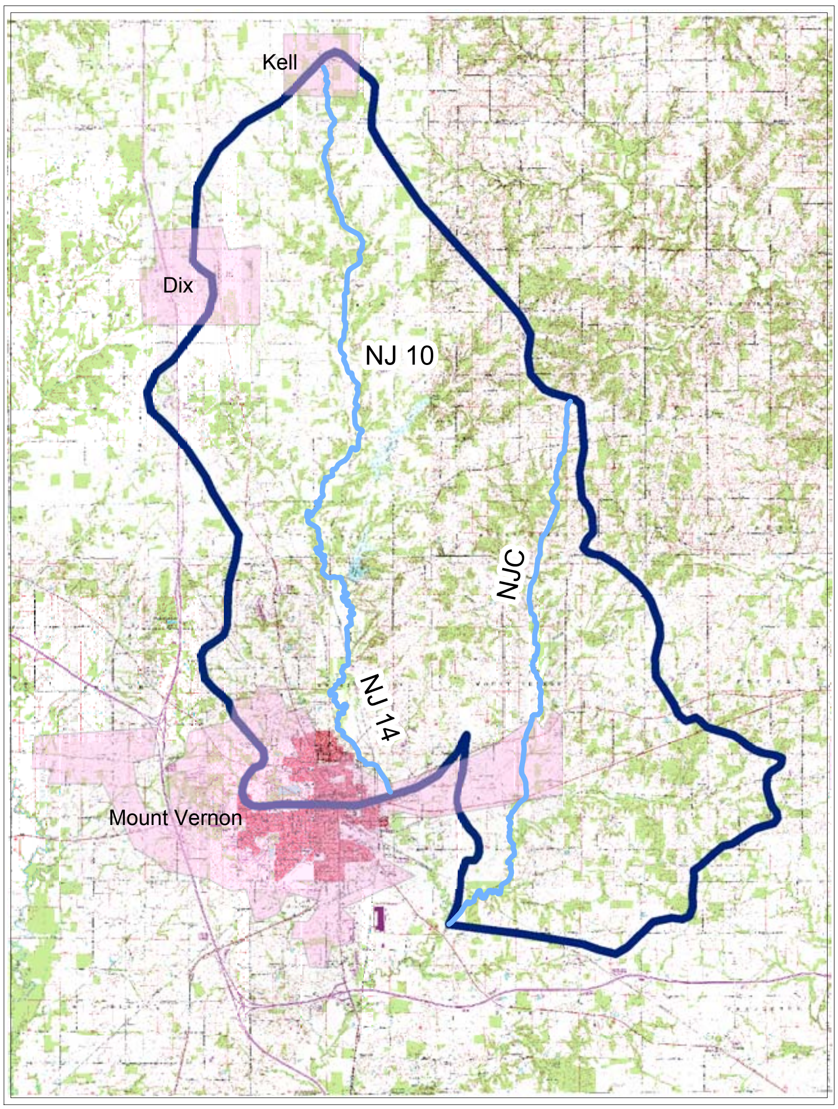
Bureau of Water
P.O. Box 19276
Springfield, IL 62794-9276

October 2004

IEPA/BOW/04-010

CASEY FORK TMDL REPORT





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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
WW-16J

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Management Section

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Marcia T. Willhite , Chief
Bureau of Water
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276

Dear Ms. Willhite:

The United States Environmental Protection Agency (U.S. EPA) has reviewed the final Total Maximum Daily Load (TMDL) for Casey Fork and Sevenmile Creek, including supporting documentation and follow up information. IEPA's submitted TMDL addresses Manganese loads that partially impair the General Use in approximately 11.8 miles of Casey Fork (Segment NJ10) and 10.2 miles of Sevenmile Creek (Segment NJC), and a Total Dissolved Solids (TDS) load that partially impairs the General Use in approximately 11.8 miles of Casey Fork (Segment NJ10). Based on this review, U.S. EPA has determined that Illinois' TMDLs for Manganese and TDS meet the requirements of Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, U.S. EPA hereby approves Illinois' TMDLs for the impaired reaches of Casey Fork and Sevenmile Creek. The statutory and regulatory requirements, and U.S. EPA's review of Illinois' compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Illinois's effort in this submitted TMDL, and look forward to future TMDL submissions by the State of Illinois. If you have any questions, please contact Mr. Kevin Pierard, Chief of the Watersheds and Wetlands Branch at 312-886-4448.

Sincerely yours,

Jo Lynn Traub
Director, Water Division

Enclosure

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Parameter changes for developing TMDLs

In May 2001 Illinois EPA entered into a contract with Camp Dresser & McKee Inc. to develop Total Maximum Daily Loads (TMDLs) for Casey Fork (NJ10), Casey Fork (NJ14), Sevenmile Creek (NJC), and Jaycees Lake. In the 1998 Section 303(d) List, Casey Fork (NJ10) was listed as impaired for the following parameters: manganese, low dissolved oxygen (DO), and total dissolved solids (TDS); Casey Fork (NJ14) was listed for manganese and low DO; Sevenmile Creek (NJC) was listed for low DO and other habitat alterations; Jaycees Lake was listed for nitrogen, siltation, total suspended solids (TSS), excessive algal growth, and chlorophyll-a.

Illinois EPA has since determined that at this time TMDLs will only be developed for those parameters with numeric water quality standards. These numeric water quality standards will serve as the target endpoints for TMDL development and provide a greater degree of clarity and certainty about the TMDL and implementation plans. As a result, a TMDL will not be developed for Jaycees Lake at this time, since numeric water quality standards do not exist for any of the parameters listed as causes of impairment. TMDL development for Sevenmile Creek will address the parameters of low DO and manganese, for which numeric water quality standards exist.

New data assessed in 2002 showed that Casey Fork segments NJ10 and NJ14 are only impaired for PCBs based on fish consumption use. This assessment was based on data extrapolated from segment NJ07. Since no new data is directly available from segments NJ10 and NJ14, Illinois EPA continued to develop TMDLs for the parameters originally listed for each of these two segments. Numeric water quality standards exist for manganese, DO, and TDS.

Causes of impairment not based on numeric water quality standards will be assigned a lower priority for TMDL development. Pending the development of numeric water quality standards for these parameters, as may be proposed by the Agency and adopted by the Illinois Pollution Control Board, Illinois EPA will continue to work toward improving water quality throughout the state by promoting and administering existing programs and working toward creating new methods for treating these potential causes of impairment.

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Contents

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Figures

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Tables

Acronyms

°C	degrees Centigrade
°F	degrees Fahrenheit
µS/cm	microSiemens per centimeter
AWQMN	Ambient Water Quality Monitoring Network
BMP	best management practices
BOD	biochemical oxygen demand
BOD_5	5-day biochemical oxygen demand
$CBOD_{20}$	20-Day Carbonaceous Biochemical Oxygen Demand
CCC	Commodity Credit Corporation
cfs	cubic feet per second
CRP	Conservation Reserve Program
CWA	Clean Water Act
DEM	Digital Elevation Model
DO	dissolved oxygen
EMC	event mean concentration
EQIP	Environmental Quality Incentive Program
FSA	Farm Service Agency
GIS	geographic information system
IBI	Index of Biotic Integrity
Illinois EPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
LA	load allocation
LC	loading capacity
LTA	long-term average
MBI	Macroinvertebrate Biotic Index
mg/kg	Milligrams per kilogram
mg/L	milligrams per liter
MOS	margin of safety
NCDC	National Climatic Data Center
NPDES	National Pollutant Discharge Elimination System
NWIS	National Water Inventory System
PRF	Plugging and Restoration Fund
SOD	sediment oxygen demand
STORET	*Storage and Retrieval*
TDS	total dissolved solids
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WLA	wasteload allocation
WMM	Watershed Management Model

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Executive Summary
Casey Fork Watershed

TMDL Fact Sheet

Basin Name:	Casey Fork	Casey Fork	Casey Fork
Impaired Segments:	NJ10	NJ14	NJC
Location:	Jefferson County, Ill.	Jefferson County, Ill.	Jefferson County, Ill.
Size:	3.5 miles	11.8 miles	10.2 miles
Primary Watershed Land Uses:	Grassland, forest, and agriculture	Grassland, forest, and agriculture	Grassland, forest, and agriculture
Criteria of Concern:	Manganese (Mn), TDS, and dissolved oxygen (DO)	Manganese and DO	Manganese and DO
Designated Uses Affected:	General use	General use	General use
Environmental Indicators:	Manganese, TDS, and DO monitoring	Manganese and DO monitoring	Manganese and DO monitoring
Major Sources:	Potentially contaminated groundwater, stagnant stream conditions, elevated instream temperatures, and nonpoint source loading from agriculture	Potentially contaminated groundwater, stagnant stream conditions, elevated instream temperatures, and nonpoint source loading from agriculture	Potentially contaminated groundwater, stagnant stream conditions, elevated instream temperatures, and nonpoint source loading from agriculture
Loading Allocation:	Mn = 166 lb/day TDS = 130,476 lb/day DO = No allocation	Mn = No allocation DO = No allocation	Mn = 91 lb/day DO = No allocation
Waste Load Allocation:	Zero; no significant point sources	Zero; no significant point sources	Zero; no significant point sources
Margin of Safety:	Implicit through data selected for development of TMDL; additional explicit of 10%	Implicit through data selected for development of TMDL; additional explicit of 10%	Implicit through data selected for development of TMDL; additional explicit of 10%

This Total Maximum Daily Load (TMDL) assessment for impaired water bodies in the Casey Fork Watershed addresses the sources of water body impairments, reductions in source loading necessary to comply with water quality standards, and the implementation of procedures to mitigate the impairment.

The TMDLs for manganese and TDS in Casey Fork segments NJ10, NJ14, and Sevenmile Creek segment NJC were based on analyses performed in a Monte Carlo simulation. The simulation for manganese in segments NJ10 and NJC showed a manganese reduction of 18 percent and 16 percent, respectively, necessary to achieve water quality standards. Results of the Monte Carlo simulation for TDS showed a 16 percent reduction for segment NJ10 necessary to achieve the water quality standard. A Monte Carlo analysis could not be conducted on segment NJ14 because only one data point was available. The potential source of manganese and TDS in the Casey Fork Watershed is contaminated groundwater. The groundwater is potentially contaminated by oil and gas activities and abandoned coal mines; however, further source identification is recommended. Contamination by oil and gas activities could stem from improperly functioning injection wells, abandoned injection wells, and leaking brine storage tanks. If source identification confirms that oil and gas activities are partially responsible for manganese and TDS impairments in the Casey Fork Watershed, the Division of Oil & Gas can regulate active facilities and treat abandoned facilities to mitigate the impairment. Confirmation that abandoned mines are a source of manganese and TDS in the watershed would require reclamation of the mines. Passive treatment for mine reclamation is recommended.

The TMDL analysis for DO in the Casey Fork Watershed was made through investigation of the relationship between DO, total organic carbon (TOC), 5-day biochemical oxygen demand (BOD_5), and reaeration in the creek. The likely source of DO impairments in the segment is primarily a lack of aeration caused by stagnant stream conditions and elevated instream temperatures. BOD loadings in runoff from nonpoint source loads may also contribute to DO impairments. However, examination of BOD in the stream segment showed that the concentrations of BOD are low and likely represent ambient conditions in the stream; therefore, reductions in BOD concentrations are not recommended at this time. Due to data limitations and technical considerations of implementation difficulties, a load allocation cannot be developed for reaeration or temperature, so allocations were not developed for the Casey Fork Watershed. Procedures to alleviate low DO caused by stagnant flows can be addressed with in-stream mitigation methods such as reaeration. Additionally, riparian buffer strips aid in decreasing instream temperatures, which could help to alleviate the DO impairment. Excess nutrients can cause excessive algal growth that can also deplete DO in streams; however, analytical tools were not used to assess nutrients, algae, and DO as no algal data were available for impaired segments. Methods to control nutrients were still included in the implementation plan such as buffer strips along the stream banks, which prevent nutrients in surface runoff from reaching the stream. The potential contributions to BOD from nonpoint source loads are attributed to agricultural land uses requiring mitigation methods to control nutrients in sediment erosion and surface runoff from the land contributing to impaired segments. Watershed controls include filter strips, which are similar to buffer strips in their ability to remove nutrients from surface runoff, and development of nutrient management plans to ensure that excess nutrients are not applied to agricultural fields.

Section 1
Goals and Objectives for Casey Fork Watershed (ILNJ07)

1.1 Total Maximum Daily Load (TMDL) Overview

A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDLs are a requirement of Section 303(d) of the Clean Water Act (CWA). To meet this requirement, the Illinois Environmental Protection Agency (Illinois EPA) must identify water bodies not meeting water quality standards and then establish TMDLs for restoration of water quality. Illinois EPA lists water bodies not meeting water quality standards every two years. This list is called the 303(d) list and water bodies on the list are then targeted for TMDL development.

In general, a TMDL is a quantitative assessment of water quality problems, contributing sources, and pollution reductions needed to attain water quality standards. The TMDL specifies the amount of pollution or other stressor that needs to be reduced to meet water quality standards, allocates pollution control or management responsibilities among sources in a watershed, and provides a scientific and policy basis for taking actions needed to restore a water body (U.S. Environmental Protection Agency [USEPA] 1998).

Water quality standards are laws or regulations that states authorize to enhance water quality and protect public health and welfare. Water quality standards provide the foundation for accomplishing two of the principal goals of the CWA. These goals are:

- restore and maintain the chemical, physical, and biological integrity of the nation's waters;
- where attainable, to achieve water quality that promotes protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water.

Water quality standards consist of three elements:

- the designated beneficial use or uses of a water body or segment of a water body;
- the water quality criteria necessary to protect the use or uses of that particular water body;
- an antidegradation policy.

Examples of designated uses are recreation and protection of aquatic life. Water quality criteria describe the quality of water that will support a designated use. Water quality criteria can be expressed as numeric limits or as a narrative statement.

Antidegradation policies are adopted so that water quality improvements are conserved, maintained, and protected.

1.2 TMDL Goals and Objectives for Casey Fork Watershed

The TMDL goals and objectives for the Casey Fork Watershed include developing TMDLs for all impaired water bodies within the watershed, describing all of the necessary elements of the TMDL, developing an implementation plan for each TMDL, and gaining public acceptance of the process. Following are the impaired water body segments in the Casey Fork Watershed, which are also shown in Figure 1-1:

- Casey Fork (NJ14)
- Casey Fork (NJ10)
- Sevenmile Creek (NJC)

The TMDL for each of the segments listed above will specify the following elements:

- Loading Capacity (LC) or the maximum amount of pollutant loading a water body can receive without violating water quality standards
- Waste Load Allocation (WLA) or the portion of the TMDL allocated to existing or future point sources
- Load Allocation (LA) or the portion of the TMDL allocated to existing or future nonpoint sources and natural background
- Margin of Safety (MOS) or an accounting of uncertainty about the relationship between pollutant loads and receiving water quality

These elements are combined into the following equation:

$$\mathbf{TMDL = LC = \sum WLA + \sum LA + MOS}$$

Each TMDL developed must also take into account the seasonal variability of pollutant loads so that water quality standards are met during all seasons of the year. Also, reasonable assurance that the TMDLs will be achieved is described in the implementation plan. The implementation plan for the Casey Fork Watershed describes how water quality standards will be attained. This implementation plan includes recommendations for implementing best management practices (BMPs), cost estimates, institutional needs to implement BMPs and controls throughout the watershed, and timeframe for completion of implementation activities.

1.3 Report Overview

The remaining sections of this report contain:

- **Section 2 Casey Fork Watershed Description** provides a description of the impaired water bodies and general watershed characteristics.
- **Section 3 Public Participation and Involvement** discusses public participation activities that occurred throughout the TMDL development.
- **Section 4 Casey Fork Watershed Water Quality Standards** defines the water quality standards for the impaired water bodies. Pollution sources will also be discussed in this section.
- **Section 5 Casey Fork Watershed Data Review** provides an overview of available data for the Casey Fork Watershed.
- **Section 6 Methodologies to Complete TMDLs for the Casey Fork Watershed** discusses the models and analyses needed for TMDL development.
- **Section 7 Methodology Development for Casey Fork** describes the analytical procedures used to examine Casey Fork.
- **Section 8 Total Maximum Daily Load for the Casey Fork Watershed** discusses the allowable loadings to water bodies to meet water quality standards and the reduction in existing loadings needed to meet allowable loads.
- **Section 9 Implementation Plan for Casey Fork** provides methods to reduce loadings to impaired water bodies.
- **Section 10 References** lists references used in this report.

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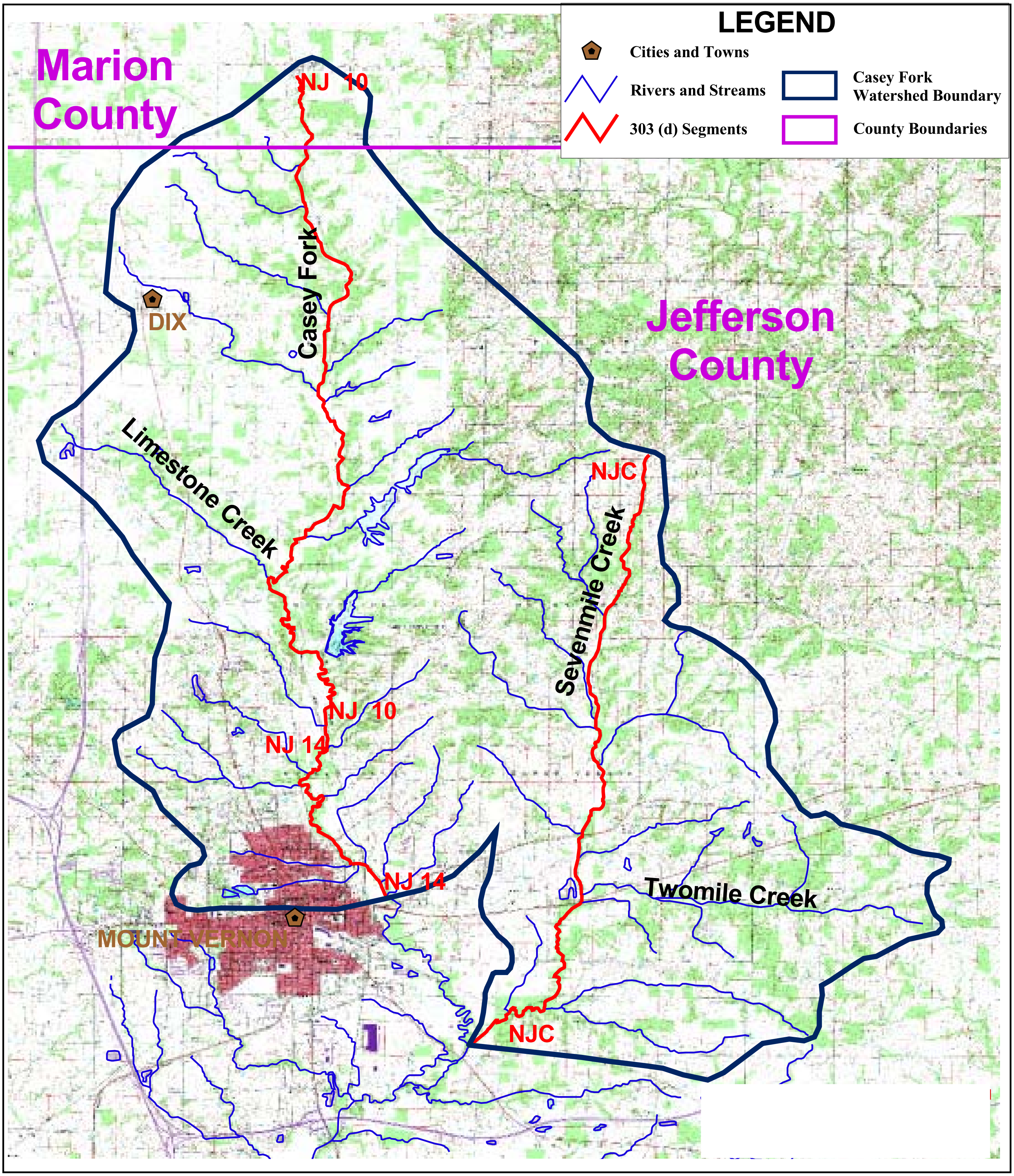

Figure 1-1
Casey Fork Watershed (ILNJ07)
Impaired Water Bodies

CDM

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Section 2
Casey Fork Watershed Description

2.1 Casey Fork Watershed Overview

The Casey Fork Watershed originates in the north central portion of Jefferson County, Illinois. The watershed is located within the U.S. Geological Survey (USGS) Big Muddy Basin (Hydrologic Unit Code 07140106). The watershed areas contributing to Casey Fork NJ10, NJ14, and Sevenmile Creek NJC encompass an area of approximately 74 square miles. Figure 1-1 shows the impaired river segments within the watershed. Impaired segments are shown in red. Table 2-1 lists the water body segments, water body size, and potential causes of impairment for each water body.

Table 2-1 Impaired Water Bodies in Casey Fork Watershed

Water Body Segment ID	Water Body Name	Size	Potential Causes of Impairment
NJ14	Casey Fork	3.5 miles	Manganese, dissolved oxygen (DO)
NJ10	Casey Fork	11.8 miles	Manganese, DO, total dissolved solids (TDS)
NJC	Sevenmile Creek	10.2 miles	DO, manganese

Land use data were obtained from the Critical Trends Assessment Land Cover Database of Illinois (IDNR 1996). Land use in the watershed is predominantly grassland followed by forested and agricultural land uses. Farmers in the area primarily raise cash crops, such as corn, soybeans, and alfalfa.

Soils within the Casey Fork Watershed are primarily moderately well drained soils. The surface layer is typically brown friable silt loam about seven inches thick. The subsurface is yellowish brown friable silty loam about three inches thick. The subsoil extends below a depth of 60 inches and is comprised of a silty clay loam (USDA 1995).

The climate in the Casey Fork Watershed is cold in the winter and warm in the summer. In the winter, October through March, the average temperature is 41 degrees Fahrenheit (°F) and the average daily minimum temperature is 31°F according to data collected at Mount Vernon, Illinois. Summer temperatures are typically 70°F with an average daily maximum of 82°F. Annual precipitation is approximately 42 inches of which 23 inches, approximately 54 percent, usually falls in April through September (NCDC 2002).

2.2 Stream Segment Site Reconnaissance of Casey Fork Watershed

The project team conducted a site reconnaissance of the Casey Fork Watershed on June 18, 2001. This section briefly describes the stream segments and the site reconnaissance.

Casey Fork looking north from Illinois Rt. 1550N.

Table 2-1 lists the impaired stream segments in the Casey Fork Watershed. Based on the 1998 303(d) list, Illinois EPA determined that two segments of Casey Fork were impaired, Segments NJ14 and NJ10. These segments are shown in Figure 1-1. Segment NJ14 flows from north to south and is located within Jefferson County, Illinois. During the site reconnaissance, this segment was observed from the bridge next to the Pacific Railroad from Illinois Route 1550N. Several old tires were observed, and the water appeared turbid or silty. This area of the river appears to have been diverted at some point in the past to accommodate the construction of a railroad line through the area. Segment NJ10 also flows from north to south and is located within Jefferson County, Illinois, with approximately the first mile of the segment located in Marion County. This segment was observed from County Roads 1750N and 1875N. Pastures and forest were observed on land adjoining this segment.

Bridge and railroad tracks over Casey Fork at Illinois Rt. 1550N, looking south.

Sevenmile Creek, looking north.

Sevenmile Creek, Segment NJC, originates in northeast Jefferson County, Illinois, and flows south-southwest towards Casey Fork. The confluence of Sevenmile Creek and Casey Fork is southeast of Mt. Vernon, Illinois, as shown in Figure 1-1. This segment was observed from the bridge on County Road 1625N, east of Akward Creek. Agricultural land was observed surrounding the segment, which had a slight riparian buffer zone. The segment north of the bridge had grassy banks. The segment south of the bridge had more substantial vegetation along the banks, and agricultural lands were further removed from the edges of the stream.

Section 3
Public Participation and Involvement

3.1 Casey Fork Watershed Public Participation and Involvement

Public knowledge, acceptance, and follow through are necessary to implement a plan to meet recommended TMDLs. It was important to involve the public as early in the process as possible to achieve maximum cooperation and counter concerns as to the purpose of the process and the regulatory authority to implement the recommendations. A public meeting was held to discuss the Casey Fork Watershed at 6:30 p.m. on December 5, 2001 at the Roland W. Louis Community Building in Mt. Vernon, Illinois. A total of 18 interested citizens including public officials and organizations other than Illinois EPA attended the public meeting.

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Section 4
Casey Fork Watershed Water Quality Standards

4.1 Illinois Water Quality Standards

Water quality standards are developed and enforced by the state to protect the "designated uses" of the state's waterways. In the state of Illinois, setting the water quality standards is the responsibility of the Illinois Pollution Control Board (IPCB). Illinois is required to update water quality standards every three years in accordance with the CWA. The standards requiring modifications are identified and prioritized by Illinois EPA, in conjunction with USEPA. New standards are then developed or revised during the three-year period.

Illinois EPA is also responsible for developing scientifically based water quality criteria and proposing them to the IPCB for adoption into state rules and regulations. The Illinois water quality standards are established in the Illinois Administrative Rules Title 35, Environmental Protection; Subtitle C, Water Pollution; Chapter I, Pollution Control Board; Part 302, Water Quality Standards.

4.2 Designated Uses

The waters of Illinois are classified by designated uses, which include: General Use, Public and Food Processing Water Supplies, Lake Michigan, and Secondary Contact and Indigenous Aquatic Life Use (Illinois EPA 2000). The only designated uses applicable to the Casey Fork are General Use.

The General Use classification provides for the protection of indigenous aquatic life, primary and secondary contact recreation (e.g., swimming or boating), and agricultural and industrial uses. The General Use is applicable to the majority of Illinois streams and lakes (Illinois EPA 2000).

4.3 Illinois Water Quality Standards

To make 303(d) listing determinations, Illinois EPA compares collected data from the water body to the available water quality standards developed by Illinois EPA for assessing water body impairment. Table 4-1 presents the water quality standards of the potential causes of impairment for TMDLs that will be developed in the Casey Fork Watershed. These water quality standards are further discussed in the remainder of the section.

Table 4-1 Summary of General Use Water Quality Standards for Casey Fork Watershed

Parameter	General Use Water Quality Standard
DO	Greater than 5.0 mg/L Greater than 6.0 mg/L (16 hours of any 24-hour period)
Manganese	1.0 mg/L
TDS	TDS = 1,000 mg/L

4.3.1 Dissolved Oxygen (DO)

DO is listed as a cause of impairment in Casey Fork segments NJ10 and NJ14 and Sevenmile Creek. The General Use water quality standard for DO is based on a minimum value of 5.0 milligrams per liter (mg/L). Therefore, DO levels shall not be less than 5.0 mg/L at any time. In addition, DO levels should not be less than 6.0 mg/L for more than 16 hours of any 24-hour period.

DO is listed as a cause of less than full support use attainment in streams if there is at least one General Use water quality violation based on the last three years of Ambient Water Quality Monitoring Network (AWQMN) data or at least one violation determined from the most recent basin survey or facility survey data.

4.3.2 Manganese

Manganese is listed as a cause of impairment in Casey Fork segments NJ10 and NJ14 and Sevenmile Creek. The General Use water quality standard for manganese is 1.0 mg/L and is based on total manganese. Manganese is listed as a cause of less than full support use attainment in streams if there is at least one General Use water quality violation based on the last three years of AWQMN data or at least one violation determined from the most recent basin survey or facility survey data.

4.3.3 TDS

TDS is listed as a cause of impairment in Casey Fork segment NJ10. The General Use water quality standard for TDS is 1,000 mg/L. TDS is listed as a cause of less than full support use attainment in streams if there is at least one General Use water quality violation of TDS in the last three years based on AWQMN data or at least one violation determined from the most recent basin survey or facility survey data. Conductivity measurements are used to determine the relative TDS level. If conductivity levels are greater than 1,667 microSiemens per centimeter (µS/cm), TDS is estimated to be a cause of impairment.

4.3.4 Parameters without Water Quality Standards

It should be noted that although formal TMDLs will not be developed for parameters without water quality standards in the Casey Fork Watershed, many of the management measures discussed in Section 9 of this report will result in reductions of the parameters listed in the 1998 and 2002 303(d) list that do not currently have adopted water quality standards. For Sevenmile Creek, the other habitat alterations impairment could be addressed by management measures for DO, which focus on reaeration.

4.4 Pollution Sources

As part of the Illinois EPA use assessment presented in the annual Illinois Water Quality Report, the causes of the pollutants resulting in a less than full support use attainment are associated with a potential source, based on data, observations, and other existing information. The following is a summary of the potential sources associated with the listed causes for the TMDL listed segments in this watershed. They are summarized in Table 4-2.

Table 4-2 Summary of Potential Sources of Pollutants

Potential Source	Associated Causes
Agriculture Nonirrigated crop production Pasture land Animal Holding/Management Areas	DO
Resource Extraction Mining Mine Tailings	TDS Manganese
Contaminated Sediments	Manganese DO

4.4.1 Agriculture

The southern Illinois area is largely agriculture land use. Rural grassland is the largest single category land use in the basin. Agricultural land uses within the watershed potentially contribute sediment, total suspended solids (TSS), nutrients, and biochemical oxygen demand (BOD) loads to the water resource loading. The amount that is contributed is a function of the soil type, slope, crop management, precipitation, total amount of cropland, and the distance to the water resource (Muir et al. 1997).

Erosion of the land and streambanks carries sediment to the streams resulting in higher levels of BOD, which impacts DO concentrations. This can also be caused by livestock on pastures and feedlots.

4.4.2 Resource Extraction

Resource extraction consists of both active mining and abandoned mine lands. Runoff and discharges from mines can contain TDS, metals, TSS, and can affect the pH of the stream, lake, or reservoir. There are currently 47 permitted coal mines with 169 authorized discharges in the Big Muddy River basin. In addition, 1,177 inactive or abandoned mines have been identified. Mining is most concentrated in Beaucoup Creek, Galum Creek, Little Muddy River, Pond Creek, Hurricane Creek, and Rend Lake watersheds (Muir et al. 1997). Mining activity does not appear to be extensive within the Casey Fork Watershed as there are currently no permitted mines within the watershed and one abandoned mine was identified.

Drainage from the mines can be impacted by contact with exposed soil, spoil piles, or pumped water from pits. Acid mine drainage occurs when water and oxygen come in contact with iron pyrite material. This combination makes ferrous iron and sulfuric acid, creating acidic runoff and impacting the stream pH. Although acid mine drainage may come from active mines, most acid mine drainage entering streams is from abandoned mine lands.

4.4.3 Contaminated Sediments

Sediments are carried to streams, lakes, and reservoirs during runoff conditions and are generally deposited in streambeds or lake bottoms. Constituents contained in sediment may include nutrients, which can impact BOD loads. Contaminated sediments containing metals can originate from urban areas or mining locations. Both agricultural lands and urban areas contribute to the nutrient loading in the sediment.

Suspended sediments settle out to stream bottoms during periods of low flow. During periods of high flow, sediments are resuspended and carried downstream to be deposited in another location. Once the sediment reaches a lake or reservoir, the sediments are deposited and typically accumulate in these areas. The source of the contaminated sediment can therefore be located much farther upstream than the location detected.

Contaminated sediments can slowly leach contaminants to the water column, thereby being a continual source of impact to the water body. Phosphorous is commonly released from sediment into the water column especially when anoxic conditions persist.

4.4.4 Urban Runoff/Storm Sewers

Urban areas in the Casey Fork Watershed constitute a small percentage of land use in the watershed; however, polluted runoff from urban sections can be significant. Runoff from urban areas reaches streams or lakes either by sheet flow runoff or through storm sewer discharges. The runoff can originate from any number of areas including highways; roadways; parking lots; industrial, commercial, or residential areas; or undeveloped lands. Phosphorous, which can influence BOD loads, can originate from fertilizer use, natural phosphorous levels in sediment, and from sanitary waste where combined sewer overflows are present.

Section 5
Casey Fork Watershed Data Review

5.1 Existing Data Review

The following data sources were reviewed for model selection and analysis:

- mapping data
- topography data
- flow data
- precipitation data
- temperature data
- existing water quality data
- land use
- soil data
- cropping practices
- reservoir characteristics
- point sources
- dairy and animal confinement locations
- septic systems

5.1.1 Mapping Data

USGS quadrangle maps (scale 1:24,000) were collected for the watershed in paper and electronic form. These were utilized for base mapping.

5.1.2 Topography Data

A Digital Elevation Model (DEM) was used to delineate watersheds in a geographic information system (GIS) for impaired segments NJ10, NJ14, and NJC. A DEM is a digital representation of the landscape as a GIS-compatible grid in which each grid cell is assigned an elevation. DEMs of 90-meter resolution were downloaded from the BASINS database (USEPA 2002a) for watershed delineation. GIS watershed delineation defines the boundaries of a watershed by computing flow directions from elevations and locating elevation peaks on the DEM. The GIS-delineated watershed was checked against USGS 7.5-minute topographic maps to ensure agreement between the watershed boundaries and natural topographic boundaries. Figure 5-1 at the end of this section shows the location of historic flow and water quality gages for the Casey Fork Watershed. The subwatershed boundaries define the area investigated for causes of impairments in each segment. Purple areas in Figure 5-1 represent features of the topographic maps that have been updated through aerial photography, but have not been field verified.

5.1.3 Flow Data

Analyses of the Casey Fork Watershed require an understanding of flow through the impaired stream segments. There is no active stream gage within the impaired segments of the Casey Fork Watershed. Therefore, the drainage area ratio method, represented by the following equation, was used to estimate flows within the subwatersheds.

$$Q_{gaged}\left(\frac{Area_{ungaged}}{Area_{gaged}}\right) = Q_{ungaged}$$

Where: Q_{gaged} = Streamflow of the gaged basin
$Q_{ungaged}$ = Streamflow of the ungaged basin
$Area_{gaged}$ = Area of the gaged basin
$Area_{ungaged}$ = Area of the ungaged basin

The assumption behind the equation is that the flow per unit area is equivalent in watersheds with similar characteristics. Therefore, the flow per unit area in the gaged watershed times the area of the ungaged watershed will result in a flow for the ungaged watershed.

Figure 5-1 shows three historic flow gages located in the Casey Fork Watershed and Table 5-1 summarizes available mean daily flow information from these stations. The non-continuous flow records represent an instantaneous flow measurement and the continuous records are mean daily flow values.

Table 5-1 Historical Flow Information for the Casey Fork Watershed

USGS Gage Number	Gage Location	Period of Record
05595800	Sevenmile Creek near Mt. Vernon, Illinois	1974 - 1982 (non-continuous)
05595820	Casey Fork at Mount Vernon, Illinois	1985 - 2000 (continuous)
05595830	Casey Fork at Route 37 near Mt. Vernon, Illinois	1980 (continuous)

USGS gage 05595820 (Casey Fork at Mt. Vernon, Illinois) was chosen as an appropriate gage from which to compute flow through segments NJ10, NJ14, and NJC. Gage 05595820 captures flow from a drainage area of 77 square miles in the Casey Fork Watershed. The gage is located at the confluence directly downstream of impaired segments NJ14 and NJC. The Mt. Vernon Wastewater Treatment Plant is upstream of the gage and therefore its average flow of 3 cfs was subtracted from all values for this gage. Daily streamflow data for the gage were downloaded from the USGS National Water Inventory System (NWIS) for the entire period of record from October 10, 1985 to September 30, 2000 (USGS 2002a). Figure 5-2 shows average monthly flows over the period of record through segments NJ10, NJ14, and NJC calculated from the drainage area ratio method using gage 05595820. Flows are higher in the spring months of March though May. For Casey Fork segment NJ10, average monthly flows range from 0 to 76 cubic feet per second (cfs) with a mean annual flow of 33 cfs. Average monthly flows in Casey Fork segment NJ14 range from 1 to 102 cfs with a mean annual flow of 45 cfs. For Sevenmile Creek segment NJC, average monthly flows range from 0 to 65 cfs with a mean annual flow of 27 cfs. The 7Q10 flow (lowest average seven consecutive day low flow with an average recurrence frequency of once in 10 years) is typically utilized as the critical low flow for National Pollutant Discharge Elimination System (NPDES) permitting and is estimated to be zero for segments NJ10, NJ14, and NJC (ISWS 2002).

5.1.4 Precipitation and Temperature Data

As discussed in Section 2.1, the Casey Fork Watershed is located within Jefferson County. One site with historical temperature and precipitation data was identified in Jefferson County through the National Climatic Data Center (NCDC) database. Daily precipitation and temperature data for Jefferson County was extracted from the NCDC database for the years of 1985 through 2001. Table 5-2 lists the station details for the Jefferson County gage.

Table 5-2 Historical Precipitation Data for the Casey Fork Watershed

NCDC Gage Number	Station Location	Period Record
5943	Jefferson County (Mt. Vernon)	1901 - present

Table 5-3 Average Monthly Precipitation in Jefferson County from 1985-2001

Month	Average Precipitation (in)
January	2.6
February	3.0
March	3.3
April	4.4
May	4.5
June	4.1
July	3.6
August	2.9
September	3.1
October	2.5
November	4.7
December	2.7
Average Annual	41.4

Table 5-3 shows the average monthly precipitation of the dataset developed for Jefferson County for the years 1985 to 2001. The average annual precipitation over the same period is approximately 41 inches for Jefferson County.

5.1.5 Water Quality Data

Three historical water quality stations exist within the impaired segments of the Casey Fork Watershed and are presented in Table 5-4. This table provides the location, station identification number, and the agency that collected the water quality data. Location and station identification number are also shown in Figure 5-1.

Table 5-4 Historical Water Quality Stations for the Casey Fork Watershed

Location (Segment ID)	Station Identification Number	Data Collection Agency
Casey Fork (NJ 10)	NJ 10	Illinois EPA Division of Water Pollution Control
Casey Fork (NJ 14)	NJ 14	Illinois EPA Division of Water Pollution Control
Sevenmile Creek (NJC)	NJC 01	Illinois EPA Division of Water Pollution Control

The impaired water body segments in the Casey Fork Watershed were presented in Section 2. For Casey Fork segments NJ10, NJ14, and Sevenmile Creek segment NJC, there is one historic water quality station within each segment. Table 5-5 summarizes available historic water quality data since 1990 from the USEPA *Storage and Retrieval (STORET)* database associated with impairments discussed in Section 2 for the Casey Fork Watershed.

Table 5-5 Water Quality Data for the Casey Fork Watershed

Sample Location and Parameter	Period of Record Examined for Samples	Number of Samples
Casey Fork Segment NJ10; Sample Location NJ10		
Manganese	7/31/95-2/22/96	2
TDS	7/31/95-2/22/96	2
DO	7/31/95-2/22/96	2
Casey Fork Segment NJ14; Sample Location NJ14		
Manganese	8/17/95	1
DO	8/17/95	1
Casey Fork Segment NJC; Sample Location NJC01		
DO	8/3/95-9/25/00	4
Manganese	8/3/95-9/25/00	4

5.1.5.1 Casey Fork Water Quality Data

There is one active water quality station in each impaired stream segment in the Casey Fork Watershed as shown in Figure 5-1. The water quality station data for each segment were downloaded from the *STORET* on-line database for the years of 1990 to 1998 (USEPA 2002b). Data collected after 1998 were available from the Illinois EPA and were incorporated into the electronic database. The data summarized in this section include water quality data for impaired constituents in the Casey Fork Watershed as well as constituents used in modeling efforts. The raw data are contained in Appendix A.

5.1.5.1.1 Manganese and TDS

Table 5-6 summarizes historical manganese and TDS data since 1990 from the USEPA *STORET* database and recent data not yet entered into the *STORET* database for impaired segments in the Casey Fork Watershed. The raw historical water quality data is contained in Appendix A. For impairments on Casey Fork segments NJ10 and Sevenmile Creek segment NJC, the average of the data sets is below the water quality standard but the maximum values observed do exceed the water quality standards for manganese and TDS. For the manganese impairment in Casey Fork Segment NJ14, the single sample exceeds the water quality endpoint. The historical water quality samples were also taken during months with historically varying flow conditions.

Table 5-6 Existing Manganese and TDS Water Quality Data and TMDL Endpoints (USEPA 2002b)

Sample Location and Parameter	Endpoint (mg/L)	Period of Record and Number of Data Points	Mean	Maximum	Minimum
Casey Fork Segment NJ10; Sample Location NJ10					
Manganese	1.0	7/31/95-2/22/96; 2	0.9	1.1	0.8
TDS	1,000	7/31/95-2/22/96; 2	730	1,093	366
Casey Fork Segment NJ14; Sample Location NJ14					
Manganese	1.0	8/17/95; 1	1.1	1.1	1.1
Sevenmile Creek Segment NJC; Sample Location NJC01					
Manganese	1.0	8/3/95-9/25/00; 4	0.5	1.1	0.2

Historical flow data were presented in Section 5.1.3. The flow values during the historical sampling events for manganese and TDS are presented in Table 5-7. As discussed in Section 5.1.3, the flow data were calculated from USGS gage 05595820. The flow for each sample date was compared to the monthly average flow shown in Figure 5-2 for the month the sample was taken. Based on this comparison, all samples were taken at below average flow values except for the September 25, 2000 sampling in Sevenmile Creek. This suggests that most historical samples were taken under baseflow conditions in Casey Fork and Sevenmile Creek.

Table 5-7 Manganese and TDS Sampling Events and Associated Flow Values

Sample Location	Date	Flow (cfs)	Mn (mg/L)	TDS (mg/L)
Casey Fork (NJ10)	7/31/1995	1.7	1.1	366
Casey Fork (NJ10)	2/22/1996	5.3	0.79	1,093
Casey Fork (NJ14)	8/17/95	2.0	1.1	–
Sevenmile Ck (NJC01)	7/31/1995	1.4	0.2	–
Sevenmile Ck (NJC01)	2/22/1996	4.41	0.29	–
Sevenmile Ck (NJC01)	7/17/2000	3.52	0.53	–
Sevenmile Ck (NJC01)	9/25/2000	11.01	1.1	–

5.1.5.1.2 DO

Table 5-8 summarizes the available historic DO data since 1990 from the USEPA *STORET* database and recent data not yet entered into the *STORET* database for impaired segments in the Casey Fork Watershed (raw data contained in Appendix A). The average DO concentration for each segment is above the water quality standard of 6.0 mg/L (16 hours of any 24-hour period), but the minimum values observed for all segments are less than the water quality standard of 6.0 mg/L.

Table 5-8 Existing DO Water Quality Data and TMDL Endpoints for Casey Fork Watershed Segments NJ10, NJ14, and NJC (USEPA 2002b and Illinois EPA 2000)

Sample Location and Parameter	Endpoint (mg/L)	Period of Record Examined for Samples and Number of Data Points	Mean (mg/L)	Maximum (mg/L)	Minimum (mg/L)
Casey Fork Segment NJ10; Sample Location NJ10					
DO	6.0 (16 hours of any 24-hour period	7/31/95-2/22/96; 2	7.0	11.1	2.9
Casey Fork Segment NJ14; Sample Location NJ14					
DO	6.0 (16 hours of any 24-hour period	8/17/95; 1	4.1	4.1	4.1
Casey Fork Segment NJC; Sample Location NJC01					
DO	6.0 (16 hours of any 24-hour period	8/3/95-9/25/00; 4	6.1	10.5	3.2

Historical flow data were presented in Section 5.1.3. The flow values during the historical sampling events for DO are presented in Table 5-9. The flow for each sample date was compared to the monthly average flow shown in Figure 5-3 for the month the sample was taken. Based on this comparison, all samples in Table 5-9 were taken at below average flow values except for the sample taken on Sevenmile Creek on September 25, 2000. This could suggest that the DO impairments are occurring during low flow values for the segments. Low flow values within the stream segment result in stagnant conditions, which could decrease the amount of aeration occurring in the stream. In addition, the days with DO impairment occurred between May and September which are typically warm weather months. Elevated stream temperatures affect the aquatic environment by limiting the concentration of DO in the water column. For example, the DO concentration for 100 percent air saturated water at sea level is 14.6 mg O_2/L at 0 degrees Centigrade (°C) (32°F) and decreases to 8.6 mg O_2/L at 25°C (77°F) (Brown and Brazier 1972).

Table 5-9 DO Sampling Events and Associated Flow Values

Sample Location	Date	Flow (cfs)	DO (mg/L)
Casey Fork (NJ10)	7/31/1995	1.7	2.9
Casey Fork (NJ10)	2/22/1996	5.3	11.1
Casey Fork (NJ14)	8/17/1995	2.0	4.1
Sevenmile Ck (NJC01)	7/31/1995	1.4	3.2
Sevenmile Ck (NJC01)	2/22/1996	4.4	5.8
Sevenmile Ck (NJC01)	7/17/2000	3.5	4.8
Sevenmile Ck (NJC01)	9/25/2000	11.0	10.5

5.1.6 Land Use

The Illinois Natural Resources Geospatial Clearinghouse distributes the Critical Trends Assessment Land Cover Database of Illinois. This database represents 23 land use classes created by satellite imagery captured between 1991 and 1995. The data were published in 1996 and are distributed by county in grid format for use in GIS.

The GIS-delineated watersheds for the Casey Fork impaired segments were used to obtain the land use from the Critical Trends Assessment Land Cover grid. Table 5-10 lists the land uses contributing to the Casey Fork Watershed as well as each land use area and percent of total area.

Table 5-10 Land Use for the Casey Fork Watershed

Land Use	Area (acres)	Percent of Total
Rural Grassland	19,283	41
Deciduous	12,187	26
Row Crop	8,241	18
Small Grains	3,025	6
Forested Wetland	1,501	3
Urban Grassland	1,049	2
Medium Density	704	2
Open Water	366	1
High Density	363	1
Shallow Water/Wetlands	191	0
Orchards/Nurseries	139	0
Coniferous	23	0
Swamp	12	0
Shallow Marsh/Wetlands	6	0
Deep Marsh	3	0
Total	**47,093**	**100**

5.1.7 Point Sources and Animal Confinement Operations

5.1.7.1 WWTPs

The Mt. Vernon Wastewater Treatment Plant is located on the Casey Fork River; however, the plant is downstream of all impaired segments. There are three other minor wastewater discharges with the watershed. The flow and load from these facilities is very small and represents an insignificant portion of the load in the watershed and, therefore, they will not be included in the analyses.

5.1.7.2 Coal Mines and Oil and Gas Fields

Acid mine drainage from coal mines could contribute to manganese and TDS concentrations in a watershed. Data from the Illinois Natural Resources Geospatial Data Clearinghouse were reviewed for coal mines, oil fields, and non-coal mines within the Casey Fork Watershed from the following references (full citation provided in Section 10):

- Chenoweth, Cheri, 1998, Areas Mined for the Springfield (No. 5) Coal in Illinois
- Stiff, Barbara J., 1997, Areas Mined for Coal in Illinois - Part 1
- Stiff, Barbara J., 1997, Areas Mined for Coal in Illinois - Part 2
- Coal Section, Illinois State Geological Survey, 1991, Point Locations of Active and Abandoned Coal Mines in Illinois
- Illinois Office of Mines and Minerals, 1998, Coal Mine Permits Boundaries in Illinois
- Staff, ISGS, 1996, Non-coal Underground Mines of Illinois
- Staff, ISGS, 1996, Non-coal Underground Mines of Illinois - Points
- Illinois State Geological Survey, not published, Oil and Gas Fields in Illinois

Figure 5-3 presents the findings from these databases for extraction operations in the Casey Fork Watershed. No coal mines were identified within the Casey Fork segment NJ10 subwatershed; however, there were four oil and gas fields identified in the NJ10 subwatershed. One abandoned mine was identified in the Sevenmile Creek segment NJC subwatershed. This mine was abandoned before 1932 and is named Lynch Coal Bank. No non-coal mines were located in the Casey Fork Watershed; however, the non-coal mine database contains only 20 percent of the non-coal mines in Illinois due to the lack of a legal filing requirement.

The IDNR Division of Oil & Gas is the regulatory authority in Illinois for permitting, drilling, operating, and plugging oil and gas production wells. The Division implements the Illinois Oil and Gas Act and enforces standards for the construction and operation of related production equipment and facilities. In addition, the Division of Oil & Gas regulates the injection of fluids into underground injection wells and cleans up abandoned well sites. Oil and gas activities can impact water bodies in several ways. Spills and improper handling of oil and oil field brine can contaminate soils, groundwater, and surface water. Abandoned and leaking injection wells can also cause contamination of groundwater and surface water. Specific pollutants from petroleum activities include chlorides, sodium, sulfates, hydrocarbons, and other organics (Muir et al. 1997). Presence of elevated chlorides, sodium, and sulfates can correlate with increases in TDS. Other pollutants of concern associated with petroleum activities are heavy metals such as manganese.

Both Illinois EPA and IDNR Office of Mines and Minerals have responsibilities relating to the permitting of active coal mines and the regulation of mine drainage. Mine drainage is any groundwater, surface water, or rainwater that flows through, or in any way contacts an area affected by mining. Mine drainage from sites in Illinois are either non-acid drainage or acid drainage and can be classified as pre-law and post-law. Pre-law mines are those mines operated prior to 1977, which are abandoned and not permitted and are typically acid drainage mines (Muir et al. 1997).

Acid mine drainage is formed when three essential components combine: iron pyrite material, oxygen, and water. Pyritic material may come in several different forms, some of which are very stable and difficult to break down while others are very reactive and break down readily. Iron pyrite is commonly found associated with coal and coal refuse materials. As water contacts iron pyrite in the presence of oxygen, a chemical reaction occurs that forms ferrous iron and sulfuric acid. The ferrous iron then undergoes oxidation to form ferric iron. With the presence of ferrous iron, ferric iron, pyrite, oxygen, and water, several chemical reactions occur that produce additional acidity, further lowering the pH of the water. The formation of new acid is practically continuous when erosion of the refuse material exposes unreacted pyrite in the presence of oxygen and water. The negative impacts of acid mine drainage are high levels of dissolved solids especially iron, sulfates, chlorides, and manganese associated with the mine drainage (Muir et al. 1997).

Table 5-11 shows constituents or "tracers" typically examined when analyzing whether sources of pollutants in a water body are from mining or oil and gas activities. For acid mine drainage, generally elevated concentrations of iron would be observed. For oil and gas contributions, chloride or sodium tracers can be used to assess impacts from brine waste generated in the production of oil and gas. As mentioned previously, the sampling data shown in Table 5-7 were taken under low-flow conditions for all samples except the September 25, 2000 sample in segment NJC. The absence of exceedences of the water quality standards for manganese or sulfates at higher flows in Table 5-11 supports the conclusion that manganese and TDS from the remaining segments could have leached into the groundwater from pools within mine sites. Therefore, groundwater could be the source of manganese and TDS for the Casey Fork Watershed. In addition, no data are available to assess the natural background of manganese and TDS in the watershed. Natural background concentrations typically are attributed to what occurs naturally in groundwater due to mineral conditions of the soils (WERF 1997).

Table 5-11 Historical Water Chemistry in Casey Fork Watershed (USEPA 2002b)

Sample Location	Date	Flow (cfs)	Total Mn (mg/L)	Sulfates (mg/L)	TDS (mg/L)	Total Fe (µg/L)	Total Ca (mg/L)	Total Cl (mg/L)	Total Na (mg/L)	Total K (mg/L)	Total Mg (mg/L)
Casey Fork (NJ10)	7/31/1995	1.7	1.1	71	366	1,100	55	39	37	3.9	23
Casey Fork (NJ10)	2/22/1996	5.3	0.79	197	1,093	810	87	133	210	4.9	45
Casey Fork (NJ14)	8/17/95	0.2	1.1	NA	NA	NA	43	NA	63	6.4	17
Sevenmile Ck (NJC01)	7/31/1995	1.4	0.2	77	NA	1,400	28	7	14	6.1	11
Sevenmile Ck (NJC01)	2/22/1996	4.4	0.29	292	NA	290	86	24.5	90	3.1	41
Sevenmile Ck (NJC01)	7/17/2000	3.5	0.53	256	NA	450	66	14	34	4.3	29
Sevenmile Ck (NJC01)	9/25/2000	11.0	1.1	122	NA	1,600	51	15	27	5.1	22

5.1.7.3 Animal Confinement Operations

The Illinois EPA provided a GIS shapefile illustrating the location of livestock facilities in the Big Muddy River Basin, which contains Casey Fork Watershed. The Illinois EPA assessed the impact of each facility on water quality with regard to the size of the facility, the site condition and management, pollutant transport efficiency, and water resources vulnerability. There were no animal confinement operations located in the Casey Fork Watershed.

5.1.8 Septic Systems

Typically, septic systems near lake waters have greater potential for impacting water quality than systems near streams due to their proximity to the water body of concern. The number of septic systems within the watersheds could not be confirmed from available data sources. It is anticipated that failing septic systems are a negligible source of pollutant loads in this watershed.

5.1.9 Aerial Photography

Aerial photographs of the Casey Fork Watershed were obtained from the Illinois Natural Resources Geospatial Data Clearinghouse. The photographs were used to supplement the USGS quadrangle maps when locating facilities.

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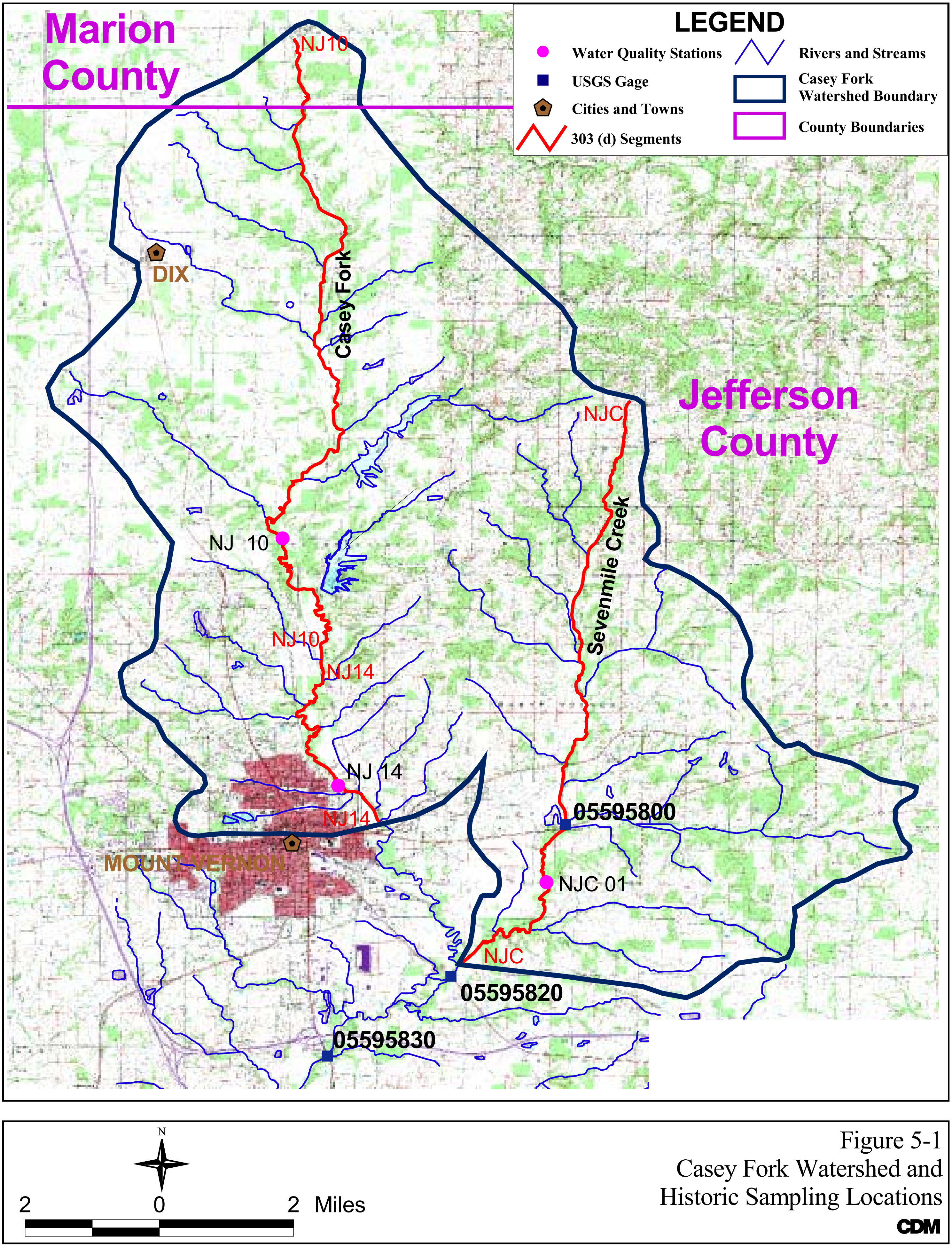

Figure 5-1
Casey Fork Watershed and
Historic Sampling Locations

CDM

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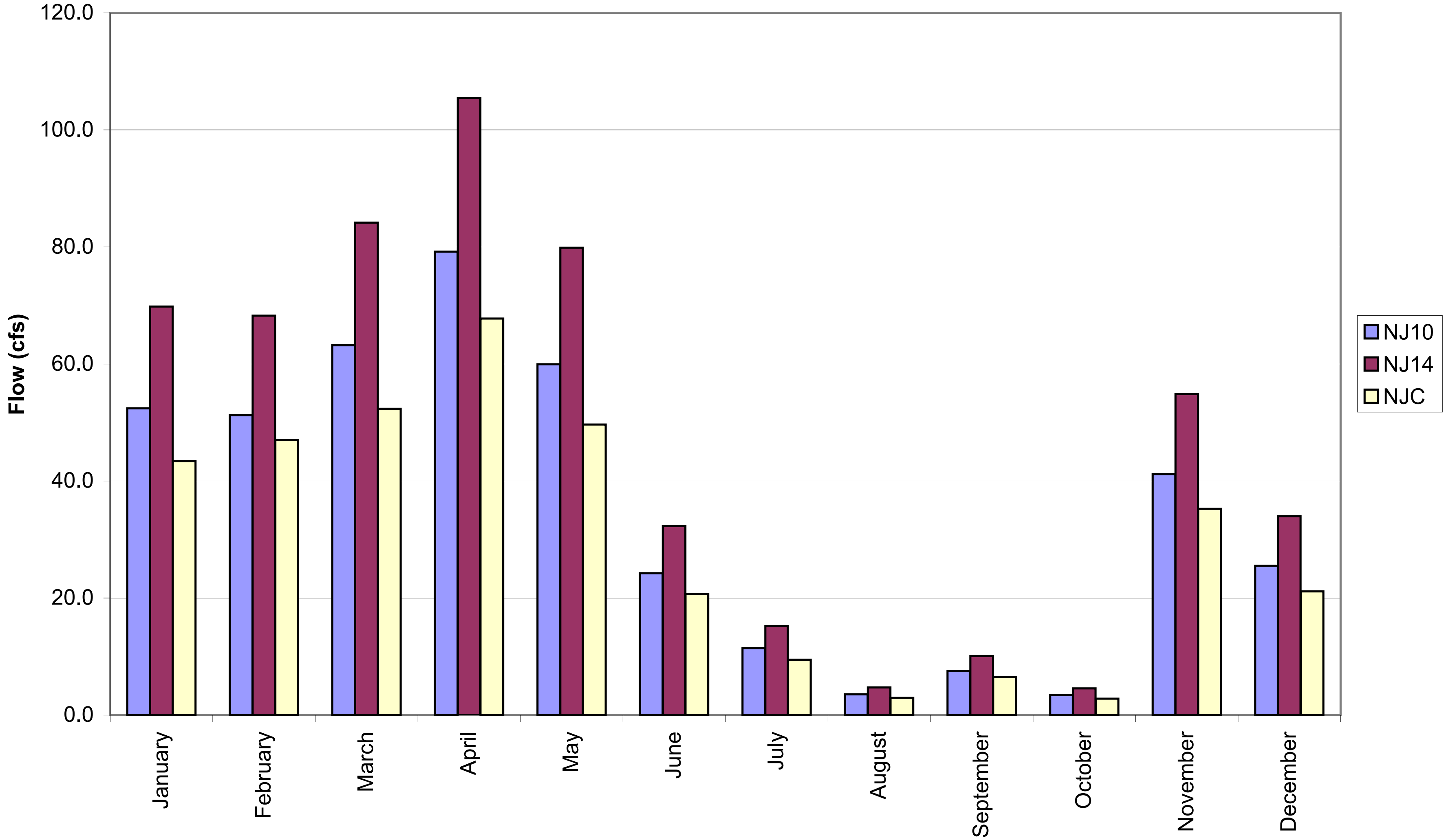
Figure 5-2 Estimated Streamflows in the Casey Fork Watershed Calculated from Gage 05595820



Period of Record
October 1985 to Septemeber 2000

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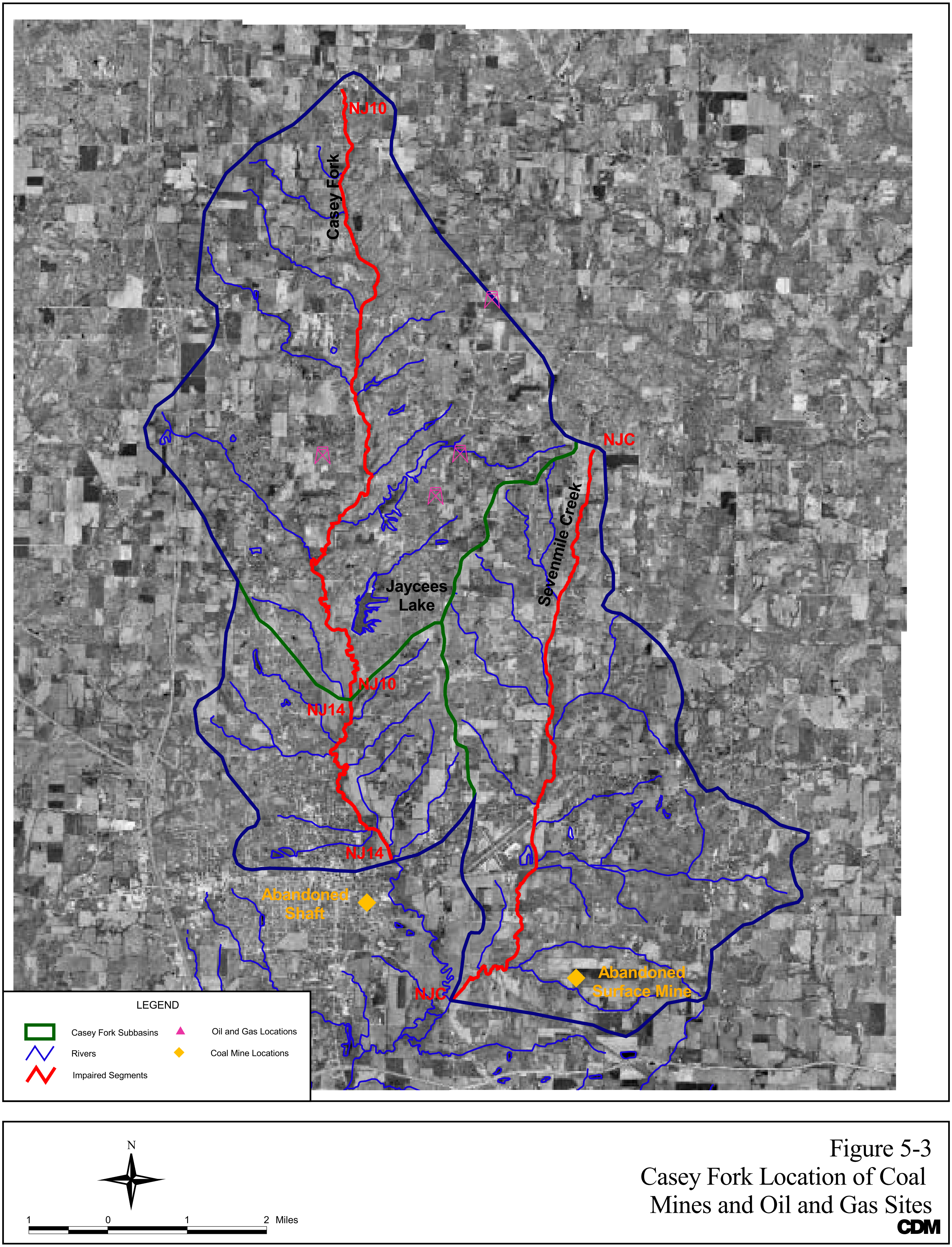

Figure 5-3
Casey Fork Location of Coal Mines and Oil and Gas Sites

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Section 6
Methodologies and Models to Complete TMDLs for the Casey Fork Watershed

6.1 Set Endpoints for TMDLs

TMDLs are used to define the total amount of pollutants that may be discharged into a particular water body within any given day based on a particular use of that water body. Developing TMDLs must, therefore, account for both present and future stream users, habitat, flow variability, and current and future point and nonpoint pollutant loadings that may impact the water body. Defining a TMDL for any particular stream segment must take into account not only the science related to physical, chemical, and biological processes that may impact water body water quality, but must also be responsive to temporal changes in the watershed and likely influences of potential solutions to water quality impairments on entities that reside in the watershed.

Stream and lake water quality standards were presented in Section 4, specifically in Table 4-1. Biological data, such as the Index of Biotic Integrity (IBI) and the Macroinvertebrate Biotic Index (MBI), are used to support 305(b) and 303(d) listing decisions; however, TMDLs were not developed specifically to meet biological endpoints for the Casey Fork Watershed. The endpoints presented in Section 4, which are chemical and physical endpoints of the following constituents, were targeted: manganese, TDS, and DO.

6.2 Methodologies and Models to Assess TMDL Endpoints

Methodologies and models were examined to assess their applicability for addressing TMDL endpoints for the Casey Fork Watershed. Model development is more data intensive than using simpler methodologies or mathematical relationships for the basis of TMDL development. In situations where only limited or qualitative data exist to characterize impairments, methodologies were used to develop TMDLs and implementation plans as appropriate.

In addition to methodologies, watershed and receiving water computer models are available for TMDL development. Most models have similar overall capabilities but operate at different time and spatial scales and were developed for varying conditions. The available models range between empirical and physically based. However, all existing watershed and receiving water computer models simplify processes and often include obviously empirical components that omit the general physical laws. They are, in reality, a representation of data.

Each model has its own set of limitations on its use, applicability, and predictive capabilities. For example, watershed models may be designed to project loads within annual, seasonal, monthly, or storm event time scales with spatial scales ranging from large watersheds to small subbasins to individual parcels such as construction sites. With regard to time, receiving water models can be steady state, quasi-dynamic, or fully dynamic. As the level of temporal and spatial detail increases, the data requirements and level of modeling effort increase.

6.2.1 Watershed Models

Watershed or loading models can be divided into categories based on complexity, operation, time step, and simulation technique. USEPA has grouped existing watershed-scale models for TMDL development into three categories based on the number of processes they incorporate and the level of detail they provide (USEPA 1997a):

- Simple models
- Mid-range models
- Detailed models

Simple models primarily implement empirical relationships between physiographic characteristics of the watershed and pollutant runoff. A list of simple category models with an indication of the capabilities of each model is shown in Table 6-1. Simple models may be used to support an assessment of the relative significance of different nonpoint sources, guide decisions for management plans, and focus continuing monitoring efforts. Generally, simple models aggregate watershed physiographic data spatially at a large scale and provide pollutant loading estimates on large time scales. Although they can easily be adopted to estimate storm event loading, their accuracy decreases since they cannot capture the large fluctuations of pollutant concentrations observed over smaller time scales.

Table 6-1 Evaluation of Watershed Model Capabilities - Simple Models (USEPA 1997a)

Criteria		USEPA Screening[1]	Simple Method[1]	Regression Method[1]	SLOSS-PHOSPH[2]	Watershed	FHWA	WMM
Land Uses	Urban	○	◒	◒	–	◒	○[3]	●
	Rural	◒	–	○	◒	◒	○	●
	Point Sources	–	–	–	–	○	–	○
Time Scale	Annual	●	●	●	●	●	●	●
	Single Event	○	○	○	–	–	○	–
	Continuous	–	–	–	–	–	–	–
Hydrology	Runoff	–[4]	◒	–	–	–	○	○
	Baseflow	–	–	–	–	–	–	○
Pollutant Loading	Sediment	◒	◒	◒	◒	◒	–	–
	Nutrients	◒	◒	◒	◒	◒	◒	◒
	Others	○	◒	◒	–	◒	◒	◒
Pollutant Routing	Transport	–	–	–	–	–	–	–
	Transformation	–	–	–	–	–	–	○
Model Output	Statistics	–	–	–	–	◒	○	○
	Graphics	–	–	–	–	◒	–	○
	Format Options	–	–	–	–	◒	–	○
Input Data	Requirements	○	○	○	○	○	○	○
	Calibration	–	–	–	○	◒	–	◒
	Default Data	●	●	◒	◒	○	◒	◒
	User Interface	–	–	–	–	◒	○	◒
BMPs	Evaluation	○	○	–	○	◒	◒	◒
	Design Criteria	–	–	–	–	–	–	–
Documentation		●	●	●	●	●	●	◒

[1] Not a computer program
[2] Coupled with GIS
[3] Highway drainage basins
[4] Extended Versions recommended use of SCS-curve number method for runoff estimation

● High ◒ Medium ○ Low – Not Incorporated

Mid-range models attempt a compromise between the empiricism of the simple models and complexity of detailed mechanistic models. Mid-range models are designed to estimate the importance of pollutant contributions from multiple land uses and many individual source areas in a watershed. Therefore, they require less aggregation of the watershed physiographic characteristics than the simple models. Mid-range models may be used to define large areas for pollution migration programs on a watershed basis and make qualitative evaluations of BMP alternatives. A list of models within the mid-range category and their capabilities is shown in Table 6-2.

Table 6-2 Evaluation of Watershed Model Capabilities - Mid-Range Models (USEPA 1997a)

Criteria		SITEMAP	GWLF	P8-UCM	Auto-QI	AGNPS	SLAMM
Land Uses	Urban	●	●	●	●	–	●
	Rural	●	●	–	–	●	–
	Point Sources	◒	◒	●	–	●	●
Time Scale	Annual	–	–	–	–	–	–
	Single Event	○	–	●	–	●	–
	Continuous	●	●	●	●	–	●
Hydrology	Runoff	●	●	●	●	●	●
	Baseflow	○	●	○	○	–	○
Pollutant Loading	Sediment	–	●	●	●	●	●
	Nutrients	●	●	●	●	●	●
	Others	–	–	●	●	–	●
Pollutant Routing	Transport	○	○	○	◒	●	◒
	Transformation	–	–	–	–	–	–
Model Output	Statistics	◒	○	–	–	–	○
	Graphics	◒	◒	●	–	●	○
	Format Options	●	●	●	○	●	●
Input Data	Requirements	◒	◒	◒	◒	◒	◒
	Calibration	○	○	○	◒	○	◒
	Default Data	●	●	◒	○	◒	◒
	User Interface	●	●	●	◒	◒	●
BMPs	Evaluation	○	○	●	◒	◒	◒
	Design Criteria	–	–	●	◒	◒	○
Documentation		●	●	●	◒	●	◒

● High ◒ Medium ○ Low – Not Incorporated

Detailed models use storm event or continuous simulation to predict flow and pollutant concentrations for a range of flow conditions. These models explicitly simulate the physical processes of infiltration, runoff, pollutant accumulation, instream effects, and groundwater/surface water interaction. These models are complex and were not designed with emphasis on their potential use by the typical state or local planner. Many of these models were developed for research into the fundamental land surface and instream processes that influence runoff and pollutant generation rather than to communicate information to decision makers faced with planning watershed management (USEPA 1997a). Although detailed or complex models provide a comparatively high degree of realism in form and function, complexity does not come without a price of data requirements for model construction, calibration, verification, and operation. If the necessary data are not available, and many inputs must be based upon professional judgment or taken from literature, the resulting uncertainty in predicted values undermine the potential benefits from greater realism. Based on the available data for the Casey Fork

Watershed, a detailed model could not be constructed, calibrated, and verified with certainty and the watershed model selection should focus on the simple or mid-range models.

6.2.1.1 Watershed Model Recommendation

For the Casey Fork Watershed, the Watershed Management Model (WMM) will be utilized in screening mode for the DO TMDLs in the watershed. For manganese and TDS, a Monte Carlo simulation will be utilized as discussed in Section 7.

6.2.2 Receiving Water Quality Models

Receiving water quality models differ in many ways, but some important dimensions of discrimination include conceptual basis, input conditions, process characteristics, and output. Table 6-3 presents extremes of simplicity and complexity for each condition as a point of reference. Most receiving water quality models have some mix of simple and complex characteristics that reflect tradeoffs made in optimizing performance for a particular task.

Table 6-3 General Receiving Water Quality Model Characteristics

Model Characteristic	Simple Models	Complex Models
Conceptual Basis	Empirical	Mechanistic
Input Conditions	Steady State	Dynamic
Process	Conservative	Nonconservative
Output Conditions	Deterministic	Stochastic

The concept behind a receiving water quality model may reflect an effort to represent major processes individually and realistically in a formal mathematical manner (mechanistic), or it may simply be a "black-box" system (empirical) wherein the output is determined by a single equation, perhaps incorporating several input variables, but without attempting to portray constituent processes mechanistically.

In any natural system, important inputs such as flow in the river change over time. Most receiving water quality models assume that the change occurs sufficiently slowly so that the parameter (for example, flow) can be treated as a constant (steady state). A dynamic receiving water quality model, which can handle unsteady flow conditions, provides a more realistic representation of hydraulics, especially those conditions associated with short duration storm flows, than a steady state model. However, the price of greater realism is an increase in model complexity that may be neither justified nor supportable.

The manner in which input data are processed varies greatly according to the purpose of the receiving water quality model. The simplest conditions involve conservative substances where the model need only calculate a new flow-weighted concentration when a new flow is added (conservation of mass). Such an approach is unsatisfactory for constituents such as DO or labile nutrients, such as nitrogen and phosphorus, which will change in concentration due to biological processes occurring in the stream.

Whereas the watershed nonpoint model's focus is the generation of flows and pollutant loads from the watershed, the receiving water models simulate the fate and transport of the pollutant in the water body. Table 6-4 presents the steady state (constant flow and loads) models applicable for this watershed. The steady state models are less complex than the dynamic models. Also, as discussed above, the dynamic models require significantly more data to develop and calibrate an accurate simulation of a water body.

Table 6-4 Descriptive List of Model Components - Steady State Water Quality Models

Model	Water Body Type	Parameters Simulated	Process Simulated	
			Physical	Chemical/Biological
USEPA Screening Methods	River, lake/ reservoir, estuary, coastal	Water body nitrogen, phosphorus, chlorophyll "a," or chemical concentrations	Dilution, advection, dispersion	First order decay - empirical relationships between nutrient loading and eutrophication indices
EUTROMOD	Lake/reservoir	DO, nitrogen, phosphorus, chlorophyll "a"	Dilution	Empirical relationships between nutrient loading and eutrophication indices
BATHTUB	Lake/reservoir	DO, nitrogen, phosphorus, chlorophyll "a"	Dilution	Empirical relationships between nutrient loading and eutrophication indices
QUAL2E	Rivers (well mixed/shallow lakes or estuaries)	DO, CBOD, arbitrary, nonconservative substances, three conservative substances	Dilution, advection, dispersion	First order decay, DO-BOD cycle, nutrient-algal cycle
EXAMSII	Rivers	Conservative and nonconservative substances	Dilution, advection, dispersion	First order decay, process kinetics, daughter products, exposure assessment
SYMPTOX3	River/reservoir	Conservative and nonconservative substances	Dilution, advection, dispersion	First order decay, sediment exchange
STREAMDO	Rivers	DO, CBOD, and ammonium	Dilution	First order decay, BOD-DO cycle, limited algal component

6.2.2.1 Receiving Water Model Recommendation

Because of the lack of spatial data sets for the stream segments within the Casey Fork Watershed, methodologies based on the USEPA Screening Methods and Monte Carlo simulations will be utilized for stream TMDL development as discussed in the following section.

6.2.3 Stream TMDLs for the Casey Fork Watershed

Because of limited data available for watershed and receiving water model development for the Casey Fork Watershed, TMDLs for the following constituents will be completed using methodologies: TDS, DO, and manganese. For DO, a Streeter-Phelps analysis based on the USEPA Screening Procedures was developed. In addition, a screening level WMM analysis was conducted. These analyses are described in Section 7. For TDS and manganese, a Monte Carlo simulation was conducted and the description of this analysis is also contained in Section 7.

6.2.4 Calibration and Validation of Models

The results of loading and receiving water simulations are more meaningful when they are accompanied by some sort of confirmatory analysis. The capability of any model to accurately depict water quality conditions is directly related to the accuracy of input data and the level of expertise required to operate the model. It is also largely dependent on the amount of data available. Calibration involves minimization of deviation between measured field conditions and model output by adjusting parameters of the model. Data required for this step are a set of known input values along with corresponding field observation results. Validation involves the use of a second set of independent information to check the model calibration. The data used for validation should consist of field measurements of the same type as the data output from the model. Specific features such as mean values, variability, extreme values, or all predicted values may be of interest to the modeler and require testing. Models are tested based on the levels of their predictions, whether descriptive or predictive. More accuracy is required of a model designed for absolute versus relative predictions. If the model is calibrated properly, the model predictions will be acceptably close to the field predictions. Because methodologies will be utilized for the Casey Fork Watershed, a detailed calibration and verification cannot be completed for the watershed.

6.2.5 Seasonal Variation

Consideration of seasonal variation, such that water quality standards for the allocated pollutant will be met during all seasons of the year, is a requirement of a TMDL submittal. TMDLs must maintain or attain water quality standards throughout the year and consider variations in the water body's assimilative capacity caused by seasonal changes in temperature and flow (USEPA 1999). Seasonal variation for the Casey Fork Watershed is discussed in Section 8.

6.2.6 Allocation

Establishing a TMDL requires the determination of the LC of each stream segment. The models or methodologies were used to establish what the LC is for each segment for each pollutant. The next step was to determine the appropriate MOS for each segment. After setting the MOS, WLA of point sources and LA from the nonpoint sources were set.

The MOS can be set explicitly as a portion of the LC or implicitly through applying conservative assumptions in data analysis and modeling approaches. Data analyses and modeling limitations were taken into account when recommending a MOS. The allocation scheme (both LA and WLA) demonstrates that water quality standards will be attained and maintained and that the load reductions are technically achievable. The allocation is the foundation for the implementation and monitoring plan. Further discussion on the allocation is presented in Section 8.

6.2.7 Implementation and Monitoring

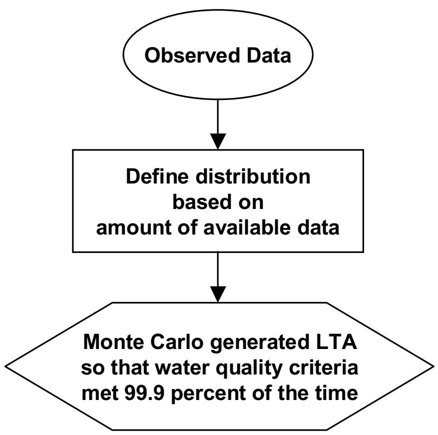
For the Casey Fork Watershed, a plan of implementation was produced to support the developed TMDL. The plan of implementation has reasonable assurance of being achieved. The plan provides the framework for the identification of the actions that must be taken on point and nonpoint sources to achieve the desired TMDLs. The accomplishment of the necessary actions to reach these targets may involve substantial efforts and expenditures by a large number of parties within the watershed. Depending upon the specific issues and their complexity in the Casey Fork Watershed, the time frame for achieving water quality standards has been developed.

The implementation plan delineates a recommended list of the sources of stressors that are contributing to the water quality impairments. The amount of the reduction needed from various sources to achieve the water quality limiting parameter was then delineated. For nonpoint sources, the use of BMPs is one way to proceed to get the desired reduction in loading. The effectiveness of various BMPs was factored into the modeling and methodologies to develop the range of options of BMPs to use. Associated with those BMPs is cost information, as available. Reductions from point sources through waste stream management, pretreatment controls, and other structural and nonstructural programs were also identified as applicable. The implementation plan for the Casey Fork Watershed is presented in Section 9.

Section 7
Methodology Development for the Casey Fork Watershed

7.1 Methodology Overview

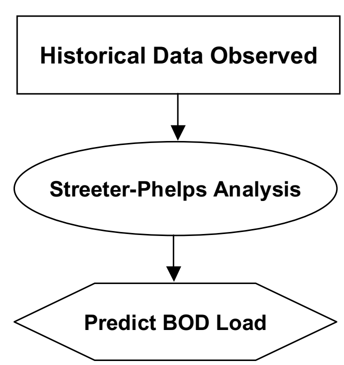
Methodologies were utilized in the TMDL analysis of Casey Fork (NJ10 and NJ14) and Sevenmile Creek (NJC) in the Casey Fork Watershed. For manganese and TDS, a Monte Carlo simulation was utilized to estimate a long-term average instream concentration needed to meet water quality standards. Investigation of DO required a Streeter-Phelps analysis.



Schematic 1

The schematic to the left shows how the Monte Carlo analysis was utilized to analyze manganese and TDS. A distribution based on existing data is inputted in the Monte Carlo simulation program. This distribution is based on the amount of existing data available. Using this defined distribution, the computer simulation program randomly generates values to determine what long-term average (LTA) would be needed in the stream segment so that water quality criteria are met 99.9 percent of the time or so that water quality criteria are exceeded less than once every three years. The TMDL for manganese and TDS will be based on this LTA. The randomly generated values generated by the Monte Carlo simulation are available in Appendix B.

The Streeter-Phelps analysis was conducted as illustrated in the schematic to the right. Observed data were utilized to set up a Streeter-Phelps analysis to predict stream coefficients that would be required to result in observed DO concentrations. This Streeter-Phelps analysis was based on USEPA's Screening Procedures (Mills et al. 1985). The 5-day biochemical oxygen demand (BOD_5) load and reaeration coefficient (k_a) utilized in the Streeter-Phelps analysis were examined in the TMDL for DO for segments NJ10, NJ14, and NJC.



Schematic 2

7.2 Watershed Delineation

Watersheds for Casey Fork segments NJ10, NJ14, and Sevenmile Creek segment NJC were delineated with GIS analyses through use of the DEM as discussed in Section 5.1.2. The delineation suggests that Casey Fork segment NJ10 captures flows from a watershed of approximately 34 square miles including flows from segment NJ10, and segment NJC captures flows from approximately 43.5 square miles. Figure 7-1 at the end of this section shows the location of the water quality stations in the Casey Fork Watershed and the boundary of the GIS-delineated watershed contributing to the impaired segments in the Casey Fork Watershed.

7.3 Methodology Development and Results

This section discusses the methodologies utilized to examine manganese, TDS, and DO levels in the Casey Fork Watershed. As shown in Table 5-5, only one data point is available for manganese for segment NJ14. A Monte Carlo analysis cannot be performed on a single point, so the implementation plan in Section 9 will address general recommendations to control manganese in the segment NJ14 subwatershed.

7.3.1 Monte Carlo Analysis Development and Results

For each constituent exceeding water quality standards, the available data was analyzed and an appropriate distribution was chosen to represent the data. A triangle distribution was chosen to analyze segments NJ10 and NJC since data for these sites were extremely limited.

Each constituent was evaluated separately using @RISK, which is a Microsoft® *Excel* add-in for the Monte Carlo analysis. The @RISK analysis package performed 10,000 iterations to determine the required percent reduction such that the water quality criteria would be met at least 99.9 percent of the time. The 99.9 percent of time value matches the Illinois EPA's 303(d) listing criteria of less than once in a three-year allowable excursion of water quality standards. For each simulation, the required percent reduction is:

$$PR = \text{maximum}\ \{0, (1 - Cc/Cd)\}$$

where:
- PR = Required percent reduction for the current iteration
- Cc = Water quality criterion in mg/L
- Cd = Randomly generated pollutant source concentration in mg/L based on the triangular distribution with the observed data's minimum, mode, and maximum values

A triangular distribution assumes that the values of a given data set are most often at or near the mode and linearly distributed to the minimum and maximum values. The minimum is the smallest concentration of the sample data set. The maximum value is the largest sample in the sample data set. The mode is the value that is most likely to be observed in a long time series of sample data. In the case where available water quality data are limited, a triangular distribution was used to describe the observed data. Since the available observed data is not sufficient to truly predict the mode, the mode was assumed to be the mean as shown in Table 5-6.

In order to define a more appropriate distribution than triangular, more data need to be collected. In the absence of any drift, or non-random error, 10 samples can be used to define a distribution. As the data set increases, so does the ability to define an appropriate distribution, such a lognormal, normal, etc. The number of samples needed to define the true data distribution depends upon the severity of the drift.

An allowable LTA instream concentration was determined for each impaired constituent. The Monte Carlo simulation analysis is designed to identify a LTA value that will meet the water quality criterion for that parameter 99.9 percent of the time. The Monte Carlo simulation was run using 10,000 iterations with the triangular distribution. For each iteration, a concentration, Cd, is randomly generated according to a specified distribution determined by observed data. For each concentration generated, a percent reduction was calculated, if necessary, to meet water quality criteria. The mean concentration value is multiplied by the inverse of the required percent reduction to compute the long-term daily average concentration that needs to be met to achieve the water quality standard.

The overall percent reduction required is the 99.9th percentile value of the probability distribution generated by the 10,000 iterations, so that the allowable LTA concentration is:

$$\mathbf{LTA = Mean * (1 - PR99.9)}$$

7.3.1.1 Monte Carlo Results for Casey Fork Segment NJ10

Segment NJ10 is in the upper watershed of Casey Fork before it joins with the outflow from Jaycees Lake. Sample data for this section was very limited. Manganese and TDS values ranged from 0.8 to 1.1 mg/L and 366 to 1,093 mg/L, respectively, as shown in Table 5-6. As discussed previously, a triangular distribution was chosen for the reason that only two samples were available for manganese and TDS.

Two of the output model concentrations are significant to the TMDL analysis of segment NJ10. The first is the average concentration calculated from the triangular distribution of the observed data. The second concentration is the LTA, which represents the average concentration that should be observed over the long term to ensure that the water quality standard is exceeded fewer than once every three years. Table 7-1 shows the average concentration calculated from the distribution utilized in the Monte Carlo analysis and the LTA concentration needed so that water quality standards will be achieved in Casey Fork segment NJ10. Calculation details are presented in Appendix B.

Table 7-1 Concentrations Calculated from Monte Carlo Analysis for Casey Fork Segment NJ10

Constituent	Average Concentration Calculated from Distribution (mg/L)	LTA Concentration (mg/L)
Manganese	0.94	0.86
TDS	726	674

Table 7-1 shows that the concentration required to meet water quality reductions, the LTA, is lower than the observed average concentration for manganese and TDS; therefore, the TMDL for Casey Fork segment NJ10 requires that a load reduction be made for both manganese and TDS based upon the available data. The TMDL will be discussed in Section 8.

7.3.1.2 Monte Carlo Results for Sevenmile Creek Segment NJC

Segment NJC is in Sevenmile Creek of the Casey Fork Watershed before it joins with Casey Fork just downstream of Mount Vernon. Sample data for this section were very limited. Manganese values ranged from 0.2 to 1.1 mg/L as shown in Table 5-6. As discussed previously, a triangular distribution was chosen for the reason that only four samples were available for manganese.

Two of the output model concentrations are significant to the TMDL analysis of segment NJC. The first is the average concentration calculated from the triangular distribution of the observed data. The second concentration is the LTA, which represents the average concentration that should be observed over the long-term to ensure that the water quality standard is exceeded fewer than once every three years. Table 7-2 shows the average concentration calculated from the distribution utilized in the Monte Carlo analysis and the LTA concentration needed so that water quality standards will be achieved in Sevenmile Creek segment NJC. Calculation details are presented in Appendix B.

Table 7-2 Modeled LTA Manganese Concentrations Required to Meet Water Quality Standards in Sevenmile Creek Segment NJC

Constituent	Average Concentration Calculated from Distribution (mg/L)	LTA Concentration (mg/L)
Manganese	0.61	0.57

Table 7-2 shows that the concentration required to meet water quality reductions, the LTA, is lower than the observed average concentration for manganese; therefore, the TMDL for Casey Fork segment NJC requires that a load reduction be made for manganese based upon the available data. The TMDL will be discussed in Section 8.

7.3.2 DO Analysis Development and Results

A Streeter-Phelps analysis was utilized for investigation of DO in the Casey Fork Watershed. Data availability useful for analyzing DO for this watershed is described in Table 7-3. The historic water quality data were investigated from 1990 to 2000.

Table 7-3 Data Availability from 1990 to 2000

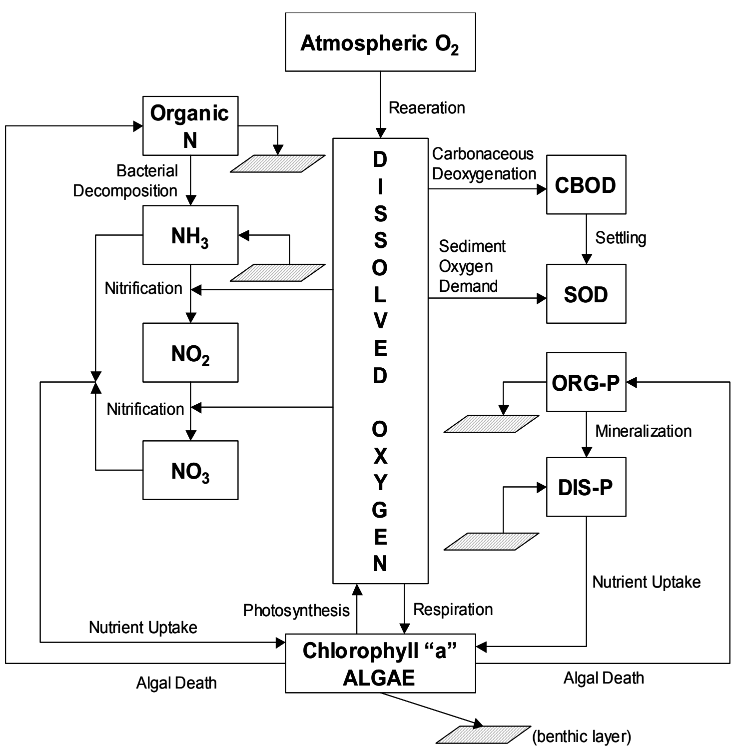
Model Parameter	Historic Data Available (Yes/No)
Flow	Yes
Stream Temperature	Yes
DO	Yes
Carbonaceous BOD_5	No
BOD_5	No
Total Nitrogen	Yes
Total Organic Carbon	Yes
Ammonia	Yes
Nitrate + Nitrite	Yes

Table 7-3 Data Availability from 1990 to 2000 (continued)

Model Parameter	Historic Data Available (Yes/No)
Total Kjeldahl Nitrogen	Yes
Total Phosphorus	Yes
Dissolved Phosphorus	Yes
Orthophosphate	Yes
pH	Yes
20-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_{20}$)	No
Daily Minimum and Maximum DO	No
Chlorophyll "a" / algae	No
Stream Depth	Yes

The lack of various constituent samples from historic data sites in the Casey Fork Watershed limits the modeling tools available for DO. Therefore, a Streeter-Phelps analysis was developed to examine the DO relationship with BOD_5 in Casey Fork and in Sevenmile Creek. The diagram to the left shows the interactions of DO with different processes within the water column of the stream (USEPA 1997b). The consumers of DO include:

- Deoxygenation of biodegradable organics whereby bacteria and fungi (decomposers) utilize oxygen in the bioxidation-decomposition process
- Sediment oxygen demand (SOD), where oxygen is utilized by organisms inhabiting the upper layers of the bottom sediment deposits
- Nitrification, in which oxygen is utilized during oxidation of ammonia and organic nitrogen to nitrates



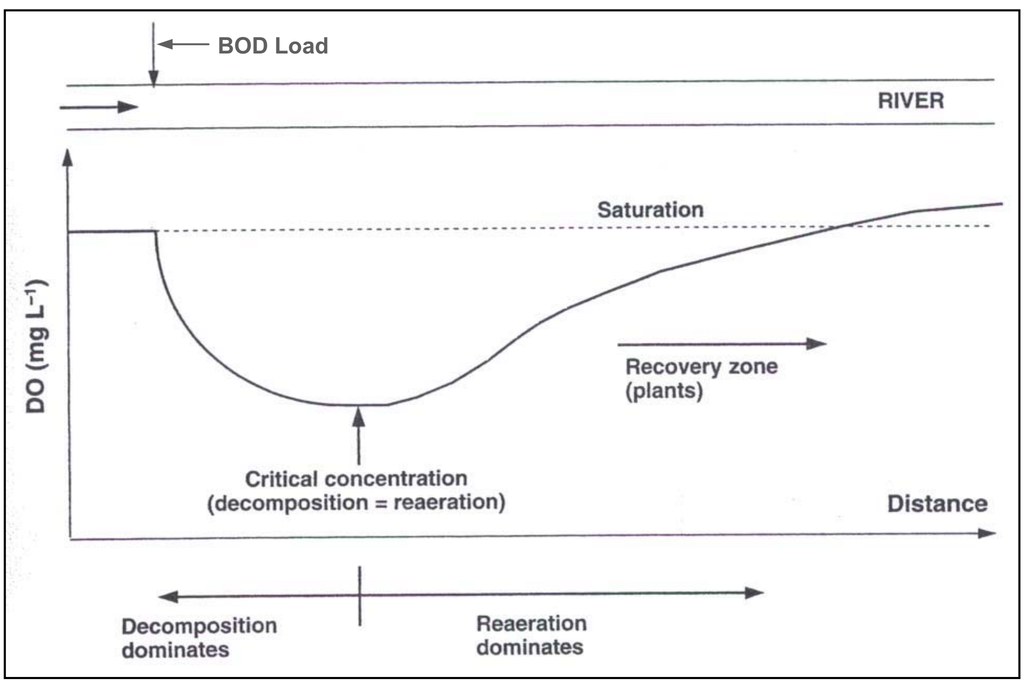
- Respiration by algae and aquatic vascular plants that use oxygen during night and early morning hours to sustain their living processes

Major oxygen sources are:

- Atmospheric reaeration, where oxygen is transported from the air into the water through turbulence at the air-water interface
- Photosynthesis, where chlorophyll-containing organisms (producers such as algae and aquatic plants) convert carbon dioxide to organic matter with a consequent production of oxygen

Streeter and Phelps (1925) proposed the basic concept of the DO balance in streams. The Streeter-Phelps equation predicts the DO "sag" that occurs after biodegradable constituents are discharged into streams. A biodegradable constituent is anything that can be broken down by microorganisms. BOD is the measure of the quantity of oxygen consumed by microorganisms during the decomposition of organic matter. When nutrients such as nitrate and phosphate are released into the water, growth of algae and aquatic plants is stimulated. The result is an increase in microbial populations, higher levels of BOD, and increased oxygen demand from the photosynthetic organisms during the dark hours. This results in a reduction in DO concentrations, especially during the early morning hours just before dawn.

In addition to natural sources of BOD, such as leaf fall from vegetation near the water's edge, aquatic plants, and drainage from organically rich areas like swamps and bogs, there are also anthropogenic (human) sources of organic matter. Point sources, which may contribute high levels of BOD, include wastewater treatment facilities, pulp and paper mills, and meat and food processing plants. Organic matter also comes from nonpoint sources such as agricultural runoff, urban runoff, and livestock operations. Both point and nonpoint sources can contribute significantly to the oxygen demand in a water body. The DO sag is shown in the following figure (Chapra 1997):



Water quality models have built upon the Streeter-Phelps equation to evaluate the DO balance in streams. The analysis for Casey Fork segments NJ10, NJ14, and Sevenmile Creek is based on BOD_5 and reaeration only. There is not enough coincident nutrient and algal historical data from these sites to assess impacts of nutrient loads on algal growth that also impact DO levels. Free floating and attached algae as well as aquatic plants are of concern. The extent to which algae impact the DO resources of a river is dependent on many factors, such as turbidity, which can decrease light transmittance through the water column. Additionally, the photosynthetic rate constantly changes in response to variations in sunlight intensity and is not constant. This results in diurnal fluctuations in DO levels (Mills et al. 1985). In addition, there is not enough data available to estimate the impacts of SOD at these sites.

The Streeter-Phelps analysis was based on the following equation (Mills et al. 1985):

$$\mathbf{DO_o} = \mathbf{D_S} - \left[\mathbf{D_o exp} \left[\frac{-\mathbf{k_a\, x}}{\mathbf{v}} \right] + \frac{\mathbf{L_0 k_d}}{\mathbf{k_a} - \mathbf{k_d}} \left[\mathbf{exp} \left(\frac{-\mathbf{k_d\, x}}{\mathbf{v}} \right) - \mathbf{exp} \left(\frac{-\mathbf{k_a\, x}}{\mathbf{v}} \right) \right] \right]$$

where: DO_o = Calculated DO concentration (mg/L)
D_S = DO at saturation (mg/L)
D_o = Initial DO deficit (mg/L)
k_a = Reaeration rate (1/day)
k_d = BOD_5 decay rate (1/day)
x = Distance downstream of discharge (ft)
v = Stream velocity (ft/day)
L_0 = Initial BOD_5 (mg/L) at x = 0

The initial BOD_5 concentration (L_o) was calculated from observed total organic carbon (TOC) data. Literature states that the ratio of BOD_5 to TOC is typically between 1.0 and 1.6 (Metcalf and Eddy, Inc. 1991). For analysis, a ratio of 1.3 was used to calculate BOD_5 for each sample date.

Literature provides equations to calculate both the BOD_5 decay rate coefficient (k_d) and reaeration rate coefficient (k_a). The decay rate coefficient is dependent on stream depth, and the reaeration coefficient is dependent on depth and velocity. Due to the limits of the data set shown in Table 7-3, the decay rate coefficient was calculated from either known depths or rating curves allowing the reaeration coefficient to be calculated from the Streeter-Phelps equation presented above as the only unknown variable. The rating curves used to determine depths are available in Appendix C.

The BOD_5 decay rate coefficient (k_d) at 20°C was calculated based on the following equation (USEPA 1997b):

$$\mathbf{k_d} = \mathbf{0.3} \left[\frac{\mathbf{H}}{\mathbf{8}} \right]^{-0.434} \quad \mathbf{for\ 0 < H < 8}$$
$$= \mathbf{0.3\ for\ H > 8}$$

The BOD_5 decay rate coefficient was corrected for temperature with the following equation (Novotny and Olem 1994):

$$k_{dT} = k_{d20}\theta^{(T-20)}$$

where k_{dT} = BOD_5 decay rate coefficient at temperature T; T in °C
θ = Thermal factor

The thermal factor (θ) in the above equation has an accepted value of 1.047 for the BOD_5 decay rate coefficient (Novotny and Olem 1994). The decay rate coefficient typically falls between 0.02 and 3.4 day^{-1}. The reaeration rate coefficient typically ranges between 0 and 100 day^{-1} (USEPA 1997b). For comparison purposes, the reaeration coefficient (k_a) was calculated based on the following equation (USEPA 1997b):

$$k_a = \frac{12.9\ v^{0.5}}{H^{1.5}} \text{ at } 20^\circ C$$

where v = Stream velocity (feet/s)
H = Stream depth (feet)

Like the BOD_5 decay rate coefficient, the reaeration coefficient is corrected for temperature with the following equation (Novotny and Olem 1994):

$$k_{aT} = k_{a20}\theta^{(T-20)}$$

where k_{dT} = Reaeration rate coefficient at temperature T; T in °C
θ = Thermal factor

The thermal factor (θ) for the reaeration coefficient has an accepted value of 1.025 (Novotny and Olem 1994).

Since no significant point sources were identified as contributing to either segment, it was assumed that the BOD_5 load from all nonpoint sources is evenly distributed throughout each segment as shown in the following figure:

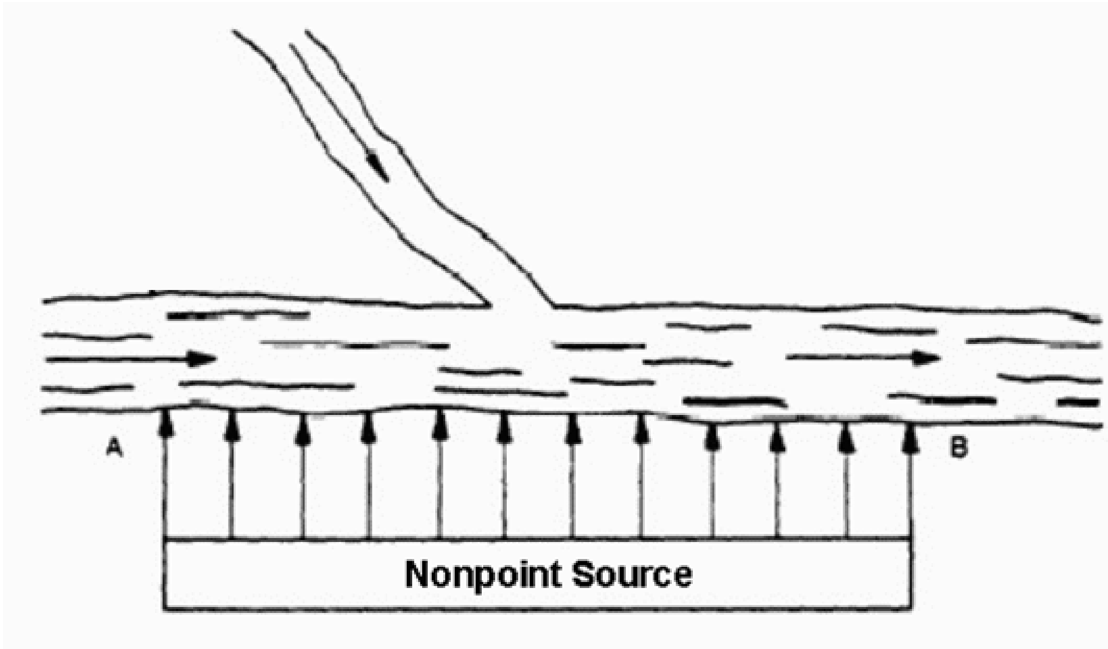


Table 7-4 shows the observed TOC data and the BOD_5 concentrations (L_0) calculated from observed TOC data. On the August 17, 1995 sampling date at station NJ14, a BOD_5 measurement was taken, so this value is used in the analysis of segment NJ14 rather than calculating a BOD_5 concentration from TOC data. Table 7-4 also shows the k_a and k_d coefficients calculated with the above equations. In addition, the estimated BOD_5 load was calculated based on the calculated BOD_5 concentration and average daily flow on the day the sample was taken. Revised k_a and k_d values are also shown in Table 7-4. These values were utilized in the Streeter-Phelps equation described above and the resulting calculated DO was compared to observed DO readings. If there was not a match between the calculated DO and observed DO, k_a and k_d were revised within their accepted ranges so that calculated DO more closely matched observed DO. If possible, only k_a was revised as it was calculated based on estimated depth and flow while k_d was based on estimated depth. Table 7-4 also includes precipitation values near or on the sampling date so that estimates of pollutant loads from runoff can be compared to loads estimated based on the BOD_5/TOC ratio. Analysis details are contained in Appendix D.

Table 7-4 Streeter-Phelps Calculated BOD_5 Concentrations (L_0) and Loads Associated with DO Concentrations

Sample Location and Date	NJ10 7/31/95	NJ10 2/22/96	NJ14 8/17/95	NJC 8/3/95	NJC 2/22/96	NJC 7/17/00	NJC 9/25/00
Measured DO (mg/L)	2.9	11.1	4.1	4.8	10.5	3.2	5.8
Measured TOC (mg/L)	7.4	4.9	–	8.0	4.5	6.0	8.5
Calculated BOD_5 Concentration (mg/L)	9.6	6.4	2.0	10.4	5.9	7.8	11.1
Calculated BOD_5 Load (lb/day)	21	137	2	17	104	101	590
Calculated k_a (1/day)	8.3	28.0	243.1	17.0	31.2	9.6	19.9
Revised k_a (1/day)	0.2	24.5	2.0	4.6	15.3	0.1	1.1
Calculated k_d (1/day)	1.0	0.6	2.7	1.1	0.6	0.8	0.7
Revised k_d (1/day)	1.0	0.6	2.7	1.1	0.6	2.3	0.7
Precipitation (in)	0.56	0.14	0.42	0.70	0.14	0.71	1.34
Dates Precipitation Occurred	3 days before sample	6 days before sample	7 days before sample	1 day before sample	6 days before sample	5 days before sample	On sample date
Flow (cfs)	0.4	4.0	0.2	0.3	3.3	2.4	9.9

The two sample dates that measured the lowest DO concentrations in the Casey Fork Watershed, July 31, 1995 at NJ10 and July 17, 2000 at NJC, required that both k_a and k_d be revised to obtain a match between the calculated and observed DO. In this case, k_a was reduced to the minimum of the literature range, 0.1/day, and k_d was revised to match the calculated and observed DO for the sample date. The need to reduce the aeration coefficient, k_a, to its minimum suggests that lack of aeration is a primary contributor to DO impairments. An error analysis was run on the literature ranges of values for k_a and k_d for each sample date to validate their use for the Streeter-Phelps analysis. Based on the data available, the analysis showed the results are acceptable and the analysis is contained in Appendix E.

As discussed in Section 6.2.1.1, the WMM model was run as a screening tool to assess the BOD_5 loads that are typically generated annually for the watershed. The major inputs to the model are land use, precipitation, and event mean concentration (EMC). Land use for the watershed was presented in Table 5-10. The average monthly and annual precipitation for Jefferson County was presented in Table 5-3. The EMCs used for each land use type are shown in Table 7-5.

Table 7-5 EMC by Land Use Type for Casey Fork Watershed

Land Use	Area (acres)	Percent of Total	BOD_5 EMC (mg/L)	Source
Rural Grassland	19,283	41	2.0	1
Deciduous	12,187	26	2.0	1
Row Crop	8,241	18	8.0	2
Small Grains	3,025	6	8.0	2
Forested Wetland	1,501	3	0.0	1
Urban Grassland	1,049	2	2.0	1

Table 7-5 EMC by Land Use Type for Casey Fork Watershed (continued)

Land Use	Area (acres)	Percent of Total	BOD_5 EMC (mg/L)	Source
Medium Density	704	2	14.1	1
Open Water	366	1	0.0	1
High Density	363	1	14.1	1
Shallow Water/Wetlands	191	0	0.0	1
Orchards/Nurseries	139	0	8.0	2
Coniferous	23	0	2.0	1
Swamp	12	0	0.0	1
Shallow Marsh/Wetlands	6	0	0.0	1
Deep Marsh	3	0	0.0	1

Source:
1 - Smullen 1999
2 - Denison and Tilton 1998

Results of the WMM screening are shown in Table 7-6. The results are for the entire watershed contributing to segments NJ10, NJ14, and NJC. Results shown are an estimate of annual loads and loads from the precipitation events provided in Table 7-6. The loads estimated from WMM generated based on precipitation events near the sampling events are all greater than those shown in Table 7-4. The WMM model files are contained in Appendix F. This analysis indicates that loading from runoff events is not the sole source of DO impairments. Other factors that could contribute to low DO levels include stagnant flow conditions occurring during low flows, elevated stream temperatures during summer months, and nutrient loads from nonpoint sources in the watershed. The implementation plan in Section 9 will address other factors that could also cause decreased DO levels in the Casey Fork Watershed.

Table 7-6 Results of WMM Screening Analysis for the Casey Fork Watershed

Event	Total BOD_5 Load (lb/event)	Precipitation (in)
Annual	271,976	41.4
07/31/1995	3,661	0.56
08/03/1995	4,577	0.70
08/17/1995	2,746	0.42
02/22/1996	915	0.14
07/17/2000	4,642	0.71
09/25/2000	8,761	1.34

The estimated BOD_5 loads in Table 7-4 are low in comparison to the WMM loads predicted suggesting that they represent loadings occurring during ambient conditions. Therefore, it is likely that further reductions in BOD concentrations could be achieved. The WMM results represent loadings from precipitation events shown in Table 7-6 that, in some cases, occurred before the sample date. On four of the five impaired dates shown in Table 7-4, the precipitation occurred between one and seven days prior to the sampling date, and it is likely that the loads from the event passed through the stream system before the sample was taken. The remaining impaired date had precipitation occurring on the sample date and had higher TOC measurements than the other impaired dates. This suggests that a portion of the BOD_5 loading may be from runoff events. As discussed in Section 5.1.5.1.2, all DO samples were taken at below average flow values suggesting that low flows may be the cause of DO impairments. At low flows, conditions in a stream can become stagnant (lack of aeration) where water pools in slow-moving sections of the stream. Therefore, the TMDL described in Section 8 and the implementation plan outlined in Section 9 will focus on increases in reaeration needed to meet the TMDL endpoint of 6.0 mg/L DO (16 hours of any 24-hour period). The implementation plan in Section 9 will also address methods to reduce the BOD_5 loading to the stream and other factors that could also cause decreased DO levels in the Casey Fork Watershed such as elevated stream temperatures during summer months and nutrient loads from nonpoint sources in the watershed.

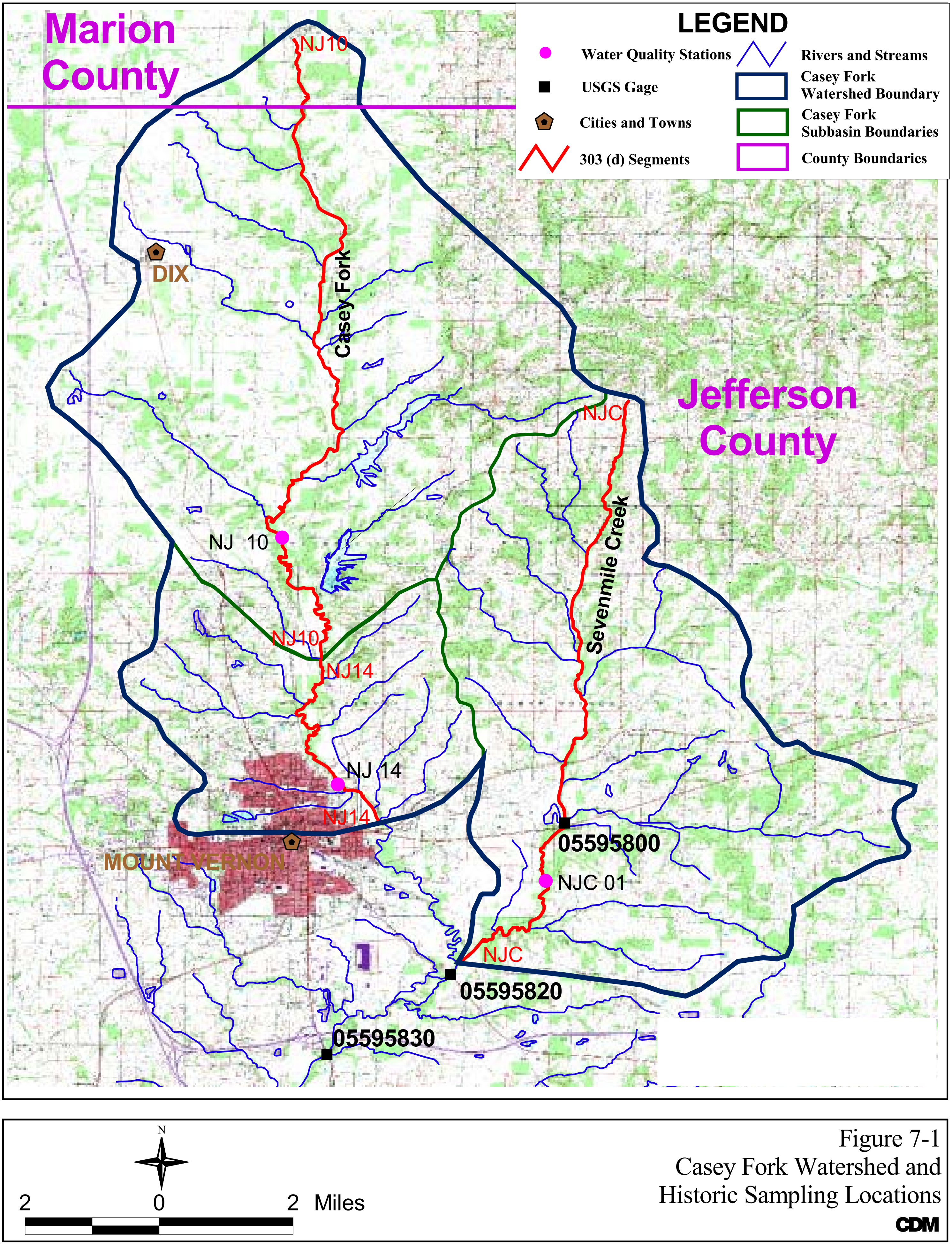


Figure 7-1
Casey Fork Watershed and
Historic Sampling Locations

CDM

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Section 8
Total Maximum Daily Load for the Casey Fork Watershed

8.1 TMDL Endpoints

The TMDL endpoints for manganese, TDS, and DO in a stream segment are summarized in Table 8-1. For manganese and TDS, the desired concentration must be below the TMDL endpoint. For DO, concentrations must be greater than 6.0 mg/L for 16 hours of any 24-hour period. These endpoints are based on protection of aquatic life in Casey Fork and Sevenmile Creek and its tributaries. The average concentrations, which are based on a limited data set, meet the desired endpoints. However, the data set has maximum or minimum values, presented in Section 5.1.5.1, that do not meet the desired endpoints and this was the basis for TMDL analysis. Further monitoring as outlined in the monitoring plan presented in Section 9, will help further define when impairments are occurring in the watershed and support the TMDL allocations outlined in the remainder of this section.

Table 8-1 TMDL Endpoints and Average Observed Concentrations for Impaired Constituents in the Casey Fork Watershed

Constituent	TMDL Endpoint (mg/L)	Average Observed Concentration for NJ10 (mg/L)	Average Observed Concentration for NJ14 (mg/L)	Average Observed Concentration for NJC (mg/L)
Manganese	1.0	0.9	1.1	0.5
TDS	1,000	730	–	–
DO	6.0	7.0	4.1	6.1

8.2 Pollutant Source and Linkages

Pollutant sources for the Casey Fork Watershed were identified through the existing data review described in Section 5. Based on the data review, the source of manganese and TDS in both Casey Fork segments NJ10 and NJ14 and Sevenmile Creek segment NJC is groundwater potentially contaminated by oil and gas activities and an abandoned coal mine. The likely source of oxygen demanding constituents is primarily factors occurring during low flow conditions, such as stagnant flows and increased water temperatures promoting algal growth. Nonpoint source loads such as runoff from agricultural lands and livestock areas in the watershed may also contribute to low DO in the stream.

8.3 Allocation

As explained in Section 1, the TMDL for Casey Fork segments NJ10 and NJ14 and Sevenmile Creek Segment NJC will address the following equation:

$$\textbf{TMDL} = \textbf{LC} = \Sigma \textbf{WLA} + \Sigma \textbf{LA} + \textbf{MOS}$$

where:	LC	=	Maximum amount of pollutant loading a water body can receive without violating water quality standards
	WLA	=	The portion of the TMDL allocated to existing or future point sources
	LA	=	Portion of the TMDL allocated to existing or future nonpoint sources and natural background
	MOS	=	An accounting of uncertainty about the relationship between pollutant loads and receiving water quality

Each of these elements will be discussed in this section as well as consideration of seasonal variation in the TMDL calculation.

8.3.1 Manganese and TDS TMDL

As noted in Section 7.3, a Monte-Carlo analysis could not be performed on the single data point available for manganese for segment NJ14; therefore, no TMDL will be developed for manganese in the segment NJ14 subwatershed.

8.3.1.1 Loading Capacity

The loading capacity for manganese and TDS for Casey Fork Segment NJ10 and Sevenmile Creek segment NJC were based on the Monte Carlo analysis described in Section 7. The LTA, determined by analysis to meet water quality standards generated from the Monte Carlo analysis, is the basis for loading capacity for Casey Fork and Sevenmile Creek. This LTA was multiplied by average flow in each segment to determine an average load. These average loads are shown in Table 8-2.

Table 8-2 Average Loads Based on LTA for Manganese and TDS

Segment and Constituent	LTA (mg/L)	Allowable Load (lb/day)
NJ10 - manganese	0.86	166
NJ10 - TDS	674	130,475
NJC - manganese	0.57	91

8.3.1.2 Seasonal Variation

A season is represented by changes in weather; for example, a season can be classified as warm or cold as well as wet or dry. Seasonal variation is represented in the Casey Fork TMDL as conditions were investigated during all seasons of the year. This takes into account the seasonal effects the stream will undergo during a given year. Since the various pollutant sources are expected to contribute loadings in different quantities during different time periods (e.g., spring runoff loads), the loadings for this TMDL will focus on a long-term average loading rather than specifying different loadings by season. Because a long-term average was used for TMDL development, it is assumed that critical condition is accounted for within the analyses.

8.3.1.3 Margin of Safety

The MOS can be implicit (incorporated into the TMDL analysis through conservative assumptions) or explicit (expressed in the TMDL as a portion of the loadings) or a combination of both. An explicit MOS of 10 percent is recommended for manganese, and TDS in the Casey Fork Watershed because of the uncertainty of the Monte Carlo analysis due to the limited data set. As more data become available, the MOS could be revisited and revised if appropriate.

8.3.1.4 Waste Load Allocation

There are no point sources in the watershed; therefore, no WLA is recommended at this time.

8.3.1.5 Load Allocation and Summary TMDLs

Table 8-3 shows a summary of the TMDL for manganese and TDS in the Casey Fork Watershed. The calculated allowable loads (LC) necessary to maintain the water quality standard are reduced by the MOS, representing the uncertainty in the data analysis, to determine the allowable loading from the watershed, the LA. The LC was calculated from the LTA presented in Section 7.3.1. For NJ10, an 18 percent reduction in manganese loads and 16 percent reduction in TDS loads were estimated as the required decreases in loadings so that water quality standards will be met in the stream segment. Similarly for Sevenmile Creek segment NJC, a 16 percent reduction of manganese was estimated.

Table 8-3 TMDL Summary for Manganese and TDS in the Casey Fork Watershed

Segment and Constituent	LC (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	Reduction Needed (lb/day)	Reduction Needed (percent)
NJ10 - manganese	166	0	150	17	32	18%
NJ10 - TDS	130,476	0	117,428	13,048	23,114	16%
NJC - manganese	91	0	82	9	16	16%

The required LTAs presented in Section 7 and in Table 8-2 were reduced because of the applied MOS and are presented in Table 8-4. The recalculated LTA represents the LA in Table 8-3. Methods to meet these LTAs will be outlined in Section 9.

Table 8-4 LTAs Adjusted by TMDL MOS

Segment and Constituent	Monte Carlo LTA (mg/L)	Recalculated LTA (mg/L)
NJ10 - manganese	0.86	0.77
NJ10 - TDS	674	607
NJC - manganese	0.57	0.51

8.3.2 DO TMDL

As discussed in Section 7.3.2, the BOD_5 loads in segments NJ10, NJ14, and NJC likely represent background loadings, which suggests that the principle cause of DO impairments in these segments is a lack of aeration caused by low flows and stagnant pools. Table 8-5 shows the aeration coefficient calculated from the observed DO in Section 7.3.2 for sample dates that did not meet the TMDL endpoint and the coefficient that would be required to meet the TMDL endpoint of 6.0 mg/L DO

(16 hours of any 24-hour period) for sampling events that had DO measurements less than 6.0 mg/L. Increasing aeration in the stream is not a parameter for which a TMDL can be developed. Therefore, no TMDL will be developed at this time. Methods to achieve elevated reaeration coefficients will be outlined in Section 9.

Table 8-5 Calculated Reaeration Coefficients and Required Reaeration Coefficients in the Casey Fork Watershed Based on TMDL Endpoint for DO

Segment	Date	Measured DO Concentration (mg/L)	Modeled k_a (1/day)	Required k_a (1/day)
NJ10	7/31/95	2.9	0.2	9.5
NJ14	8/17/95	4.1	2.0	7.6
NJC	8/3/95	4.8	4.6	9.1
NJC	7/17/00	3.2	0.1	6.3
NJC	9/25/00	5.8	1.1	1.8

Based on the data analysis, increases of aeration would be required in summer months but not during winter conditions. Monitoring data to make the analysis more robust will be discussed in Section 9 as well as management measures to increase aeration and reduce nonpoint source loads contributing to non-attainment of the DO water quality standard.

To confirm that reductions in BOD_5 loads to meet the water quality standard are not an appropriate measure for controlling DO in this watershed, the Streeter-Phelps equations presented in Section 7.3.2 were used to estimate the BOD_5 loading required to meet the water quality standard on each sample date impaired for DO. Table 8-6 shows the BOD_5 loads estimated from TOC as discussed in Section 7.3.2 and the BOD_5 loading that would be necessary to meet water quality standards.

Table 8-6 Calculated BOD_5 Loads and Required BOD_5 Loads in the Casey Fork Watershed Based on TMDL Endpoint for DO

Segment	Date	Measured DO Concentration (mg/L)	Calculated BOD_5 (lb/d)	Required BOD_5 (lb/d)
NJ10	7/31/95	2.9	21	0
NJ14	8/17/95	4.1	2	0
NJC	8/3/95	4.8	17	0
NJC	7/17/00	3.2	101	0

Table 8-6 shows that the reductions in BOD_5 loads necessary for compliance with the DO loads are not a feasible option for increasing DO in the Casey Fork Watershed.

Section 9
Implementation Plan for Casey Fork Watershed

9.1 Implementation Actions and Management Measures for Manganese and TDS

An adaptive management or phased approach is recommended for the TMDL for this watershed because of the limited amount of data available for the TMDL analysis of Casey Fork Watershed. Adaptive management is a systematic process for continually improving management policies and practices through learning from the outcomes of operational programs. Some of the differentiating characteristics of adaptive management are:

1. acknowledgement of uncertainty about what policy or practice is "best" for the particular management issue.
2. thoughtful selection of the policies or practices to be applied (the assessment and design stages of the cycle).
3. careful implementation of a plan of action designed to reveal the critical knowledge that is currently lacking.
4. monitoring of key response indicators.
5. analysis of the management outcomes in consideration of the original objectives, and incorporation of the results into future decisions (British Columbia Ministry of Forests 2000).

Based on existing data review, presented in Section 5, the likely sources of manganese and TDS in the Casey Fork Watershed are oil and gas activities and abandoned coal mines. Further source identification is required as outlined in the next section.

9.1.1 Source Identification for Manganese and TDS

It is recommended that further source identification activities take place within the watershed because the current data regarding sources of manganese and TDS in Casey Fork Watershed is limited. The GIS data and mapping provided in Section 5 (Figure 5-3) should be the basis for the start of the source investigation. Collection of data during various flow conditions may also be beneficial in determining the source of these constituents. Available GIS data does not show any abandoned coal mines in the Casey Fork Segment NJ10 Watershed. Therefore, any improperly functioning injection wells, abandoned injection wells, or leaking brine storage tanks should be identified. For Sevenmile Creek, the location of the potential discharge from the abandoned coal mine should be identified. Once potential sources are identified and located, sampling stations should be placed in appropriate locations to assess water quality downstream of these sources. The potential source identification and station sampling placement should be the result of field investigations.

9.1.2 Manganese and TDS Management Measures

If the sources of manganese and TDS in Casey Fork Segment NJ10 are confirmed to be from oil and gas activities, sources could be improperly functioning injection wells, abandoned injection wells, or leaking brine storage tanks. The IDNR Division of Oil & Gas Plugging and Restoration Fund Program (PRF) provides treatment of abandoned injection wells. The IDNR Division of Oil & Gas also regulates brine storage and permitted injection wells. If these operations are found to be the source of manganese and TDS, the Division of Oil & Gas will be able to regulate these activities within its permit program. Because the exceedences of water quality standards occurred during low conditions, it is likely that contaminated groundwater by oil and gas activities could cause impairment of Segment NJ10. Sources of the groundwater contamination are the same as those listed above and by mitigating these sources of potential groundwater contamination, associated surface water impacts can be prevented.

If the source of manganese in Sevenmile Creek is attributed to abandoned coal mining activity, active chemical treatment methods, passive treatment methods, and mine reclamation are available. Active chemical treatment typically involves the addition of alkaline chemicals, such as calcium carbonate, sodium hydroxide, sodium bicarbonate, and anhydrous ammonia to acid mine drainage. These chemicals raise the pH to acceptable levels and decrease the solubility of dissolved metals. Metal precipitates form and settle out of the solution. Active chemical treatment is not a viable option for the Casey Fork Watershed because the chemicals are expensive, and the treatment system requires additional costs associated with operation and maintenance as well as the disposal of metal-laden sludges.

Reclamation of abandoned mines is another method of controlling pollutants. Reclamation of abandoned mine land involves clearing site vegetation, removing contaminated topsoil and coal, and restoring functionality of the site for recreational, agricultural, or wildlife habitat purposes. The environmental benefits realized from abandoned mine reclamation projects are numerous and significant, including restoring land for future use and improving water quality. Restoration of the land can result in increased and enhanced pasture land, recreational areas, or wildlife habitat (PDEP 2002). However, reclamation projects tend to be costly and resource intensive and may not be appropriate for abandoned mine sites in Casey Fork Watershed.

Passive methods could be utilized until full reclamation of an abandoned mine occurs. Chemical addition and energy consuming treatment processes are virtually eliminated with passive treatment systems. The operation and maintenance requirements of passive systems are considerably less than active treatment systems (PDEP 2002). Therefore, passive treatment systems would be the best solution for controlling manganese from abandoned coal mines in the Sevenmile Creek Watershed.

Following are examples of the passive treatment technologies:

- aerobic wetland
- compost or anaerobic wetland
- open limestone channels
- diversion wells
- anoxic limestone drains
- vertical flow reactors
- pyroclastic process

The remainder of this section discusses these technologies.

9.1.2.1 Aerobic Wetland

An aerobic wetland consists of a large surface area pond with horizontal surface flow. The pond may be planted with cattails and other wetland species. Aerobic wetlands can only effectively treat water that is net alkaline (pH greater than 7). In aerobic wetland systems, metals are precipitated through oxidation reactions to form oxides and hydroxides. A typical aerobic wetland will have a water depth of six to 18 inches (PDEP 2002).

9.1.2.2 Compost or Anaerobic Wetland

Compost wetlands, or anaerobic wetlands as they are sometimes called, consist of a large pond with a lower layer of organic substrate. The flow is horizontal within the substrate layer of the basin. Piling the compost a little higher than the free water surface can encourage the flow within the substrate. Typically, the compost layer consists of spent mushroom compost that contains about 10 percent calcium carbonate. Other compost materials include peat moss, wood chips, sawdust, or hay. A typical compost wetland will have 12 to 24 inches of organic substrate and be planted with cattails or other emergent vegetation (PDEP 2002).

9.1.2.3 Open Limestone Channels

Open limestone channels may be the simplest passive treatment method. Open limestone channels are constructed in two ways. In the first method, a drainage ditch constructed of limestone collects contaminated acid mine drainage water. The other method consists of placing limestone fragments directly in a contaminated stream. Dissolution of the limestone adds alkalinity to the water and raises the pH. This treatment requires large quantities of limestone for long-term success (PDEP 2002).

9.1.2.4 Diversion Wells

Diversion wells are another simple way of increasing the alkalinity of contaminated waters. Acidic water is conveyed by a pipe to a downstream "well," which contains crushed limestone aggregate. The hydraulic force of the pipe flow causes the limestone to turbulently mix and abrade into fine particles preventing armoring (PDEP 2002).

9.1.2.5 Anoxic Limestone Drains

An anoxic limestone drain is a buried bed of limestone constructed to intercept subsurface mine water flow and prevent contact with atmospheric oxygen. Keeping oxygen out of the water prevents oxidation of metals and armoring of the limestone. An anoxic limestone drain can be considered a pretreatment step to increase alkalinity and raise pH before the water enters a constructed aerobic wetland (PDEP 2002).

9.1.2.6 Vertical Flow Reactors

Vertical flow reactors were conceived as a way to overcome the alkalinity producing limitations of anoxic limestone drains and the large area requirements of compost wetlands. The vertical flow reactor consists of a treatment cell with an underdrained limestone base topped with a layer of organic substrate and standing water. The water flows vertically through the compost and limestone and is collected and discharged through a system of pipes. The vertical flow reactor increases alkalinity by limestone dissolution and bacterial sulfate reduction (PDEP 2002).

9.1.2.7 Pyrolusite Process

This is a patented process, which utilizes site-specific cultured microbes to remove iron, manganese, and aluminum from acid mine drainage. The treatment process consists of a shallow bed of limestone aggregate inundated with acid mind drainage. After laboratory testing determines the proper combinations, microorganisms are introduced to the limestone bed by inoculation ports located throughout the bed. The microorganisms grow on the surface of the limestone chips and oxidize the metal contaminants while etching away limestone, which in turn increases the alkalinity and raises the pH of water. This process has been used on several sites in western Pennsylvania with promising results (PDEP 2002).

9.2 Implementation Actions and Management Measures for DO and Phosphorus

DO impairments are addressed by focusing on organic loads that consume oxygen through decomposition and nutrient loads that can cause algal growth, which can also deplete DO. Analysis provided in Section 7 established a relationship between reaeration, BOD_5, and DO concentrations in Casey Fork segments NJ10, NJ14, and Sevenmile Creek segment NJC, so management measures for the Casey Fork Watershed will focus on increasing reaeration and decreasing BOD_5 loads to increase DO concentrations.

The likely sources of low DO in the Casey Fork Watershed segments NJ10, NJ14, and NJC, are increased water temperatures and low flow or stagnant conditions. Additional contributors to low DO are nonpoint contributions from agriculture. Therefore, management measures for the Casey Fork Watershed will focus on reducing stream temperatures, reducing stagnant conditions through reaeration, and reducing nonpoint source loading through sediment and surface runoff controls.

Implementation actions, management measures, or BMPs are used to control the generation or distribution of pollutants. BMPs are either structural, such as wetlands, sediment basins, fencing, reaeration structures, or filter strips; or managerial, such as conservation tillage, nutrient management plans, or crop rotation. Both types require good management to be effective in reducing pollutant loading to water resources (Osmond et al. 1995).

It is generally more effective to install a combination of BMPs or a BMP system. A BMP system is a combination of two or more individual BMPs that are used to control a pollutant from the same critical source. In other words, if the watershed has more than one identified pollutant, but the transport mechanism is the same, then a BMP system that establishes controls for the transport mechanism can be employed. (Osmond et al. 1995).

Implementation actions and management measures are described for each nonpoint source in the watershed. Nonpoint sources include cropland and rural grassland. The final source is internal phosphorus cycled from lake sediments.

9.2.1 DO Concentration Management

The sources of nonpoint source pollution in the Casey Fork TMDL are likely due to runoff from agricultural cropland. BMPs evaluated for treatment of these nonpoint sources are:

- Filter strips
- Reaeration
- Nutrient Management Plans

Organic and nutrient loads originating from cropland is most efficiently treated with a combination of riparian buffer or grass filter strips. Nutrient management within the watershed could also help in increasing DO levels. Instream management measures for DO focus on reaeration techniques. The Streeter-Phelps equations presented in Section 7 utilizes a reaeration coefficient. Increasing the reaeration coefficient by physical means will increase DO in impaired segments of the Casey Fork Watershed.

9.2.1.1 Filter Strips

Filter strips can be used as a structural control to reduce pollutant loads to Casey Fork Watershed. Filter strips implemented along stream segments slow and filter nutrients and sediment out of runoff, help reduce stream water temperatures thereby increasing the water body DO saturation level, and provide bank stabilization decreasing erosion and deposition. The following paragraphs focus on the implementation of filter strips in Casey Fork Watershed. Finally, design criteria and size selection of filter strips are detailed.

Organic debris in topsoil contributes to the BOD_5 load to water bodies (USEPA 1997b). Increasing the length of stream bordered by grass and riparian buffer strips will decrease the amount of BOD_5 and nutrient load associated with sediment loads to

Casey Fork Segments NJ10 and NJ14 and Sevenmile Creek Segment NJC. Nutrient criteria, currently being developed and expected to be adopted around 2007 by the Illinois EPA, will assess the instream nutrient concentrations required for the watershed. As stated previously, excess nutrients in streams can cause excessive algal growth, which can deplete DO in streams. Adoption of nutrient criteria, expected in 2007, will affect this DO TMDL and would be expected to also help control exceedences of DO water quality criteria in Casey Fork segments NJ10 and NJ14 and Sevenmile Creek segment NJC.

Filter strips will help control BOD_5 levels by removing organic loads associated with sediment from runoff; however no studies were identified as providing an estimate of removal efficiency. Grass filter strips can remove as much as 75 percent of sediment and 45 percent of total phosphorus from runoff, so it is assumed that the removal of BOD_5 falls within this range (NCSU 2000). Riparian buffer strips also help reduce water temperatures increasing the water body DO saturation level as explained in Section 7. In addition, filter strips should be harvested periodically so that removal rate efficiencies over extended periods of time remain high (USEPA 1993).

Riparian vegetation, specifically shade, plays a significant role in controlling stream temperature change. The shade provided will reduce solar radiation loading to the stream. Furthermore, riparian vegetation provides bank stability that reduces sediment loading to the stream and the stream width-to-depth ratio. Research in California (Ledwith 1996), Washington (Dong et al. 1998), and Maine (Hagan and Whitman 2000) show that riparian buffers effect microclimate factors such as air temperature and relative humidity proximal to the stream. Ledwith (1996) found that a 500-foot buffer had an air temperature decrease of 12 degrees Fahrenheit (°F) at the stream over a zero-foot buffer. The greatest change occurred in the first 100 feet of the 500-foot buffer where the temperature decreased 2°F per 30 feet from the stream bank. A decrease in the air temperature proximal to the stream would result in a smaller convective flux to the stream during the day.

Filter strip widths for the Casey Fork TMDL were estimated based on the slope. According to the NRCS Planning and Design Manual, the majority of sediment is removed in the first 25 percent of the width (NRCS 1994). Table 9-1 outlines the guidance for filter strip flow length by slope (NRCS 1999). Based on slope estimates near tributaries within the watershed filter strip, widths of 72 to 144 feet could be incorporated in locations throughout the watershed. The total acreage examined was 665 acres.

Table 9-1 Filter Strip Flow Lengths Based on Land Slope

Percent Slope	0.5%	1.0%	2.0%	3.0%	4.0%	5.0% or greater
Minimum	36	54	72	90	108	117
Maximum	72	108	144	180	216	234

The acreages provided above are used to calculate an approximation of BMP costs in Section 9.3 and should only be used as a guideline for watershed planning. It is recommended that landowners evaluate their land near streams and lakes and create or extend filter strips according to the NRCS guidance presented in Table 9-1. Programs available to fund the construction of these buffer strips are discussed in Section 9.3.

9.2.1.2 Reaeration

The purpose of reaeration is to increase DO concentrations in streams. Physical measures that will assist in increasing reaeration of a stream include bank stabilization, channel modifications, and the addition of rip rap or pool and rifle sequences. Bank stabilization reduces erosion by planting vegetation along the bank or modification of the channel to decrease the slope of the bank. Rip rap or pool and rifle sequences would increase reaeration by increasing turbulence. Turbulence creates an increase in the interaction between air and water, which draws air into the river increasing aeration. Expanding monitoring to several locations along the impaired segments could help identify reaches that would benefit the most from an increase of turbulence. Although reaeration methods are viable options for increasing DO, it is not a practical option for the impaired segments in the Casey Fork Watershed due to the rural nature of the watershed. Funding is not available to individuals to implement reaeration measures, whereas funding is available for other measures addressed in this plan. Therefore, costs of implementation were not developed for reaeration of the stream.

9.2.1.3 Nutrient Management

Nutrient management could result in reduced phosphorus and nitrogen loads within the Casey Fork Watershed. Crop management of nitrogen and phosphorus can be accomplished through Nutrient Management Plans, which focus on increasing the efficiency with which applied nutrients are used by crops, thereby reducing the amount available to be transported to both surface and groundwater. In the past, nutrient management focused on application rates designed to meet crop nitrogen requirements but avoid groundwater quality problems created by excess nitrogen leaching. This results in buildup of soil phosphorus above amounts sufficient for optimal crop yields. Illinois, along with most Midwestern states, demonstrates high soil test phosphorus in greater than 50 percent of soil samples analyzed (Sharpley et al. 1999).

The overall goal of phosphorus reduction from agriculture should increase the efficiency of phosphorus use by balancing phosphorus inputs in feed and fertilizer with intakes of crops and animal produce as well as managing the level of phosphorus in the soil. Reducing phosphorus loss in agricultural runoff may be brought about by source and transport control measures, such as filter strips or grassed waterways. The Nutrient Management Plans account for all inputs and outputs of phosphorus to determine reductions. Elements of a Nutrient Management Plan include:

- plan summary
- manure summary, including annual manure generation, use, and export
- nutrient application rates by field and crop
- summary of excess manure utilization procedures
- implementation schedule
- manure management and stormwater BMPs

In Illinois, Nutrient Management Plans have successfully reduced phosphorus application to agricultural lands by 36-lb/acre. National reductions range from 11 to 106-lb/acre, with an average of 35-lb/acre (NCSU 2000).

9.3 Reasonable Assurance

Reasonable assurance means that a demonstration is given that the pollutant reductions in this watershed will be implemented. It should be noted that all programs discussed in this section are voluntary. The discussion in Sections 9.1 and 9.2 provided a means for obtaining the reductions necessary. The remainder of this section discusses the programs available to assist with funding and an estimate of costs to the watershed for implementing these practices.

9.3.1 Available Programs for TDS and Manganese TMDL

As mentioned previously, the IDNR Division of Oil & Gas is responsible for regulating oil and gas activities within the watershed. If sources are attributed to active operations, source control can be regulated through the current permitting process. If an abandoned injection well is determined to be a cause of impairment, the Division of Oil & Gas PRF program could be utilized for remediation of the abandoned well.

The state agency primarily responsible for reclamation of pre-law coal mine areas is the IDNR, Office of Mines and Minerals, Abandoned Mined Lands Reclamation Division (AMLRD). The AMLRD contracts or oversees reclamation of pre-law mine sites utilizing funds from a "reclamation fee" (tax) on every ton of coal mined in Illinois since the implementation of the Surface Mining Control and Reclamation Act of 1977. The fee monies are sent to the U.S. Department of Interior and are then partially reallocated back to the states for several purposes, which include the reclamation of pre-law abandoned mined lands. This reclamation fee funds almost all the reclamation of pre-law mine sites in Illinois. The AMLRD also has the responsibility to reclaim permitted mine sites where the operator has deserted the site and all of the bond money has been forfeited. This adds to the overall number of projects that the AMLRD has to complete (Muir et al. 1997).

Abandoned mine sites are reclaimed through the ALMRD according to a priority list as monies become available. Because the federally designated first priority for ALMRD projects is safety, most of the early reclamation projects were not environmentally oriented. Even so, the AMLRD has completed a large number of environmentally oriented reclamation projects (Muir et al. 1997). Due to the uncertainty of sources of TDS and manganese in the Casey Fork Watershed, no cost estimates were developed for mitigation of the potential sources provided in this report. If the abandoned mine in the Sevenmile Creek Watershed is shown to contribute to impairment of Sevenmile Creek, funds from the ALMRD focused on environmental projects should be directed towards water bodies with TMDLs.

9.3.2 Available Programs for DO TMDL

Approximately 65 percent of the Casey Fork Watershed is classified as rural grassland (pasture land, CRP, waterways, buffer strips, etc.), row crop, and small grains land. There are several voluntary conservation programs established through the 2002 U.S. Farm Bill, which encourage landowners to implement resource-conserving practices for water quality and erosion control purposes. These programs would apply to crop fields and rural grasslands that are presently used as pasture land. Each program is discussed separately in the following sections.

9.3.2.1 Conservation Reserve Program (CRP)

This voluntary program encourages landowners to plant long-term resource-conserving cover to improve soils, water, and wildlife resources. CRP is the USDA's single largest environmental improvement program and one of its most productive and cost-efficient. It is administered through the FSA by USDA's Commodity Credit Corporation (CCC). The program was initially established in the Food & Security Act of 1985. The duration of the contracts under CRP range from 10 to 15 years.

Eligible land must be one of the following:

1. cropland that is planted or considered planted to an agricultural commodity two of the five most recent crop years (including field margins). Must be physically and legally capable of being planted in a normal manner to an agricultural commodity.

2. certain marginal pastureland enrolled in the Water Bank Program.

The CCC bases rental rates on the relative productivity of soils within each county, and the average of the past three years of local dryland cash rent or cash-rent equivalent. The maximum rental rate is calculated in advance of enrollment. Producers may offer land at the maximum rate or at a lower rental rate to increase likelihood of offer acceptance. In addition, the CCC provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. CCC also encourages restoration of wetlands by offering a one-time incentive payment equal to 25 percent of the costs incurred. This incentive is in addition to the 50 percent cost share provided to establish cover (USDA 1999).

Finally, CCC offers additional financial incentives of up to 20 percent of the annual payment for certain continuous sign-up practices. Continuous sign-up provides management flexibility to farmers and ranchers to implement certain high-priority conservation practices on eligible land. The land must be determined by NRCS to be eligible and suitable for any of the following practices:

- riparian buffers
- filter strips
- grass waterways
- shelter belts
- field windbreaks
- living snow fences
- contour grass strips
- salt tolerant vegetation
- shallow water areas for wildlife
- eligible acreage within an USEPA-designated wellhead protection area (FSA 1997)

9.3.2.2 Environmental Quality Incentive Program (EQIP)

The Environmental Quality Incentive Program (EQIP) is a voluntary USDA conservation program for farmers and private landowners engaged in livestock or agricultural production who are faced with serious threats to soil, water, and related natural resources. It provides technical, financial, and educational assistance primarily in designated "priority areas." Priority areas are defined as watershed regions, or areas of special environmental sensitivity that have significant soil, water, or natural resource related concerns. The program goal is to maximize environmental benefits per dollar expended and provides "(1) flexible technical and financial assistance to farmers and ranchers that face the most serious natural resource problems, (2) assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourage environmental enhancement, (3) assistance to farmers and ranchers in making beneficial, cost-effective changes to measures needed to conserve and improve natural resources, and (4) for the consolidation and simplification of the conservation planning process." As of 2001, 379,000 acres have been protected in Illinois using EQIP (NRCS 2002b,c).

Landowners, with the assistance of a local NRCS or other service provider, are responsible for development of a site-specific conservation plan, which addresses the primary natural resource concerns of the priority area. Conservation practices include but are not limited to erosion control, filter strips, buffers, and grassed waterways. If the plan is approved by NRCS, a five- to 10-year contract that provides cost-share and incentive payments is developed.

Cost-share assistance may pay landowners up to 75 percent of the costs of conservation practices, such as grassed waterways, filter strips, manure management, capping abandoned wells, and other practices important to improving and maintaining the health of natural resources in the area. Total incentive and cost-share payments are limited to $10,000 per person per year and $50,000 over the life of the contract.

9.3.2.3 Wildlife Habitat Incentives Program (WHIP)

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program that encourages the creation of high quality wildlife habitat of national, state, tribal, or local significance. WHIP is administered through NRCS, which provides technical and financial assistance to landowners for development of upland, riparian, and aquatic habitat areas on their property. NRCS works with the participant to develop a wildlife habitat development plan which becomes the basis of the cost-share agreement between NRCS and the participant. Most contracts are five to 10 years in duration, depending upon the practices to be installed. However, longer term contracts of 15 years or greater may also be funded. Under the agreement:

- the landowner agrees to maintain the cost-shared practices and allow NRCS or its agent access to monitor its effectiveness.
- NRCS agrees to provide technical assistance and pay up to 75 percent of the cost of installing the wildlife habitat practices. Additional financial or technical assistance may be available through cooperating partners (NRCS 2002a).

The Farm Service Agency (FSA) administers the CRP. NRCS administers the EQIP and WHIP. Local NRCS and FSA contact information in Jefferson County are listed in the Table 9-2 below.

Table 9-2 Local NRCS and FSA Contact Information

Contact	Address	Phone
Local NRCS Office		
Art J. Friederich	109 Shiloh Drive Mt. Vernon, Illinois 62864	618-244-0773 x 3
Local FSA Office		
Jefferson Service Center	109 Shiloh Drive Mt. Vernon, Illinois 62864	618-244-0773 x 3

9.3.2.4 Clean Water Act Section 319 Grants

Section 319 was added to the CWA to establish a national program to address nonpoint sources of water pollution. Through this program, each state is allocated section 319 funds on an annual basis according to a national allocation formula based on the total annual appropriation for the section 319 grant program. The total award consists of two categories of funding; incremental funds and base funds. A state is eligible to receive EPA 319(h) grants upon USEPA's approval of the state's Nonpoint Source Assessment Report and Nonpoint Source Management Program. States may reallocate funds through subawards (e.g., contracts, subgrants) to both public and private entities, including local governments, tribal authorities, cities, counties, regional development centers, local school systems, colleges and universities, local nonprofit organizations, state agencies, federal agencies, watershed groups, for-profit groups, and individuals. Subawards to individuals are limited to demonstration projects (USEPA 2003, 2002).

USEPA designates incremental funds, a $100-million award, for the restoration of impaired water through the development and implementation of watershed-based plans and TMDLs for impaired waters. Base funds, funds other than incremental funds, are used to provide staffing and support to manage and implement the state Nonpoint Source Management Program. Section 319 funding can be used to implement activities which improve water quality, such as filter strips, streambank stabilization, etc (USEPA 2003, 2002).

9.3.2.5 Cost Estimates for BMPs

Cost estimates for implementing riparian or grass filter strips along the main branch and tributaries to segments NJ14 and NJC are shown in Table 9-3. Unit costs were provided by the Jefferson County NRCS. For riparian buffer strips, capital costs were estimated at a total of $415,000 with an annual maintenance cost of $41,500. For grass filter strips, capital costs were estimated to be $223,000 with an annual maintenance expense of $22,300. For streambank stabilization, capital costs were estimated to be approximately $1,300,000 with an annual maintenance cost of $132,000. These costs estimates should be considered an order of magnitude estimate to assess costs for implementation of BMPs in the watershed. Based on this preliminary estimate, it appears that grass filter strips would be a more cost-effective way to control BOD and nutrient loads in the Casey Fork Watershed.

Table 9-3 Cost Estimate of Implementation Measures for Casey Fork Watershed

BMP	Acres	Mean $/Acre	Capital Cost ($)	Mean $ Acre/Year	Maintenance Cost ($)
Riparian Revegetation Labor	665	$109	$72,500	$10.88	$7,200
Hardwood Cost	665	$326	$217,000	$32.63	$22,000
Grass Filter Strip	665	$234	$156,000	$23.40	$16,000
Streambank Stabilization *	33,000	$40	$1,300,000	$4.00	$132,000
Nutrient Management Plan	11,270	$7	$78,890	—	$0

* Cost calculated on linear foot basis.

9.4 Monitoring Plan

The purpose of the monitoring plan for the Casey Fork Watershed is to assess the overall implementation of management actions outlined in this section. This can be accomplished by conducting the following monitoring programs:

- track implementation of management measures in the watershed
- estimate effectiveness of management measures
- continued ambient monitoring

Tracking the implementation of management measures can be used to address the following goals (NCSU 2000):

- determine the extent to which management measures and practices have been implemented compared to action needed to meet TMDL endpoints.
- establish a baseline from which decisions can be made regarding the need for additional incentives for implementation efforts.
- measure the extent of voluntary implementation efforts.

- support workload and cost analysis for assistance or regulatory programs.
- determine the extent to which management measures are properly maintained and operated.

Estimating the effectiveness of the BMPs implemented in the watershed could be completed by monitoring before and after the BMP is incorporated into the watershed. Additional monitoring could be conducted on specific structural systems such as a constructed wetland. Inflow and outflow measurements could be conducted to determine site-specific removal efficiency.

Segments within the Casey Fork Watershed are monitored approximately every five years as part of the Big Muddy River Basin Intensive Survey. Continuation of this monitoring will assess instream water quality as improvements in the watershed are completed. This data will also be used to assess whether water quality standards in the watershed are being attained. In addition, future ambient water quality network stations could be located in the watershed. Samples are taken through this network approximately every nine weeks. To further support DO modeling and to plan for future nutrient criteria in the watershed the following parameters should be added to the monitoring list:

- BOD_5
- BOD_{20}
- Chlorophyll "a" or algae monitoring

9.5 Implementation Time Line

Implementing the actions outlined in this section for the Casey Fork Watershed should occur in phases, and the effectiveness of the management actions should be assessed as improvements are made. It is assumed that it may take up to one to two years for further source identification in the watershed. It is also assumed that it may take up to five years to secure funding for actions needed in the watershed and five to seven years after funding to implement the measures. The length of time required to meet water quality standards will be based on the types of BMPs implemented in the watershed. In summary, to meet water quality standards in the Casey Fork Watershed may take 15 to 20 years to complete.

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Section 10
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Appendix A
Historic Water Quality Data

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	7/31/1995	1055	MANGANESE, TOTAL (UG/L AS MN)	1100
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	2/22/1996	1055	MANGANESE, TOTAL (UG/L AS MN)	790

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	7/31/1995	299	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	2.9
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	2/22/1996	299	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	11.1

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	7/31/1995	70300	SOLIDS, RESIDUE ON EVAPORATION AT 180 DEG C, DISSOLVED (MG/L)	366
ILNJ 07	NJ 10	Casey Fk.	11.82	NJ 10	21ILL	2/22/1996	70300	SOLIDS, RESIDUE ON EVAPORATION AT 180 DEG C, DISSOLVED (MG/L)	1093

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJ14	Casey Fk.	3.49	NJ14	21ILL	8/17/1995	1055	MANGANESE, TOTAL (UG/L AS MN)	1100

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJ14	Casey Fk.	3.49	NJ14	21ILL	8/17/1995	299	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	4.1

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC01	21ILL	7/17/2000	299	OXYGEN, DISSOLVED MG/L	3.2
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC01	21ILL	9/25/2000	299	OXYGEN, DISSOLVED MG/L	5.8
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	8/3/1995	299	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	4.8
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	2/22/1996	299	OXYGEN ,DISSOLVED, ANALYSIS BY PROBE MG/L	10.5

WSID	Segment	Name	Size Miles	Primary Station ID	Organization Code	Start Date	Parameter Code	Parameter Long Name	Result Value
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	8/3/1995	1055	MANGANESE, TOTAL (UG/L AS MN)	200
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	2/22/1996	1055	MANGANESE, TOTAL (UG/L AS MN)	290
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	7/17/2000	1055	MANGANESE, TOTAL (UG/L AS MN)	530
ILNJ 07	NJC	Sevenmile Cr.	10.21	NJC 01	21ILL	9/25/2000	1055	MANGANESE, TOTAL (UG/L AS MN)	1100

Appendix B
Monte Carlo Analyses

IEPA
Watershed Load Reductions
12/12/2002

Monte Carlo Simulations using @RISK 3.5

Watershed : NJC Casey Fork

Manganese

Cc (Mn)	1	mg/L	- Water quality criterion
Cd (Mn)	#NAME?	mg/L	- Randomly generated pollutant source concentration base on the observed data

Percent Reduction

PR = Max{ 0, (1-Cc/Cd)}

PR (Mn) #NAME?

After Monte-Carlo Simulation:

Percent reduction at the 99th percentile

PR99 (Mn) 2.9% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 0.6 mg/L

LTA = mean * (1 - PR99)

LTA (Mn) 0.594 mg/L

Percent reduction at the 99.9th percentile

PR99.9 (Mn) 6.9% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 0.6 mg/L

LTA = mean * (1 - PR99.9)

LTA (Mn) 0.569 mg/L

Simulation Results for IEPA_Monte_Carlo_NJC2.xls

Iterations= 10000
Simulations= 1
# Input Variables= 1
# Output Variables= 1
Sampling Type= Monte Carlo
Runtime= 00:00:17
Run on 12/12/2002, 10:12:40 AM

Summary Statistics

Cell	Name	Minimum	Mean	Maximum
B18	PR (Mn)	0.00E+00	0.000634	0.087288
B12	(Input) Cd (Mn)	0.203528	0.611707	1.095635

@RISK Simulation of IEPA_Monte_Carlo_NJC2.xls	Run on 12/12/2002, 10:12:40 AM	Simulations= 1	Iterations= 10000
Name	PR (Mn)	Cd (Mn)	
Description	Output	Triang(0.2,0.53,1.1)	
Cell	B18	B12	
Minimum =	0.00E+00	0.2035278	
Maximum =	0.08728763	1.095635	
Mean =	0.000634266	0.6117067	
Std Deviation =	0.005403117	1.85E-01	
Variance =	2.92E-05	3.42E-02	
Skewness =	9.987886	0.2336278	
Kurtosis =	112.5327	2.406839	
Errors Calculated =	0	0	
Mode =	0	0.5424754	
5% Perc =	0	0.3216716	
10% Perc =	0	0.3745805	
15% Perc =	0	0.4146097	
20% Perc =	0	0.447775	
25% Perc =	0	0.4761432	
30% Perc =	0	0.5007832	
35% Perc =	0	0.523631	
40% Perc =	0	0.5466869	
45% Perc =	0	0.570644	
50% Perc =	0	0.5965016	
55% Perc =	0	0.6214914	
60% Perc =	0	0.6489349	
65% Perc =	0	0.6791338	
70% Perc =	0	0.7111931	
75% Perc =	0	0.745613	
80% Perc =	0	0.7812406	
85% Perc =	0	0.8221503	
90% Perc =	0	0.8709074	
95% Perc =	0	0.9380932	
Filter Minimum =			
Filter Maximum =			
Type (1 or 2) =			
# Values Filtered =	0	0	
Scenario #1 =	>75%		
Scenario #2 =	<25%		
Scenario #3 =	>90%		
Target #1 (Value)=	0.028976118	1.029840827	
Target #1 (Perc%)=	99%	99%	
Target #2 (Value)=	0.069468342	1.07465446	
Target #2 (Perc%)=	99.91%	99.91%	

Notes:

- Scenarios are a function within @Risk software package that can be used for obtaining a specific outcome (typically for financial). This functionality of @Risk was not used in this Monte Carlo analysis

Simulation Sensitivities for PR (Mn) in Cell B18

(From @RISK Simulation of IEPA_Monte_Carlo_NJC2.xls- Run on 12/12/2002, 10:12:40 AM, Simulations= 1, Iterations= 10000)

Rank	Cell	Name	Sensitivity (RSqr=7.716693E-02)	Rank Correlation Coefficient
#1	B12	Cd (Mn)	0.2777894	0.2389105

Notes:

- Rank is the Rank Correlation Coefficient. Rank order correlation calculates the relationship between two data sets by comparing the rank of each value in a data set. To calculate rank, the data is ordered from lowest to highest and assigned numbers (ranks) that correspond to their position in the order.

Simulation Variables for IEPA_Monte_Carlo_NJC2.xls
(From @RISK Simulation of IEPA_Monte_Carlo_NJC2.xls- Run on 12/12/2002, 10:12:40 AM, Simulations= 1, Iterations= 10000)
Outputs:

Cell	Name	Current
B18	PR (Mn)	0

Input Variables:

Cell	Name	Current	Worksheet	Formula in Cell
! B12	Cd (Mn)	Triang(0.2,0.53,1.1)	[IEPA_Monte_Carlo_NJC2.xls]NJC	'=RiskTriang(0.2,0.53,1.1)

Notes:
- Current is a label that @Risk uses in its results output reports. The values that current refers to in this case is the function that defines the value for each iteration

IEPA
Watershed Load Reductions
12/12/2002

Monte Carlo Simulations using @RISK 3.5

Watershed : NJ 10 Casey Fork

Manganese

Cc (Mn)	1	mg/L	- Water quality criterion
Cd (Mn)	#NAME?	mg/L	- Randomly generated pollutant source concentration base on the observed data

Percent Reduction

PR = Max{ 0, (1-Cc/Cd)}

PR (Mn) #NAME?

After Monte-Carlo Simulation:

Percent reduction at the 99th percentile

PR99 (Mn) 7.2% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 0.9 mg/L

LTA = mean * (1 - PR99)

LTA (Mn) 0.877 mg/L

Percent reduction at the 99.9th percentile

PR99.9 (Mn) 8.5% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 0.9 mg/L

LTA = mean * (1 - PR99.9)

LTA (Mn) 0.864 mg/L

IEPA
Watershed Load Reductions
12/12/2002

Monte Carlo Simulations using @RISK 3.5

Watershed : NJ 10 Casey Fork

TDS

Cc (TDS)	1000	mg/L	- Water quality criterion
Cd (TDS)	#NAME?	mg/L	- Randomly generated pollutant source concentration based on the observed data

Percent Reduction

PR = Max{ 0, (1-Cc/Cd)}

PR (TDS) #NAME?

After Monte-Carlo Simulation:

Percent reduction at the 99th percentile

PR99 (TDS) 3.9% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 732.2 mg/L

LTA = mean * (1 - PR99)

LTA (TDS) 703.873 mg/L

Percent reduction at the 99.9th percentile

PR99.9 (TDS) 6.8% percent

Long Term Average
LTA = allowable LTA source concentration in mg/L

mean 732.2 mg/L

LTA = mean * (1 - PR99.9)

LTA (Mn) 682.131 mg/L

@RISK Simulation of IEPA_Monte_Carlo_NJC2.xls	Run on 12/12/2002, 10:12:40 AM	Simulations= 1; Iterations = 10000
Name	PR (Mn)	Cd (Mn)
Description	Output	Triang(0.2,0.53,1.1)
Iteration# / Cell	B18	B12
1	0	0.4058746
2	0	0.4605283
3	0	0.5200244
4	0	0.5335785
5	0	0.4993508
6	0	0.8541803
7	0	0.7699422
8	0	0.7116668
9	0	0.7555396
10	0	0.7735038
11	0	0.7513192
12	0	0.5164775
13	0	0.5887308
14	0	0.6873266
15	0	0.6609719
16	0	0.947062
17	0	0.5871149
18	0	0.7538983
19	0	0.6037794
20	0	0.6174957
21	0	0.7086326
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9548	0	0.277526
9549	0	0.6325639
9550	0	0.8708534
9551	0	0.537091
9552	0	0.3776105
9553	0	0.3621721
9554	0	0.5948647
9555	0	0.5340908
9556	0	0.5927967
9557	0	0.5650362
9558	0	0.537895
9559	0	0.6162285
9560	0	0.3516765
9561	0	0.4936044
9562	0	0.8439289
9563	0.00E+00	0.7473811
9564	0	0.8936589
9565	0	0.764286
9566	0	0.2752139
9567	0	0.6322806
9568	0	0.4484695
9569	0	0.4419106
9570	0	0.3592982
9571	0	0.3659086
9572	0	0.9308187
9573	0	0.9883636
9574	0	0.8821624
9575	0	0.3741592
9576	0.00E+00	0.8317171
9577	0	0.5234128
9578	0	0.7746232
9579	0.00E+00	0.7931321
9580	0	0.2329405
9581	0	0.3221876
9582	0	0.6833352
9583	0	0.6095557
9584	0	0.6731271
9585	0	0.6060705
9586	0	0.82161
9587	0	0.7977784
9588	0	0.6881107
9589	0	0.6604373
9590	0	0.4565327
9591	0	0.7097034
9592	0	0.4957913
9593	0	0.4138112
9594	0	0.577066
9595	0	0.5749953
9596	0	0.62326

9597	0	0.609185
9598	0	0.7484514
9599	0	0.49044
9600	0	0.7462383
9601	0	0.7063327
9602	0	0.8328262
9603	0	0.4460255
9604	0	0.6305634
9605	0	0.8201858
9606	0	0.7215068
9607	0	0.6331202
9608	0	0.5658159
9609	0	0.9941918
9610	0	0.6073011
9611	0	0.6926706
9612	0	0.75863
9613	0	0.7496477
9614	0	0.5093495
9615	0	0.533492
9616	0.05016588	1.052815
9617	0	0.7198223
9618	0	0.493824
9619	0	0.5709001
9620	0	0.4575542
9621	0	0.5878191
9622	0	0.7914956
9623	0	0.9023437
9624	0	0.5644896
9625	0	0.5394691
9626	0	0.4623966
9627	0	0.735073
9628	0	0.5476487
9629	0	0.3336276
9630	0	0.5366598
9631	0	0.4907351
9632	0	0.8832472
9633	0	0.7923074
9634	0	0.4932959
9635	0	0.5116768
9636	0	0.487048
9637	0	0.8744721
9638	0	0.4490892
9639	0	0.4833837
9640	0	0.6083294
9641	0	0.3970006
9642	0	0.6096351
9643	0	0.4526942
9644	0	0.5452095
9645	0	0.7298641
9646	0	0.8609259
9647	0	0.5318376
9648	0	0.7162476
9649	0	0.353569
9650	0	0.461864
9651	0	0.7932275
9652	0	0.39278
9653	0	0.7070252
9654	0	0.8765206
9655	0	0.579281
9656	0	0.7713785
9657	0	0.3161264
9658	0	0.8901549
9659	0	0.4688392
9660	0	0.6303009

9661	0	0.7960357
9662	0	0.5297841
9663	0	0.426913
9664	0	0.5685346
9665	0	0.5434155
9666	0	0.4077379
9667	0	0.6237361
9668	0	0.52731
9669	0	0.6409745
9670	0	0.5864098
9671	0	0.6613455
9672	0	0.2397616
9673	0	0.4504977
9674	0	0.4575905
9675	0	0.5483539
9676	0	0.5285742
9677	0	0.3852162
9678	0	0.2793477
9679	0	0.9750076
9680	0	0.6459044
9681	0	0.4353012
9682	0	0.8014423
9683	0	0.4193019
9684	0	0.5885903
9685	0	0.6257027
9686	0	0.8954199
9687	0	0.7313291
9688	0.00E+00	0.5297198
9689	0	0.8662707
9690	0	0.4323518
9691	0	0.7207225
9692	0	0.6142957
9693	0	0.658269
9694	0	0.7675632
9695	0	0.8779141
9696	0	0.3929462
9697	0	0.5082831
9698	0.03316862	1.034307
9699	0.03939981	1.041016
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9701	0	0.7588099
9702	0	0.522203
9703	0	0.7371739
9704	0	0.5841879
9705	0	0.3149179
9706	0.02863846	1.029483
9707	0	0.9626038
9708	0	0.4490211
9709	0	0.518315
9710	0	0.6211521
9711	0	0.3271525
9712	0	0.694429
9713	0	0.2783174
9714	0	0.3352299
9715	0	0.8229335
9716	0	0.4882486
9717	0	0.7394175
9718	0	0.5400452
9719	0	0.6171612
9720	0	0.4835873
9721	0	0.8006393
9722	0	0.6282886
9723	0	0.5303729
9724	0	0.4555199

9725	0	0.7161195
9726	0	0.4859815
9727	0	0.478918
9728	0	0.7277729
9729	0	0.4305358
9730	0	0.5528796
9731	0	0.5453432
9732	0	0.8812385
9733	0	0.6948582
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9735	0	0.6161313
9736	0	0.5971293
9737	0	0.7841976
9738	0	0.3726448
9739	0	0.6701464
9740	0	0.4892645
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9742	0	0.5206853
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9745	0	0.525378
9746	0	0.4134013
9747	0	0.4264405
9748	0	0.5451121
9749	0	0.3460624
9750	0	0.6634363
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9752	0	0.6414266
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9755	0	0.9741646
9756	0	0.8381717
9757	0	0.6882432
9758	0	0.5115779
9759	0	0.9213013
9760	0	0.6128547
9761	0	0.4342224
9762	0	0.8347432
9763	0	0.6297712
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9780	0	0.8192685
9781	0	0.650344
9782	0	0.9174858
9783	0	0.7734731
9784	0	0.6711754
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9786	0	0.6128829
9787	0	0.5167137
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9790	0	0.809442
9791	0	0.6751741
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9793	0	0.543012
9794	0	0.9286873
9795	0	0.4277323
9796	0	0.8004768
9797	0	0.2932838
9798	0	0.8774227
9799	0	0.452907
9800	0	0.3897569
9801	0	0.5450742
9802	0	0.5368865
9803	0	0.4104376
9804	0	0.4587685
9805	0	0.2819594
9806	0	0.9082741
9807	0	0.7780222
9808	0	0.4254278
9809	0	0.5200797
9810	0	0.5600449
9811	0	0.6082556
9812	0	0.3205072
9813	0	0.4942483
9814	0	0.3743255
9815	0	0.8616024
9816	0	0.7618043
9817	0	0.5773858
9818	0	0.6620879
9819	0	0.8569103
9820	0	0.6227706
9821	0	0.6941238
9822	0	0.9488009
9823	0	0.432854
9824	0	0.6379653
9825	0	0.4971516
9826	0	0.72456
9827	0	0.4422802
9828	0	0.3648516
9829	0	0.8673027
9830	0	0.5830275
9831	0	0.5627314
9832	0	0.6372116
9833	0	0.5668045
9834	0	0.7953041
9835	0	0.5071967
9836	0	0.6232674
9837	0	0.672376
9838	0	0.7011133
9839	0	0.7435493
9840	0	0.5711117
9841	0	0.3440518
9842	0	0.7153255
9843	0	0.73185
9844	0	0.5831655
9845	0	0.4156297
9846	0	0.7029912
9847	0	0.4585672
9848	0	0.788938
9849	0	0.6735441
9850	0	0.5685256
9851	0	0.662845
9852	0	0.9213665

9853	0	0.2516473
9854	0	0.7322233
9855	0	0.6973248
9856	0	0.7937818
9857	0	0.9188938
9858	0	0.5131025
9859	0	0.8824173
9860	0	0.5764321
9861	0	0.490837
9862	0	0.3791572
9863	0	0.5539534
9864	0	0.8626894
9865	0	0.527805
9866	0	0.7936698
9867	0	0.5049415
9868	0	0.7896271
9869	0	0.9332042
9870	0	0.4415528
9871	0	0.6205664
9872	0	0.6800405
9873	0.000488854	1.000489
9874	0	0.5618294
9875	0	0.9085753
9876	0	0.7355476
9877	0	0.9342636
9878	0	0.567003
9879	0	0.8734416
9880	0	0.5835566
9881	0	0.7711296
9882	0	0.8393475
9883	0	0.4336337
9884	0	0.5586824
9885	0	0.440175
9886	0	0.5127062
9887	0	0.4205176
9888	0	0.6225263
9889	0	0.5723206
9890	0	0.5938781
9891	0	0.4691301
9892	0	0.8058386
9893	0	0.7376608
9894	0	0.6226745
9895	0	0.8766924
9896	0	0.5515553
9897	0	0.7284196
9898	0	0.4986835
9899	0	0.6199225
9900	0	0.5524026
9901	0	0.7392406
9902	0	0.7632006
9903	0	0.8868548
9904	0	0.4216375
9905	0	0.6824964
9906	0	0.7490516
9907	0	0.744764
9908	0	0.6359226
9909	0	0.6153396
9910	0	0.5245613
9911	0	0.67838
9912	0	0.5362462
9913	0	0.8446094
9914	0	0.5484722
9915	0	0.4566437
9916	0	0.5705043

9917	0	0.5287965
9918	0	0.8348071
9919	0.01930772	1.019688
9920	0	0.9368973
9921	0	0.3600283
9922	0	0.2614613
9923	0	0.4786787
9924	0	0.6091253
9925	0	0.5688972
9926	0	0.7587922
9927	0	0.7381505
9928	0	0.7921826
9929	0	0.7604145
9930	0	0.4238108
9931	0.01821931	1.018557
9932	0	0.5298239
9933	0	0.8782116
9934	0	0.6170096
9935	0	0.8017546
9936	0	0.5492392
9937	0.04570176	1.04789
9938	0	0.7615706
9939	0	0.447968
9940	0	0.7353106
9941	0	0.9664752
9942	0	0.4989043
9943	0	0.6293291
9944	0	0.5981603
9945	0	0.5519186
9946	0	0.4620182
9947	0	0.6302404
9948	0	0.4519765
9949	0	0.3771909
9950	0	0.3962975
9951	0	0.6878635
9952	0	0.8918643
9953	0	0.6064531
9954	0	0.5369762
9955	0	0.5584928
9956	0	0.5360437
9957	0	0.8465365
9958	0	0.5297796
9959	0	0.5172077
9960	0	0.473314
9961	0	0.7529418
9962	0	0.992027
9963	0	0.5329245
9964	0	0.7807862
9965	0	0.5403393
9966	0	0.5236364
9967	0	0.7896982
9968	0	0.5286981
9969	0.03701722	1.03844
9970	0.02970178	1.030611
9971	0	0.8556813
9972	0	0.4112226
9973	0	0.7470725
9974	0	0.8298028
9975	0	0.487987
9976	0	0.4251429
9977	0	0.5872752
9978	0	0.8512811
9979	0	0.3739619
9980	0	0.344321

9981	0	0.8715729
9982	0	0.5353905
9983	0	0.581781
9984	0	0.6056858
9985	0	0.5468008
9986	0	0.2539385
9987	0.039034	1.040619
9988	0	0.3746848
9989	0	0.4151309
9990	0	0.580514
9991	0	0.6449723
9992	0	0.6648746
9993	0	0.7672165
9994	0	0.4535264
9995	0	0.8292479
9996	0	0.791956
9997	0	0.6161394
9998	0	0.7146112
9999	0	0.4612654
10000	0	0.4690703

@RISK Simulation of IEPA_Monte_Carlo_NJ10_2.xls	Run on 12/12/2002, 2:34:26 PM	Simulations= 1	Iterations= 10000	
Name	PR (Mn)	PR (TDS)	Cd (Mn)	Cd (TDS)
Description	Output	Output	Triang(0.79,0.945,1.1)	Triang(366,729.5,1093)
Iteration# / Cell	B18	B56	B12	B50
1	0	0	0.9123586	480.0054
2	0.0438765	0.02360216	1.04589	1024.173
3	0	0	0.9088263	688.7186
4	0.03544236	0	1.036745	718.3351
5	0	0	0.9085937	798.3022
6	0	0	0.9056146	664.5908
7	0	0.03244622	0.9936981	1033.534
8	0	0	0.9179392	689.1498
9	0.05919271	0	1.062917	636.1331
10	0	0	0.9275647	859.228
11	0.0349384	0	1.036203	828.1325
12	0.004580317	0	1.004601	836.1618
13	0	0	0.939351	841.1589
14	0	0	0.9873832	701.7619
15	0	0	0.9250984	636.9002
16	0	0	0.899687	917.9521
17	0.01823628	0	1.018575	700.545
18	0	0	0.9275252	484.633
19	0.02060408	0	1.021038	790.4144
20	0	0	0.958952	510.0813
21	0	0	0.8858769	565.8337
22	0	0	0.9302284	821.2212
23	0	0	0.8839837	785.4622
24	0	0	0.9693409	653.1953
25	0.07736266	0.007074851	1.083849	1007.125
26	0	0	0.951889	889.7945
27	0	0	0.9419221	878.7103
28	0.00167115	0	1.001674	741.9253
29	0	0	0.8659518	921.0125
30	0	0	0.7948408	919.2859
31	0	0	0.9612805	784.6961
32	0	0	0.8540593	886.2022
33	0	0	0.8737767	559.4374
34	0	0	0.9574975	751.1131
35	0	0	0.8907686	546.0872
36	0	0	0.9669209	452.843
37	0.001631675	0.07344583	1.001634	1079.268
38	0	0	0.8858172	748.1901
39	0	0	0.9039096	519.414
40	0.05376971	0	1.056825	636.556
41	0	0	0.9113655	758.3236
42	0	0	0.9054131	894.0664
43	0	0	0.9069259	830.6386
44	0	0	0.9174612	696.0523
45	0.03215196	0	1.03322	821.1881
46	0	0	0.8504928	884.7708
47	0.01972971	0	1.020127	834.6922
48	0	0	0.9480821	751.0097
49	0.03728226	0	1.038726	591.2657
50	0	0	0.9372144	900.0674
51	0	0	0.8349641	524.2511
52	0	0	0.8128735	677.7255
53	0	0	0.9508772	698.5263
54	0	0	0.952794	808.2661
55	0	0	0.8993971	831.2859
56	0	0	0.9529466	685.6216
57	0.06362519	0	1.067948	690.9742
58	0	0	0.9552861	574.5385
59	0.05894366	0	1.062636	895.2375
60	0	0	0.9652134	739.817
61	0	0	0.9677182	982.7992
62	0	0	0.9744005	820.1249
63	0.06933041	0	1.074495	541.5081
64	0.0709677	0	1.076389	629.9893
65	0	0	0.8148934	682.9794
66	0	0	0.951336	728.7211
67	0	0	0.8266332	740.2842
68	0	0	0.8254789	757.7241
69	0.02101018	0	1.021461	936.1603

70	0	0	0.8817956	538.5392
71	0	0	0.935613	704.0846
72	0	0	0.858803	869.0026
73	0	0	0.8880542	981.7238
74	0	0	0.8503599	673.5494
75	0	0	0.9564196	836.3091
76	0.00E+00	0	0.8889148	626.0856
77	0.01385328	0	1.014048	744.97
78	0	0	0.953728	981.7578
79	0	0	0.9177752	734.2009
80	0	0	0.927282	705.54
81	0.007355839	0	1.00741	780.4247
82	0	0	0.9554994	705.5829
83	0.04646904	0	1.048734	872.8153
84	0	0	0.9102847	830.7857
85	0.05542737	0	1.05868	448.0515
86	0	0	0.996296	599.4542
87	0.05173267	0	1.054555	607.2716
88	0	0	0.9904907	676.9712
89	0.02111553	0	1.021571	523.7565
90	0	0	0.954901	820.2629
91	0.03803909	0	1.039543	719.7785
92	0.0706089	0	1.075973	748.9745
93	0	0	0.9752803	683.9803
94	0.05507451	0	1.058285	531.5216
95	0	0	0.9665431	602.3513
96	0	0	0.9623734	641.0985
97	0	0	0.8743816	891.364
98	0	0.00267523	0.9714985	1002.682
99	0.01573762	0	1.015989	607.6625
100	0	0	0.8886957	827.1656
101	0	0	0.9428049	533.3059
102	0	0	0.8852533	673.2833
103	0	0	0.9163111	526.3917
104	0	0	0.9535545	789.5196
105	0	0	0.905347	716.0314
106	0	0	0.9528013	711.2485
107	0.003668968	0	1.003682	550.2015
108	0	0	0.8242946	533.2475
109	0	0.01227643	0.9076743	1012.429
110	0	0	0.8777354	766.3802
111	0.02554782	0	1.026218	823.0825
112	0.007654916	0	1.007714	755.3264
113	0	0	0.9840702	899.6575
114	0	0	0.8288744	698.7072
115	0	0	0.8303555	900.4281
116	0	0	0.9514113	527.6956
117	0	0	0.9356704	694.5009
118	0.03826587	0	1.039788	537.1057
119	0	0	0.9893537	860.5522
120	0	0	0.9211812	916.5159
121	0.005808285	0	1.005842	811.8285
122	0	0	0.8395945	677.6246
123	0	0	0.9285793	934.571
124	0	0	0.8235294	465.2558
125	0	0	0.8993459	642.6608
126	0	0	0.8854333	616.5087
127	0	0.04886667	0.9796763	1051.377
128	0	0	0.9554943	531.6111
129	0.03507467	0	1.03635	509.1905
130	0	0	0.8811207	509.6086
131	0.03184394	0	1.032891	743.0197
132	0	0	0.8611976	798.376
133	0	0	0.9676695	758.287
134	0	0	0.8509077	585.0626
135	0	0	0.9811797	931.9966
136	0.04942425	0.03366127	1.051994	1034.834
137	0	0.06837421	0.919214	1073.392
138	0	0	0.9504858	950.1013
139	0.02048572	0	1.020914	925.0492
140	0	0	0.9086803	820.4801
141	0	0	0.9454955	785.7232
142	0	0	0.9773387	982.0403

143	0	0	0.8862158	728.5507
144	0	0	0.9106325	906.9243
145	0	0	0.9411115	904.5137
146	0	0	0.9836637	832.3709
147	0	0	0.8819512	889.5066
148	0	0	0.9901361	679.0916
149	0	0	0.8209966	873.0571
150	0	0	0.9233819	550.2482
151	0	0	0.8796988	731.8381
152	0.08007362	0	1.087044	649.6372
153	0	0	0.9870045	770.3745
154	0	0	0.9113705	615.8028
155	0.03349013	0	1.034651	596.6444
156	0	0	0.9959609	809.7657
157	0	0	0.9618521	481.0888
158	0.006485938	0	1.006528	703.0343
159	0	0	0.9443112	494.9996
160	0.008815461	0	1.008894	828.1464
161	0	0	0.8781177	874.0622
162	0	0	0.9499866	976.6188
163	0.006887551	0	1.006935	595.7618
164	0	0	0.7998978	787.8365
165	0	0	0.8851582	831.5588
166	0	0	0.9590758	646.9238
167	0.00389576	0	1.003911	797.0345
168	0.01994702	0	1.020353	766.5365
169	0	0	0.9197928	712.0206
170	0	0	0.9758494	626.622
171	0	0	0.9239497	551.1302
172	0	0	0.8329023	755.238
173	0	0	0.9581703	791.761
174	0	0	0.9123712	846.2405
175	0	0.01350701	0.9531488	1013.692
176	0.005661077	0	1.005693	529.5297
177	0.04426055	0	1.04631	637.3589
178	0.03650935	0	1.037893	503.5752
179	0	0	0.9444699	729.1062
180	0	0	0.9878302	691.0464
181	0.02518708	0	1.025838	638.6044
182	0	0	0.9484609	480.4214
183	0	0	0.9145839	852.6663
184	0	0	0.8138276	599.5654
185	0.01446258	0	1.014675	973.7631
186	0	0	0.9906886	479.3086
187	0	0	0.8838654	736.6094
188	0	0	0.8033483	823.9425
189	0	0	0.81049	917.1268
190	0	0	0.9059998	714.6694
191	0	0	0.8751857	657.178
192	0	0	0.8024105	768.7834
193	0	0	0.9308878	936.4364
194	0	0	0.8738868	743.2632
195	0	0	0.9046742	449.548
196	0	0	0.9356099	793.9324
197	0	0	0.9301095	692.9064
198	0	0	0.9248359	780.5756
199	0	0	0.9260003	896.6067
200	0	0	0.970857	653.254
201	0	0	0.9928029	810.6874
202	0	0	0.9791712	894.9781
203	0.04858775	0	1.051069	612.7297
204	0	0	0.9050426	603.071
205	0	0	0.9719064	459.0513
206	0	0	0.9201383	683.9646
207	0	0	0.8678499	718.4908
208	0.01215647	0	1.012306	508.2773
209	0	0	0.9686601	722.5779
210	0	0	0.9291654	923.623
211	0.007333744	0	1.007388	718.0416
212	0	0	0.9087132	811.2336
213	0	0	0.9075825	565.1479
214	0.007771765	0	1.007833	930.1993
215	0	0	0.9962288	981.5613

216	0	0	0.9626722	858.0048
217	0.002334573	0.01314099	1.00234	1013.316
218	0.05750448	0	1.061013	928.3894
219	0	0	0.94125	802.5863
220	0	0	0.8468621	953.7313
221	0.02852286	0	1.02936	958.908
222	0	0	0.9654719	625.5967
223	0.0121815	0	1.012332	865.8212
224	0	0	0.8630648	831.7253
225	0	0	0.918361	627.3513
226	0	0	0.8284936	721.66
227	0	0	0.950741	703.8505
228	0	0	0.856086	901.9447
229	0	0	0.8390674	854.5682
230	0	0	0.9021994	862.3531
231	0	0	0.9874945	632.7814
232	0.05595343	0	1.05927	669.6188
233	0	0	0.9428816	824.1887
234	0.01400807	0	1.014207	526.4797
235	0	0	0.8966133	657.4486
236	0	0	0.9233426	527.1517
237	0	0	0.952715	683.9432
238	0	0	0.9350947	951.6501
239	0	0	0.8785591	686.8581
240	0	0	0.8433274	703.653
241	0.01476848	0	1.01499	730.5407
242	0	0	0.9781529	446.4879
243	0	0	0.8411525	731.8954
244	0	0	0.8124598	627.4578
245	0	0	0.9305359	506.7321
246	0.01058531	0	1.010699	908.3021
247	0	0	0.977963	568.1727
248	0	0.002509174	0.9549153	1002.516
249	0	0	0.9812404	734.4869
250	0	0	0.9227158	810.9465
251	0	0	0.9576802	711.0287
252	0	0	0.8878554	802.0547
253	0	0	0.9664955	887.4025
254	0	0	0.9884241	406.8783
255	0.003789948	0	1.003804	454.7186
256	0	0	0.9958791	882.4279
257	0	0.0118384	0.9264804	1011.98
258	0	0	0.9346226	687.4785
259	0	0	0.9719551	760.6039
260	0.00E+00	0.05873429	0.8789436	1062.399
261	0	0.008153194	0.9270639	1008.22
262	0.05071951	0	1.053429	563.67
263	0	0	0.9481017	855.2352
264	0	0	0.8838332	806.9443
265	0	0	0.9091243	815.447
266	0	0	0.9700696	703.8061
267	0	0	0.9655881	553.7823
268	0	0	0.9857789	610.9101
269	0	0	0.9679053	910.8429
270	0	0	0.8485228	647.5357
271	0	0	0.9613462	719.3806
272	0.03321001	0	1.034351	426.9159
273	0	0	0.9418578	706.309
274	0	0	0.8879832	805.0194
275	0	0	0.9369164	933.7006
276	0	0	0.9159961	908.7713
277	0	0.06535675	0.9292639	1069.927
278	0.002409716	0	1.002416	961.6887
279	0	0	0.8417223	708.9354
280	0	0.00740632	0.8632165	1007.462
281	0	0	0.9232397	838.3555
282	0.05244557	0	1.055348	707.3713
283	0	0	0.8956533	663.4792
284	0	0	0.8458236	841.336
285	0.03349811	0	1.034659	977.3873
286	0	0	0.9254987	835.5122
287	0	0	0.9525054	838.4506
288	0	0	0.9689202	644.2963

289	0	0	0.9891403	688.2641
290	0.06759909	0	1.0725	438.9014
291	0	0	0.96751	506.5804
292	0	0	0.9608321	602.0944
293	0	0	0.844734	744.6102
294	0	0	0.8816806	600.272
295	0.07747596	0	1.083983	642.4208
296	0.004328349	0.001249119	1.004347	1001.251
297	0	0	0.9266797	805.599
298	0	0	0.8559246	657.7812
299	0	0	0.9397644	890.6706
300	0.000949339	0	1.00095	774.9562
301	0.04505899	0	1.047185	517.5758
302	0.03650558	0	1.037889	583.9156
303	0	0	0.8966883	680.558
304	0	0	0.9288197	543.6753
305	0.02123868	0	1.0217	902.674
306	0	0	0.9039218	765.4999
307	0.06299548	0	1.067231	844.6143
308	0.04635783	0	1.048611	560.6801
309	0	0	0.8400756	803.1233
310	0	0	0.8983715	782.9974
311	0	0	0.9087634	685.8893
312	0	0	0.87591	709.9341
313	0.003728047	0	1.003742	877.4631
314	0.01086579	0	1.010985	597.2753
315	0	0	0.8419593	579.7097
316	0.07434243	0	1.080313	737.9434
317	0	0	0.8742455	915.8908
318	0.003115103	0	1.003125	687.0873
319	0	0	0.895872	906.3307
320	0	0	0.9606144	712.1879
321	0	0	0.8764386	683.0249
322	0	0	0.8363531	743.8074
323	0	0	0.9749587	770.9128
324	0	0	0.9503365	675.2794
325	0	0	0.947342	753.7876
326	0	0	0.811914	920.9944
327	0	0	0.95477	644.72
328	0	0	0.8575652	634.5287
329	0.00E+00	0	0.8292057	492.5958
330	0	0	0.9562148	740.4178
331	0.02538659	0	1.026048	678.1635
332	0	0	0.9033221	975.27
333	0	0	0.9351773	726.6116
334	0	0	0.9843868	826.632
335	0	0	0.9400886	678.7849
336	0	0	0.874384	761.07
337	0	0	0.8663594	724.9654
338	0	0	0.9246322	672.8835
339	0.02550822	0.07614829	1.026176	1082.425
340	0	0	0.98593	915.4714
341	0	0	0.88049	834.1848
342	0	0	0.9619003	650.1406
343	0	0	0.9678904	805.6014
344	0	0	0.9638187	474.2995
345	0.04917809	0	1.051722	791.326
346	0	0	0.8738489	505.0596
347	0.06792878	0	1.072879	902.7686
348	0	0	0.8956109	423.6705
349	0	0	0.931592	796.7504
350	0	0	0.895174	806.0146
351	0	0	0.9411366	799.9485
352	0.01094195	0	1.011063	790.2226
353	0	0	0.9835186	845.6458
354	0	0	0.9781255	813.5456
355	0	0	0.9677652	910.2376
356	0	0	0.9364901	481.6634
357	0	0	0.9576178	681.3741
358	0	0	0.8933806	728.2478
359	0.05460155	0	1.057755	444.1674
360	0	0	0.9017633	625.4258
361	0	0	0.9128855	846.8604

362	0	0	0.8720195	460.0653
363	0	0	0.8619351	859.5604
364	0	0	0.9707294	727.713
365	0	0	0.9682494	671.3719
366	0	0	0.911791	798.9223
367	0	0	0.8984231	424.5517
368	0	0	0.9100459	801.5536
369	0	0	0.9855558	859.7057
370	0	0	0.9394793	533.785
371	0	0	0.8525877	773.473
372	0	0	0.9278823	674.1678
373	0	0	0.9923673	584.554
374	0	0	0.9846436	538.6807
375	0.03138205	0	1.032399	590.6081
376	0	0	0.8174443	829.3838
377	0	0	0.8388157	496.4192
378	0	0	0.9226723	751.0255
379	0	0	0.9300919	715.57
380	0	0	0.9400472	569.5654
381	0.06261869	0	1.066802	950.8931
382	0	0	0.9301164	761.5754
383	0.05790797	0	1.061467	442.9937
384	0.06502987	0	1.069553	517.8367
385	0	0	0.987726	690.0422
386	0	0	0.9100753	536.178
387	0	0	0.9196422	847.5129
388	0	0	0.9915149	737.9324
389	0.06731798	0	1.072177	622.9868
390	0	0	0.9333166	760.8558
391	0	0	0.8545261	786.8306
392	0.02481283	0	1.025444	727.8278
393	0	0	0.9790767	818.6425
394	0	0	0.962126	823.1043
395	0	0	0.981849	608.3325
396	0.005267104	0	1.005295	603.0717
397	0	0	0.9231321	661.3436
398	0	0	0.9127518	672.4749
399	0	0	0.8114569	652.0206
400	0	0	0.9330177	909.609
401	0	0	0.8687142	732.7833
402	0	0	0.9933848	558.701
403	0	0	0.9703879	627.9277
404	0	0	0.8830122	736.9424
405	0.01816888	0	1.018505	663.2842
406	0.01710784	0	1.017406	785.4061
407	0	0	0.9366094	587.8384
408	0	0	0.8627818	626.0383
409	0	0	0.8917533	787.5671
410	0	0	0.9817201	484.5248
411	0	0	0.8510858	793.0439
412	0.05935262	0	1.063098	534.9196
413	0.06498501	0	1.069502	611.8228
414	0	0	0.8102307	571.3353
415	0.02128148	0	1.021744	520.3671
416	0	0	0.8479386	615.0982
417	0	0	0.984166	788.6393
418	0	0	0.998894	854.9102
419	0	0	0.8380641	930.7863
420	0	0	0.9622192	779.6458
421	0	0	0.9463817	479.4418
422	0	0	0.9470878	748.624
423	0	0	0.870546	480.8847
424	0	0	0.9212327	813.9631
425	0	0	0.9241955	558.4841
426	0	0	0.9102724	567.7626
427	0	0	0.7929611	947.0647
428	0	0	0.935259	590.5952
429	0	0	0.9320189	721.9657
430	0.00E+00	0.0163851	0.9406545	1016.658
431	0	0	0.9406272	835.9413
432	0	0	0.9859952	748.7711
433	0	0	0.8699708	870.7492
434	0	0	0.9746214	650.7389

435	0	0	0.866206	690.061
436	0	0	0.9077524	693.1008
437	0	0	0.9756853	507.043
438	0	0	0.9212443	749.9973
439	0	0	0.8619681	570.4979
440	0	0	0.9994382	852.3082
441	0	0	0.9881826	729.9198
442	0	0	0.9644861	455.8835
443	0	0	0.9931996	545.9964
444	0.03659114	0	1.037981	736.1964
445	0	0	0.9707621	936.8013
446	0	0	0.8945724	722.3245
447	0	0	0.9461788	789.1741
448	0	0	0.9926422	595.9221
449	0.02137057	0	1.021837	704.5032
450	0	0	0.9782411	988.3772
451	0	0.01443864	0.9609438	1014.65
452	0	0	0.9198049	758.9122
453	0	0	0.9310848	910.2577
454	0	0	0.9103813	633.3533
455	0	0	0.9334508	913.1376
456	0	0	0.9545206	948.3994
457	0	0	0.9150709	733.9187
458	0	0.04465451	0.9485066	1046.742
459	0	0	0.8359981	875.8085
460	0	0	0.8404417	740.3736
461	0	0	0.9343992	811.1995
462	0	0	0.9811292	818.21
463	0.003762147	0	1.003776	561.1357
464	0	0	0.9849685	816.609
465	0	0	0.8721777	865.8445
466	0.01672263	0	1.017007	518.5001
467	0	0	0.9201471	612.6497
468	0.04492206	0	1.047035	906.6988
469	0	0	0.9809464	611.3057
470	0	0	0.961404	778.5826
471	0	0	0.9409509	968.2599
472	0.01618412	0	1.01645	687.2339
473	0	0	0.8372727	981.4286
474	0.0462406	0	1.048482	734.3738
475	0	0	0.9273719	675.9297
476	0	0	0.9817486	480.0313
477	0.006451813	0	1.006494	500.1609
478	0	0	0.8659714	769.2843
479	0	0	0.8940066	677.5787
480	0.04108452	0	1.042845	722.8974
481	0	0	0.9555017	588.031
482	0	0	0.9054413	800.2454
483	0	0	0.9364991	724.7971
484	0	0	0.9716882	577.3636
485	0.04650858	0	1.048777	679.8149
486	0.02251987	0	1.023039	414.902
487	0	0	0.8710544	802.449
488	0.07291889	0	1.078654	397.4693
489	0.02854852	0	1.029387	676.9301
490	0	0	0.8239392	530.5552
491	0	0	0.942783	706.9704
492	0.0213339	0	1.021799	619.2079
493	0	0	0.948535	982.7422
494	0.0497967	0	1.052406	584.6862
495	0	0	0.9323981	904.3771
496	0	0	0.9563171	847.8407
497	0	0	0.9761002	662.3649
498	0	0	0.8456222	764.312
499	0	0	0.9004218	859.4929
500	0.05435768	0	1.057482	894.5516
501	0	0	0.9643573	802.5054
502	0	0	0.9177248	888.8551
503	0	0	0.955161	981.312
504	0	0	0.8868923	717.0621
505	0	0	0.8523524	903.4474
506	0	0	0.9311276	966.19
507	0	0	0.843693	674.337

508	0	0	0.9642	571.2726
509	0.07813802	0	1.084761	614.1898
510	0	0	0.9325255	805.0161
511	0.03493855	0	1.036204	790.1754
512	0	0	0.9304062	866.8007
513	0	0	0.9272361	630.4937
514	0	0	0.9180105	461.3923
515	0	0	0.9354593	586.4694
516	0	0	0.8805004	738.3867
517	0	0	0.8221825	458.2365
518	0	0	0.8249596	515.7191
519	0	0	0.8836732	548.5038
520	0	0	0.9174019	817.7361
521	0	0	0.8844869	642.5723
522	0	0	0.9358334	631.4749
523	0.01689499	0	1.017185	845.9342
524	0.03736343	0	1.038814	843.2488
525	0	0	0.8878396	697.4808
526	0	0	0.937476	454.97
527	0	0	0.930467	501.8379
528	0	0	0.9465919	706.3062
529	0.007140728	0	1.007192	761.7935
530	0.03931247	0	1.040921	625.4333
531	0	0	0.9067662	705.9714
532	0	0	0.9491217	722.9352
533	0	0	0.9911346	858.2447
534	0.03559194	0	1.036906	563.6417
535	0	0	0.9104982	643.3031
536	0	0	0.9122452	895.3909
537	0.00E+00	0	0.9429633	759.5983
538	0	0	0.888117	688.1868
539	0	0	0.9278975	890.9207
540	0	0.007007331	0.9913906	1007.057
541	0	0	0.8913305	867.201
542	0	0	0.9010326	517.0549
543	0	0	0.8974757	394.0361
544	0	0	0.9459258	806.0196
545	0	0	0.916204	612.5892
546	0	0	0.8901853	913.1652
547	0	0	0.9305462	923.7715
548	0.0635113	0	1.067819	724.2144
549	0	0	0.9971249	770.499
550	0	0	0.9560353	480.7241
551	0	0	0.9230143	421.8308
552	0	0	0.9724261	978.0927
553	0.006003134	0	1.006039	687.9196
554	0.005245276	0	1.005273	677.124
555	0	0	0.8874981	694.2227
556	0	0	0.8515875	876.0337
557	0.03777523	0	1.039258	764.0964
558	0	0	0.8947778	480.65
559	0	0	0.8484108	687.907
560	0.005185008	0	1.005212	469.6752
561	0	0	0.922988	563.0414
562	0	0	0.984491	905.768
563	0	0	0.9425026	643.0176
564	0.03592376	0	1.037262	674.8556
565	0	0	0.9573566	524.2733
566	0	0	0.829347	883.591
567	0	0.03558178	0.995842	1036.895
568	0	0	0.9857047	959.5793
569	0	0	0.8785346	777.3801
570	0	0	0.9959065	599.7906
571	0	0	0.964403	892.7599
572	0	0	0.9315658	716.6528
573	0	0	0.9464874	586.8441
574	0	0	0.8801952	666.4291
575	0	0	0.7986239	544.605
576	0	0	0.9776272	775.0572
577	0	0	0.9407988	804.4584
578	0.06425953	0	1.068672	828.1691
579	0	0	0.8819136	682.9454
580	0	0	0.9729425	825.2157

581	0	0	0.8888028	591.9658
582	0	0	0.9672353	770.4961
583	0	0	0.8891324	669.9347
584	0	0	0.8813219	773.4744
585	0	0	0.95136	830.1998
586	0	0	0.8934714	920.1448
587	0	0	0.8333588	978.3899
588	0	0	0.9384403	593.3179
589	0	0	0.9276071	803.621
590	0	0.03478554	0.9122066	1036.039
591	0	0	0.8843215	531.6929
592	0	0	0.9338694	589.7437
593	0	0	0.9668256	684.2752
594	0	0	0.9205914	701.4451
595	0	0	0.9857025	700.9951
596	0	0	0.9369612	539.9271
597	0	0	0.973438	700.9228
598	0	0	0.9658478	920.6232
599	0	0	0.9330971	796.3748
600	0	0	0.9852546	607.965
601	0.04739668	0	1.049755	878.831
602	0.00440705	0	1.004427	585.0576
603	0	0	0.934129	928.546
604	0	0	0.9005147	729.1027
605	0	0	0.8605905	520.1667
606	0	0	0.8248002	749.6037
607	0	0	0.7950505	836.5649
608	0	0	0.9890338	747.9827
609	0.04416788	0	1.046209	851.1643
610	0	0	0.9848617	833.7165
611	0	0	0.8849181	743.3855
612	0	0	0.8146766	980.3921
613	0.0440433	0	1.046072	817.9674
614	0	0	0.8721336	470.3851
615	0	0	0.993334	559.351
616	0	0	0.9335632	989.76
617	0.02472115	0	1.025348	649.5046
618	0	0	0.8514882	839.6087
619	0	0	0.8852727	704.6561
620	0	0	0.968403	915.8252
621	0	0	0.9428173	895.3731
622	0	0	0.9800483	771.686
623	0.03916574	0	1.040762	590.4584
624	0	0	0.9306663	728.5778
625	0.04766859	0	1.050055	981.4103
626	0	0	0.9491885	761.5263
627	0	0	0.9384014	640.2869
628	0	0	0.9282012	844.4956
629	0	0	0.9095745	785.983
630	0.006690315	0	1.006735	484.1973
631	0	0.06718427	0.9120476	1072.023
632	0	0	0.9371029	679.9466
633	0	0	0.84706	623.8021
634	0	0	0.839313	697.5166
635	0	0	0.9653344	868.8544
636	0	0	0.9227743	621.1085
637	0.001361412	0.03303831	1.001363	1034.167
638	0	0	0.8127934	558.2633
639	0	0	0.9440175	932.7399
640	0	0	0.9132746	621.1538
641	0	0	0.9890187	645.759
642	0	0	0.914482	518.0871
643	0	0	0.9702557	843.7321
644	0.01592655	0	1.016184	487.615
645	0	0	0.9778102	781.3721
646	0	0	0.9257255	794.4876
647	0	0	0.9014772	682.4842
648	0	0	0.9427074	688.3977
649	0.004881672	0	1.004906	729.1781
650	0	0	0.8829576	752.2679
651	0	0	0.8034858	445.8995
652	0	0	0.9678608	575.0952
653	0.01231822	0	1.012472	789.7104

654	0.0542664	0	1.05738	706.6558
655	0	0	0.864867	808.3801
656	0	0	0.9994332	666.4218
657	0	0	0.9221762	795.4831
658	0	0	0.9639801	569.1525
659	0	0	0.8641216	957.9458
660	0	0	0.9940044	488.7638
661	0	0	0.962073	755.3732
662	0	0	0.9666724	725.8229
663	0	0	0.8979416	767.2371
664	0	0	0.9197359	596.727
665	0	0	0.9099266	562.1531
666	0.04450915	0	1.046582	756.5642
667	0	0	0.8689455	863.2314
668	0	0.01117243	0.9460334	1011.299
669	0	0	0.9848269	510.1399
670	0	0	0.8748751	575.6483
671	0.04492655	0	1.04704	820.3437
672	0.01947371	0	1.019861	861.2516
673	0	0	0.8431174	544.5448
674	0	0	0.9901742	925.194
675	0	0	0.8751328	793.3395
676	0	0	0.8745639	639.8931
677	0	0	0.9020624	795.9979
678	0	0	0.8533576	771.2062
679	0	0	0.8314387	597.9349
680	0	0	0.8735499	794.0764
681	0	0	0.9830172	842.1791
682	0	0	0.9519014	860.7449
683	0	0	0.9286186	690.2963
684	0.00165009	0.04692031	1.001653	1049.23
685	0	0	0.8584298	619.3889
686	0	0	0.8835163	821.7163
687	0.03181782	0	1.032863	712.4279
688	0	0	0.9320293	723.0107
689	0	0	0.8948017	964.8718
690	0	0	0.9473246	442.0643
691	0	0	0.8792318	467.4215
692	0	0	0.793915	806.0504
693	0.01667705	0	1.01696	743.3524
694	0	0	0.9010584	561.574
695	0	0	0.9570706	826.7458
696	0	0	0.9059734	734.5861
697	0	0	0.847524	722.5176
698	0	0	0.9507939	702.473
699	0.02675231	0	1.027488	724.9243
700	0	0	0.9800998	684.5693
701	0	0	0.9731008	544.7015
702	0	0	0.8735614	824.4435
703	0	0	0.865351	537.9705
704	0	0	0.9732949	714.8113
705	0	0	0.9907636	822.9169
706	0.04714149	0	1.049474	965.8307
707	0	0	0.8546664	649.4348
708	0	0	0.9421885	780.8906
709	0	0	0.98547	614.7876
710	0.01802764	0	1.018359	540.4209
711	0	0	0.8600692	940.8561
712	0	0	0.9516771	697.0337
713	0	0.01417852	0.8421727	1014.382
714	0	0	0.9118145	712.7272
715	0	0	0.9222766	859.841
716	0	0	0.9043206	989.434
717	0	0	0.90395	731.1806
718	0	0	0.8565072	758.2963
719	0	0	0.9616047	901.8341
720	0	0	0.8415741	678.2444
721	0	0	0.931675	777.0572
722	0.02066818	0	1.021104	559.4207
723	0	0	0.9306518	794.3259
724	0.04377906	0	1.045783	904.2881
725	0	0	0.9236533	522.1396
726	0	0	0.8826562	512.9903

727	0	0	0.8209148	525.515
728	0.01456309	0	1.014778	831.5823
729	0	0	0.938161	571.7864
730	0	0	0.8208879	755.6046
731	0.01738705	0	1.017695	626.3284
732	0	0	0.9738132	646.131
733	0	0	0.948302	550.9141
734	0	0	0.9343313	866.1698
735	0	0	0.8927378	700.97
736	0	0	0.9091368	774.7704
737	0	0	0.9889523	782.3219
738	0	0	0.9868893	851.6207
739	0	0	0.9277291	405.4617
740	0	0	0.8683513	863.5351
741	0.08288227	0	1.090373	927.5381
742	0	0	0.9958912	830.6666
743	0	0	0.8594545	534.6987
744	0.01110458	0.01164894	1.011229	1011.786
745	0	0	0.8414101	558.9227
746	0	0	0.9334356	641.2792
747	0	0	0.8746895	582.1501
748	0	0	0.9153261	706.4392
749	0	0	0.9283255	853.5148
750	0.03981742	0	1.041469	521.0175
751	0	0	0.9403512	693.4821
752	0.05544095	0	1.058695	557.018
753	0	0	0.8534132	720.431
754	0	0	0.9143592	706.6397
755	0	0	0.9686618	940.6748
756	0	0	0.9148206	910.3862
757	0	0	0.9472217	654.9815
758	0.009080088	0	1.009163	827.4223
759	0	0	0.8742387	803.2117
760	0.002579561	0	1.002586	612.5603
761	0	0	0.9298598	829.9233
762	0	0	0.944362	666.896
763	0	0	0.8738512	871.2027
764	0	0	0.9741277	569.8961
765	0	0	0.9791071	632.1242
766	0	0	0.9767845	645.0425
767	0	0	0.877612	723.1134
768	0	0	0.9566189	625.057
769	0	0	0.8940586	803.1378
770	0	0	0.9058703	470.5048
771	0.008841963	0	1.008921	698.4271
772	0	0	0.9175023	770.3057
773	0.02339806	0	1.023959	655.3878
774	0	0	0.9761752	516.3758
775	0	0	0.9085003	663.725
776	0	0	0.8635907	577.6824
777	0	0	0.927784	551.5007
778	0	0	0.9843793	782.0233
779	0.06343245	0.03511246	1.067729	1036.39
780	0.03082364	0	1.031804	816.425
781	0	0	0.8913409	691.7852
782	0	0	0.9671662	638.2757
783	0	0	0.8372434	608.6665
784	0.06301279	0	1.06725	820.1534
785	0.01582804	0	1.016083	594.3586
786	0	0	0.7979617	832.2448
787	0.04336442	0	1.04533	870.2606
788	0	0	0.9658374	781.5529
789	0.04741753	0	1.049778	636.4985
790	0	0	0.8565088	901.9208
791	0	0	0.8827393	570.6309
792	0	0	0.9223932	989.8303
793	0	0	0.8523522	644.8345
794	0.01482402	0	1.015047	692.5461
795	0	0	0.8898522	963.882
796	0	0	0.9808176	896.4802
797	0	0	0.8850152	452.0529
798	0	0	0.9315264	743.0977
799	0	0	0.9737266	429.1655

800	0	0	0.9782487	813.9728
801	0	0	0.8714485	769.0081
802	0	0	0.898137	874.3344
803	0.07297045	0	1.078714	554.0316
804	0	0	0.9938338	567.0685
805	0	0	0.9534684	529.2839
806	0	0	0.8714513	656.0176
807	0	0	0.9454718	470.6124
808	0	0	0.9793877	480.2025
809	0	0	0.85672	587.5345
810	0.003434715	0	1.003447	525.3392
811	0	0	0.8390809	457.0236
812	0	0	0.9459063	634.2488
813	0	0	0.9621713	623.3725
814	0	0	0.9560747	585.4613
815	0.00E+00	0	0.9689128	865.4179
816	0	0	0.9467855	719.33
817	0	0	0.9117901	891.6707
818	0	0	0.8212956	848.4957
819	0	0	0.9381338	556.6766
820	0	0	0.9608383	654.7173
821	0	0	0.9122167	926.5803
822	0	0	0.8693176	837.8904
823	0.002878169	0	1.002887	581.7547
824	0	0	0.9484786	703.9138
825	0.04110307	0	1.042865	964.2011
826	0	0	0.9364239	614.9897
827	0	0	0.8450239	903.5263
828	0	0	0.8562444	606.6181
829	0	0	0.9466157	643.5217
830	0	0	0.8638186	718.2708
831	0	0	0.9791998	895.8974
832	0	0	0.9456101	710.844
833	0	0	0.80888	792.3456
834	0.03326977	0	1.034415	684.6976
835	0	0	0.898639	659.9138
836	0	0	0.9728476	630.7106
837	0	0	0.8787737	568.6617
838	0	0	0.958814	756.447
839	0	0	0.8902799	587.6954
840	0	0	0.877498	641.2743
841	0	0	0.9744375	653.6946
842	0	0	0.9780715	528.0021
843	0	0	0.99628	857.0805
844	0	0	0.9183208	493.4421
845	0	0	0.9940453	789.2006
846	0	0	0.8944613	782.8684
847	0	0	0.8479147	551.202
848	0	0	0.8955082	662.115
849	0	0	0.9595929	568.6771
850	0	0	0.9598125	751.8315
851	0	0	0.8934689	775.1675
852	0	0	0.9966936	615.4407
853	0	0	0.9550461	775.6331
854	0	0	0.8813181	668.7711
855	0	0	0.9358938	634.9039
856	0.04796177	0	1.050378	454.8447
857	0	0	0.9805846	900.392
858	0	0	0.9659255	721.1773
859	0.00E+00	0	0.9251595	754.5382
860	0	0	0.9331163	579.2751
861	0.000660817	0	1.000661	895.2183
862	0	0	0.9873483	670.5308
863	0	0	0.8351111	779.4141
864	0	0	0.9246852	702.3403
865	0	0	0.8104117	746.301
866	0	0	0.8144442	616.9271
867	0.01318087	0	1.013357	962.6037
868	0	0	0.9223318	550.9658
869	0	0	0.9279565	870.2638
870	0	0	0.8786337	603.3829
871	0	0	0.9762463	601.352
872	0	0	0.8938572	578.3072

873	0.01254753	0	1.012707	942.5833
874	0	0	0.9275754	912.1008
875	0	0	0.9079329	707.7353
876	0	0	0.996699	865.1815
877	0	0	0.9530974	474.5206
878	0	0	0.9622863	671.312
879	0	0	0.9271871	641.4683
880	0	0	0.9005646	788.1931
881	0.04886832	0	1.051379	836.1967
882	0.00E+00	0	0.8627443	990.5891
883	0	0	0.9194225	614.3392
884	0	0	0.9675928	850.8911
885	0	0	0.9677408	856.7758
886	0	0	0.88107	835.8241
887	0.02431018	0	1.024916	965.2796
888	0	0	0.8496533	777.2228
889	0.001979101	0	1.001983	835.9988
890	0	0	0.8229403	684.2052
891	0	0	0.8318169	838.6564
892	0	0	0.9081948	825.4359
893	0	0	0.9075267	627.2267
894	0.008368724	0	1.008439	483.3637
895	0	0	0.9973866	772.1273
896	0	0	0.8822553	762.3381
897	0	0	0.9574814	770.8341
898	0	0	0.8321623	696.6741
899	0	0	0.907615	832.392
900	0.01225599	0	1.012408	768.6132
901	0	0	0.8504747	521.3733
902	0	0	0.9319474	419.2895
903	0	0	0.9942379	742.1697
904	0	0	0.9912401	479.5867
905	0	0	0.8460037	644.0967
906	0	0	0.9389321	749.3752
907	0.01982806	0	1.020229	852.5889
908	0	0	0.9568146	796.8665
909	0	0	0.9256634	667.3129
910	0	0	0.8871388	809.7299
911	0	0	0.9434885	770.1602
912	0.04785679	0	1.050262	459.8429
913	0	0	0.9747682	746.0912
914	0	0	0.9479635	572.8188
915	0.01638938	0	1.016662	669.4406
916	0.07965969	0	1.086555	447.6646
917	0	0	0.913589	732.2009
918	0	0	0.9087722	718.201
919	0.01809685	0	1.01843	625.6434
920	0	0	0.9769541	777.1877
921	0	0	0.9739046	971.2477
922	0	0	0.9310441	550.7574
923	0	0	0.8579044	581.2104
924	0	0	0.9719455	560.9421
925	0	0	0.9882627	458.9339
926	0	0	0.89376	911.3484
927	0	0	0.9896019	966.5242
928	0	0	0.8576033	871.9449
929	0	0	0.9785179	755.3984
930	0	0	0.8975349	977.9774
931	0	0	0.8848657	733.9273
932	0	0	0.9627129	552.2312
933	0.02474293	0	1.025371	545.09
934	0	0	0.9228439	662.4019
935	0	0	0.9566257	807.8461
936	0	0	0.9769382	702.9054
937	0.05134318	0	1.054122	670.2766
938	0	0	0.9253994	657.3638
939	0	0	0.9074266	748.4704
940	0	0	0.9369622	553.7756
941	0	0	0.9401176	532.4982
942	0	0	0.8619586	755.5127
943	0.01162005	0	1.011757	667.2249
944	0.02965607	0	1.030562	904.1183
945	0	0	0.9588411	593.8853

946	0.02589632	0	1.026585	991.6611
947	0	0	0.8392076	577.4696
948	0	0	0.9015746	625.7902
949	0	0	0.8811672	656.23
950	0.000442431	0	1.000443	522.578
951	0.01677294	0	1.017059	746.295
952	0	0	0.9584814	738.8179
953	0	0	0.929696	782.5363
954	0.009974326	0	1.010075	791.0804
955	0.06267236	0	1.066863	692.3405
956	0	0	0.9738971	612.5997
957	0	0	0.9223641	728.1707
958	0	0	0.9656366	637.7861
959	0	0	0.8523272	435.1078
960	0.01831244	0	1.018654	671.1477
961	0	0	0.8775365	754.083
962	0.02930784	0	1.030193	635.3339
963	0	0	0.9567078	450.5568
964	0	0	0.9942252	571.3171
965	0.03487085	0	1.036131	657.2247
966	0	0	0.9838266	824.1478
967	0	0	0.8766555	917.8954
968	0	0	0.934715	606.7744
969	0	0.007916871	0.8890973	1007.98
970	0	0	0.9838179	879.9515
971	0	0	0.9981592	874.821
972	0	0	0.9167268	747.1204
973	0.002373109	0	1.002379	438.6432
974	0	0	0.9040359	773.3386
975	0	0	0.9765263	444.532
976	0	0	0.9532148	528.207
977	0	0	0.8823961	895.2614
978	0.008494413	0	1.008567	499.3023
979	0	0.008240963	0.9231606	1008.309
980	0	0	0.8878868	676.073
981	0	0	0.9371576	704.4619
982	0	0	0.9767618	396.2563
983	0	0	0.9363851	569.8698
984	0	0	0.8782606	545.3754
985	0.00E+00	0	0.9415287	667.7954
986	0	0	0.9898374	419.7863
987	0	0	0.9740098	489.2787
988	0	0	0.8157017	842.5922
989	0	0	0.8582108	651.0322
990	0	0	0.8882852	881.8833
991	0	0	0.9996662	767.8036
992	0	0	0.8664141	692.4751
993	0	0	0.9051175	722.7533
994	0	0	0.8880439	818.8798
995	0	0.07127989	0.9956555	1076.751
996	0.004562976	0	1.004584	654.103
997	0	0	0.9197539	900.4614
998	0	0	0.8489961	815.2761
999	0.02279541	0	1.023327	824.2271
1000	0	0	0.8072892	756.4948
1001	0	0	0.9475787	727.3983
1002	0.007538129	0	1.007595	706.7204
1003	0	0	0.9118643	514.0011
1004	0	0	0.9862081	563.9413
1005	0	0	0.9998947	809.5902
1006	0	0	0.9955168	536.7745
1007	0	0	0.9597125	678.7056
1008	0	0	0.9654025	918.9156
1009	0	0	0.9708891	764.2241
1010	0	0.01284404	0.8538487	1013.011
1011	0	0	0.8983008	820.6528
1012	0	0	0.9175218	764.0838
1013	0	0.02648729	0.9441372	1027.208
1014	0	0	0.8963106	651.3591
1015	0	0	0.9376411	762.5377
1016	0	0	0.9574192	904.459
1017	0	0	0.8337844	691.4382
1018	0.008753695	0	1.008831	520.8027

1019	0.005160879	0	1.005188	699.3378
1020	0.01728218	0	1.017586	615.8384
1021	0	0	0.8448354	804.404
1022	0.03454069	0	1.035776	609.4449
1023	0	0	0.8479918	485.5518
1024	0	0	0.9483349	607.0696
1025	0	0	0.8913283	677.3251
1026	0	0	0.9436659	843.425
1027	0	0	0.8652526	643.261
1028	0.03565238	0	1.03697	558.8515
1029	0	0	0.928532	540.8774
1030	0	0	0.9008808	826.6837
1031	0	0	0.9169387	921.4266
1032	0.0114791	0	1.011612	727.429
1033	0	0	0.8379147	533.851
1034	0	0	0.9380014	747.5944
1035	0.005768125	0	1.005802	742.955
1036	0	0	0.8478631	692.3635
1037	0	0	0.9930851	641.0671
1038	0	0	0.8946435	657.047
1039	0	0	0.9407187	981.7957
1040	0	0	0.8464417	594.5711
1041	0.03267613	0	1.03378	682.3593
1042	0	0	0.9160918	730.8095
1043	0	0	0.9497438	753.967
1044	0	0	0.9551535	513.7394
1045	0	0	0.8354029	960.2202
1046	0.05549555	0	1.058756	637.2786
1047	0	0	0.9322067	636.3551
1048	0	0	0.9640149	712.9821
1049	0	0	0.9390193	849.8448
1050	0.008539936	0	1.008613	765.2911
1051	0	0	0.9897757	541.6772
1052	0	0	0.910156	658.4246
1053	0.01641705	0	1.016691	884.1589
1054	0.05317773	0.03502704	1.056164	1036.298
1055	0	0	0.963213	749.2325
1056	0	0	0.9533409	884.012
1057	0	0	0.9777001	716.9664
1058	0.03806658	0.01546097	1.039573	1015.704
1059	0	0	0.8494077	490.6135
1060	0	0	0.9436707	683.6502
1061	0	0	0.8544249	633.8637
1062	0	0	0.9819837	902.2072
1063	0	0	0.9714162	810.7521
1064	0.06883147	0	1.073919	833.9669
1065	0	0	0.9394741	954.2477
1066	0.0757153	0	1.081918	617.8712
1067	0	0	0.9591458	947.5533
1068	0.008583258	0	1.008658	613.3793
1069	0.005654891	0	1.005687	708.0088
1070	0	0	0.9686676	671.6411
1071	0	0	0.8109622	718.9417
1072	0	0	0.9357039	585.0313
1073	0	0	0.8860747	847.2083
1074	0	0	0.9556664	530.4581
1075	0.001889058	0	1.001893	822.1127
1076	0	0	0.9996499	906.9797
1077	0	0	0.8686174	742.4574
1078	0	0	0.867062	762.2879
1079	0	0	0.9874752	879.3079
1080	0	0	0.8103273	500.9307
1081	0	0	0.8811612	696.3391
1082	0.03371439	0	1.034891	770.5335
1083	0.008382305	0	1.008453	557.8124
1084	0	0	0.8241634	679.0425
1085	0	0	0.9984289	945.1887
1086	0	0	0.943804	875.909
1087	0	0	0.9583015	670.6148
1088	0	0	0.9420404	777.1118
1089	0	0	0.9868652	748.6787
1090	0	0	0.9570893	547.0258
1091	0	0	0.8114867	880.2374

1092	0.03608897	0	1.03744	944.8541
1093	0	0	0.8467846	483.2819
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1095	0	0	0.9296707	710.0311
1096	0	0	0.931778	712.9608
1097	0	0	0.955959	928.4643
1098	0.06391709	0	1.068281	874.5216
1099	0	0	0.961261	792.3782
1100	0	0	0.9081059	874.5492
1101	0	0	0.923106	784.8726
1102	0	0	0.8741494	707.9381
1103	0.01750842	0.005404872	1.01782	1005.434
1104	0	0	0.9642466	910.144
1105	0	0	0.9479775	508.2582
1106	0.006704087	0	1.006749	829.3228
1107	0	0	0.9727305	642.1699
1108	0.07739826	0	1.083891	749.3297
1109	0	0	0.8329042	635.7723
1110	0	0	0.8777257	522.2627
1111	0	0	0.9951983	576.4301
1112	0	0	0.9661286	598.6795
1113	0	0	0.937525	561.4557
1114	0	0	0.8889469	480.8011
1115	0	0	0.9932759	772.4389
1116	0.0422135	0	1.044074	770.9849
1117	0	0	0.9622295	791.949
1118	0	0	0.8115598	886.1208
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1120	0	0	0.8425405	676.7806
1121	0	0	0.9193805	858.3873
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1123	0	0	0.9768004	617.0148
1124	0	0	0.9040139	603.5106
1125	0	0	0.9226927	700.5939
1126	0	0	0.9377407	956.2065
1127	0	0.03595245	0.8420882	1037.293
1128	0	0	0.9811082	803.4238
1129	0.01149238	0	1.011626	816.9711
1130	0.05382206	0	1.056884	651.9084
1131	0	0	0.9647722	557.2798
1132	0	0	0.8203178	623.5354
1133	0	0	0.9266351	824.5576
1134	0	0	0.7965719	933.1051
1135	0.02022796	0	1.020646	700.9226
1136	0	0	0.8052823	852.5038
1137	0	0	0.9852502	773.893
1138	0	0	0.9826291	613.0579
1139	0	0	0.8744441	853.6196
1140	0	0	0.9351947	971.7142
1141	0	0	0.8910262	831.5095
1142	0	0	0.9702878	925.9727
1143	0.07078376	0	1.076176	777.9911
1144	0	0	0.9680973	803.991
1145	0	0	0.9369656	913.199
1146	0	0	0.9840289	533.6986
1147	0	0	0.9444625	880.7798
1148	0	0	0.9987983	636.2233
1149	0	0	0.885501	827.7216
1150	0	0	0.9489453	488.4528
1151	0	0	0.8459124	931.2177
1152	0.06808833	0	1.073063	659.6033
1153	0	0	0.9833437	778.2768
1154	0	0	0.9175186	751.9415
1155	0	0	0.978842	703.8646
1156	0	0	0.8495372	442.0623
1157	0.01761215	0	1.017928	989.9237
1158	0	0	0.9317812	897.176
1159	0	0	0.991376	857.3421
1160	0.04444626	0	1.046514	832.2983
1161	0	0	0.9826583	790.9808
1162	0.02955463	0	1.030455	971.521
1163	0	0.001024493	0.983198	1001.026
1164	0	0	0.9666225	801.5923

1165	0	0	0.9472154	529.1938
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1167	0	0	0.8995653	819.2581
1168	0	0	0.9735982	697.9009
1169	0	0	0.8307828	624.374
1170	0	0	0.889526	860.2165
1171	0.04011675	0	1.041793	594.9388
1172	0.04312608	0	1.04507	926.5021
1173	0	0	0.9274136	860.0629
1174	0.04039928	0	1.0421	849.6668
1175	0	0	0.9546373	740.03
1176	0	0	0.8606684	535.0883
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1178	0	0	0.9380578	679.3957
1179	0	0	0.8505749	669.5261
1180	0.05205766	0	1.054917	755.1407
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1182	0	0	0.8941653	745.661
1183	0	0	0.856633	728.1033
1184	0	0	0.8229467	583.2936
1185	0	0	0.9389799	497.2025
1186	0.01755702	0	1.017871	785.5959
1187	0	0	0.8836615	610.3254
1188	0	0	0.953101	882.466
1189	0	0	0.9289145	777.9522
1190	0	0	0.9468359	739.7057
1191	0	0	0.9617624	677.6161
1192	0	0	0.8729153	493.7115
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1194	0	0	0.9435402	931.4743
1195	0	0	0.9148583	837.8602
1196	0	0	0.8951316	725.4103
1197	0	0.003175441	0.9164998	1003.186
1198	0	0	0.9175743	753.4568
1199	0	0	0.9824715	813.1282
1200	0	0	0.8982291	532.523
1201	0	0	0.9241145	845.6951
1202	0	0	0.8183905	692.1585
1203	0	0	0.9459162	591.7162
1204	0.04674764	0	1.04904	471.6208
1205	0	0	0.9889632	726.7726
1206	0.01709897	0	1.017396	750.0532
1207	0	0	0.8981907	658.0219
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1209	0	0	0.8905565	750.3607
1210	0	0	0.8769799	794.1689
1211	0	0	0.93966	686.5417
1212	0.007298767	0	1.007352	945.4874
1213	0	0	0.9034958	808.33
1214	0	0	0.8902398	713.5457
1215	0	0.03941098	0.9152297	1041.028
1216	0	0	0.9757012	732.6705
1217	0	0	0.9981879	937.9958
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1219	0.006471966	0	1.006514	637.825
1220	0.005907451	0	1.005943	799.5726
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1223	0	0	0.8230047	962.5869
1224	0	0	0.8743615	653.3102
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1229	0	0	0.964568	716.6411
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1242	0	0	0.9113454	564.5467
1243	0	0	0.9069371	528.6326
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1247	0	0	0.8946621	733.2089
1248	0	0	0.9731047	925.7167
1249	0	0	0.9390125	544.1345
1250	0	0	0.8345588	656.9864
1251	0	0	0.8812426	637.668
1252	0	0	0.8318471	493.8419
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1254	0	0	0.9314336	668.082
1255	0	0	0.9371291	801.5044
1256	0	0	0.8957663	803.7569
1257	0.05688524	0	1.060316	731.2867
1258	0	0	0.9746828	597.801
1259	0	0	0.8358698	818.0579
1260	0	0	0.8070047	853.2742
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1262	0	0	0.9031907	693.58
1263	0	0	0.9900734	576.0377
1264	0	0	0.9504127	668.2881
1265	0	0	0.8958011	910.2396
1266	0	0	0.9153655	747.7742
1267	0	0	0.9677056	714.8983
1268	0	0	0.9562625	947.4374
1269	0	0	0.8835013	663.0456
1270	0	0	0.9332256	531.0787
1271	0	0	0.9220514	756.1531
1272	0	0	0.8618221	710.8105
1273	0.03402521	0	1.035224	669.553
1274	0	0	0.8981694	563.1368
1275	0	0	0.8736404	493.0024
1276	0	0	0.9589186	656.3904
1277	0	0	0.8548216	763.2394
1278	0.04949425	0	1.052071	726.6946
1279	0	0	0.9330856	817.4221
1280	0.03762393	0	1.039095	541.5551
1281	0	0	0.8785986	815.6673
1282	0	0	0.89994	653.6868
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1285	0	0	0.9081768	775.5012
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1287	0	0.02485462	0.9679207	1025.488
1288	0	0	0.877206	805.361
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1290	0	0	0.8915802	848.7938
1291	0.0364995	0	1.037882	463.3889
1292	0.04887032	0	1.051381	698.2345
1293	0	0	0.9261256	738.335
1294	0	0	0.8902338	426.6104
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1296	0.04278301	0	1.044695	855.814
1297	0.005048942	0	1.005075	753.3278
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1299	0.005172958	0	1.0052	682.9553
1300	0	0	0.8856521	699.3262
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1305	0	0	0.8615921	753.3413
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1316	0	0.04038713	0.9180262	1042.087
1317	0	0	0.973632	838.6439
1318	0	0	0.9500992	636.2906
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1320	0	0	0.9907063	871.9653
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1322	0.06207823	0	1.066187	899.5314
1323	0.006234857	0	1.006274	792.7866
1324	0	0	0.8706214	989.206
1325	0	0	0.8888006	713.0127
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1328	0	0	0.9601104	596.0249
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1331	0.00E+00	0	0.9034169	565.0378
1332	0.004940113	0	1.004965	876.4694
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1336	0	0	0.939427	870.9224
1337	0	0	0.8742081	475.1032
1338	0	0	0.9792733	802.5377
1339	0.01329553	0	1.013475	804.1215
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1342	0.04846491	0	1.050933	754.5841
1343	0	0	0.984524	556.6937
1344	0.04555832	0	1.047733	736.3017
1345	0.01524937	0	1.015486	668.6771
1346	0	0	0.9538547	920.3356
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1348	0	0	0.9141915	965.0272
1349	0	0	0.9821155	717.729
1350	0.05430648	0	1.057425	645.4286
1351	0	0	0.8643491	553.4502
1352	0	0	0.9782699	936.5369
1353	0.02950616	0	1.030403	759.3529
1354	0	0	0.9170299	800.8687
1355	0	0.05465736	0.9415102	1057.818
1356	0	0	0.8690701	506.0284
1357	0	0	0.9836957	712.698
1358	0	0	0.9603993	806.8536
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1361	0.04200874	0	1.043851	986.3558
1362	0.02850415	0	1.029341	690.5281
1363	0	0	0.9796042	587.4312
1364	0	0	0.9203172	750.9731
1365	0	0	0.9975471	755.4424
1366	0	0	0.9193829	437.9837
1367	0	0	0.9904358	893.1575
1368	0	0	0.9441115	806.7175
1369	0.01436847	0	1.014578	833.3561
1370	0	0	0.9518456	627.9902
1371	0	0	0.8861936	728.3265
1372	0	0	0.9190648	501.1698
1373	0.04976938	0	1.052376	925.9362
1374	0	0	0.8737316	569.6646
1375	0	0	0.8973191	652.7178
1376	0	0	0.8642404	843.0881
1377	0	0	0.947172	559.6906
1378	0	0	0.9982599	969.9117
1379	0	0	0.8769085	631.2144
1380	0	0	0.8537084	387.4644
1381	0.009248481	0	1.009335	567.9297
1382	0	0	0.9373929	507.8055
1383	0.02399149	0.02159295	1.024581	1022.07

1384	0	0	0.8620945	492.9416
1385	0	0	0.9876622	877.3997
1386	0	0	0.8519209	706.0051
1387	0	0	0.9674431	428.7142
1388	0.01277418	0	1.012939	615.9111
1389	0.02490572	0	1.025542	858.7878
1390	0	0	0.928803	982.0567
1391	0	0	0.9286597	703.9434
1392	0	0	0.9425553	670.8602
1393	0	0	0.8857201	779.1456
1394	0	0	0.9280716	634.2485
1395	0.003994416	0	1.00401	846.0386
1396	0	0	0.9678813	704.3897
1397	0	0	0.9485077	445.6992
1398	0	0	0.9315484	533.1595
1399	0	0	0.9345456	582.697
1400	0	0	0.8400474	536.7578
1401	0	0	0.9043941	571.868
1402	0.0331452	0	1.034281	591.5377
1403	0	0	0.9221643	867.4725
1404	0	0	0.9717357	842.7463
1405	0	0	0.9908345	919.9378
1406	0.02036539	0	1.020789	733.9933
1407	0	0	0.886425	686.2036
1408	0	0	0.9477482	789.3797
1409	0	0	0.953563	865.9293
1410	0	0	0.9552563	668.5535
1411	0	0	0.9659721	813.2854
1412	0	0.06461049	0.9953262	1069.073
1413	0	0	0.8790711	758.6533
1414	0	0	0.8609511	920.4311
1415	0.02135853	0	1.021825	879.0471
1416	0	0	0.8704839	510.7105
1417	0	0.06520641	0.8883826	1069.755
1418	0	0	0.9550515	921.4818
1419	0	0	0.8771839	422.6687
1420	0	0	0.8625944	883.0424
1421	0	0	0.9837134	685.2991
1422	0	0	0.8893036	481.3602
1423	0.00372533	0	1.003739	532.028
1424	0	0	0.9000525	784.0854
1425	0.04451253	0	1.046586	972.8672
1426	0	0	0.8491948	740.4504
1427	0	0	0.896832	771.1627
1428	0	0.008280852	0.8250486	1008.35
1429	0.07343873	0	1.079259	635.2777
1430	0	0	0.8984526	441.2685
1431	0	0	0.9622023	670.722
1432	0	0	0.9964832	877.5962
1433	0.000440016	0	1.00044	677.0804
1434	0	0	0.8837093	874.3315
1435	0.01324567	0	1.013423	519.5266
1436	0	0	0.9534166	913.9469
1437	0	0	0.9296319	771.2792
1438	0	0	0.9668456	461.2199
1439	0	0	0.9926819	435.1667
1440	0	0	0.9531863	862.5801
1441	0.02855876	0	1.029398	923.0673
1442	0	0	0.9582778	514.3943
1443	0	0	0.9409829	737.3784
1444	0	0	0.8930411	652.3992
1445	0	0	0.8575509	884.3425
1446	0.009371184	0	1.00946	832.7407
1447	0.07166865	0	1.077202	501.0321
1448	0.0103055	0	1.010413	613.0701
1449	0	0	0.9693196	536.6843
1450	0	0	0.9408051	578.5267
1451	0.0230738	0	1.023619	856.8947
1452	0	0	0.9275869	711.9831
1453	0	0	0.9672796	480.8306
1454	0	0.03898301	0.8253813	1040.564
1455	0	0	0.944762	819.0872
1456	0	0	0.8406633	818.6489

1457	0.03897974	0	1.040561	568.9091
1458	0	0	0.9484448	729.9003
1459	0.01090387	0	1.011024	742.7649
1460	0	0	0.9502379	746.6219
1461	0	0	0.8815598	803.7807
1462	0	0	0.9641454	421.9313
1463	0	0	0.7921833	486.5078
1464	0	0	0.8914896	528.4443
1465	0	0	0.9287922	672.6653
1466	0.0744647	0	1.080456	785.1654
1467	0	0	0.9101874	474.1031
1468	0.01145146	0	1.011584	884.9732
1469	0	0	0.8768157	831.1101
1470	0.08668506	0	1.094913	512.2098
1471	0	0	0.9410988	965.6117
1472	0	0	0.9104674	799.925
1473	0	0	0.9561281	695.7635
1474	0	0	0.9375528	873.4257
1475	0	0	0.8953305	961.1639
1476	0.02843586	0	1.029268	827.4277
1477	0	0	0.9948778	642.2231
1478	0.001236064	0	1.001238	882.2266
1479	0	0	0.8755586	883.7812
1480	0	0	0.8910689	751.1263
1481	0.01024518	0	1.010351	924.8015
1482	0	0	0.9833117	972.6152
1483	0	0	0.8973938	751.9575
1484	0.01591968	0	1.016177	682.243
1485	0.04103418	0	1.04279	734.9849
1486	0	0	0.8530447	813.5156
1487	0	0	0.9130467	931.2611
1488	0	0	0.9989738	863.1646
1489	0	0	0.8977937	919.2375
1490	0	0	0.9013306	854.0834
1491	0.04741776	0	1.049778	575.2815
1492	0	0	0.8729734	791.7719
1493	0.004101612	0	1.004119	732.4034
1494	0	0	0.9154632	477.3182
1495	0	0	0.9607092	831.2556
1496	0.02554376	0	1.026213	714.2255
1497	0	0	0.8746163	785.3671
1498	0.01650485	0	1.016782	645.2296
1499	0	0	0.921499	757.5297
1500	0	0	0.9655705	730.1981
1501	0	0	0.9572212	803.7816
1502	0	0	0.9752812	797.2921
1503	0	0	0.9985029	497.2199
1504	0	0	0.8735976	617.4418
1505	0	0	0.8234004	629.1609
1506	0	0	0.946052	836.024
1507	0.05392224	0	1.056996	695.8031
1508	0	0	0.8073348	837.89
1509	0.001029119	0	1.00103	590.5813
1510	0	0	0.9807404	699.7805
1511	0	0	0.8198714	795.8588
1512	0.02690845	0	1.027653	670.93
1513	0	0	0.8686329	622.216
1514	0	0	0.8939149	696.6098
1515	0	0	0.8163982	623.0033
1516	0	0	0.9882929	747.5215
1517	0	0.01947577	0.9927881	1019.863
1518	0	0	0.971991	732.3607
1519	0	0	0.9789663	742.7975
1520	0	0	0.945264	686.8502
1521	0	0	0.8997641	775.1987
1522	0	0	0.8320233	935.4017
1523	0	0	0.9354511	957.3034
1524	0	0	0.9905768	742.3924
1525	0	0	0.8794072	930.924
1526	0	0	0.9195724	707.8687
1527	0	0	0.943037	536.445
1528	0.04556806	0	1.047744	507.3056
1529	0.03253566	0	1.03363	766.2457

1530	0	0	0.9297036	576.9809
1531	0	0	0.9519956	622.8753
1532	0	0	0.9926935	839.0131
1533	0	0	0.9449022	693.3121
1534	0	0	0.9242058	768.1808
1535	0	0	0.9127215	456.7875
1536	0	0	0.9354101	718.9566
1537	0	0	0.9007403	926.8619
1538	0	0	0.9133171	628.9976
1539	0.01892684	0	1.019292	937.6165
1540	0	0	0.9111072	872.197
1541	0	0	0.9458216	741.5883
1542	0.01317878	0	1.013355	487.9648
1543	0	0	0.8042638	843.6964
1544	0	0.02800923	0.8926747	1028.816
1545	0	0	0.8101731	672.455
1546	0	0	0.8779738	490.042
1547	0	0	0.8504767	794.9907
1548	0	0	0.8824226	455.4628
1549	0	0	0.9704645	672.3724
1550	0	0	0.9637826	849.1652
1551	0	0	0.9741539	741.1948
1552	0	0	0.9605609	962.2434
1553	0.0430345	0	1.04497	781.8554
1554	0.00E+00	0	0.9030915	644.3171
1555	0	0	0.8485414	822.2501
1556	0	0	0.9245166	988.6024
1557	0	0	0.8776734	749.2832
1558	0	0	0.855256	669.238
1559	0	0	0.9759562	915.054
1560	0	0	0.8945829	825.9197
1561	0.04849305	0	1.050964	561.196
1562	0	0	0.9316116	767.8056
1563	0.002213395	0	1.002218	852.8588
1564	0	0	0.9101022	731.2277
1565	0	0	0.9149191	776.7605
1566	0	0	0.9689287	444.584
1567	0	0	0.9891316	559.6004
1568	0	0	0.8766119	668.5953
1569	0.02857679	0	1.029417	980.7775
1570	0	0	0.9752634	727.9698
1571	0	0	0.9109869	547.0628
1572	0	0	0.8683485	725.5986
1573	0	0	0.8621258	903.6238
1574	0	0	0.89885	752.4884
1575	0	0	0.8949596	644.8958
1576	0	0	0.8414036	799.0502
1577	0	0	0.9370874	453.8867
1578	0.02632088	0	1.027032	764.0245
1579	0	0	0.8858284	740.0377
1580	0	0	0.9414783	622.4506
1581	0	0.0284395	0.9280803	1029.272
1582	0	0	0.8372272	846.6635
1583	0	0	0.9710833	974.9516
1584	0	0	0.9329351	920.39
1585	0	0	0.8973188	645.532
1586	0	0	0.9673132	739.5931
1587	0	0	0.9451243	685.1508
1588	0	0	0.8554636	749.9203
1589	0	0	0.8747761	948.2651
1590	0.0273873	0	1.028159	879.1125
1591	0	0	0.9127589	634.3236
1592	0	0	0.8731892	482.4685
1593	0	0	0.9660473	665.8069
1594	0	0	0.8577098	909.1443
1595	0	0	0.9784194	861.3389
1596	0	0	0.9492674	632.555
1597	0	0	0.9009317	768.1347
1598	0	0	0.9435145	564.3032
1599	0.0710777	0	1.076516	946.8755
1600	0	0	0.9960464	757.1422
1601	0	0	0.9306439	588.618
1602	0	0	0.9289392	699.0331

1603	0	0	0.921413	986.1865
1604	0.02508476	0	1.02573	397.102
1605	0.05513304	0	1.05835	536.5932
1606	0	0	0.9342676	433.2352
1607	0	0	0.9540203	688.7567
1608	0	0	0.9382629	600.829
1609	0	0	0.9472279	860.9067
1610	0	0	0.9381536	928.5087
1611	0.02935643	0	1.030244	828.3279
1612	0	0	0.9482234	895.26
1613	0	0	0.8645652	483.4052
1614	0.06716613	0	1.072002	603.7509
1615	0	0	0.8868458	745.8528
1616	0	0	0.8313169	516.3394
1617	0.01851262	0	1.018862	468.1022
1618	0.01197897	0	1.012124	911.5997
1619	0	0	0.9441963	947.0836
1620	0.02430364	0	1.024909	962.2952
1621	0	0	0.9211224	881.2998
1622	0	0	0.9178379	594.6302
1623	0	0	0.9233598	986.955
1624	0	0	0.8520222	799.9885
1625	0	0	0.8298768	598.154
1626	0.04245336	0	1.044336	636.3446
1627	0	0	0.9247624	708.7509
1628	0	0	0.8754631	806.5833
1629	0	0	0.9540543	679.6313
1630	0	0	0.8651511	739.1779
1631	0	0	0.9463751	706.9829
1632	0	0	0.8945473	977.878
1633	0	0	0.9720503	553.8201
1634	0	0	0.8409762	615.3912
1635	0.01177929	0	1.01192	767.4925
1636	0	0	0.9832044	853.1808
1637	0.01895012	0	1.019316	652.3702
1638	0.001820384	0	1.001824	584.2457
1639	0.00E+00	0	0.9409289	712.4465
1640	0.02981831	0	1.030735	881.6726
1641	0	0	0.9716564	832.6426
1642	0	0	0.9331444	713.6765
1643	0	0	0.9573824	838.665
1644	0.004924911	0	1.004949	516.4716
1645	0	0	0.8919214	825.6356
1646	0.01918872	0	1.019564	769.4785
1647	0	0	0.8582047	927.037
1648	0	0	0.8641103	528.7939
1649	0	0	0.9165473	478.0281
1650	0	0	0.8771427	571.5458
1651	0	0	0.8882838	943.9615
1652	0	0	0.9108191	622.5455
1653	0	0	0.9647632	642.6432
1654	0	0	0.8194991	721.4495
1655	0	0	0.8636465	777.2513
1656	0	0	0.9546378	498.395
1657	0	0	0.9120626	879.3122
1658	0	0	0.9570338	734.479
1659	0.01571557	0	1.015967	773.2273
1660	0	0	0.8203613	549.3345
1661	0.03044786	0	1.031404	772.7065
1662	0	0	0.9355706	925.7951
1663	0	0	0.9581653	949.9769
1664	0	0	0.8077168	717.3194
1665	0	0	0.9547401	757.8367
1666	0	0	0.934753	657.3933
1667	0	0	0.9836213	894.796
1668	0	0	0.8838348	883.4419
1669	0	0	0.8741401	881.0322
1670	0	0	0.8831543	941.2274
1671	0	0	0.8957282	994.9708
1672	0	0	0.9820197	804.3825
1673	0	0	0.9803106	769.6658
1674	0	0.005642516	0.937821	1005.675
1675	0.00E+00	0	0.9479665	580.5692

1676	0	0	0.834363	787.6827
1677	0	0	0.9611922	840.3037
1678	0	0	0.9418479	885.285
1679	0	0	0.9498699	669.9921
1680	0	0	0.861487	718.4149
1681	0	0	0.9160676	857.0866
1682	0	0	0.9357559	532.7957
1683	0.01049435	0	1.010606	564.5938
1684	0	0	0.8649451	911.5853
1685	0.004866851	0	1.004891	814.1154
1686	0	0	0.8772151	769.293
1687	0	0	0.9627981	801.6628
1688	0	0	0.9563993	679.5098
1689	0	0	0.9090976	560.8761
1690	0	0	0.9358522	769.6206
1691	0.04269638	0	1.044601	613.4141
1692	0	0	0.9400478	743.043
1693	0.07294717	0	1.078687	847.2507
1694	0	0	0.9302221	661.6662
1695	0	0	0.7925615	755.467
1696	0	0	0.9825851	651.1959
1697	0	0	0.8596954	707.6324
1698	0.003274405	0	1.003285	758.7057
1699	0	0	0.850649	749.6226
1700	0	0	0.8301526	665.0362
1701	0	0	0.9752171	751.2923
1702	0	0	0.9864146	894.218
1703	0	0	0.9821848	641.5499
1704	0	0	0.9080047	731.1014
1705	0.01383661	0	1.014031	879.5173
1706	0.04445702	0	1.046525	564.4797
1707	0	0	0.9402514	992.8431
1708	0	0	0.8505536	862.2824
1709	0	0	0.80418	921.8146
1710	0	0	0.9185491	904.1346
1711	0.001699545	0	1.001702	637.951
1712	0	0	0.9744851	851.0669
1713	0.03937725	0	1.040991	624.8712
1714	0.04733677	0	1.049689	651.2161
1715	0	0	0.9723355	657.2161
1716	0.01595592	0	1.016215	498.5091
1717	0	0	0.9921875	717.5466
1718	0	0	0.9082782	644.5713
1719	0	0.010144	0.846625	1010.248
1720	0	0	0.9789724	797.6868
1721	0	0	0.915275	529.7261
1722	0	0	0.8939714	745.9318
1723	0	0	0.9463819	821.1153
1724	0	0	0.9947637	961.5096
1725	0	0	0.9702408	892.253
1726	0	0	0.9624956	728.5916
1727	0	0	0.9755313	838.8799
1728	0	0	0.9807913	999.7704
1729	0	0	0.8566247	600.6138
1730	0.07955398	0	1.08643	706.1563
1731	0	0	0.9350166	829.3877
1732	0	0	0.8697559	776.0307
1733	0.007578908	0	1.007637	833.2819
1734	0	0	0.9875989	689.6194
1735	0	0	0.9079823	835.7393
1736	0	0	0.8658049	559.5355
1737	0	0	0.8917434	569.4827
1738	0	0	0.9747195	891.5314
1739	0	0	0.8596414	472.9385
1740	0	0	0.9528457	813.8015
1741	0	0	0.8917464	820.6143
1742	0	0	0.9149167	732.962
1743	0	0	0.966444	951.066
1744	0	0	0.9169248	614.719
1745	0	0	0.9404691	425.3852
1746	0	0	0.8967187	926.2996
1747	0	0	0.9251784	655.5126
1748	0.06582633	0	1.070465	749.467

1749	0	0	0.9156832	577.9138
1750	0	0	0.8374809	682.2949
1751	0.01048188	0	1.010593	716.7734
1752	0	0	0.9096952	496.5508
1753	0	0	0.9064163	957.3226
1754	0	0	0.9338891	526.1263
1755	0	0	0.9175023	837.9317
1756	0.02141869	0	1.021888	718.4877
1757	0.05657452	0	1.059967	510.5201
1758	0	0	0.9450026	529.6345
1759	0	0	0.8972795	544.4431
1760	0	0	0.9932647	759.4352
1761	0	0	0.8469758	789.9722
1762	0	0	0.9804667	673.795
1763	0	0	0.911672	877.394
1764	0.0172448	0	1.017547	486.6662
1765	0	0	0.9553177	640.4823
1766	0	0	0.9635275	758.3948
1767	0	0	0.9227387	668.8751
1768	0.0138475	0	1.014042	510.646
1769	0	0	0.9517876	555.8669
1770	0	0	0.9326929	608.9884
1771	0.07735942	0	1.083846	732.5244
1772	0	0	0.899698	839.2322
1773	0.008822657	0	1.008901	874.0977
1774	0	0	0.9639058	913.8315
1775	0	0	0.8985717	750.5384
1776	0	0	0.9123264	953.8671
1777	0.005488091	0	1.005518	473.403
1778	0.0157648	0	1.016017	718.6465
1779	0	0	0.9794985	724.5637
1780	0	0	0.8535742	606.5673
1781	0	0	0.9536409	562.1828
1782	0	0	0.9159333	600.1464
1783	0	0	0.9411699	881.0737
1784	0.009162625	0	1.009247	541.6156
1785	0	0	0.9047502	563.7476
1786	0	0	0.9459263	776.7303
1787	0	0	0.9166148	803.7109
1788	0	0	0.9180233	884.9185
1789	0	0	0.952022	445.4872
1790	0.05890648	0	1.062594	613.6347
1791	0	0	0.9210269	875.8622
1792	0	0	0.8882708	784.3538
1793	0	0	0.8226145	698.6411
1794	0	0	0.8186402	693.1206
1795	0	0	0.9619852	743.0742
1796	0	0	0.9116172	825.6472
1797	0.04823952	0	1.050685	689.028
1798	0	0	0.800574	864.4055
1799	0	0	0.9325114	652.7977
1800	0	0	0.9414836	696.8782
1801	0	0	0.9167306	865.0507
1802	0	0	0.9588432	683.9254
1803	0	0	0.9561674	700.6329
1804	0.01288517	0	1.013053	798.5434
1805	0	0	0.9367924	689.2941
1806	0	0	0.9401888	710.1891
1807	0	0	0.9640618	572.3683
1808	0.01158782	0	1.011724	672.1142
1809	0	0	0.9013576	571.199
1810	0.008935419	0	1.009016	739.748
1811	0	0	0.9787489	574.3984
1812	0	0	0.9741543	696.8892
1813	0	0	0.9074819	718.6752
1814	0	0	0.8586193	546.6385
1815	0	0	0.903204	938.6933
1816	0	0	0.8833195	797.3338
1817	0	0	0.9980296	564.2776
1818	0	0	0.9200788	737.8076
1819	0	0	0.8240302	593.6678
1820	0	0	0.9580905	891.5211
1821	0	0	0.8740014	902.5887

1822	0	0	0.9817373	725.5807
1823	0	0	0.8312966	706.6967
1824	0	0	0.9849352	925.245
1825	0	0	0.9473456	721.6812
1826	0	0	0.8912277	914.0716
1827	0	0	0.8742091	734.1739
1828	0	0	0.9652545	867.9644
1829	0	0	0.96117	587.3957
1830	0	0	0.848653	494.7523
1831	0	0	0.9699109	680.0914
1832	0.005589112	0.05806663	1.00562	1061.646
1833	0	0	0.9103491	762.0942
1834	0	0.02018564	0.9374098	1020.602
1835	0	0	0.9138253	581.7747
1836	0	0	0.9345543	971.6887
1837	0	0	0.8147773	851.5273
1838	0.04899494	0	1.051519	976.7574
1839	0	0	0.9032098	584.8589
1840	0.01447469	0	1.014687	902.0555
1841	0	0	0.9488603	529.9875
1842	0.01171613	0	1.011855	462.5359
1843	0	0	0.8220665	925.1521
1844	0	0	0.9167114	587.0838
1845	0	0	0.8930859	594.7186
1846	0	0	0.9890714	679.5292
1847	0	0	0.9492894	892.5263
1848	0	0	0.9333935	783.0972
1849	0	0	0.9413136	677.6357
1850	0	0	0.9431524	841.1905
1851	0	0	0.9660845	896.7352
1852	0	0	0.9666989	902.3255
1853	0	0	0.9204684	696.4681
1854	0	0	0.9749336	582.881
1855	0	0	0.9988264	625.1772
1856	0.0152453	0	1.015481	705.8979
1857	0.01258951	0	1.01275	691.5009
1858	0	0	0.9665565	811.2548
1859	0	0	0.9401164	863.0347
1860	0	0	0.8770555	582.9114
1861	0	0	0.9455693	960.8694
1862	0	0	0.977566	807.7839
1863	0	0	0.9135213	716.4945
1864	0	0	0.8746587	756.8682
1865	0	0	0.9604332	767.6804
1866	0	0	0.9460549	848.1244
1867	0	0	0.8500564	423.5753
1868	0	0	0.8996952	695.7045
1869	0	0	0.8864729	546.7789
1870	0	0	0.9026259	557.4409
1871	0	0	0.9831768	607.9489
1872	0	0	0.8339663	569.1075
1873	0.02004368	0	1.020454	641.5051
1874	0	0	0.8776503	482.9298
1875	0	0	0.9138144	494.4439
1876	0	0	0.8924266	897.5645
1877	0	0	0.8791611	912.6952
1878	0	0	0.91921	818.5923
1879	0	0	0.9989191	773.7126
1880	0	0	0.8784532	606.4847
1881	0.06762781	0	1.072533	612.8529
1882	0.07261463	0	1.0783	742.7501
1883	0	0	0.9842591	754.1262
1884	0	0	0.9216492	809.2045
1885	0.009869708	0	1.009968	749.823
1886	0	0	0.9684772	758.9221
1887	0.01738199	0	1.017689	693.7795
1888	0	0	0.9831	648.6235
1889	0	0	0.9491992	778.9083
1890	0	0.008414628	0.8651091	1008.486
1891	0	0	0.9983825	812.9874
1892	0	0	0.9348549	957.2967
1893	0	0	0.9992599	676.1588
1894	0	0.005421511	0.822766	1005.451

1895	0	0	0.9779807	733.0103
1896	0	0	0.9932795	750.1509
1897	0	0	0.9115301	784.2809
1898	0	0	0.9581979	805.0869
1899	0	0	0.9094814	651.9475
1900	0	0	0.9565312	829.856
1901	0	0	0.9489268	618.6917
1902	0.04635017	0	1.048603	588.2501
1903	0	0	0.8481488	774.3375
1904	0	0	0.9354509	641.889
1905	0.03890367	0	1.040478	863.9218
1906	0	0	0.9599654	681.4122
1907	0	0	0.9495147	636.9232
1908	0	0	0.9398968	770.9924
1909	0	0	0.8947616	667.9243
1910	0.06734876	0	1.072212	649.3801
1911	0	0	0.9283112	695.8845
1912	0.0664535	0	1.071184	777.2466
1913	0	0	0.8402984	763.7085
1914	0	0	0.938919	712.0245
1915	0	0	0.8955566	619.5441
1916	0	0	0.8846378	702.1427
1917	0	0	0.8373721	823.5691
1918	0	0	0.8631663	831.3544
1919	0.00E+00	0	0.9289151	732.1805
1920	0.02860468	0	1.029447	880.4582
1921	0	0	0.9887856	708.4783
1922	0	0	0.9490329	820.237
1923	0	0	0.8768749	637.2123
1924	0	0	0.9715518	558.514
1925	0	0	0.9673269	819.866
1926	0.01429568	0	1.014503	550.2358
1927	0	0	0.9459459	485.2863
1928	0	0	0.8415149	561.1127
1929	0	0	0.8720803	862.9369
1930	0	0	0.9456728	598.2281
1931	0.02545787	0	1.026123	753.1803
1932	0.0314239	0	1.032443	772.4733
1933	0	0	0.9673634	723.0551
1934	0	0	0.990853	910.1083
1935	0	0	0.9371377	623.2186
1936	0	0	0.9776229	660.1313
1937	0	0	0.9741172	733.4138
1938	0	0	0.9552473	897.5786
1939	0	0	0.8648641	667.6315
1940	0	0	0.9504352	886.5156
1941	0	0	0.9126104	624.5403
1942	0	0	0.9879977	626.841
1943	0	0	0.9515164	797.1836
1944	0.007023686	0	1.007073	757.9339
1945	0	0	0.8617287	753.668
1946	0	0	0.9915615	616.7816
1947	0	0	0.9248582	565.9254
1948	0	0	0.9916151	755.5246
1949	0	0	0.8381533	613.5427
1950	0	0	0.9828578	797.7775
1951	0	0	0.8236766	870.5738
1952	0	0	0.8838353	873.6718
1953	0.005829482	0	1.005864	683.1961
1954	0	0	0.9130112	764.0015
1955	0	0	0.961867	885.5943
1956	0.06416091	0	1.06856	722.1805
1957	0	0	0.8582702	758.2384
1958	0.003871364	0	1.003886	631.3024
1959	0	0	0.8957497	828.4494
1960	0	0	0.9854483	663.9752
1961	0.008275673	0	1.008345	691.933
1962	0	0	0.9506752	513.0952
1963	0	0	0.9108147	783.6076
1964	0	0	0.9154372	907.9033
1965	0	0	0.8337929	642.5844
1966	0	0.009254626	0.8275635	1009.341
1967	0	0	0.8964352	637.7377

1968	0	0	0.9046397	485.8826
1969	0	0	0.8778079	829.335
1970	0.01798089	0	1.01831	719.3936
1971	0	0	0.9182715	866.574
1972	0.01146778	0	1.011601	723.7467
1973	0	0	0.9308401	813.83
1974	0	0	0.9640422	799.217
1975	0	0	0.9028972	831.2409
1976	0.03122408	0	1.03223	918.797
1977	0	0	0.9667144	840.5197
1978	0	0	0.9979876	831.3308
1979	0	0	0.9583133	832.9923
1980	0	0	0.8617761	550.5375
1981	0	0	0.9337324	510.1599
1982	0.06201265	0	1.066113	888.8782
1983	0	0	0.8713241	861.3298
1984	0	0	0.9879201	727.7255
1985	0.01585134	0	1.016107	687.822
1986	0	0	0.8658888	554.4208
1987	0	0	0.8482954	726.5854
1988	0	0	0.9446235	888.4958
1989	0	0	0.9373065	498.4552
1990	0.01608042	0	1.016343	860.2712
1991	0	0	0.9076676	751.8481
1992	0	0	0.8835822	595.09
1993	0	0	0.9519069	991.8343
1994	0	0	0.9107254	588.3195
1995	0.03544819	0	1.036751	706.5511
1996	0.08352936	0	1.091142	850.9963
1997	0	0	0.9647067	845.6847
1998	0	0	0.977195	824.2924
1999	0	0	0.9309686	894.1766
2000	0	0.05571817	0.8898541	1059.006
2001	0	0	0.8932363	668.5706
2002	0.02544503	0	1.026109	875.0593
2003	0	0	0.9608474	814.1078
2004	0	0	0.9573524	814.1791
2005	0	0	0.8873747	797.2477
2006	0	0	0.9355447	766.4122
2007	0	0	0.8909571	560.6294
2008	0	0	0.8521061	660.7874
2009	0	0	0.8935779	793.8685
2010	0	0	0.8629541	622.6866
2011	0	0	0.8526008	641.507
2012	0	0	0.8841314	832.3621
2013	0.03397824	0	1.035173	732.0887
2014	0	0	0.962345	647.3751
2015	0	0	0.8984396	676.5979
2016	0	0	0.9434221	858.4106
2017	0	0	0.9609677	853.3038
2018	0	0	0.8655317	627.0932
2019	0.0693432	0	1.07451	561.6207
2020	0.02380179	0	1.024382	896.1891
2021	0.05506045	0	1.058269	916.5372
2022	0	0	0.9155584	485.4535
2023	0	0	0.9793037	780.1011
2024	0	0	0.9586421	625.8088
2025	0.005492244	0	1.005523	538.01
2026	0	0	0.8984491	685.6091
2027	0	0	0.9905958	479.2318
2028	0.01669589	0	1.016979	697.4658
2029	0	0	0.89341	706.6897
2030	0	0	0.9591185	779.6352
2031	0	0	0.9838726	711.691
2032	0	0	0.9990738	822.4878
2033	0	0	0.9671394	654.5951
2034	0.005747555	0	1.005781	685.7408
2035	0	0	0.9670269	760.8808
2036	0	0	0.8509293	877.8558
2037	0	0	0.9345894	537.512
2038	0	0	0.8351674	823.0397
2039	0.07445284	0	1.080442	459.4419
2040	0	0	0.9704176	845.7399

2041	0	0	0.8508428	719.6697
2042	0	0.01519432	0.9967453	1015.429
2043	0	0	0.8489858	858.843
2044	0.07737037	0	1.083858	844.7424
2045	0	0	0.9658244	639.252
2046	0	0	0.9158382	826.8089
2047	0	0	0.8931452	692.6952
2048	0.003169175	0	1.003179	487.8152
2049	0	0	0.9646796	895.5305
2050	0	0	0.9591389	769.4534
2051	0	0	0.9024982	794.9229
2052	0	0	0.9389005	872.1848
2053	0	0	0.9119492	666.1521
2054	0	0	0.9039859	631.8973
2055	0	0	0.9184436	988.1245
2056	0	0	0.9361674	520.0293
2057	0	0	0.8021777	967.087
2058	0	0	0.8667678	897.297
2059	0	0	0.9452604	654.7336
2060	0	0	0.9465985	826.8041
2061	0	0	0.9944082	851.9865
2062	0.07865383	0	1.085368	602.3459
2063	0	0.001366744	0.954838	1001.369
2064	0	0	0.9702976	629.0144
2065	0	0	0.9311638	523.7583
2066	0	0	0.9932049	849.1121
2067	0	0	0.9329541	460.3141
2068	0	0	0.8271242	752.302
2069	0.06081448	0	1.064752	556.2983
2070	0	0	0.9740528	950.3942
2071	0	0	0.9028632	839.5605
2072	0	0	0.9953975	629.4906
2073	0.05513958	0	1.058357	890.6994
2074	0	0	0.9300724	542.7231
2075	0	0	0.9441755	624.666
2076	0	0	0.8886538	745.5335
2077	0	0	0.8853356	738.6026
2078	0.03014301	0	1.03108	870.1896
2079	0	0	0.9269249	612.3925
2080	0	0	0.9124854	930.9759
2081	0	0	0.9087337	579.4881
2082	0	0	0.9077405	668.9751
2083	0.008149081	0	1.008216	762.3961
2084	0	0	0.8797719	585.2604
2085	0.02693732	0	1.027683	570.3065
2086	0.03213478	0	1.033202	400.3622
2087	0	0	0.8967506	622.2572
2088	0	0	0.9575418	999.7903
2089	0	0	0.822677	619.5292
2090	0	0	0.8467743	586.1523
2091	0.02099797	0	1.021448	662.0807
2092	0	0	0.9976406	835.5717
2093	0	0	0.9421088	619.0181
2094	0	0	0.9893408	697.277
2095	0	0	0.9873896	886.6685
2096	0.05802661	0	1.061601	891.7657
2097	0	0	0.8291417	872.6049
2098	0.01482448	0	1.015048	795.6415
2099	0	0	0.8250421	432.25
2100	0	0	0.9033713	866.0886
2101	0	0	0.857903	821.3122
2102	0	0	0.8845636	609.8035
2103	0	0	0.9743738	573.5248
2104	0	0	0.9888273	712.1161
2105	0	0	0.9160408	974.5459
2106	0	0	0.9425907	724.3241
2107	0	0	0.8789262	748.6461
2108	0	0	0.8888006	716.7231
2109	0	0	0.9131194	721.1173
2110	0	0	0.9874994	777.4054
2111	0	0	0.8766795	867.7871
2112	0.02671695	0	1.02745	675.5344
2113	0.03259829	0	1.033697	578.2542

2114	0	0	0.8447521	803.2066
2115	0	0	0.9091732	506.0261
2116	0	0	0.9450696	547.2558
2117	0.0156457	0	1.015894	507.0814
2118	0.01409878	0	1.0143	760.3311
2119	0	0	0.9587296	656.9363
2120	0	0	0.8333424	655.1956
2121	0	0	0.8592528	399.7732
2122	0	0	0.8601114	545.5903
2123	0	0	0.9780312	955.078
2124	0.0387044	0	1.040263	770.6325
2125	0	0	0.9919201	901.6214
2126	0.05042117	0	1.053098	576.4489
2127	0	0	0.9464936	979.6251
2128	0	0	0.8928695	560.513
2129	0	0	0.9237217	439.8546
2130	0	0	0.9131869	769.8663
2131	0.02014608	0	1.02056	670.6691
2132	0.0323608	0	1.033443	701.6437
2133	0	0	0.9261974	659.6503
2134	0	0	0.9368796	675.522
2135	0	0	0.9960392	616.028
2136	0	0	0.9531948	766.4158
2137	0.01943651	0	1.019822	712.4009
2138	0.01594091	0	1.016199	755.515
2139	0.01569724	0	1.015948	598.7564
2140	0.04862161	0	1.051106	834.5756
2141	0	0	0.9120606	920.8599
2142	0	0	0.9922507	713.7106
2143	0	0	0.9008346	971.6987
2144	0	0	0.8797156	505.979
2145	0	0	0.8868396	739.2563
2146	0.02091971	0	1.021367	723.8658
2147	0	0	0.9515569	669.2979
2148	0	0	0.9375099	708.0365
2149	0	0	0.9008734	787.031
2150	0	0	0.8496977	741.8112
2151	0	0	0.9912313	724.1509
2152	0.03350176	0	1.034663	583.1566
2153	0.01696683	0	1.01726	906.9566
2154	0	0	0.8862951	728.3033
2155	0.02579891	0	1.026482	754.0545
2156	0.01574163	0	1.015993	562.4824
2157	0	0	0.9303094	891.0455
2158	0	0	0.9418579	881.7924
2159	0.02499005	0	1.025631	737.0549
2160	0.02154933	0	1.022024	716.5887
2161	0	0	0.8616008	831.0306
2162	0	0	0.8783336	943.7327
2163	0.01287036	0	1.013038	642.6796
2164	0	0	0.9518002	679.9706
2165	0	0.06167906	0.9822577	1065.733
2166	0	0	0.8140363	673.2103
2167	0.01759942	0	1.017915	641.7338
2168	0	0	0.8308561	865.5072
2169	0	0	0.8379213	716.3222
2170	0	0	0.939378	954.2797
2171	0	0	0.8853599	828.4124
2172	0	0	0.9708784	812.5621
2173	0	0	0.9247566	712.7051
2174	0	0	0.8844628	984.7157
2175	0	0	0.9613779	623.9213
2176	0	0	0.8602939	511.2347
2177	0.007413947	0	1.007469	627.4417
2178	0	0	0.9408157	819.5444
2179	0	0	0.913743	716.9551
2180	0.01065198	0	1.010767	534.1512
2181	0	0	0.9368694	688.3159
2182	0	0	0.8596231	631.0309
2183	0.05164532	0	1.054458	566.7012
2184	0	0	0.8862108	565.5817
2185	0	0	0.9375794	983.7676
2186	0	0	0.9168466	738.4446

2187	0.01909676	0	1.019469	781.6455
2188	0	0	0.9680169	859.4764
2189	0	0	0.8571619	892.6099
2190	0.006014941	0	1.006051	709.0623
2191	0	0	0.8411035	681.442
2192	0	0	0.8784726	705.4067
2193	0.03249843	0	1.03359	656.0553
2194	0	0	0.8847452	834.0329
2195	0.01414703	0	1.01435	814.902
2196	0	0	0.9042721	917.9214
2197	0	0	0.9409019	522.7217
2198	0	0	0.9286758	967.1667
2199	0.01146778	0	1.011601	750.4938
2200	0.006289294	0	1.006329	900.2276
2201	0.0181612	0	1.018497	740.5287
2202	0	0	0.9346443	831.0536
2203	0	0	0.8249814	609.0568
2204	0	0	0.8578283	796.3164
2205	0.004137909	0	1.004155	730.7559
2206	0	0	0.9058391	824.4744
2207	0	0	0.9017005	772.5135
2208	0	0	0.8663628	978.3702
2209	1.39239E-06	0	1.000001	672.7116
2210	0	0	0.9908814	572.1395
2211	0	0	0.9127071	691.4281
2212	0	0	0.8712696	662.766
2213	0	0	0.9726639	950.715
2214	0	0	0.887476	765.6519
2215	0	0	0.9944574	785.1942
2216	0	0.004758531	0.9909033	1004.781
2217	0	0	0.967847	764.0081
2218	0	0	0.8583637	519.5024
2219	0	0	0.8820257	708.1617
2220	0	0	0.8872938	603.0422
2221	0.05047453	0	1.053158	749.0122
2222	0.05085099	0	1.053575	448.9225
2223	0	0	0.956367	709.5333
2224	0.05101083	0	1.053753	965.5119
2225	0	0	0.9054792	748.3527
2226	0	0	0.9212189	866.4131
2227	0	0	0.8561996	593.5233
2228	0	0	0.9966213	891.8188
2229	0	0	0.8606278	633.7727
2230	0	0	0.8678975	668.4952
2231	0	0	0.9435474	760.8185
2232	0	0	0.9113452	917.255
2233	0	0	0.995518	626.3945
2234	0	0	0.9714686	624.6962
2235	0	0	0.9250602	870.7516
2236	0	0	0.9287209	585.8271
2237	0.02449155	0	1.025106	618.5579
2238	0	0	0.8351389	974.0735
2239	0	0	0.8978471	542.1919
2240	0	0	0.8737025	643.1254
2241	0	0	0.9435509	687.5374
2242	0	0	0.9473732	894.8918
2243	0	0	0.9418491	587.5427
2244	0	0	0.9068133	907.063
2245	0	0	0.9132917	682.8735
2246	0	0	0.9987946	889.9731
2247	0.01031206	0	1.010419	675.7911
2248	0	0	0.8753905	427.1343
2249	0	0	0.8728209	817.5854
2250	0	0	0.9293579	413.8551
2251	0	0	0.9792265	712.0607
2252	0	0	0.9294502	795.4072
2253	0	0	0.9130322	919.6671
2254	0	0	0.9761351	732.0012
2255	0	0	0.9227881	934.9525
2256	0.07006235	0	1.075341	937.422
2257	0	0	0.8279051	822.8625
2258	0.000898758	0	1.0009	639.1166
2259	0	0	0.839079	549.5666

2260	0	0	0.8609731	643.9297
2261	0	0	0.8628638	491.7571
2262	0	0	0.9301721	787.798
2263	0	0	0.9428815	953.5903
2264	0.0112795	0	1.011408	828.6743
2265	0	0.06071597	0.9669265	1064.641
2266	0	0	0.934869	742.6595
2267	0.03793397	0	1.03943	664.2397
2268	0	0	0.9293066	616.4728
2269	0.007355671	0	1.00741	844.7722
2270	0	0	0.9269127	614.1019
2271	0.006708133	0	1.006753	671.1526
2272	0	0.04407941	0.904977	1046.112
2273	0	0	0.9868454	626.3583
2274	0.05043472	0	1.053113	557.8763
2275	0	0	0.9493574	935.8414
2276	0.02239283	0	1.022906	697.6172
2277	0	0	0.924629	562.2878
2278	0	0	0.8180718	906.6755
2279	0	0	0.9884924	674.3771
2280	0	0	0.9422526	576.2712
2281	0	0	0.9770259	747.4602
2282	0	0	0.9473994	709.9905
2283	0	0	0.8555281	428.1112
2284	0	0.05584734	0.9368391	1059.151
2285	0	0	0.9527479	848.2872
2286	0	0	0.8812429	791.621
2287	0	0	0.9936435	560.7984
2288	0	0	0.8839099	806.1783
2289	0	0	0.9039663	996.4088
2290	0.03312463	0	1.034259	744.4505
2291	0.07712746	0	1.083573	548.8896
2292	0	0	0.9472679	797.4005
2293	0.01495358	0	1.015181	514.3392
2294	0.007263191	0.03762675	1.007316	1039.098
2295	0	0	0.8743397	937.9671
2296	0	0	0.9136314	694.4453
2297	0	0	0.9768147	478.8513
2298	0	0	0.8827684	827.7808
2299	0	0	0.8944603	800.1407
2300	0	0	0.8492134	762.406
2301	0.02024601	0	1.020664	845.8379
2302	0.08003496	0	1.086998	696.7512
2303	0	0	0.9323558	691.5891
2304	0	0	0.9668934	599.8611
2305	0	0	0.8196973	644.7092
2306	0	0	0.9511082	451.0847
2307	0	0	0.820431	882.4083
2308	0	0	0.8951462	506.0478
2309	0	0	0.9934163	783.3121
2310	0.0109709	0	1.011093	852.7257
2311	0	0	0.9945472	696.7299
2312	0	0	0.980022	902.2454
2313	0	0	0.9989014	851.8284
2314	0	0	0.8740754	840.7913
2315	0	0	0.9032548	675.9103
2316	0	0.01413297	0.9165739	1014.336
2317	0	0.01377636	0.9484372	1013.969
2318	0	0	0.9592896	916.9078
2319	0	0	0.970332	573.0381
2320	0.01575525	0	1.016007	707.1117
2321	0	0	0.8940759	603.3591
2322	0	0	0.8494501	468.4069
2323	0	0	0.9684133	827.9316
2324	0	0	0.9192685	713.0591
2325	0.04699803	0	1.049316	933.9612
2326	0	0	0.9494569	699.0768
2327	0	0	0.9139	903.1818
2328	0	0	0.9346426	525.5983
2329	0.02721326	0	1.027974	924.5646
2330	0.005232816	0	1.00526	539.4321
2331	0	0	0.9540823	627.8955
2332	0	0	0.9355292	590.6456

2333	0.00244664	0	1.002453	866.0883
2334	0	0	0.9923057	729.1168
2335	0	0	0.9345035	640.5074
2336	0	0	0.9079041	848.7748
2337	0.01084071	0	1.01096	900.167
2338	0.02519807	0	1.025849	697.438
2339	0	0	0.9517862	934.4811
2340	0	0	0.918658	769.5197
2341	0.01973948	0	1.020137	926.1394
2342	0	0	0.9529929	459.795
2343	0	0	0.93201	410.2102
2344	0	0	0.9506199	560.0261
2345	0	0	0.8522685	819.416
2346	0	0	0.9292551	519.3566
2347	0	0	0.8065959	676.5447
2348	0.03802033	0	1.039523	510.3827
2349	0	0	0.8891718	677.058
2350	0.01448199	0	1.014695	792.3121
2351	0.03412748	0	1.035333	828.2345
2352	0	0	0.9545633	832.766
2353	0	0	0.9533707	483.1073
2354	0	0	0.9127182	727.6964
2355	0	0	0.9753587	653.1824
2356	0	0	0.9209806	644.24
2357	0	0	0.8298963	581.2143
2358	0.01653137	0	1.016809	823.0331
2359	0	0	0.8843426	591.2224
2360	0.02388712	0	1.024472	675.2443
2361	0	0	0.908909	705.3734
2362	0	0	0.9348389	529.176
2363	0.01803916	0	1.018371	811.3596
2364	0	0	0.9099614	746.4626
2365	0.01855592	0	1.018907	853.5892
2366	0	0	0.9598975	687.2488
2367	0.03930972	0	1.040918	612.9314
2368	0	0	0.9509416	482.7032
2369	0	0	0.7928102	807.7013
2370	0	0	0.8753	878.5841
2371	0.05182932	0	1.054662	611.3326
2372	0.0109695	0	1.011091	580.2618
2373	0.000686287	0	1.000687	786.6511
2374	0.0396798	0	1.041319	648.8873
2375	0	0	0.8922437	650.3168
2376	0	0	0.8465876	682.1849
2377	0.00068538	0	1.000686	699.7786
2378	0	0	0.8729614	713.9108
2379	0.006033225	0	1.00607	803.2173
2380	0	0	0.9472321	732.514
2381	0	0	0.9442053	901.0344
2382	0	0	0.877862	724.8865
2383	0	0	0.9170117	710.434
2384	0	0	0.9177749	586.104
2385	0.04011136	0	1.041788	686.3182
2386	0	0	0.9025457	749.3613
2387	0	0	0.8732741	914.4358
2388	0	0	0.9231896	730.5824
2389	0	0	0.9112628	909.5746
2390	0	0.01741952	0.9540369	1017.728
2391	0	0	0.985929	583.5475
2392	0	0	0.9036497	858.1204
2393	0.02835749	0	1.029185	392.1458
2394	0	0	0.8480266	531.8657
2395	0	0	0.983143	721.5726
2396	0	0	0.9200916	671.9778
2397	0.02865249	0	1.029498	772.7496
2398	0.0552609	0	1.058493	767.1779
2399	0	0	0.8275858	509.4587
2400	0	0	0.9050925	662.4321
2401	0.08053486	0	1.087589	949.4725
2402	0	0	0.9902424	977.7948
2403	0	0	0.9701532	466.829
2404	0	0	0.8756772	635.777
2405	0	0	0.954994	858.6293

2406	0	0	0.9634874	467.6923
2407	0.00013672	0	1.000137	664.8457
2408	0	0	0.9462982	571.6406
2409	0	0	0.9597844	917.1495
2410	0	0	0.9426225	752.9301
2411	0	0	0.8759999	627.04
2412	0	0	0.8635505	409.8153
2413	0	0	0.9539956	410.3065
2414	0	0	0.8690518	653.9851
2415	0.01594455	0	1.016203	533.2487
2416	0	0	0.9839911	523.4279
2417	0	0	0.9314092	734.5833
2418	0	0	0.9557465	735.907
2419	0.08455173	0	1.092361	687.5455
2420	0	0	0.9441056	535.5538
2421	0	0	0.9470708	423.8218
2422	0.07624069	0	1.082533	732.308
2423	0	0	0.888117	713.8793
2424	0	0	0.9448943	667.9232
2425	0	0	0.8348852	921.8271
2426	0.04755425	0	1.049929	789.0091
2427	0	0	0.9416552	950.864
2428	0	0	0.8885517	585.2444
2429	0	0	0.950301	723.2328
2430	0	0	0.9405244	613.5097
2431	0	0	0.9052889	627.0473
2432	0	0	0.9096406	473.8106
2433	0	0	0.9490617	748.0566
2434	0	0	0.9186223	532.1519
2435	0.05301087	0	1.055978	663.3163
2436	0	0	0.9257759	573.7949
2437	0	0	0.948203	812.2372
2438	0	0	0.9120536	883.8489
2439	0	0	0.9495	612.7365
2440	0.003265432	0	1.003276	957.6632
2441	0	0	0.997236	505.3155
2442	0	0	0.9674423	929.0126
2443	0.00623122	0	1.00627	766.251
2444	0	0	0.8918744	800.3576
2445	0.07400623	0	1.079921	905.112
2446	0	0	0.8374922	715.5894
2447	0	0	0.874647	795.1444
2448	0	0	0.9664815	661.6908
2449	0.06997774	0	1.075243	869.8467
2450	0	0	0.8743056	571.1006
2451	0.006022109	0.003918437	1.006059	1003.934
2452	0	0	0.8534665	755.3666
2453	0.02056125	0.001736272	1.020993	1001.739
2454	0	0	0.9078906	480.4688
2455	0	0	0.922383	916.908
2456	0	0	0.9032489	739.1517
2457	0	0	0.8974336	796.4413
2458	0	0	0.8906733	414.9801
2459	0.02811136	0	1.028924	772.9281
2460	0.03688285	0	1.038295	999.6732
2461	0	0	0.8650497	818.2263
2462	0	0	0.8846858	587.1796
2463	0	0.03919677	0.9191355	1040.796
2464	0	0	0.9644977	871.9136
2465	0.05538071	0	1.058627	748.908
2466	0.04471948	0	1.046813	628.35
2467	0	0	0.9555854	787.1193
2468	3.57E-03	0	1.003583	637.5793
2469	0	0	0.9718142	538.8204
2470	0	0	0.9260232	778.2958
2471	0	0	0.9974343	598.6564
2472	0.04661941	0	1.048899	622.4932
2473	0	0	0.918798	636.7088
2474	0	0	0.9415039	901.9094
2475	0.06725087	0	1.0721	571.2604
2476	0	0	0.88647	871.2649
2477	0	0	0.8867491	705.1585
2478	0	0	0.8272355	920.5522

2479	0	0	0.8013207	578.1968
2480	0	0	0.8782155	865.8387
2481	0	0	0.9271644	839.6283
2482	0	0	0.9446272	795.0256
2483	0	0	0.9893366	571.5629
2484	0	0	0.9843293	434.9034
2485	0	0	0.9729066	993.9805
2486	0	0	0.8704318	669.7376
2487	0.06683604	0	1.071623	828.5851
2488	0	0	0.9482292	534.0065
2489	0.07272305	0	1.078426	803.0842
2490	0.0535841	0	1.056618	647.1511
2491	0.005023931	0	1.005049	582.0711
2492	0	0	0.9268942	870.7871
2493	0.02021365	0	1.020631	600.0584
2494	0	0	0.8744293	636.6115
2495	0	0	0.950357	693.5778
2496	0	0	0.9271505	856.6204
2497	0.05386338	0	1.05693	809.1595
2498	0	0	0.8480754	463.4791
2499	0	0	0.9029926	475.8138
2500	0	0	0.9918757	886.6318
2501	0.02097547	0	1.021425	794.7084
2502	0	0	0.8876864	583.2394
2503	0.00E+00	0	0.7987134	867.2392
2504	0	0	0.8366377	683.1152
2505	0	0.0343075	0.8198718	1035.526
2506	0	0	0.8225399	836.8647
2507	0	0	0.9040632	766.4998
2508	0	0	0.9225408	680.1249
2509	0	0	0.9804634	809.7585
2510	0	0	0.8556542	715.2781
2511	0	0	0.9908942	811.1995
2512	0	0	0.8895394	916.9386
2513	0	0	0.9414881	377.8938
2514	0	0	0.9508189	985.2349
2515	0	0	0.8611078	581.7295
2516	0	0	0.9678724	558.4017
2517	0	0	0.9061044	393.2677
2518	0	0	0.8761974	601.063
2519	0	0	0.9517142	604.7852
2520	0.01262589	0	1.012787	432.269
2521	0	0	0.9570112	579.4945
2522	0	0	0.9132911	805.2655
2523	0	0	0.8317674	883.8464
2524	0	0	0.9432745	732.7021
2525	0	0	0.9543261	991.2955
2526	0	0	0.9463695	539.6741
2527	0	0	0.9868635	519.8775
2528	0	0	0.825767	774.6989
2529	0.02913053	0	1.030005	906.722
2530	0	0.03878362	0.9707822	1040.349
2531	0.01167717	0	1.011815	855.0908
2532	0	0	0.8736985	453.0107
2533	0	0	0.8822882	891.3262
2534	0	0	0.9060444	663.6819
2535	0	0	0.9172674	705.558
2536	0	0	0.8898491	898.4878
2537	0.03084724	0	1.031829	831.7671
2538	0	0.01249277	0.8857252	1012.651
2539	0	0	0.8746387	794.4232
2540	0.06067512	0	1.064594	763.6724
2541	0	0	0.8427992	771.515
2542	0	0	0.9487031	747.1308
2543	0	0	0.9104469	656.533
2544	0.01682513	0	1.017113	771.1546
2545	0	0	0.82911	704.8372
2546	0.04245027	0	1.044332	874.4794
2547	0	0	0.9759093	533.427
2548	0.05569923	0.02892017	1.058985	1029.781
2549	0	0	0.9979889	882.7505
2550	0	0	0.9691669	666.0941
2551	0	0	0.9214637	680.2333

2552	0.06972926	0	1.074956	929.9016
2553	0	0	0.8419286	977.4245
2554	0	0	0.955591	992.0928
2555	0	0	0.9129667	696.8453
2556	0	0	0.8136855	698.5962
2557	0.05204651	0	1.054904	716.0121
2558	0.01496376	0	1.015191	883.0477
2559	0	0	0.9195186	826.915
2560	0.02383368	0	1.024416	572.2158
2561	0	0	0.9532643	667.7401
2562	0.00015867	0	1.000159	966.5293
2563	0	0	0.9445572	994.7015
2564	0	0	0.9914595	651.3647
2565	0.03641122	0	1.037787	982.5405
2566	0	0	0.858151	612.127
2567	0	0	0.9049305	828.3119
2568	0	0	0.9608845	750.1961
2569	0	0	0.9595817	765.622
2570	0	0	0.9401343	806.9684
2571	0	0	0.9015376	755.8422
2572	0	0	0.9535025	809.6102
2573	0	0	0.9033533	805.5375
2574	0	0.05715553	0.9127403	1060.62
2575	0	0	0.9430862	819.0916
2576	0	0	0.8511839	791.8603
2577	0	0	0.932285	880.7953
2578	0	0	0.9053661	696.9752
2579	0	0	0.9656654	778.1134
2580	0	0	0.9200937	703.7351
2581	0	0	0.9236634	715.295
2582	0.04638282	0	1.048639	911.6769
2583	0	0	0.8775952	833.3309
2584	0.03318487	0	1.034324	654.7823
2585	0	0	0.9555568	633.3015
2586	0	0	0.9318145	896.7628
2587	0	0	0.9746873	781.5848
2588	0	0	0.9031866	609.4437
2589	0	0	0.947838	822.0996
2590	0	0	0.9772553	682.0641
2591	0	0	0.9767214	909.3357
2592	0	0	0.9616423	658.2437
2593	0.01693621	0	1.017228	713.8088
2594	0	0	0.9994978	607.7067
2595	0	0	0.9278766	740.5944
2596	0	0	0.9768171	638.821
2597	0	0	0.8673819	656.4712
2598	0	0	0.8752618	773.9568
2599	0	0	0.82318	778.5731
2600	0	0	0.9321749	660.9001
2601	0	0	0.9415343	746.2855
2602	0	0	0.8277446	962.4575
2603	6.02E-02	0	1.064066	774.186
2604	0	0	0.8946667	838.4059
2605	0	0	0.9541206	994.8785
2606	0.01084212	0	1.010961	487.558
2607	0	0	0.8315929	523.9297
2608	0	0	0.9965979	502.5612
2609	0	0	0.9906107	483.8352
2610	0	0	0.9602513	661.4324
2611	0	0	0.9085853	742.0003
2612	0.01479397	0	1.015016	760.3011
2613	0	0	0.9244821	439.9214
2614	0	0	0.9619493	723.2805
2615	0	0	0.8998503	489.6034
2616	0	0	0.9441144	733.8517
2617	0.007182427	0	1.007234	749.9109
2618	0	0	0.8323617	780.5301
2619	0	0	0.9074695	763.5681
2620	0	0	0.9760548	740.9623
2621	0	0	0.9402952	865.9201
2622	0.04284501	0	1.044763	714.4719
2623	0.07149573	0	1.077001	901.9158
2624	0	0	0.9402115	531.0294

2625	0	0	0.8970365	531.735
2626	0	0	0.8228928	796.9116
2627	0	0	0.8512009	996.9634
2628	0	0	0.8394099	937.7388
2629	0	0	0.8642085	950.6451
2630	0	0	0.9576073	690.7657
2631	0	0	0.9398844	684.4711
2632	0	0	0.9066697	810.0103
2633	0	0	0.9589257	837.1201
2634	0	0	0.8770988	681.0078
2635	0	0	0.8526084	580.5405
2636	0	0	0.9584414	799.677
2637	0	0	0.8564302	787.5845
2638	0	0	0.9467584	952.4982
2639	0	0	0.9454958	660.2167
2640	0.05833632	0	1.06195	968.0408
2641	0	0	0.9230526	712.0215
2642	0	0	0.941834	598.3296
2643	0	0	0.8361678	905.7635
2644	0	0	0.9041731	861.5813
2645	0	0	0.836357	500.7086
2646	0	0	0.9339831	794.0678
2647	0	0	0.9369574	538.813
2648	0.00E+00	0	0.8932616	405.3506
2649	0	0	0.9229156	876.7752
2650	0	0	0.9197842	420.4071
2651	0	0	0.9613403	793.8802
2652	0	0	0.8702632	740.076
2653	0	0	0.9100278	854.8384
2654	0	0	0.9427071	873.8503
2655	0.01892222	0	1.019287	601.9177
2656	0	0	0.9706935	624.8078
2657	0	0	0.9204939	476.1835
2658	0.04956448	0	1.052149	944.1667
2659	0	0	0.8990522	672.0883
2660	0	0	0.9497738	636.7648
2661	0	0	0.8093893	842.5939
2662	0.007877882	0	1.00794	562.8814
2663	0	0	0.8498544	699.2127
2664	0	0	0.9470209	485.7754
2665	0	0	0.9658507	650.5897
2666	0.01277155	0	1.012937	808.1761
2667	0	0	0.850625	644.0631
2668	0.002221225	0	1.002226	819.2411
2669	0.01483968	0	1.015063	657.9284
2670	0.03483174	0	1.036089	753.4068
2671	0	0	0.9529287	806.7004
2672	0	0.05009345	0.9510617	1052.735
2673	0	0	0.9710661	638.9873
2674	0	0	0.9079197	640.3254
2675	0.04080946	0	1.042546	454.0063
2676	0	0	0.9120725	576.4704
2677	0	0	0.9261407	493.1651
2678	0.006742684	0	1.006788	792.1647
2679	0	0	0.9374018	650.9629
2680	0.06764123	0	1.072549	698.2266
2681	0.05752487	0.01537371	1.061036	1015.614
2682	0	0	0.9091828	949.163
2683	0	0	0.980664	580.7994
2684	0	0	0.9461821	792.4406
2685	0	0	0.9022331	504.3177
2686	0	0	0.8459479	796.6097
2687	0	0	0.9189622	606.1258
2688	0	0	0.9374695	675.5937
2689	0	0	0.9928258	974.2424
2690	0	0	0.9615319	575.5027
2691	0	0	0.9617293	845.0068
2692	0	0	0.9144181	524.6843
2693	0	0	0.9849682	788.0645
2694	0.08081375	0	1.087919	948.0887
2695	0	0	0.8147868	931.9878
2696	0.005657129	0	1.005689	560.3184
2697	0	0	0.9103535	850.4951

2698	0	0	0.9657095	621.7001
2699	0	0	0.9698998	662.0473
2700	0.009372581	0	1.009461	581.4451
2701	0	0	0.9487368	814.9268
2702	0	0	0.9334631	546.5087
2703	0	0	0.9555121	574.1968
2704	0	0	0.9880198	604.2758
2705	0.04143554	0	1.043227	829.6669
2706	0	0	0.9121101	929.3389
2707	0	0	0.9294794	748.262
2708	0	0	0.8783494	888.2949
2709	0	0	0.9649194	590.6306
2710	0	0	0.9529393	478.8683
2711	0	0	0.8123757	679.5244
2712	0	0	0.8980551	662.1814
2713	0	0	0.8731124	749.9796
2714	0	0	0.9995135	969.0317
2715	0.001278536	0	1.00128	585.3682
2716	0	0	0.889876	616.6588
2717	0	0	0.8958479	444.5633
2718	0	0	0.9381781	812.528
2719	0	0	0.9780327	483.0262
2720	0	0	0.9427652	722.4268
2721	0	0	0.910119	741.9534
2722	0	0	0.9200502	976.63
2723	0	0	0.8697808	784.9114
2724	0	0	0.9504379	723.244
2725	0	0	0.8605729	834.2776
2726	0	0	0.9516202	803.4926
2727	0	0	0.924853	716.7884
2728	0	0	0.9449683	764.4988
2729	0.0266136	0	1.027341	729.668
2730	0	0	0.9813604	823.9176
2731	0	0	0.9488353	734.5133
2732	0	0	0.9000192	627.2654
2733	0	0	0.96108	690.8181
2734	0	0	0.8876117	675.1093
2735	0	0	0.9817451	843.2994
2736	0	0	0.9715225	801.9776
2737	0.04615101	0	1.048384	910.1995
2738	0.009572292	0	1.009665	905.5742
2739	0.05008385	0	1.052724	746.1587
2740	0	0	0.8413876	789.46
2741	0	0	0.8398495	785.9761
2742	0	0	0.9410802	495.8888
2743	0	0	0.9826324	639.7042
2744	0	0	0.9952052	977.2499
2745	0	0	0.8606792	883.5043
2746	0.01585234	0	1.016108	524.7726
2747	0	0	0.9952781	953.4848
2748	0.02265958	0	1.023185	866.6797
2749	0	0	0.8042105	701.8125
2750	0.004594492	0	1.004616	723.9756
2751	0	0	0.9496342	762.9097
2752	0	0	0.9782972	917.2528
2753	0	0	0.9668663	714.7915
2754	0.07300923	0	1.078759	721.3972
2755	0.02299838	0	1.02354	524.4339
2756	0	0	0.9858911	748.3434
2757	0	0	0.9652385	487.8748
2758	0	0	0.9722152	772.6562
2759	0	0	0.9428987	767.1016
2760	0	0	0.9484559	709.2076
2761	0	0	0.921039	578.9683
2762	0.05004817	0	1.052685	817.783
2763	0	0	0.8749138	545.0234
2764	0	0	0.883465	848.2656
2765	0	0	0.896477	723.7099
2766	0	0	0.9536366	671.0847
2767	0	0	0.9955654	899.6269
2768	0.03458406	0	1.035823	731.1255
2769	0	0.05531373	0.9356993	1058.552
2770	0	0	0.9654646	902.9722

2771	0	0	0.939117	540.4977
2772	0	0	0.9124157	659.3849
2773	0	0	0.9878054	959.28
2774	0.06009615	0	1.063939	558.451
2775	0	0	0.9714558	789.0861
2776	0	0	0.8984839	531.6599
2777	0	0	0.8993753	736.8459
2778	0	0	0.8301325	714.0659
2779	0	0	0.8627361	798.1166
2780	0	0	0.9523137	588.4694
2781	0	0	0.8316842	782.686
2782	0	0	0.9405451	549.3828
2783	0	0	0.8549262	842.7958
2784	0	0	0.9891629	692.4629
2785	0.02160422	0	1.022081	806.6458
2786	0	0	0.9657941	736.8497
2787	0	0	0.9994569	884.8488
2788	0.0390656	0	1.040654	698.4385
2789	0	0	0.9393814	885.6819
2790	0	0	0.8549367	727.6658
2791	0	0	0.9727956	721.8253
2792	0.04349652	0.05208328	1.045475	1054.945
2793	0	0	0.913232	768.0126
2794	0	0	0.9263346	701.8834
2795	0	0	0.9315062	417.1687
2796	0	0	0.8998595	733.5144
2797	0.07215211	0	1.077763	837.0412
2798	0	0	0.9434526	531.2216
2799	0	0	0.9506999	778.9218
2800	0	0	0.8064544	925.3759
2801	0	0	0.9751783	930.9866
2802	0	0	0.9550488	721.4016
2803	0	0	0.935502	582.2789
2804	0	0	0.9582582	623.2426
2805	0	0	0.8727164	788.2803
2806	0	0	0.9068418	770.5723
2807	0	0	0.9950001	528.7224
2808	0	0	0.925912	462.2955
2809	0	0	0.8712966	639.9912
2810	0	0	0.904541	678.0063
2811	0.01972271	0	1.02012	715.04
2812	0	0	0.976792	894.3389
2813	0.01331691	0.008414628	1.013497	1008.486
2814	0	0	0.9045989	563.2218
2815	0.06296197	0	1.067193	773.0416
2816	0	0	0.900796	800.5212
2817	0	0	0.9201582	872.3556
2818	0	0	0.8867946	722.5823
2819	0	0	0.8937384	753.1907
2820	0	0	0.8918534	932.9255
2821	0	0	0.9079151	457.9196
2822	0	0	0.9875563	435.8372
2823	0	0	0.9691704	984.8272
2824	0	0	0.8471658	691.3362
2825	0	0	0.9015631	432.5059
2826	0	0	0.9203108	667.0162
2827	0.03521231	0	1.036497	950.8043
2828	0	0	0.9694306	661.0134
2829	0	0	0.8676226	900.6328
2830	0.06594915	0	1.070606	512.8281
2831	0	0	0.8256429	913.1132
2832	0	0	0.9341966	801.6739
2833	0	0	0.9134647	536.8223
2834	0	0	0.922129	630.9639
2835	0	0	0.9271219	871.7907
2836	0	0.02704583	0.8918917	1027.798
2837	0	0	0.8624845	544.6779
2838	0	0	0.8619075	957.1486
2839	0.04208504	0	1.043934	971.0415
2840	0	0	0.9154977	672.1761
2841	0	0.02779452	0.8223589	1028.589
2842	0	0	0.9667707	591.0992
2843	0	0	0.9702908	528.6028

2844	0	0	0.9256664	758.5158
2845	0	0	0.8787454	618.9672
2846	0	0	0.8879617	956.3352
2847	0	0	0.9468285	694.8165
2848	0.005913575	0	1.005949	613.6019
2849	0.03280273	0	1.033915	577.0522
2850	0.01436076	0	1.01457	866.9883
2851	0	0	0.9396278	811.4639
2852	0	0	0.9777485	817.7348
2853	0	0	0.9142105	635.4455
2854	0	0	0.9086322	572.6921
2855	0	0	0.9759003	872.5052
2856	0	0	0.9413809	500.6007
2857	0.0357768	0	1.037104	917.3447
2858	0	0	0.9755804	484.0053
2859	0	0	0.8796092	774.9854
2860	0	0	0.9089594	596.3223
2861	0	0	0.9208908	564.2247
2862	0.05661402	0	1.060012	750.7023
2863	0	0	0.9478111	807.3556
2864	0	0	0.9340498	730.5151
2865	0	0	0.9629455	883.9425
2866	0	0	0.9704699	973.4842
2867	0	0	0.975083	543.0027
2868	0	0	0.9461478	627.7295
2869	0	0	0.9047558	557.3468
2870	0	0	0.9324347	759.014
2871	0	0	0.930277	458.749
2872	0.04747498	0	1.049841	585.4929
2873	0	0	0.9567226	429.4182
2874	0	0	0.9358016	785.8875
2875	0	0	0.9827762	875.1918
2876	0	0	0.9875219	653.6564
2877	0	0	0.8874478	506.3082
2878	0	0	0.8386427	932.2053
2879	0	0	0.8327455	668.9879
2880	0	0	0.9942701	702.9948
2881	0.02582382	0	1.026508	585.6323
2882	0	0	0.9275586	818.5622
2883	0	0	0.9720022	787.5444
2884	0.0424884	0	1.044374	645.0283
2885	0	0	0.9418564	932.4438
2886	0	0	0.8816695	461.8134
2887	0	0	0.942928	668.6592
2888	0	0.0223678	0.9306975	1022.88
2889	0	0	0.9213388	639.0166
2890	0	0	0.9688446	496.6153
2891	0	0	0.9394383	578.3201
2892	0	0	0.8468518	389.5992
2893	0	0	0.8429511	701.7358
2894	0	0	0.9849966	962.7712
2895	0	0	0.9613959	452.5048
2896	0	0	0.88875	603.1184
2897	0	0	0.8586121	679.3758
2898	0.01700646	0	1.017301	685.996
2899	0	0	0.9790573	494.9188
2900	0	0	0.9619257	998.554
2901	0	0	0.9068362	643.1727
2902	0	0	0.882606	681.9977
2903	0.01442806	0	1.014639	745.6463
2904	0	0	0.8086376	828.1673
2905	0.01319275	0	1.013369	847.0483
2906	0	0	0.9653437	539.126
2907	0.009413052	0	1.009503	416.6558
2908	0.06427098	0	1.068685	749.9167
2909	0	0	0.964346	735.3566
2910	0	0	0.9993735	406.8841
2911	0	0	0.9611961	766.3115
2912	0	0.00300323	0.9099056	1003.012
2913	0	0	0.99054	589.6118
2914	0	0	0.8798878	861.4008
2915	0	0	0.8699527	970.5797
2916	0	0	0.9049154	801.0142

2917	0	0	0.8929899	762.9974
2918	0	0	0.9526195	740.0433
2919	0	0	0.8810553	712.7767
2920	0	0	0.9365458	734.1374
2921	0	0	0.9137673	745.2425
2922	0	0	0.8971742	820.2172
2923	0	0	0.9637638	398.6876
2924	0	0	0.8489805	614.4537
2925	0	0	0.9679013	937.7217
2926	0.02807068	0	1.028881	492.5868
2927	0.01036855	0	1.010477	837.1498
2928	0	0	0.8176249	953.0182
2929	0	0	0.876886	809.6505
2930	0.07856797	0	1.085267	788.8279
2931	0	0	0.9549358	688.3918
2932	0	0	0.9148009	727.5145
2933	0.000658989	0	1.000659	648.2408
2934	0	0	0.995025	933.8983
2935	0.04460989	0	1.046693	878.2662
2936	0	0	0.9359939	833.9202
2937	0	0	0.923244	815.339
2938	0	0	0.9802188	825.2066
2939	0	0	0.8708823	891.748
2940	0	0	0.8812609	680.1133
2941	0	0	0.9684631	485.9639
2942	0.0475473	0	1.049921	736.1994
2943	0	0	0.8644445	830.7416
2944	0	0	0.9025772	852.033
2945	0	0	0.9869382	946.972
2946	0	0	0.9768537	786.1653
2947	0	0	0.9565627	668.8359
2948	0	0	0.8588961	811.8763
2949	0	0	0.9194848	772.1863
2950	0	0	0.9105894	733.3071
2951	0	0	0.8584251	844.8563
2952	0	0	0.9872498	810.9803
2953	0	0	0.9321814	760.7911
2954	0.003066607	0	1.003076	681.4197
2955	0.004559853	0	1.004581	523.1698
2956	0	0	0.9341463	615.5239
2957	0.03516055	0	1.036442	616.685
2958	0	0	0.9817346	670.8832
2959	0.03760076	0	1.03907	604.3685
2960	0	0	0.8886789	777.4476
2961	0	0	0.9538189	586.5596
2962	0	0	0.9485871	628.2457
2963	0	0	0.9700518	580.3522
2964	0.060036	0	1.063871	833.1812
2965	0	0	0.9116353	855.8107
2966	0	0	0.8350543	659.0302
2967	0	0	0.9550691	472.193
2968	0	0	0.9652356	964.7152
2969	0	0	0.9617685	691.9824
2970	0	0	0.8284819	766.2788
2971	0.01697115	0	1.017264	930.7045
2972	0	0	0.9833176	784.7971
2973	0	0	0.855196	748.1086
2974	0.008016825	0	1.008082	700.7947
2975	0	0	0.8401675	690.2896
2976	0	0	0.9680592	671.96
2977	0	0	0.8886431	752.7139
2978	0	0.01599403	0.9849963	1016.254
2979	0	0	0.8708917	486.3037
2980	0.05334422	0	1.05635	861.7867
2981	0	0	0.9958255	436.1186
2982	0	0	0.8448694	600.6921
2983	0	0	0.9247816	938.939
2984	0	0	0.9483137	858.4789
2985	0	0	0.902476	677.0192
2986	0	0	0.9270409	640.3232
2987	0	0	0.9563973	738.6251
2988	0	0	0.9523638	892.8569
2989	0	0.04889596	0.8426704	1051.41

2990	0	0	0.9369019	746.3051
2991	0	0	0.9628223	765.3641
2992	0.008688091	0	1.008764	581.129
2993	0	0	0.9530818	642.5021
2994	0.06455731	0	1.069013	883.4376
2995	0	0	0.9545408	790.0348
2996	0.02379178	0	1.024372	881.1418
2997	0	0	0.9164512	615.8839
2998	0	0	0.9464765	833.9464
2999	0	0	0.8478819	662.5374
3000	0	0	0.8029731	906.3957
3001	0	0	0.9226883	524.4509
3002	0.04799487	0	1.050415	637.5323
3003	0	0	0.9894952	714.1191
3004	0	0	0.9871707	715.6308
3005	0	0	0.9332271	941.5474
3006	0	0	0.8499314	923.2269
3007	0	0	0.8969489	723.457
3008	0	0	0.8713242	551.4862
3009	0.02219866	0	1.022703	743.5328
3010	0	0	0.9287584	655.2521
3011	0	0	0.9844546	475.4304
3012	0	0	0.9219856	790.1437
3013	0.03601846	0	1.037364	576.8795
3014	0	0	0.9572582	537.9225
3015	0	0	0.8601989	538.2282
3016	0	0	0.9014268	514.819
3017	0	0	0.8653728	561.436
3018	0	0	0.9479807	751.3051
3019	0.0430781	0	1.045017	547.6467
3020	0	0	0.8753672	809.8302
3021	0.05228034	0	1.055164	424.4369
3022	0	0	0.9000306	794.7589
3023	0	0	0.8620396	734.7523
3024	0.02163287	0	1.022111	611.4895
3025	0.008931322	0	1.009012	574.4965
3026	0	0	0.9918978	690.1608
3027	0	0	0.9938903	986.9974
3028	0.01126629	0	1.011395	947.3241
3029	0	0	0.8778913	608.1464
3030	0.04406796	0	1.046099	687.299
3031	0	0	0.9490024	776.5271
3032	0	0	0.9929568	466.8486
3033	4.14E-02	0	1.043163	696.7682
3034	0	0	0.8954803	695.6995
3035	0	0	0.82265	822.7847
3036	0	0	0.9729599	938.4307
3037	0	0	0.9432697	816.7188
3038	0	0	0.9077432	394.4946
3039	0.02571352	0	1.026392	843.6216
3040	0	0	0.9162407	708.0947
3041	0.04899297	0	1.051517	809.7831
3042	0	0	0.8810971	587.2969
3043	0	0	0.9543194	722.7316
3044	0	0	0.925658	607.0695
3045	0	0	0.9658411	813.4235
3046	0.02761498	0	1.028399	534.7113
3047	0	0	0.9749172	603.4656
3048	0	0	0.9194608	618.9261
3049	0	0	0.8815721	621.4907
3050	0	0	0.8941673	622.4614
3051	0	0	0.9179682	667.2172
3052	0.01026862	0	1.010375	703.4468
3053	0	0	0.9364816	552.2255
3054	0	0	0.9983055	756.4837
3055	0	0	0.9217734	640.0138
3056	0.01186992	0	1.012012	774.7347
3057	0	0	0.9937879	713.3445
3058	0	0	0.9856144	882.1877
3059	0	0	0.9222685	653.19
3060	0	0	0.8459731	736.6442
3061	0	0	0.8966738	804.829
3062	0	0.02468919	0.9446705	1025.314

3063	0	0	0.9560557	801.6774
3064	0.02299716	0	1.023538	614.2582
3065	0	0	0.9540232	673.4389
3066	0.06447756	0	1.068921	819.5492
3067	0	0	0.8525666	769.1451
3068	0.0169856	0	1.017279	818.549
3069	0	0	0.9320754	727.5086
3070	0	0	0.9912466	666.1379
3071	0.0164874	0	1.016764	621.0793
3072	0	0	0.9682995	903.1002
3073	0.02079351	0	1.021235	966.7231
3074	0	0	0.9830819	939.3309
3075	0	0.0554112	0.9747068	1058.662
3076	0	0	0.9230981	540.7704
3077	0	0	0.9784201	872.9986
3078	0	0	0.9221485	732.7057
3079	0	0	0.919576	829.7151
3080	0	0	0.9046667	542.4815
3081	0	0	0.8752882	980.3926
3082	0	0	0.9497648	708.4971
3083	0	0	0.9928117	540.4536
3084	0.006321816	0.01212788	1.006362	1012.277
3085	0.05363844	0	1.056679	878.2973
3086	0	0	0.9607752	873.1243
3087	0.01383203	0	1.014026	678.0858
3088	0	0	0.9134328	977.614
3089	0	0	0.9081044	699.143
3090	0	0.03783323	0.9131075	1039.321
3091	0.02465303	0	1.025276	881.727
3092	0	0	0.853541	841.4062
3093	0	0	0.955535	769.7111
3094	0	0	0.8491641	742.8337
3095	0.05035764	0	1.053028	998.6352
3096	0	0	0.9754229	916.5988
3097	0	0	0.925115	765.6594
3098	0	0	0.9702467	963.7631
3099	0	0	0.8188884	724.8356
3100	0	0	0.9653337	806.5041
3101	0	0	0.9649359	711.1957
3102	0	0	0.9760248	824.114
3103	0	0	0.8955342	888.7908
3104	0	0	0.9866955	771.2302
3105	0.04554842	0	1.047722	518.3804
3106	0	0	0.9730971	879.4486
3107	0	0	0.8787099	684.1913
3108	0	0	0.9049514	687.6068
3109	0	0	0.8454331	750.7913
3110	0	0	0.9395646	765.233
3111	0.05218901	0	1.055063	634.9103
3112	0	0	0.8887591	550.004
3113	0	0	0.8872209	733.1643
3114	0	0	0.9776448	907.7823
3115	0	0	0.98356	398.398
3116	0	0	0.9773936	815.6268
3117	0	0	0.8370006	597.2894
3118	0	0	0.8793774	725.1043
3119	0	0	0.9607919	729.7444
3120	0	0	0.9158275	807.9985
3121	0	0	0.9406068	414.2244
3122	0	0	0.9451172	721.925
3123	0.03816509	0	1.039679	802.4019
3124	0	0	0.9271631	747.7305
3125	0	0	0.9882467	907.586
3126	0.001677145	0	1.00168	851.5705
3127	0.05930273	0	1.063041	425.4994
3128	0	0	0.9934573	941.9943
3129	0	0	0.9760848	698.3266
3130	0	0	0.9752174	591.3392
3131	0	0	0.8135256	826.436
3132	0	0	0.9922474	469.054
3133	0	0	0.9206737	961.2563
3134	0.02421745	0	1.024819	587.3857
3135	0	0	0.9398164	723.3899

3136	0	0	0.8791252	823.9642
3137	0.01581187	0	1.016066	592.447
3138	0	0	0.9410468	804.9923
3139	0	0	0.87673	971.9784
3140	0	0	0.9895839	642.4852
3141	0	0	0.8854848	851.22
3142	0	0	0.915545	728.1473
3143	0	0.03264342	0.9794083	1033.745
3144	0	0	0.9360731	787.5583
3145	0	0	0.8698239	537.7723
3146	0	0.02128001	0.9645731	1021.743
3147	0	0	0.8940968	539.0816
3148	0.01310545	0	1.013279	769.2585
3149	0	0	0.9659442	637.0535
3150	0	0	0.8893993	871.6764
3151	0	0.01937055	0.9273037	1019.753
3152	0	0	0.8670769	530.3995
3153	0	0	0.9595877	991.8661
3154	0	0	0.9770454	648.7515
3155	0	0.02888528	0.891962	1029.745
3156	0.06064024	0	1.064555	541.6835
3157	0	0	0.8434867	755.4282
3158	0	0	0.8636247	809.173
3159	0.005601445	0	1.005633	928.9471
3160	0	0	0.8560652	568.3677
3161	0	0	0.9545095	508.976
3162	0	0	0.9055158	499.7832
3163	0	0	0.9166377	724.8975
3164	0	0	0.8481621	495.0707
3165	0	0	0.8580697	924.1287
3166	0	0	0.901601	579.3771
3167	0.00E+00	0	0.8491881	579.005
3168	0.003177111	0	1.003187	780.0839
3169	0	0	0.9348644	776.5093
3170	0.02167992	0	1.02216	781.517
3171	0.01012887	0	1.010233	862.6385
3172	0	0	0.8216271	642.4019
3173	0	0	0.9322823	486.8375
3174	0.01101282	0	1.011135	748.3751
3175	0	0	0.9038246	829.9202
3176	0	0	0.8898793	852.1265
3177	0	0	0.9836383	827.8231
3178	0	0	0.9841108	459.8576
3179	0	0	0.8275632	607.4797
3180	0	0	0.8766775	727.3722
3181	0.01931367	0.002082012	1.019694	1002.086
3182	0	0	0.863017	483.8
3183	0	0	0.9069196	698.0294
3184	0	0	0.9526224	804.3693
3185	0	0	0.9047096	399.6485
3186	0	0	0.844803	752.8734
3187	0.02512452	0	1.025772	508.2487
3188	0.02045897	0	1.020886	652.3992
3189	0	0	0.919593	878.296
3190	0	0	0.9941735	620.1245
3191	0	0	0.8302254	538.882
3192	0	0	0.9873137	758.3583
3193	0	0	0.911357	549.7075
3194	0	0	0.8440199	599.7131
3195	0	0	0.9187483	791.377
3196	0	0	0.849223	544.2129
3197	0	0	0.9213419	704.0599
3198	0	0	0.987518	652.9893
3199	0	0	0.9292871	838.9271
3200	0	0	0.8844137	816.3718
3201	0	0	0.8882899	766.1548
3202	0.05907464	0	1.062784	764.3505
3203	0	0	0.9896932	569.3891
3204	0.08311037	0	1.090644	780.8873
3205	0	0	0.9854322	764.0383
3206	0	0	0.8776615	734.5513
3207	0	0	0.8746666	680.2238
3208	2.84E-02	0	1.029217	463.7751

3209	0	0	0.9786429	704.3957
3210	0.00E+00	0	0.9760938	862.694
3211	0	0	0.9061967	740.1142
3212	0.006638562	0	1.006683	885.7975
3213	0	0	0.9217362	801.334
3214	0	0	0.8611635	718.8859
3215	0	0	0.9551958	825.2878
3216	0.00884845	0	1.008927	616.9807
3217	0	0	0.9477434	840.6442
3218	0.04993967	0	1.052565	624.6351
3219	0	0	0.9332474	793.271
3220	0	0	0.8955771	811.2247
3221	0	0	0.9470594	909.9331
3222	0.06148828	0	1.065517	628.8499
3223	0.01195254	0	1.012097	872.6115
3224	0	0	0.9637572	615.4446
3225	0.04873106	0	1.051227	802.6202
3226	0	0	0.9703789	630.8617
3227	0	0	0.8739905	799.9231
3228	0	0	0.9945022	974.8198
3229	0	0	0.8495232	707.7841
3230	0	0	0.8888519	820.0355
3231	0	0	0.8890847	517.388
3232	0	0	0.921252	646.9197
3233	0	0	0.7953762	896.3394
3234	0	0	0.9283543	929.2112
3235	0	0	0.887289	662.6411
3236	0.006857113	0	1.006904	793.3709
3237	0.01454783	0	1.014763	423.6383
3238	0.0230319	0	1.023575	697.1738
3239	0	0	0.9780956	770.3325
3240	0.03301022	0	1.034137	908.81
3241	0	0	0.9282007	946.8123
3242	0	0	0.9489931	685.9404
3243	0	0	0.8304431	721.0004
3244	0	0	0.9287214	740.1088
3245	0	0	0.9001535	794.9716
3246	0	0	0.902131	486.2152
3247	0	0	0.9453986	523.6663
3248	0	0	0.8407265	756.5725
3249	0	0	0.930811	729.7278
3250	0.04334882	0	1.045313	752.0956
3251	0	0	0.9520957	614.2296
3252	0	0	0.9951493	831.9224
3253	0.01994452	0	1.02035	457.0394
3254	0	0	0.8747665	629.6234
3255	0.03417553	0	1.035385	797.6567
3256	0	0	0.8346828	617.6362
3257	0	0	0.9395609	695.0999
3258	0.008246005	0	1.008315	564.2183
3259	0.001006639	0	1.001008	536.6955
3260	0.001989142	0	1.001993	855.6484
3261	0	0	0.942789	729.4909
3262	0	0	0.9278062	886.1852
3263	0	0	0.8645105	995.2163
3264	0	0	0.8976927	509.1646
3265	0	0	0.9524736	873.3494
3266	0	0	0.9381014	774.2204
3267	0.05244851	0	1.055352	440.1425
3268	0.02277303	0	1.023304	797.7401
3269	0.03726723	0.03462615	1.03871	1035.868
3270	0	0	0.9706587	681.5344
3271	0	0	0.9866703	951.0801
3272	0.01874359	0	1.019102	773.4802
3273	0	0	0.9560667	837.2805
3274	0	0	0.9797061	700.5491
3275	0	0	0.9380492	743.8697
3276	0	0.01317363	0.9016126	1013.349
3277	0	0	0.8151606	765.9375
3278	0	0	0.9964128	657.8432
3279	0	0	0.9980195	738.3051
3280	0	0	0.8759612	529.4492
3281	0	0	0.9180346	915.1605

3282	0	0	0.8194784	847.9612
3283	0	0.03835701	0.9460746	1039.887
3284	0	0	0.9523093	702.2641
3285	0	0	0.9579113	817.5907
3286	0	0	0.9306003	691.7439
3287	0	0	0.9160482	626.7623
3288	0	0	0.8975472	877.4005
3289	0.008224883	0	1.008293	922.9849
3290	0	0	0.8848248	504.8216
3291	0	0	0.9088559	764.4848
3292	0	0	0.9728712	558.534
3293	0	0	0.9048041	796.2331
3294	0	0	0.8014255	803.8837
3295	0	0.002755489	0.8785538	1002.763
3296	0	0	0.9356676	710.731
3297	0.001216424	0	1.001218	600.9265
3298	0	0	0.9469293	623.1937
3299	0	0	0.9066136	720.4437
3300	0	0	0.9468451	468.4184
3301	0	0	0.9611138	801.3964
3302	0	0	0.9199815	778.5851
3303	0	0	0.9763866	903.8044
3304	0.04091272	0	1.042658	543.3232
3305	0	0	0.8380266	668.576
3306	0	0	0.9483237	522.7607
3307	0.04340287	0	1.045372	871.5161
3308	0	0	0.9351908	813.3577
3309	0.0618668	0	1.065947	552.9938
3310	0	0	0.941386	845.2714
3311	0	0	0.873432	457.2558
3312	0	0	0.8883103	731.8162
3313	0.002692735	0	1.0027	931.7439
3314	0.03164833	0	1.032683	854.9127
3315	0	0	0.8726345	716.9649
3316	0.0527097	0	1.055643	545.3578
3317	0	0	0.8246047	721.6096
3318	0	0	0.8481611	523.7299
3319	0	0	0.8886122	722.0183
3320	0	0	0.8946716	989.6259
3321	0	0	0.9815144	559.7014
3322	0	0	0.9437912	615.1734
3323	0	0	0.9110253	552.5488
3324	0	0	0.8092382	962.1924
3325	0	0	0.936611	926.6786
3326	0	0	0.9562099	824.3405
3327	0.02898367	0	1.029849	873.0313
3328	0	0	0.9838384	687.0764
3329	0	0	0.9615365	544.098
3330	0.000545441	0	1.000546	626.847
3331	0.03539911	0	1.036698	597.2516
3332	0	0.006941752	0.8654346	1006.99
3333	0	0	0.9260404	935.4098
3334	0	0	0.9144139	641.0467
3335	0	0	0.9285069	866.6973
3336	0	0	0.8673804	730.7619
3337	0	0	0.9140834	511.8941
3338	0	0	0.9389623	836.0095
3339	0	0	0.962892	660.3971
3340	0	0	0.8836238	869.5384
3341	0	0	0.8841556	803.5403
3342	0	0	0.9744522	788.0999
3343	0	0	0.8892789	966.8163
3344	0	0.03333882	0.9215406	1034.489
3345	0	0	0.9817485	543.2585
3346	0	0	0.8769907	854.1559
3347	0	0	0.9546481	689.5656
3348	0	0	0.8188861	823.2008
3349	0.03466447	0	1.035909	779.1599
3350	0	0	0.9740549	831.9615
3351	0	0.01459432	0.9152496	1014.81
3352	0	0	0.982547	593.9706
3353	0	0	0.951713	843.4786
3354	0	0	0.873453	948.9612

3355	0	0	0.8842767	987.4388
3356	0	0	0.9925959	826.9402
3357	0	0	0.9527078	722.9332
3358	0	0	0.8364344	417.4523
3359	0	0	0.9306488	737.0042
3360	0.02615403	0	1.026856	688.6258
3361	0	0	0.9236519	840.0486
3362	0	0	0.8709342	759.8434
3363	0	0	0.8822174	700.0992
3364	0	0	0.9229112	955.0165
3365	0	0	0.8899027	750.4725
3366	0	0	0.8837781	744.4623
3367	0	0	0.9659569	789.2813
3368	0.03770375	0	1.039181	710.9576
3369	0	0	0.8592225	812.5642
3370	0.0281147	0	1.028928	794.1082
3371	0	0	0.9571554	804.341
3372	0	0	0.895181	998.5276
3373	0	0	0.9307646	979.3281
3374	0	0	0.90174	758.856
3375	0	0	0.9525571	556.912
3376	0	0	0.9016942	519.7156
3377	0	0	0.9504328	673.789
3378	0.000471162	0	1.000471	551.0408
3379	0	0	0.9563586	800.1831
3380	0.01253859	0	1.012698	629.4352
3381	0.007402298	0	1.007457	887.3528
3382	0	0	0.8450011	723.2661
3383	0	0	0.8767961	729.6022
3384	0	0	0.900008	859.5081
3385	0	0	0.9609557	766.8155
3386	0	0	0.9018968	717.4407
3387	0.01386976	0	1.014065	634.9791
3388	0	0	0.9447269	862.6694
3389	0	0	0.836786	425.2253
3390	0	0	0.9664025	408.2534
3391	0	0	0.9210382	730.0229
3392	0	0	0.982906	532.6063
3393	0	0	0.9837083	677.7397
3394	0	0	0.959296	811.447
3395	0	0	0.9087556	548.3192
3396	0	0	0.9371351	550.8651
3397	0	0	0.845585	730.3506
3398	0	0	0.9327539	702.115
3399	0	0	0.8659082	648.3012
3400	0	0	0.9375133	703.4856
3401	0	0	0.9500329	690.7593
3402	0	0	0.9464597	624.6192
3403	0	0	0.986533	476.4099
3404	0	0	0.9691798	568.1273
3405	0	0	0.9305329	575.8831
3406	0	0	0.854866	523.4534
3407	0.05791035	0	1.06147	708.8527
3408	0	0	0.9267908	817.1511
3409	0	0	0.9318391	656.5405
3410	0	0	0.8504966	782.6199
3411	0	0	0.9748005	897.3956
3412	0	0	0.8733323	875.4234
3413	0.04242061	0	1.0443	595.0566
3414	0	0	0.9936029	410.4787
3415	0	0	0.8468201	863.2057
3416	0	0	0.9232355	667.3495
3417	0	0	0.9606269	914.0803
3418	0	0	0.9310194	742.3531
3419	0	0	0.8708183	940.9765
3420	0.06342969	0	1.067726	392.1736
3421	0	0	0.9062669	690.766
3422	0	0	0.8388271	980.9875
3423	0	0	0.9379486	706.3291
3424	0	0	0.9211223	780.1716
3425	0	0	0.9437658	904.6538
3426	0	0	0.9508716	697.813
3427	0	0	0.9222149	656.6811

3428	0	0	0.8277515	535.8961
3429	0	0	0.9716881	790.2153
3430	0	0.01101101	0.9670716	1011.134
3431	0	0	0.8199492	874.6031
3432	0	0	0.8851379	785.0911
3433	0.005051974	0	1.005078	422.0795
3434	0	0	0.927801	554.9117
3435	0	0	0.9010208	740.8798
3436	0.05397338	0	1.057053	841.0229
3437	0	0	0.8730047	749.2795
3438	0	0	0.9136222	793.0474
3439	0	0	0.9381948	671.8766
3440	0	0	0.8800813	462.5777
3441	0	0	0.919706	639.1583
3442	0	0	0.8798254	857.2942
3443	0	0	0.9149595	621.8385
3444	0	0	0.9780498	824.996
3445	0	0	0.9844761	761.3716
3446	0	0	0.9477131	637.4473
3447	0	0	0.9895416	769.9621
3448	0	0	0.9349901	606.3407
3449	0.004216275	0	1.004234	825.092
3450	0	0	0.8660085	687.0662
3451	0	0	0.8810745	529.7777
3452	0	0	0.9793154	657.9431
3453	0	0	0.846527	601.4166
3454	0	0	0.8754098	834.6322
3455	0	0	0.9981837	541.1772
3456	0.05446429	0	1.057602	648.2487
3457	0	0	0.9001234	505.3891
3458	0	0	0.9104938	671.614
3459	0.02820653	0	1.029025	696.5852
3460	0	0.003633942	0.9569954	1003.647
3461	0	0	0.91514	515.0646
3462	0	0	0.9304579	402.7757
3463	0	0	0.9591486	568.3984
3464	0.0165542	0	1.016833	784.1717
3465	0	0	0.9601629	960.604
3466	0	0	0.8885741	756.161
3467	0	0	0.8998293	666.1624
3468	0	0	0.9139541	905.8222
3469	0	0	0.9509065	636.3648
3470	0.04656285	0	1.048837	871.5854
3471	0.01032445	0	1.010432	940.0029
3472	0	0	0.8112983	821.3237
3473	0.04982224	0	1.052435	783.7766
3474	0	0	0.8866822	733.9741
3475	0	0	0.9669287	764.2626
3476	0.021222	0	1.021682	862.1917
3477	0.001244308	0	1.001246	911.5879
3478	0.0295332	0	1.030432	747.9924
3479	0	0	0.8486057	882.0992
3480	0.02655898	0	1.027284	880.7089
3481	0	0	0.8904555	857.3654
3482	0.00E+00	0	0.8805393	664.5706
3483	0	0	0.9400246	909.6815
3484	0	0	0.8454899	618.827
3485	0	0	0.9287261	773.706
3486	0	0	0.8925847	857.3839
3487	0	0	0.9175003	649.4847
3488	0	0	0.8908657	849.69
3489	0	0	0.8899915	711.0175
3490	0	0	0.9008522	901.3436
3491	0	0	0.9558604	838.7724
3492	0	0	0.8358313	449.8258
3493	0	0	0.9216384	864.9182
3494	0	0	0.880469	904.0453
3495	0	0	0.9284639	682.1434
3496	0	0	0.8910534	509.4593
3497	0	0	0.9310361	950.5034
3498	0	0	0.9784277	568.7766
3499	0	0	0.9255489	740.1757
3500	0	0	0.9331437	614.3839

3501	0	0	0.9108904	730.3981
3502	0	0	0.916934	662.8857
3503	0	0	0.8953087	912.0071
3504	0.009985721	0	1.010086	891.1072
3505	0	0.05016747	0.8852817	1052.817
3506	0	0	0.9724379	461.3233
3507	0	0	0.933817	808.295
3508	0	0	0.957496	870.1512
3509	0.03782941	0	1.039317	641.3277
3510	0	0	0.8831099	428.971
3511	0.0175232	0	1.017836	966.5337
3512	0	0	0.8849896	881.4344
3513	0	0	0.9427792	928.8615
3514	0.05773186	0	1.061269	919.0361
3515	0	0	0.9521692	715.5204
3516	0	0	0.9646427	676.9902
3517	0	0	0.9744713	603.914
3518	0	0	0.8572339	607.8593
3519	0	0	0.9606957	910.7703
3520	0	0	0.8941566	613.4146
3521	0.04488659	0	1.046996	505.6374
3522	0	0	0.8874853	568.6041
3523	0	0	0.8924355	714.478
3524	0	0	0.9872391	683.6832
3525	0.00E+00	0	0.9740432	735.3326
3526	0	0	0.954623	867.1187
3527	0	0	0.9776136	947.6926
3528	0.02464554	0	1.025268	492.3975
3529	0	0	0.9724607	520.1863
3530	0	0	0.9976442	539.5448
3531	0	0	0.8995187	672.9199
3532	0	0	0.9944434	767.9205
3533	0	0	0.856795	540.4469
3534	0	0	0.9442997	731.6949
3535	0	0.005317806	0.9602761	1005.346
3536	0	0	0.9531953	593.2787
3537	0	0	0.9187871	694.136
3538	0	0	0.9250051	680.1695
3539	0	0	0.8727037	966.4512
3540	0	0	0.8161952	549.4347
3541	0	0	0.8937478	689.4186
3542	0	0	0.9760618	897.1226
3543	0	0	0.8647721	589.3221
3544	0	0	0.9364038	436.0849
3545	0	0	0.8685778	750.8096
3546	0	0	0.9249207	763.0577
3547	0	0	0.9681024	778.2877
3548	0	0	0.9484974	455.495
3549	0.004468284	0	1.004488	742.1092
3550	0	0	0.85208	877.51
3551	0	0	0.8972865	637.5216
3552	0	0	0.9452538	771.1644
3553	0	0	0.9584346	635.0914
3554	0	0	0.8973385	813.9535
3555	0.04595955	0	1.048174	729.3369
3556	0	0	0.9691892	904.2482
3557	0.06853256	0	1.073575	532.2328
3558	0.06297055	0	1.067202	592.3676
3559	0.05425297	0	1.057365	777.9534
3560	0	0	0.9601297	829.772
3561	0	0	0.9791147	751.5291
3562	0.02679872	0	1.027537	798.233
3563	0.05121303	0	1.053977	654.3912
3564	0.03168818	0	1.032725	970.7255
3565	0	0	0.9996874	503.1492
3566	0	0	0.9798608	799.4759
3567	0	0	0.8838301	785.7612
3568	0	0	0.9908227	564.4971
3569	0.02034384	0	1.020766	543.6629
3570	0	0	0.8907166	724.5274
3571	0	0	0.8420656	726.5593
3572	0.05521591	0	1.058443	815.344
3573	0.02725964	0	1.028024	755.8

3574	0	0	0.9870498	815.0413
3575	0	0	0.8497862	658.2592
3576	0	0	0.9663541	759.4051
3577	0	0	0.8302416	830.3566
3578	0	0	0.9578322	693.6465
3579	0	0	0.9328732	766.5582
3580	0	0	0.9484602	671.2271
3581	0.01110475	0	1.011229	715.9722
3582	0	0	0.9077269	837.7044
3583	0.004124841	0	1.004142	711.6721
3584	0	0	0.8721672	962.553
3585	0	0	0.9104066	697.4565
3586	0.02654888	0	1.027273	633.1049
3587	0	0	0.9728274	784.1108
3588	0.04049763	0	1.042207	426.7406
3589	0	0	0.9680237	986.2846
3590	0	0	0.9872348	723.8174
3591	0	0	0.9479104	674.0831
3592	0	0	0.9528077	749.4086
3593	0.01162931	0	1.011766	660.0098
3594	0	0	0.920487	973.816
3595	0	0	0.9178784	826.413
3596	0.06383137	0	1.068184	872.6839
3597	0	0	0.8842041	712.2277
3598	0	0	0.9617143	968.2756
3599	0	0	0.8364267	698.1469
3600	0	0	0.9683406	978.1631
3601	0	0	0.8480494	962.2176
3602	0	0	0.9592757	623.0338
3603	0	0	0.843821	818.6701
3604	0	0	0.8855142	506.791
3605	0	0	0.9559672	814.548
3606	0	0	0.8979216	781.624
3607	0	0	0.81422	808.5178
3608	0	0	0.9425856	814.146
3609	0	0	0.956038	683.8859
3610	0.01491606	0	1.015142	668.9539
3611	0.02680839	0	1.027547	687.5692
3612	0	0	0.9963668	590.3188
3613	0	0	0.8879929	677.1889
3614	0	0	0.8395469	784.5264
3615	0.05017076	0	1.052821	975.994
3616	0	0	0.9942001	897.5733
3617	0.03526882	0	1.036558	957.8766
3618	0	0	0.8649061	530.3773
3619	0	0	0.9515008	877.8566
3620	0.01285526	0	1.013023	889.5392
3621	0	0	0.9246932	712.9814
3622	0.02378207	0	1.024361	409.1609
3623	0.03864513	0	1.040199	976.9421
3624	0	0	0.9754444	856.5972
3625	0	0	0.9885051	873.84
3626	0	0	0.9226814	992.9202
3627	0.07994121	0	1.086887	525.8276
3628	0	0	0.8799093	853.9545
3629	0	0	0.9166389	557.8102
3630	0	0	0.9610952	724.2327
3631	0	0	0.9503543	615.4352
3632	0.01881312	0	1.019174	668.6064
3633	0	0	0.90081	538.5489
3634	0.005136994	0	1.005164	615.3862
3635	0	0	0.9972262	495.2116
3636	0	0	0.9809951	809.574
3637	0	0	0.9624109	836.1885
3638	0	0	0.8246067	920.9902
3639	0	0	0.8865464	859.7283
3640	0	0.04683508	0.8875911	1049.136
3641	0	0	0.9112881	492.5743
3642	0	0	0.9196352	754.1354
3643	0	0	0.9142965	820.1268
3644	0	0	0.8466837	699.3637
3645	0.01397675	0	1.014175	865.1646
3646	0	0	0.8140386	915.9842

3647	0	0	0.8450959	721.3698
3648	0	0	0.9904703	562.7845
3649	0	0	0.9288145	779.0989
3650	0.03810271	0.04731487	1.039612	1049.665
3651	0	0	0.9604194	552.4064
3652	0	0	0.9648804	804.2092
3653	0.00E+00	0	0.9714233	802.5014
3654	0	0	0.989725	863.6201
3655	0	0	0.9390314	637.1348
3656	0	0	0.8489621	834.789
3657	0	0	0.9682795	740.6461
3658	0	0	0.8936096	819.5386
3659	0	0	0.9066803	487.7197
3660	0	0	0.921948	819.772
3661	0.01066004	0	1.010775	779.632
3662	0	0	0.8717459	874.8559
3663	0	0	0.8598332	788.3058
3664	0	0	0.8691552	440.2375
3665	0	0	0.8956042	952.5522
3666	0	0	0.8376069	609.3142
3667	0	0	0.9497995	943.8375
3668	0.07085831	0	1.076262	711.0406
3669	0.03901403	0	1.040598	849.6793
3670	0	0	0.9441959	781.4587
3671	0	0	0.8711923	630.8658
3672	0	0	0.9356069	669.8495
3673	0	0	0.8375782	606.1841
3674	0	0	0.9175927	591.3108
3675	0	0	0.8365228	696.9584
3676	0	0	0.9444943	825.6224
3677	0	0	0.9927913	720.5468
3678	0	0	0.8536516	811.4722
3679	0	0	0.8759997	801.6214
3680	0	0	0.9784243	577.6608
3681	0.02180818	0	1.022294	914.9064
3682	0	0	0.9979724	539.7167
3683	0	0	0.9631971	594.0313
3684	0	0	0.8553791	822.4369
3685	0	0	0.9740603	699.3968
3686	0	0	0.9834408	456.9666
3687	0	0	0.9745477	906.8341
3688	0	0	0.8695383	781.5179
3689	0	0	0.843303	673.8582
3690	0	0	0.9553213	706.6019
3691	0.01964469	0	1.020038	700.2485
3692	0	0	0.895802	991.3084
3693	0	0	0.9196247	671.0447
3694	0	0	0.8697755	959.911
3695	0.01216823	0	1.012318	662.9681
3696	0	0	0.9773648	630.7742
3697	0.05457862	0	1.057729	731.6692
3698	0	0	0.952663	715.9856
3699	0	0	0.9754015	632.2957
3700	0	0	0.8545203	867.9655
3701	0	0	0.8699322	806.0735
3702	0.0149092	0	1.015135	930.2925
3703	0.01838472	0	1.018729	777.0593
3704	0	0	0.8979909	742.7831
3705	0	0	0.9197549	694.6326
3706	0	0	0.9523471	565.988
3707	0	0	0.915833	875.0231
3708	0	0	0.8862931	701.9595
3709	0	0	0.8752868	678.0118
3710	0	0	0.9700493	656.7298
3711	0	0	0.837057	666.7034
3712	0	0	0.9166793	638.303
3713	0.02923026	0.02245469	1.03011	1022.97
3714	0	0	0.8200073	873.3491
3715	0	0	0.994948	481.1585
3716	0	0	0.8646376	766.168
3717	0	0	0.8552469	789.0702
3718	0.02244745	0	1.022963	696.3759
3719	0	0	0.9669052	477.1264

3720	0	0	0.8774465	866.4963
3721	0	0.02220373	0.9975576	1022.708
3722	0	0	0.9770056	870.4635
3723	0	0	0.8926283	728.7106
3724	0	0	0.8809023	693.7228
3725	0	0.0223268	0.9554536	1022.837
3726	0	0	0.8995144	826.272
3727	0	0	0.8327574	778.923
3728	0	0	0.9566826	726.1583
3729	0.004736996	0	1.00476	723.0886
3730	0	0	0.9894792	705.8622
3731	0.03126371	0	1.032273	872.376
3732	0	0	0.8994995	705.7684
3733	0	0	0.9232914	678.3094
3734	0	0	0.8705505	827.7072
3735	0	0	0.8899491	882.1072
3736	0	0	0.8871479	855.5001
3737	0	0	0.9914286	577.9609
3738	0	0	0.8566911	945.582
3739	0	0	0.8979535	698.9007
3740	0	0	0.930172	889.3937
3741	0	0	0.8072714	697.494
3742	0	0	0.9109384	760.5032
3743	0	0	0.9781992	983.363
3744	0	0	0.928795	801.7878
3745	0	0	0.8355995	820.7432
3746	0.0336873	0	1.034862	560.2696
3747	0	0	0.9610101	862.8943
3748	0	0	0.9983333	679.7874
3749	0	0	0.8427572	772.6181
3750	0	0	0.9295459	845.0756
3751	0	0	0.8787383	863.0087
3752	0	0	0.9566707	660.7906
3753	0	0	0.9849606	564.6597
3754	0	0	0.9144502	796.7751
3755	0.001867742	0	1.001871	514.5765
3756	0	0	0.8526173	925.1898
3757	0	0	0.9275597	521.6812
3758	0.03112283	0	1.032123	769.087
3759	0.01187199	0	1.012015	532.4969
3760	0	0	0.9586524	912.6686
3761	0	0	0.9751792	840.2006
3762	0	0	0.9331437	677.6908
3763	0	0	0.9653502	694.3868
3764	0	0	0.9609397	905.9274
3765	0	0	0.8863463	770.0513
3766	0	0	0.858283	700.9785
3767	0	0	0.835734	570.9861
3768	0	0	0.9167263	735.1683
3769	0	0	0.8850041	942.6801
3770	0	0	0.8392113	812.1005
3771	0.01222343	0	1.012375	762.375
3772	0	0	0.8706323	738.3212
3773	0	0	0.9398081	640.4874
3774	0	0	0.9239122	745.888
3775	0	0	0.9903805	590.0107
3776	0	0	0.8159688	945.1819
3777	0	0	0.9569657	711.8373
3778	0	0.02104258	0.9804993	1021.495
3779	0	0	0.9070868	401.8979
3780	0.005713875	0	1.005747	488.7188
3781	0	0	0.9418855	868.9725
3782	0	0	0.8299004	776.4873
3783	0	0	0.8405761	603.3901
3784	0.05144197	0	1.054232	751.0889
3785	0	0	0.8708115	535.491
3786	0	0	0.9864568	674.4597
3787	0	0	0.8681255	788.4397
3788	0	0	0.9891199	796.3002
3789	0.00036725	0	1.000367	608.8438
3790	0	0	0.9809961	709.226
3791	0	0	0.9583225	775.1906
3792	0	0	0.9996011	744.5557

3793	0.04613125	0	1.048362	684.1834
3794	0	0	0.8677698	720.716
3795	0	0	0.9390318	881.2199
3796	0.05224459	0	1.055125	850.0241
3797	0	0	0.9555101	510.6119
3798	0.01616524	0	1.016431	806.9437
3799	0	0	0.9281061	590.7856
3800	0	0	0.9514864	717.8352
3801	0	0	0.9905428	619.8808
3802	0	0	0.9425977	954.5103
3803	0	0	0.9168841	552.8555
3804	0	0	0.97263	719.7263
3805	0	0	0.8316748	590.733
3806	0.0232005	0	1.023751	610.7487
3807	0	0	0.9604571	712.7694
3808	0.01542732	0	1.015669	466.8908
3809	0	0	0.8415948	691.5194
3810	0	0	0.9212646	666.9719
3811	0	0	0.8778676	902.0538
3812	0	0	0.9558806	725.1044
3813	0	0	0.9630004	924.0646
3814	0	0	0.8788727	865.5707
3815	0	0.05330334	0.9162703	1056.305
3816	0	0	0.9547275	633.4429
3817	0	0	0.9302961	768.8096
3818	0	0	0.9879685	721.6334
3819	0.04668599	0	1.048972	549.3606
3820	0	0	0.9498995	836.8429
3821	0	0	0.9321826	745.6848
3822	0	0	0.9405476	853.5826
3823	0	0	0.9641501	767.9597
3824	0	0	0.9467774	718.4671
3825	0	0	0.8523735	799.2626
3826	0	0	0.825903	481.3894
3827	0	0	0.8710162	691.9532
3828	0	0	0.9766052	633.2715
3829	0	0	0.9477821	564.0078
3830	0	0	0.9274754	405.9149
3831	0	0	0.9493489	600.3568
3832	0	0	0.9721847	939.3541
3833	0.003426408	0	1.003438	726.8043
3834	0.06691284	0	1.071711	525.204
3835	0	0.05215942	0.9324991	1055.03
3836	0.02643912	0	1.027157	683.6768
3837	0	0	0.9021608	683.6825
3838	0.01089428	0	1.011014	651.3923
3839	0	0	0.9199378	840.4465
3840	0	0	0.8901855	646.353
3841	0	0	0.9073266	715.0452
3842	0	0	0.961637	570.563
3843	0	0	0.9888737	547.015
3844	0.0452011	0	1.047341	788.9263
3845	0	0	0.974583	944.9203
3846	0	0	0.873147	785.7965
3847	0	0	0.9157508	979.5155
3848	0	0	0.9710538	564.5824
3849	0	0	0.9483346	467.2952
3850	0	0	0.993738	573.8497
3851	0	0	0.8655307	898.7931
3852	0	0	0.9394144	603.7969
3853	0	0	0.993489	776.0837
3854	0.002079711	0	1.002084	906.5686
3855	0	0	0.9492936	423.7242
3856	0	0	0.8895079	459.3788
3857	0	0	0.9165667	768.1863
3858	0	0	0.8454345	836.1977
3859	0	0	0.9582057	758.4212
3860	0.01180839	0	1.01195	733.4397
3861	0	0	0.9570347	844.9241
3862	0	0	0.8950213	874.8196
3863	0	0	0.9024485	754.0757
3864	0.03563958	0	1.036957	800.2037
3865	0	0	0.9520271	785.362

3866	0.0522839	0	1.055168	999.2284
3867	0	0	0.9948977	665.2079
3868	0	0	0.9006817	581.5978
3869	0.008223332	0	1.008291	804.8107
3870	0	0	0.8437101	894.6514
3871	0	0	0.8473926	575.8235
3872	0	0	0.8513669	703.6875
3873	0	0	0.8472668	934.9913
3874	0	0	0.9843664	658.6176
3875	0.02535146	0	1.026011	843.1494
3876	0	0.01709929	0.8664206	1017.397
3877	0	0	0.9647265	914.4866
3878	0.02947776	0	1.030373	862.1141
3879	0	0	0.936042	851.8575
3880	0	0	0.9224303	642.2217
3881	0	0	0.8357252	509.7371
3882	0.04966632	0	1.052262	977.2971
3883	0.05541541	0	1.058666	674.7479
3884	0	0	0.9485101	848.9201
3885	0	0	0.9764265	702.2565
3886	0.0161703	0	1.016436	830.8469
3887	0	0	0.9657143	873.5662
3888	0	0	0.9695011	900.8455
3889	0	0	0.8882015	809.1983
3890	0	0	0.9733576	703.5914
3891	0	0	0.8955174	723.3411
3892	0	0	0.9053432	779.6998
3893	0.03777488	0	1.039258	716.9717
3894	0	0	0.9262238	414.3038
3895	0	0	0.8907976	694.9163
3896	0	0	0.8785891	722.3
3897	0	0	0.8800944	689.9452
3898	0	0	0.9124253	656.8434
3899	0.003636947	0	1.00365	623.4237
3900	0	0	0.9017603	606.0728
3901	0	0	0.8669758	679.9743
3902	0	0	0.8584675	643.0527
3903	0	0	0.9896677	692.2881
3904	0	0	0.9618034	726.9382
3905	0.02202377	0	1.02252	567.1053
3906	0	0	0.92755	922.7188
3907	0	0	0.8509331	461.4714
3908	0.03478211	0	1.036036	918.3697
3909	0	0	0.9972813	787.3179
3910	0	0	0.838421	781.3536
3911	0.05717573	0	1.060643	817.9307
3912	0	0	0.879824	649.5737
3913	0	0	0.9642757	651.8334
3914	0	0	0.9840564	753.6436
3915	0	0	0.8638892	608.1259
3916	0	0	0.8567342	566.816
3917	0	0	0.9539707	478.223
3918	0	0	0.8555573	849.6658
3919	0	0	0.9531658	594.2966
3920	0	0	0.9531631	687.9708
3921	0	0	0.8947634	636.4617
3922	0	0	0.9216295	837.888
3923	0	0	0.9469694	728.6868
3924	0	0	0.8949405	899.9934
3925	0	0	0.9806337	900.4929
3926	0	0	0.9498066	834.7922
3927	0	0	0.8608512	761.8188
3928	0	0	0.9060641	534.4257
3929	0	0	0.9870006	507.3992
3930	0	0	0.9127195	657.5363
3931	0.0449491	0	1.047065	747.9357
3932	0	0	0.9616696	601.7177
3933	0	0	0.9725342	767.1691
3934	0	0	0.974824	784.5742
3935	0	0	0.9236916	759.6504
3936	0	0	0.931589	487.4473
3937	0.03993349	0	1.041595	948.1902
3938	0	0	0.8838114	648.0745

3939	0	0	0.8879868	684.0596
3940	0	0	0.8272076	492.5184
3941	0.009516917	0	1.009608	744.7103
3942	0.03256682	0	1.033663	690.5582
3943	0	0	0.890671	753.6352
3944	0	0	0.9363735	916.7338
3945	0	0	0.8640362	987.5745
3946	0	0	0.9486582	710.6204
3947	0	0.006614213	0.8212333	1006.658
3948	0.01754649	0	1.01786	727.8478
3949	0.00815935	0	1.008227	651.1876
3950	0	0	0.9129514	491.3997
3951	0	0	0.9720363	551.2208
3952	0.009777592	0	1.009874	577.0911
3953	0.03580635	0	1.037136	573.2272
3954	0	0	0.9753317	552.7137
3955	0.02861113	0	1.029454	744.4491
3956	0	0	0.9666215	690.2786
3957	0	0	0.8898629	849.8715
3958	0	0	0.8254189	903.4318
3959	0	0.003787179	0.8855365	1003.802
3960	0	0	0.9879436	533.6028
3961	0.005764489	0	1.005798	671.8998
3962	0	0	0.9028192	773.78
3963	0	0	0.9280454	618.969
3964	0	0	0.8556492	622.3145
3965	0	0	0.9257166	844.5972
3966	0	0	0.9811977	482.3584
3967	0	0	0.87881	793.0482
3968	0.0335182	0	1.034681	780.6817
3969	0	0	0.8858151	485.0574
3970	0	0	0.9510199	474.323
3971	0	0	0.9784414	618.378
3972	0	0	0.8926437	665.5718
3973	0	0	0.9674037	841.15
3974	0	0	0.9813254	937.8633
3975	0	0	0.8589244	850.8674
3976	0	0	0.8923641	772.3691
3977	0	0	0.9752612	490.027
3978	0	0	0.9326598	629.8203
3979	0	0.07724763	0.8046566	1083.714
3980	0	0	0.8998852	595.9343
3981	0.0446092	0	1.046692	903.503
3982	0	0	0.8002715	781.2107
3983	0	0	0.9810321	791.2289
3984	0	0	0.9541107	642.9134
3985	0	0	0.895108	709.912
3986	0	0	0.9024143	541.9739
3987	0	0	0.8088952	695.8877
3988	0	0	0.8708446	549.6992
3989	0.04353461	0	1.045516	839.6465
3990	0.00659555	0	1.006639	386.0228
3991	0	0	0.8983079	689.8718
3992	0	0	0.9473759	922.2173
3993	0	0	0.8628253	736.5524
3994	0	0	0.9716858	505.9597
3995	0.03859743	0	1.040147	732.6936
3996	0	0	0.94447	776.5406
3997	0.005554053	0	1.005585	832.6453
3998	0.06323966	0	1.067509	699.5112
3999	0	0	0.9163352	638.3438
4000	0	0	0.96558	521.5596
4001	0.05880792	0	1.062482	912.7001
4002	0.05295006	0	1.05591	813.9697
4003	0	0	0.9227667	812.3475
4004	0	0	0.9518146	660.611
4005	0	0	0.8757423	569.6652
4006	0	0	0.9182531	669.8781
4007	0	0	0.9048715	727.9422
4008	0	0	0.9228902	780.415
4009	0.00635625	0	1.006397	594.3762
4010	0	0	0.9754914	760.3599
4011	0.05220253	0	1.055078	701.0417

4012	0.007873595	0	1.007936	716.728
4013	0	0	0.8738936	671.398
4014	0	0	0.9374151	751.0848
4015	0	0	0.9928028	650.1292
4016	0	0	0.8914294	867.5007
4017	0.01447135	0	1.014684	852.5721
4018	0	0	0.8412187	718.1156
4019	0	0	0.96399	835.1503
4020	0	0	0.875372	918.6351
4021	0	0	0.9010102	941.3838
4022	0.009888437	0	1.009987	507.768
4023	0	0	0.9727555	729.7435
4024	0.03657002	0	1.037958	456.6653
4025	0	0	0.9048314	715.2428
4026	0.009114195	0	1.009198	699.3167
4027	0	0	0.9160603	449.966
4028	0	0	0.9727259	872.7178
4029	0.01678168	0	1.017068	589.7504
4030	0	0	0.9698271	725.9836
4031	0	0	0.9826559	775.4573
4032	0	0	0.8059266	792.3904
4033	0	0	0.8568344	617.8342
4034	0	0	0.9730033	631.2676
4035	0.05688424	0	1.060315	848.5883
4036	0	0	0.9054661	664.1693
4037	0	0	0.9114284	672.7693
4038	0	0	0.9607357	626.5853
4039	0	0	0.8704684	958.2821
4040	0	0	0.9779639	409.6963
4041	0	0	0.9800885	986.4352
4042	0	0	0.9718346	992.6437
4043	0	0	0.8572595	559.995
4044	0	0	0.9962494	750.4842
4045	0	0	0.9244502	771.3597
4046	0	0	0.8535551	856.4856
4047	0.0357967	0	1.037126	888.0568
4048	0	0	0.9676666	872.0466
4049	0	0	0.9946886	930.7282
4050	0.03118562	0	1.032189	757.6411
4051	0.02858593	0	1.029427	826.7314
4052	0	0	0.9952152	941.082
4053	0	0	0.9839379	655.6163
4054	0	0	0.9230725	905.1854
4055	0	0	0.9844718	589.0784
4056	0	0	0.9309508	534.0112
4057	0	0	0.8640646	622.177
4058	0	0	0.9504229	899.9855
4059	0	0	0.9882965	909.3474
4060	0	0	0.9621362	590.0881
4061	0	0	0.9445477	591.6074
4062	0.02043184	0	1.020858	520.1563
4063	0	0	0.9354156	615.4744
4064	0	0	0.9587235	676.4907
4065	0	0.03867924	0.9508933	1040.235
4066	0	0	0.9550579	825.8081
4067	0	0	0.9070211	974.038
4068	0	0	0.9519056	761.1341
4069	0.01425556	0	1.014462	711.7712
4070	0	0	0.9627635	862.5942
4071	0.005871994	0	1.005907	608.0917
4072	0	0	0.804005	762.2189
4073	0	0	0.9082957	586.2727
4074	0.05921213	0.05090938	1.062939	1053.64
4075	0	0	0.9242665	803.2085
4076	0	0	0.9131714	633.483
4077	0	0	0.8322337	851.73
4078	0	0	0.8800943	580.7138
4079	0	0	0.9662454	977.9353
4080	0	0	0.9957552	589.0431
4081	0	0	0.8200505	631.7488
4082	0	0	0.9579867	755.6783
4083	0	0	0.9082627	729.6645
4084	0	0	0.8983349	879.4969

4085	0	0	0.95589	957.5353
4086	0.03008066	0	1.031014	744.4327
4087	0.005643768	0	1.005676	489.9138
4088	0.02256045	0	1.023081	662.9614
4089	0	0	0.8403711	819.7034
4090	0	0	0.846563	809.1873
4091	0	0	0.9876127	725.912
4092	0	0	0.8917878	689.6447
4093	0	0	0.9821704	633.1453
4094	0	0.04862517	0.9226446	1051.11
4095	0	0	0.9084846	854.3829
4096	0	0	0.8900108	819.0706
4097	0	0	0.8954285	945.0469
4098	0	0	0.9141597	499.8544
4099	0	0	0.9951307	839.9244
4100	0	0	0.911403	797.8604
4101	0.04480478	0	1.046906	757.4255
4102	0	0	0.9640996	636.1769
4103	0	0	0.9503003	918.6747
4104	0	0	0.955276	947.0284
4105	0	0	0.9392191	844.8937
4106	0	0	0.9585718	581.3982
4107	0.02850195	0	1.029338	889.3959
4108	0	0	0.8432803	489.5773
4109	0	0	0.9174585	529.8798
4110	0	0	0.8829038	734.0635
4111	0	0	0.8420511	741.8634
4112	0	0	0.9655555	757.4271
4113	0	0.0502473	0.9611739	1052.906
4114	0	0	0.9358107	778.0878
4115	0.001988225	0	1.001992	956.8289
4116	0	0	0.8758156	987.02
4117	0	0	0.8955352	640.7927
4118	0.03190375	0	1.032955	923.2927
4119	0.00E+00	0	0.9450438	925.6303
4120	0	0	0.890685	570.2316
4121	0	0	0.971296	771.7298
4122	0	0	0.9622179	896.3716
4123	0	0	0.9721211	840.4957
4124	0	0	0.9087229	782.1213
4125	0	0	0.9401015	616.4766
4126	0	0	0.9130602	809.6058
4127	0.02061784	0	1.021052	888.2034
4128	0	0	0.9321629	669.7949
4129	0	0	0.8362035	791.3139
4130	0.06358107	0	1.067898	823.2327
4131	0	0	0.9319054	784.3943
4132	0	0	0.9539519	693.6596
4133	0	0	0.9481803	896.5568
4134	0	0	0.8969879	825.8978
4135	0	0	0.9283103	556.5189
4136	0.004005161	0	1.004021	701.0497
4137	0	0	0.8357602	529.1229
4138	0	0	0.8924093	723.4655
4139	0	0	0.9806585	604.4163
4140	0	0	0.9568128	635.3751
4141	0	0	0.9579918	970.6027
4142	0.04908286	0	1.051616	819.9423
4143	0	0	0.9510726	571.9348
4144	0	0	0.9860258	834.4295
4145	0	0	0.9234637	681.9822
4146	0	0	0.9713928	581.9213
4147	0	0	0.9925491	675.6924
4148	0.002244703	0	1.00225	855.2934
4149	0.004461122	0	1.004481	749.909
4150	0	0	0.9514047	545.0964
4151	0.04057591	0	1.042292	708.7595
4152	0	0	0.9729568	436.4071
4153	0	0	0.8645891	738.9226
4154	0.02657587	0	1.027301	766.7849
4155	0.004638338	0	1.00466	816.0737
4156	0.03878118	0	1.040346	799.3103
4157	0	0	0.920404	796.1768

4158	0.06727678	0	1.072129	864.3306
4159	0	0	0.9696797	487.8215
4160	0	0	0.8403834	846.4109
4161	0.0365773	0	1.037966	997.8458
4162	0	0	0.9608252	541.7192
4163	0	0	0.9440832	982.2086
4164	0	0	0.9348384	857.1596
4165	0	0	0.9229301	736.1006
4166	0	0	0.9149818	776.5063
4167	0	0.04986275	0.9392766	1052.479
4168	0	0	0.8188907	930.1932
4169	0	0	0.9222414	941.9821
4170	0	0	0.8821294	564.5317
4171	0	0	0.8594749	722.9907
4172	0	0	0.9149633	989.8656
4173	0	0	0.9010193	693.1384
4174	0	0	0.9939736	743.9403
4175	0	0	0.908467	866.6725
4176	0	0	0.8652921	421.4046
4177	0	0	0.9911963	643.8452
4178	0	0	0.8657703	947.1574
4179	0	0	0.9537736	963.8739
4180	0	0	0.9462786	843.48
4181	0	0	0.8958915	597.0944
4182	0	0	0.9502279	831.3101
4183	0	0	0.9567873	660.6704
4184	0	0	0.9181195	998.4753
4185	0	0	0.9522405	976.8337
4186	0	0	0.9080677	708.8857
4187	0	0	0.9415238	887.6204
4188	0.01426462	0	1.014471	470.362
4189	0	0	0.922108	779.3723
4190	0.01059495	0	1.010708	801.0092
4191	0	0	0.8961552	750.9223
4192	0	0	0.8116761	798.6721
4193	0	0	0.9264692	575.2337
4194	0	0	0.9387721	761.5279
4195	0	0	0.9152613	555.0074
4196	0	0	0.9566075	482.2989
4197	0	0	0.9619764	697.1702
4198	0	0	0.8860847	826.7493
4199	0	0	0.9421726	628.1581
4200	0	0	0.9541373	639.8471
4201	0	0	0.8818879	779.7656
4202	0.05960445	0	1.063382	519.0761
4203	0	0	0.9965071	828.3096
4204	0	0	0.9064761	709.2297
4205	0	0	0.950029	763.0204
4206	0	0	0.9412785	742.5491
4207	0	0	0.9350487	699.0817
4208	0	0	0.9666647	713.5309
4209	0	0	0.871233	873.9006
4210	0	0	0.8709676	863.9149
4211	0	0	0.9425414	653.6418
4212	0	0	0.9271943	489.6307
4213	0	0	0.9037275	944.8101
4214	0.02003732	0	1.020447	596.7261
4215	0	0	0.9026548	832.3633
4216	0	0	0.9188353	691.923
4217	0	0	0.8736008	849.2935
4218	0	0	0.8523548	647.0091
4219	0	0	0.896111	871.7155
4220	0	0	0.9506292	749.207
4221	0	0	0.9365379	755.6088
4222	0.08444855	0	1.092238	792.9048
4223	0	0	0.9557446	425.6316
4224	0	0	0.8234543	734.7156
4225	0	0	0.9390858	805.2269
4226	0	0.04160526	0.9272041	1043.411
4227	0	0	0.8207308	830.3648
4228	0	0	0.9066684	568.548
4229	0.04558736	0	1.047765	691.3148
4230	0	0	0.9710543	799.1624

4231	0	0	0.8908004	993.3002
4232	0	0	0.8401326	825.6856
4233	0	0	0.8551583	993.6805
4234	0	0	0.9322413	873.1274
4235	0.02660958	0	1.027337	700.895
4236	0.000764154	0	1.000765	540.9029
4237	0	0	0.9175979	711.1165
4238	0.03708107	0	1.038509	562.2503
4239	0	0	0.8328338	833.5516
4240	0	0	0.9673182	615.9853
4241	0	0	0.9013908	906.7317
4242	0	0	0.855386	593.0114
4243	0	0	0.8856757	648.3799
4244	0	0	0.9846206	774.3792
4245	0	0	0.8905606	585.7792
4246	0	0	0.9275281	630.0602
4247	0	0	0.9726788	868.8802
4248	0	0	0.9958364	699.1132
4249	0	0.05773552	0.9140729	1061.273
4250	0	0	0.8565409	895.9073
4251	0	0	0.941244	875.8942
4252	0	0	0.8404666	855.6451
4253	0	0	0.98662	765.3915
4254	0	0	0.970319	594.0331
4255	0.05556825	0	1.058838	819.9716
4256	0	0	0.9755208	796.5461
4257	0	0	0.9391264	841.387
4258	0	0	0.9560509	687.0792
4259	0	0	0.8467275	691.7474
4260	0	0	0.8851655	781.324
4261	0	0	0.9444854	522.0658
4262	0	0	0.9163522	755.1478
4263	0	0	0.9684229	500.5236
4264	0	0	0.9282371	412.6635
4265	0	0	0.930918	833.3966
4266	0	0	0.8576599	823.1954
4267	0	0	0.9042676	656.9213
4268	0	0	0.885846	998.4711
4269	0	0	0.9865608	728.6981
4270	0	0	0.9867296	810.9035
4271	0	0	0.9527696	856.8492
4272	0.07702566	0	1.083454	520.6821
4273	0	0	0.9942292	542.804
4274	0	0	0.9414995	878.2967
4275	0	0	0.9972317	765.5067
4276	0	0	0.9611024	844.3025
4277	0	0	0.9353582	758.0277
4278	0	0	0.9853345	677.6824
4279	0	0	0.9473545	568.9062
4280	0	0	0.9290996	517.4694
4281	0	0	0.9394095	615.0278
4282	0.06811563	0	1.073094	979.3681
4283	0	0	0.8654789	581.5197
4284	0	0	0.9939933	762.6275
4285	0	0	0.9653975	667.7419
4286	0.03801349	0	1.039516	832.4901
4287	0.01548574	0	1.015729	719.483
4288	0	0	0.9440168	700.1542
4289	0	0	0.8685282	948.7721
4290	0	0	0.9182131	996.3428
4291	0	0	0.9439369	723.601
4292	0	0	0.9182473	652.6272
4293	0	0	0.9017627	583.2537
4294	0	0	0.9169359	561.1651
4295	0.01422711	0	1.014432	525.2556
4296	0	0	0.9864506	769.5886
4297	0	0	0.8504024	686.0667
4298	0.01911935	0.03944049	1.019492	1041.06
4299	0	0	0.897014	507.763
4300	0	0	0.9656967	756.6003
4301	0	0	0.9793833	891.1909
4302	0	0	0.9000467	734.2656
4303	0	0	0.9044878	645.8232

4304	0	0	0.8958331	641.6894
4305	0	0	0.8619214	628.6895
4306	0.00706905	0	1.007119	760.7327
4307	0	0	0.8972074	698.7968
4308	0	0	0.9454663	862.2277
4309	0.02206687	0	1.022565	508.5833
4310	0	0.05408133	0.9121765	1057.173
4311	0	0	0.9194314	471.9995
4312	0	0	0.9839924	592.6305
4313	0	0	0.836997	850.2714
4314	0	0	0.8929993	695.4999
4315	0	0	0.8748233	750.4245
4316	0	0	0.9775952	599.3594
4317	0.01681835	0	1.017106	905.6757
4318	0	0	0.9728323	841.0988
4319	0	0	0.8486896	505.9007
4320	0	0	0.9751508	745.7945
4321	0	0	0.9036742	585.9255
4322	0	0	0.9984344	665.8334
4323	0	0	0.9008129	866.0545
4324	0	0	0.9736452	743.325
4325	0.04584317	0	1.048046	647.0388
4326	0.01633364	0	1.016605	712.4785
4327	0	0	0.9324036	803.3054
4328	0	0	0.8770502	698.5752
4329	0	0	0.9714397	881.0507
4330	0	0	0.9671797	726.6357
4331	0	0	0.8918582	595.1635
4332	0	0	0.9588771	806.4486
4333	0	0	0.9126962	951.8667
4334	0	0	0.9673479	722.2568
4335	0	0	0.9518016	704.6968
4336	0	0	0.9302215	997.7852
4337	0	0	0.8396575	758.3948
4338	0	0	0.8848563	898.1885
4339	0	0	0.9954057	796.0042
4340	0	0	0.964758	648.2118
4341	0	0	0.9914578	604.8932
4342	0.03771545	0	1.039194	825.2095
4343	0.07256254	0	1.07824	979.2239
4344	0	0.07057788	0.9063415	1075.937
4345	0	0	0.9364857	959.3114
4346	0	0	0.9354486	586.0117
4347	0	0	0.7965889	783.53
4348	0	0	0.9957519	816.1228
4349	0	0	0.9078144	807.9797
4350	0	0	0.9644917	955.9529
4351	0	0	0.9937348	763.571
4352	0	0	0.9759092	677.1494
4353	0	0	0.9798295	824.8298
4354	0	0	0.9924736	548.9266
4355	0	0	0.9334731	718.8084
4356	0	0	0.9526793	570.8586
4357	0	0	0.8367954	822.7659
4358	0	0	0.9922662	710.7264
4359	0	0	0.9776341	759.1857
4360	0	0	0.8751232	911.6967
4361	0	0	0.8859001	776.4053
4362	0.005999445	0	1.006036	813.7233
4363	0	0	0.8882033	982.2434
4364	0.02873166	0	1.029582	472.4102
4365	0	0	0.8768354	658.3644
4366	0.03203487	0	1.033095	492.5835
4367	0.02140788	0	1.021876	648.176
4368	0	0	0.9736282	714.8615
4369	0	0	0.9765949	456.7263
4370	0	0	0.8861917	719.6852
4371	0	0	0.9121494	695.8906
4372	0	0	0.9975517	693.5856
4373	0.07416989	0	1.080112	878.4827
4374	0.007294182	0	1.007348	828.5771
4375	0	0	0.9464331	477.8293
4376	0.000942932	0	1.000944	826.3674

4377	0	0	0.9953319	997.4037
4378	0	0	0.9764847	750.9282
4379	0	0	0.9439694	716.0515
4380	0	0	0.8437941	606.5651
4381	0	0	0.93599	796.9371
4382	0	0	0.9056704	640.924
4383	0.01440907	0	1.01462	432.2014
4384	0.04511955	0	1.047251	559.8768
4385	0	0	0.9383341	606.9588
4386	0	0	0.991941	444.0117
4387	0	0	0.9226878	785.0126
4388	0.008211568	0	1.00828	699.0828
4389	0.04141179	0	1.043201	610.3751
4390	0	0	0.9041297	627.637
4391	0	0	0.9528683	829.3777
4392	0	0	0.9024637	801.2062
4393	0	0	0.9643548	725.3378
4394	0	0	0.8231345	776.4534
4395	0	0	0.9635036	898.1934
4396	0	0	0.8554145	738.8549
4397	0	0	0.817242	715.9259
4398	0	0	0.9712149	577.6668
4399	0	0	0.8336584	797.4514
4400	0	0	0.7967423	675.1868
4401	0.002592095	0	1.002599	844.2137
4402	0	0	0.9963095	752.9023
4403	0	0	0.8833875	847.6358
4404	0	0	0.9803768	542.5759
4405	0.04431381	0	1.046369	639.6575
4406	0	0	0.9355413	493.659
4407	0	0	0.9625365	783.2679
4408	0	0	0.9578148	742.3857
4409	0	0.02025679	0.9040211	1020.676
4410	0	0	0.9218426	535.6535
4411	0	0	0.8602028	583.386
4412	0	0	0.8925257	759.9849
4413	0	0	0.892925	807.7664
4414	0.0190356	0	1.019405	592.8192
4415	0	0	0.8970105	765.5378
4416	0	0	0.9487326	814.7075
4417	0	0	0.9137861	788.6457
4418	0	0	0.9092957	601.2468
4419	0	0	0.8484375	940.9348
4420	0.03288632	0	1.034005	825.0962
4421	0	0	0.9197303	783.2208
4422	0	0	0.9441665	942.1884
4423	0	0	0.9325386	704.4374
4424	0	0	0.8984097	732.6785
4425	0.04809978	0	1.05053	658.3008
4426	0.003105349	0	1.003115	714.7125
4427	0	0	0.8670105	709.0953
4428	0	0	0.8978323	644.7414
4429	0	0	0.8981476	567.1348
4430	0	0	0.9412349	754.6612
4431	0	0	0.8374785	632.6245
4432	0	0.009671708	0.9240597	1009.766
4433	0	0	0.9822427	649.0971
4434	0	0	0.8727009	739.4147
4435	0	0	0.8633546	580.0084
4436	0	0	0.9872891	502.5448
4437	0	0	0.8776391	974.9404
4438	0	0	0.9240864	931.7531
4439	0	0	0.9381726	791.9866
4440	0	0	0.9370687	951.9836
4441	0.04907753	0	1.05161	499.4428
4442	0	0	0.8653697	646.6226
4443	0	0.002939655	0.9721876	1002.948
4444	0	0	0.9050444	748.1564
4445	0	0	0.9446906	430.2585
4446	0	0	0.9949099	846.075
4447	0	0	0.9642394	928.6281
4448	0.03017849	0	1.031118	886.6067
4449	0	0	0.9912983	692.3421

4450	0	0	0.8433582	765.0536
4451	0	0	0.839882	844.1726
4452	0.02146454	0	1.021935	656.7278
4453	0	0	0.9463822	916.1771
4454	0	0	0.9153908	731.9269
4455	0	0	0.9673849	567.8079
4456	0.02279102	0	1.023323	807.6985
4457	0	0	0.8475038	611.3483
4458	0	0	0.9448214	814.6089
4459	0	0	0.9210392	564.5341
4460	0	0	0.9289856	742.5373
4461	0	0	0.9955193	651.4839
4462	0	0	0.8640299	747.8909
4463	0	0	0.8200305	668.5042
4464	0	0	0.849664	697.4725
4465	0	0	0.9273712	637.1237
4466	0	0	0.9159051	905.8925
4467	0	0	0.9081992	648.8814
4468	0	0	0.885484	840.1924
4469	0	0	0.8949375	822.6783
4470	0	0	0.9403525	695.763
4471	0	0	0.886211	733.4723
4472	0	0	0.9637421	830.9893
4473	0.08000285	0	1.08696	589.8398
4474	0	0	0.9980538	607.5803
4475	0.006960526	0	1.007009	633.1882
4476	0	0	0.9157158	724.1832
4477	0	0	0.8881022	720.6416
4478	0	0	0.9347072	591.0947
4479	0	0	0.8273807	835.4398
4480	0	0	0.9783357	540.3431
4481	0	0	0.9054679	854.8566
4482	0	0	0.9767086	943.7643
4483	0	0	0.9448981	546.3797
4484	0	0	0.9638432	556.5624
4485	0	0	0.9820097	914.3434
4486	0	0	0.9225134	637.0476
4487	0	0	0.9830159	517.8183
4488	0.06420259	0	1.068607	944.4876
4489	0	0	0.9195009	646.1019
4490	0.03326895	0	1.034414	949.7293
4491	0	0	0.9263106	633.0153
4492	0	0	0.9589959	988.993
4493	0	0	0.959649	770.8716
4494	0	0	0.9647254	696.8389
4495	0	0	0.9015161	576.4778
4496	0	0	0.8624706	483.5948
4497	0	0	0.9801838	670.1072
4498	0	0	0.8735907	591.5228
4499	0	0	0.8246848	532.9139
4500	0	0	0.8904775	810.0616
4501	0.0210675	0	1.021521	811.2337
4502	0	0	0.9214609	901.603
4503	0	0	0.8588967	748.2461
4504	0.02648174	0	1.027202	678.6317
4505	0	0	0.9616565	765.0249
4506	0	0	0.8689773	441.5776
4507	0.01659849	0	1.016879	901.647
4508	0	0	0.9752453	784.3943
4509	0	0	0.8915207	954.6041
4510	0.06302819	0	1.067268	726.2819
4511	0	0	0.8634832	688.6426
4512	0	0	0.9739077	944.9984
4513	0	0	0.9297036	419.159
4514	0	0	0.9855836	730.9826
4515	0.006379755	0	1.006421	574.7803
4516	0	0	0.929875	771.8169
4517	0	0	0.9141237	839.1047
4518	0	0	0.8720135	921.6246
4519	0	0	0.8603013	738.7974
4520	0.04078791	0	1.042522	974.2142
4521	0	0	0.8879548	794.3639
4522	0	0	0.8855323	549.9014

4523	0.04423665	0	1.046284	904.0454
4524	0	0	0.9761642	591.3648
4525	0	0	0.9986621	807.0273
4526	0	0	0.9247472	785.1385
4527	0.02329458	0	1.02385	900.7169
4528	0	0	0.9085304	768.0667
4529	0	0	0.9514488	540.8994
4530	0	0	0.9304025	718.7273
4531	0	0	0.9032655	757.2934
4532	0	0	0.9725055	970.3778
4533	0.007442508	0	1.007498	966.2074
4534	0	0	0.9743651	388.0157
4535	0	0.04314789	0.9798701	1045.094
4536	0	0	0.8988702	723.6005
4537	0	0	0.9809238	738.3157
4538	0	0	0.8177648	664.138
4539	0	0	0.8326147	624.2061
4540	0	0	0.9836572	500.6818
4541	0.05484214	0	1.058024	643.0378
4542	0	0	0.9914309	626.4797
4543	0	0	0.9183124	620.0411
4544	0	0	0.857334	716.1993
4545	0	0	0.8467137	683.5056
4546	0.01591197	0	1.016169	557.0708
4547	0	0	0.8989295	537.6871
4548	0	0	0.9313557	709.8268
4549	0	0	0.9325778	800.2675
4550	0.01456302	0	1.014778	896.2947
4551	0	0	0.8761323	805.7032
4552	0.05968599	0	1.063475	772.875
4553	0	0	0.9756167	727.988
4554	0	0	0.8611664	544.9102
4555	0	0	0.9013036	782.4698
4556	0	0	0.8220645	879.9962
4557	0	0	0.9293042	571.1548
4558	0	0	0.9839658	634.1575
4559	0	0	0.9791712	568.6837
4560	0	0	0.9486576	604.0116
4561	0	0	0.9577316	562.5532
4562	0	0	0.8727372	873.6459
4563	0	0	0.9158281	422.3117
4564	0	0	0.9532359	782.1993
4565	0	0	0.9718711	601.0469
4566	0	0	0.8740102	926.3592
4567	0.004635124	0	1.004657	692.2157
4568	0	0	0.9036968	922.4937
4569	0.01567391	0	1.015924	865.4503
4570	0	0	0.9488325	723.1117
4571	0	0	0.9943997	588.4142
4572	0.01714374	0	1.017443	914.9152
4573	0	0	0.9544953	948.2816
4574	0.05789498	0	1.061453	463.2934
4575	0	0	0.8652471	615.1733
4576	0	0	0.8671923	852.6379
4577	0	0	0.8868588	603.8127
4578	0	0	0.9514555	982.6624
4579	0.002305723	0	1.002311	836.8456
4580	0	0	0.8943962	513.4283
4581	0	0	0.9035292	910.4913
4582	0	0	0.8629271	777.2877
4583	0	0	0.8438692	502.6236
4584	0	0	0.9102849	559.3099
4585	0	0	0.9825112	723.3098
4586	0	0	0.884633	804.0109
4587	0	0	0.8581043	715.1169
4588	0	0	0.8226472	831.8564
4589	0	0	0.9653509	676.4712
4590	0	0	0.9404727	589.2104
4591	0.01033394	0	1.010442	758.9745
4592	0.06610947	0	1.070789	718.2297
4593	0	0	0.9660671	854.2941
4594	0	0	0.9084521	738.3532
4595	0.009422819	0	1.009512	830.9678

4596	0	0	0.9454582	549.6485
4597	0	0	0.994841	678.5972
4598	0	0	0.7962571	887.6609
4599	0	0	0.9979968	650.6954
4600	0.02930226	0	1.030187	541.2459
4601	0	0	0.9308955	592.7883
4602	0	0	0.9934496	852.1786
4603	0.04776341	0	1.050159	744.3582
4604	0	0	0.895529	790.8502
4605	0	0	0.915397	695.5109
4606	0	0	0.9386224	432.476
4607	0	0	0.9001816	493.184
4608	0	0	0.9235166	527.9044
4609	0.01569677	0	1.015947	929.1983
4610	0	0	0.8479207	633.2339
4611	0	0	0.9211459	837.8693
4612	0	0	0.9587116	587.048
4613	0	0	0.9040761	736.139
4614	0	0	0.9794361	693.4869
4615	0.000422471	0	1.000423	750.6488
4616	0	0	0.8699387	677.6992
4617	0.01802749	0	1.018358	602.588
4618	0	0	0.8653297	712.5649
4619	0	0	0.8920702	847.4645
4620	0	0	0.9309355	917.1996
4621	0.00E+00	0	0.9742857	824.9997
4622	0	0	0.9741465	441.8476
4623	0	0	0.9948009	507.6316
4624	0	0	0.9984119	655.9139
4625	0	0	0.9561951	623.9357
4626	0	0	0.9629703	765.842
4627	0	0	0.9144979	610.9102
4628	0	0	0.8444207	740.9181
4629	0.03634289	0	1.037714	596.6627
4630	0	0	0.9323881	651.8641
4631	0	0	0.9350242	581.9296
4632	0.0817385	0	1.089014	669.5679
4633	0	0	0.9188704	767.4858
4634	0	0	0.9270411	706.1908
4635	0	0	0.9158294	582.1199
4636	0	0	0.8637671	484.2909
4637	0	0	0.9800614	768.3676
4638	0	0	0.8733175	720.2358
4639	0.01832337	0	1.018665	552.0403
4640	0	0	0.9380978	485.0493
4641	0	0	0.9429051	501.5187
4642	0	0	0.8704047	686.3175
4643	0.040287	0	1.041978	774.9442
4644	0	0	0.8914798	854.235
4645	0	0	0.8623255	629.252
4646	0	0	0.9253067	802.2753
4647	0	0	0.9535333	468.911
4648	0	0	0.9639814	674.6235
4649	0	0	0.9142227	501.8942
4650	0.04086166	0	1.042602	593.3101
4651	0	0	0.9379789	784.0078
4652	0.000822867	0	1.000823	826.6707
4653	0	0	0.8621722	729.5443
4654	0	0	0.856642	607.6425
4655	0.00E+00	0	0.961534	813.966
4656	0.06978321	0	1.075018	636.7341
4657	0	0	0.8881198	791.9376
4658	0.00085196	0	1.000853	831.7739
4659	0.000794213	0	1.000795	690.1618
4660	0.06745981	0	1.07234	783.3031
4661	0	0	0.8649089	635.946
4662	0	0	0.8985686	593.1948
4663	0	0	0.9608831	807.1503
4664	0.003417468	0	1.003429	683.5828
4665	0	0	0.922692	596.1831
4666	0	0	0.8330348	950.8287
4667	0	0	0.9374782	569.6594
4668	0	0	0.8529553	583.5536

4669	0	0	0.8850179	880.7708
4670	0.007407269	0	1.007463	688.1718
4671	0.07158928	0	1.077109	741.4377
4672	0	0	0.9056109	758.7625
4673	0	0	0.9551574	882.9961
4674	0.000694509	0	1.000695	587.5221
4675	0	0	0.9933328	902.5426
4676	0	0	0.9026221	614.3021
4677	0.009291279	0	1.009378	544.562
4678	0	0	0.9613926	411.7577
4679	0	0	0.9057717	646.9906
4680	0	0	0.9316598	774.5267
4681	0	0	0.8298569	637.4566
4682	0.02458883	0	1.025209	811.2744
4683	0	0	0.9076912	500.7204
4684	0	0	0.9249212	695.0629
4685	0	0	0.8825839	677.5296
4686	0	0	0.9618618	771.8522
4687	0.02166532	0	1.022145	959.3849
4688	0	0	0.8137915	836.3646
4689	0	0.05750324	0.9226561	1061.012
4690	0	0	0.8559927	616.4654
4691	0	0	0.860254	646.8356
4692	0	0	0.997855	589.9079
4693	0.02671502	0	1.027448	518.1411
4694	0	0	0.9046095	665.2572
4695	0.02683423	0	1.027574	684.543
4696	0	0	0.9371619	798.9172
4697	0	0	0.8914925	875.2928
4698	0.04009506	0	1.04177	602.7283
4699	0	0	0.9806217	488.3569
4700	0.007292065	0	1.007346	739.5974
4701	0.006813077	0	1.00686	754.8303
4702	0	0	0.995355	750.9928
4703	0	0	0.8692126	716.4568
4704	0	0	0.9174009	506.0822
4705	0	0	0.8651295	831.6332
4706	0	0	0.8249401	628.7696
4707	0	0	0.9851253	926.3998
4708	0.009043082	0	1.009126	833.3599
4709	0	0	0.9427021	602.9245
4710	0	0	0.8717974	798.3737
4711	0	0	0.9812131	613.4015
4712	0	0	0.9522878	894.8724
4713	0	0	0.9996126	772.4336
4714	0	0	0.877775	475.6416
4715	0	0	0.9649076	694.7982
4716	0	0	0.971871	964.509
4717	0	0	0.8659078	778.0893
4718	0	0	0.9045404	880.6415
4719	0	0	0.9393719	600.3085
4720	0	0	0.9016551	466.1523
4721	0.01587171	0	1.016128	801.3106
4722	0	0	0.8984387	768.6263
4723	0.05643967	0	1.059816	792.9056
4724	0	0	0.9048957	767.5723
4725	0	0	0.9323629	769.1946
4726	0.02857409	0	1.029415	917.8724
4727	0.03215708	0	1.033226	644.8868
4728	0.03273848	0	1.033847	917.7722
4729	0	0	0.9349831	592.8427
4730	0	0	0.8859807	969.9974
4731	0	0	0.9630913	950.2016
4732	0	0	0.9421912	647.4897
4733	0	0	0.9299615	706.7725
4734	0	0	0.9703635	700.5632
4735	0	0	0.996837	498.2137
4736	0.0433161	0	1.045277	611.9373
4737	0	0	0.8995423	916.4464
4738	0	0	0.9169306	625.7454
4739	0.04602395	0	1.048244	695.9741
4740	0	0	0.9803814	794.1784
4741	0	0	0.9627618	766.0712

4742	0	0	0.8921984	605.7966
4743	0	0	0.9154674	810.1937
4744	0	0	0.8728035	673.7952
4745	0	0	0.9323417	802.4208
4746	0	0	0.9541848	893.5554
4747	0	0	0.9016531	690.3924
4748	0	0	0.9883057	455.8878
4749	0	0.00625757	0.9200735	1006.297
4750	0	0.03857451	0.9147559	1040.122
4751	0	0	0.9712474	749.8326
4752	0.03010364	0	1.031038	773.0509
4753	0	0	0.9051424	878.7176
4754	0	0	0.8508068	801.6171
4755	0	0	0.9539692	601.4927
4756	0	0	0.8399988	748.3169
4757	0	0	0.9483026	839.5787
4758	0	0	0.922493	666.7386
4759	0	0	0.8340543	602.5294
4760	0	0	0.9797514	711.4086
4761	0	0	0.8485923	705.4905
4762	0	0	0.9887092	793.6153
4763	0	0	0.9569091	609.3758
4764	0.0652471	0	1.069801	659.0836
4765	0.06413373	0	1.068529	700.532
4766	0	0	0.9168866	791.7502
4767	0	0	0.8613372	828.0683
4768	0	0	0.9518993	566.2803
4769	0	0	0.979242	894.6008
4770	0	0	0.9163064	911.3378
4771	0	0	0.9136324	541.0193
4772	0.06552375	0	1.070118	807.3458
4773	0	0.03023588	0.996725	1031.179
4774	0	0	0.9714279	927.7559
4775	0	0	0.9381355	462.596
4776	0.07293372	0	1.078672	697.2904
4777	0	0	0.8119555	955.6675
4778	0	0	0.8926515	796.4966
4779	0	0	0.9460455	948.1469
4780	0	0	0.9065545	835.5746
4781	0.06608024	0	1.070756	701.0778
4782	0.02285071	0	1.023385	596.9467
4783	0	0	0.8956551	707.1011
4784	0	0	0.9961523	674.7833
4785	0	0	0.9552958	742.6577
4786	0	0	0.9538946	717.9247
4787	0.0776225	0	1.084155	402.6482
4788	0	0	0.9363249	639.8354
4789	0	0	0.9704652	560.2712
4790	0	0	0.8052481	506.6977
4791	0.00652496	0	1.006568	790.3026
4792	0	0	0.8722401	613.4919
4793	0	0	0.9749172	749.8902
4794	0.01669684	0	1.01698	553.6465
4795	0.03641768	0	1.037794	795.7432
4796	0	0	0.8502269	585.7411
4797	0	0	0.9122246	572.2505
4798	0	0	0.9546261	902.9702
4799	0	0	0.9792293	653.6124
4800	0	0	0.9513195	810.34
4801	0	0	0.8986942	782.5157
4802	0	0	0.8282632	760.2665
4803	0	0	0.9608437	865.0727
4804	0	0	0.9990411	840.5042
4805	0.07542551	0	1.081579	712.9517
4806	0	0	0.8454718	516.8039
4807	0.009468406	0	1.009559	888.0752
4808	0	0	0.9195668	528.5672
4809	0.02686405	0	1.027606	875.6459
4810	0.02353145	0	1.024099	427.8745
4811	0	0	0.9730043	946.9627
4812	0.07873484	0	1.085464	509.4755
4813	0	0	0.8934642	956.0289
4814	0.06109764	0.01107671	1.065073	1011.201

4815	0	0	0.9773167	590.8778
4816	0	0	0.9205949	805.3289
4817	0	0	0.8527594	593.1711
4818	0	0	0.9595116	946.4971
4819	0	0.01519885	0.9289849	1015.433
4820	0	0	0.8892833	469.7755
4821	0	0	0.8979039	896.0099
4822	0	0	0.9984847	888.71
4823	0	0	0.9478736	372.7123
4824	0	0.06347872	0.8791404	1067.781
4825	0	0	0.9685816	683.6815
4826	0	0	0.9175172	762.0333
4827	0	0	0.8128898	731.3544
4828	0	0	0.906047	895.9646
4829	0	0	0.9448583	481.6288
4830	0	0	0.8914447	537.7997
4831	0	0	0.9209239	776.0081
4832	0	0	0.899682	834.4908
4833	0.01317426	0	1.01335	558.1946
4834	0	0	0.8416696	608.1939
4835	0	0	0.9582176	880.7949
4836	0	0	0.9714078	670.8998
4837	0	0	0.9240407	732.7979
4838	0	0	0.9580902	645.0242
4839	0	0	0.846736	571.1526
4840	0	0	0.9700841	560.0641
4841	0	0	0.9411697	579.3173
4842	0.0626985	0	1.066893	902.6736
4843	0	0	0.9159446	499.0623
4844	4.63E-02	0	1.048553	771.0706
4845	0	0	0.8500472	969.4016
4846	0.0372126	0	1.038651	677.5404
4847	0	0	0.9385274	756.8524
4848	0	0	0.8873664	896.1458
4849	0	0	0.9399824	827.5123
4850	0	0	0.9319387	726.1844
4851	0.04054093	0	1.042254	674.056
4852	0	0	0.9867668	443.7206
4853	0	0	0.8626688	717.8162
4854	0	0	0.9493866	720.4771
4855	0	0	0.948603	971.2462
4856	0	0	0.8612583	798.7877
4857	0	0	0.8319635	750.8054
4858	0	0	0.9795558	891.8556
4859	0	0	0.9076383	854.2593
4860	0.04528057	0	1.047428	689.9056
4861	0	0	0.9912377	536.8516
4862	0	0	0.9304124	753.8101
4863	0	0	0.9322596	608.5037
4864	0	0	0.9962249	781.5764
4865	0	0	0.8842082	935.0107
4866	0	0	0.9669098	532.8943
4867	0	0	0.9647918	546.3542
4868	0	0.01365741	0.8465338	1013.846
4869	0.008561933	0	1.008636	946.4232
4870	0	0	0.9231395	551.5552
4871	0	0	0.9139642	746.5471
4872	0.08782071	0	1.096276	747.3538
4873	0	0	0.9637163	996.2535
4874	0	0	0.8782551	673.1647
4875	0	0	0.9341047	616.0386
4876	0.05191905	0	1.054762	753.676
4877	0	0	0.9112993	753.0179
4878	0	0	0.9856233	654.0072
4879	0	0	0.9292105	867.4623
4880	0	0	0.9289579	839.521
4881	0	0	0.9701713	590.7837
4882	0	0	0.9570962	690.1521
4883	0	0.0151082	0.9201688	1015.34
4884	0	0	0.9541324	751.1423
4885	0	0	0.8959092	504.0024
4886	0	0	0.9652688	666.2167
4887	0.05561522	0	1.05889	482.5797

4888	0	0	0.8757554	682.1337
4889	0	0	0.9014338	590.788
4890	0	0	0.9441909	525.6354
4891	0	0	0.8950531	773.4788
4892	0	0	0.9455728	436.8726
4893	0	0.0490444	0.9380541	1051.574
4894	0	0	0.9526428	614.5401
4895	0	0	0.9655265	785.5722
4896	0	0	0.9217986	732.6944
4897	0.02874747	0	1.029598	838.1401
4898	0.03790968	0	1.039403	451.789
4899	0	0	0.9584623	632.3173
4900	0.004814483	0	1.004838	776.7457
4901	0	0	0.8588313	700.0449
4902	0	0	0.9886124	497.7352
4903	0	0	0.9168004	873.9993
4904	0	0	0.8432068	965.4149
4905	0.01701374	0	1.017308	653.4671
4906	0	0	0.9016476	727.3088
4907	0	0	0.8700033	841.6652
4908	0.009446316	0	1.009536	924.9302
4909	0	0	0.9451182	926.4227
4910	0	0	0.8407478	747.0613
4911	0.06114137	0	1.065123	515.2078
4912	0	0	0.9018868	962.6003
4913	0	0	0.897936	869.6254
4914	0	0	0.9119769	750.6713
4915	0	0	0.8357536	562.6385
4916	0	0	0.8697283	604.1665
4917	0	0	0.897105	973.2344
4918	0	0	0.9204667	380.5695
4919	0.02526901	0	1.025924	717.9455
4920	0	0	0.8787222	772.204
4921	0	0	0.986731	752.4692
4922	0	0	0.9594297	381.8281
4923	0	0	0.9503731	744.1216
4924	0	0	0.9440167	701.47
4925	0	0	0.998452	516.4564
4926	0.05255983	0	1.055476	677.4387
4927	0	0	0.9575957	705.7368
4928	0	0	0.9080363	766.613
4929	0.008730732	0	1.008808	566.9985
4930	0	0	0.9393581	831.3719
4931	0	0	0.8402742	904.7494
4932	0	0	0.874581	710.2089
4933	0	0	0.992837	645.918
4934	0	0	0.8809628	627.3528
4935	0	0	0.9213472	765.3618
4936	0	0	0.9288653	692.6741
4937	0	0	0.9930061	697.2047
4938	0	0	0.8676556	805.1976
4939	0	0	0.9211	743.5561
4940	0	0	0.9483262	794.8622
4941	0	0	0.9860181	519.8605
4942	0	0	0.9763988	755.3797
4943	0	0	0.8782397	582.6829
4944	0.001195702	0	1.001197	804.0021
4945	0	0	0.8973429	969.4545
4946	0	0	0.9093637	525.0901
4947	0	0	0.8999375	643.7916
4948	0	0	0.8776455	841.1592
4949	0	0	0.8972066	655.8387
4950	0	0	0.9310267	932.2349
4951	0	0.05755993	0.8472316	1061.075
4952	0	0	0.9553313	881.0629
4953	0	0	0.968007	809.4744
4954	0	0	0.9914355	687.0679
4955	0	0	0.9345482	691.2431
4956	0	0	0.9207969	770.3259
4957	0	0	0.945183	918.4349
4958	0	0	0.9561554	678.0555
4959	0	0	0.8872439	841.4696
4960	0	0	0.8710248	686.5759

4961	0	0	0.8204365	708.1973
4962	0	0	0.8829682	633.1177
4963	0	0	0.916997	675.6804
4964	0.01506225	0	1.015293	756.4116
4965	0	0	0.8385953	498.0111
4966	0	0	0.9979381	828.5785
4967	0	0	0.8948526	986.8999
4968	0	0	0.9868476	943.3215
4969	0	0	0.846943	890.5661
4970	0	0	0.9628076	653.8616
4971	0	0	0.9429954	691.7148
4972	0.003343472	0	1.003355	694.3394
4973	0	0	0.8506263	861.2076
4974	0	0	0.8634034	449.7098
4975	0	0	0.9327926	921.4476
4976	0	0	0.9398327	763.2654
4977	0.01572007	0	1.015971	579.9707
4978	0	0	0.89115	801.5156
4979	0	0	0.9615761	537.0892
4980	0.0543036	0	1.057422	788.5308
4981	0	0	0.9145026	858.8238
4982	2.90764E-05	0	1.000029	707.4357
4983	0	0	0.8655712	459.932
4984	0	0	0.8516405	975.8785
4985	0	0	0.9084498	813.5491
4986	0	0	0.9700319	745.4302
4987	0.05546654	0	1.058724	651.374
4988	0.06188413	0	1.065966	747.4086
4989	0	0	0.9315431	891.2859
4990	0	0	0.8748887	730.0038
4991	0.05844879	0	1.062077	609.7831
4992	0	0	0.8605801	596.735
4993	0	0	0.9308407	626.4348
4994	0	0	0.8791478	666.6609
4995	0.00108192	0	1.001083	593.2482
4996	0	0	0.9939308	854.8849
4997	0	0	0.8221945	675.719
4998	0	0	0.9910578	497.4885
4999	0	0	0.9359648	583.4818
5000	0.007154159	0	1.007206	626.8901
5001	0	0	0.9630317	612.786
5002	0	0	0.9879408	772.274
5003	0	0	0.9646087	595.584
5004	0	0	0.847819	631.0107
5005	0	0	0.9029842	766.4125
5006	0.04649752	0	1.048765	908.2651
5007	0.01566198	0	1.015911	693.476
5008	0	0	0.825772	582.1671
5009	0	0	0.9319874	989.6833
5010	0	0	0.906072	824.197
5011	0	0	0.9457278	966.9482
5012	0.02462235	0	1.025244	875.8205
5013	0.04158261	0	1.043387	493.5168
5014	0	0	0.9561765	465.8223
5015	0.04013885	0	1.041817	843.8434
5016	0	0	0.99636	816.2311
5017	0	0	0.8964242	875.2383
5018	0	0	0.905892	637.5859
5019	0	0	0.9194259	753.6624
5020	0	0	0.8951328	953.965
5021	0.03751366	0	1.038976	712.076
5022	0.03484431	0	1.036102	706.5344
5023	0	0	0.9061491	898.2595
5024	0	0	0.9417571	971.7182
5025	0	0	0.8696786	990.2377
5026	0	0	0.9630154	818.7042
5027	0	0	0.9155425	801.4376
5028	0	0	0.9376991	537.0075
5029	0	0	0.92424	856.8697
5030	0.03658538	0	1.037975	714.4874
5031	0.03558877	0	1.036902	485.7271
5032	0	0	0.922679	560.2079
5033	0.04778988	0	1.050188	870.3759

5034	0	0	0.9435642	731.8896
5035	0.0284943	0.05832763	1.02933	1061.94
5036	0	0	0.9419174	513.4686
5037	0	0	0.960406	714.4795
5038	0	0	0.9159989	753.9875
5039	0	0	0.9439901	878.7907
5040	0	0	0.962674	848.094
5041	0	0	0.9726871	561.2701
5042	0.01355596	0	1.013742	536.4611
5043	0.000266999	0	1.000267	911.4717
5044	0	0	0.9377298	781.8871
5045	0	0	0.9160652	700.4438
5046	0	0	0.8494209	848.0582
5047	0	0	0.8284633	671.1097
5048	0.0600777	0	1.063918	563.5893
5049	0.01334201	0	1.013522	715.7794
5050	0	0	0.9490985	670.0958
5051	0	0	0.937182	712.5272
5052	0	0	0.9201474	814.3886
5053	0	0.03503558	0.840283	1036.308
5054	0.0103576	0	1.010466	729.3254
5055	0	0	0.9135471	711.8817
5056	0	0	0.9168375	875.0656
5057	0	0	0.8686706	980.1084
5058	0.06506682	0	1.069595	563.0738
5059	0	0	0.8633378	753.9005
5060	0.01204867	0	1.012196	606.3644
5061	0	0	0.9725959	724.152
5062	0	0	0.9403192	558.9285
5063	0	0	0.9669271	707.6375
5064	0	0	0.8617088	848.6411
5065	0	0	0.9469462	770.5757
5066	0.07571854	0	1.081922	881.5944
5067	0	0	0.9379203	469.8353
5068	0.004301296	0	1.00432	855.8883
5069	0.0653367	0	1.069904	816.596
5070	0.02800896	0	1.028816	810.5842
5071	0	0	0.9484166	611.528
5072	0	0	0.958569	615.5051
5073	0	0	0.8629583	890.8418
5074	0.02410914	0	1.024705	959.5739
5075	0	0	0.9475439	763.4858
5076	0	0	0.9207799	595.2399
5077	0.0114902	0	1.011624	616.6551
5078	0	0	0.9388645	809.1962
5079	0	0	0.8997976	695.1771
5080	0	0	0.8825759	754.0527
5081	0	0	0.9478741	666.5074
5082	0	0	0.9542937	554.8665
5083	0	0	0.9097567	519.8311
5084	0	0	0.9229867	527.9456
5085	0	0	0.8316994	639.6904
5086	0	0	0.9765559	478.7751
5087	0	0	0.9804083	737.8878
5088	0	0	0.8688662	784.857
5089	0	0	0.91074	700.9107
5090	0.06486336	0	1.069362	849.1811
5091	0	0	0.9486311	607.8981
5092	0	0	0.933449	745.0079
5093	0	0	0.9125402	578.4261
5094	0	0	0.942285	899.4333
5095	0	0	0.9432507	676.9236
5096	0	0	0.9183481	816.2778
5097	0	0	0.9725599	810.3553
5098	0	0	0.9521812	891.5392
5099	0	0.071209	0.9502379	1076.668
5100	0	0	0.9831638	970.2868
5101	0	0	0.9665267	805.0931
5102	0	0	0.9628727	534.129
5103	0	0	0.9751707	645.14
5104	0.004305436	0	1.004324	871.4123
5105	0	0	0.9256055	796.217
5106	0.0393261	0	1.040936	769.0897

5107	0	0	0.8506233	918.7276
5108	0.08482077	0	1.092682	717.7242
5109	0	0	0.9407541	875.3085
5110	0	0	0.952024	817.0007
5111	0	0	0.9555954	647.3232
5112	0	0	0.9558494	701.1487
5113	0	0	0.9318718	670.0618
5114	0.03453712	0	1.035773	758.2232
5115	0.05569835	0	1.058984	694.1563
5116	0	0	0.9639793	654.6332
5117	0	0	0.9273028	783.1489
5118	0	0	0.9088613	681.8408
5119	0	0	0.9395193	783.7379
5120	0	0	0.8808757	990.3475
5121	0	0	0.9260535	726.5202
5122	0.007342246	0	1.007397	846.9411
5123	0	0	0.8732429	589.6601
5124	0	0	0.8690805	945.6044
5125	0	0	0.9333274	653.209
5126	0	0.003008362	0.8538488	1003.017
5127	0.06323951	0	1.067509	548.2773
5128	0	0	0.8485667	691.3913
5129	0	0.04634633	0.9829003	1048.599
5130	0	0	0.7962976	613.1677
5131	0	0	0.9194841	465.7169
5132	0	0	0.944196	893.4835
5133	0	0	0.8922874	923.176
5134	0	0	0.8452558	569.3683
5135	0	0	0.9147567	920.3409
5136	0	0	0.978056	512.3931
5137	0	0	0.9068614	572.1636
5138	0	0	0.8915554	757.8414
5139	0	0	0.9365577	707.1074
5140	0	0	0.9056735	576.0068
5141	0.0180246	0	1.018355	701.6619
5142	0	0	0.9297873	803.5534
5143	0.0563994	0	1.05977	954.4505
5144	0	0	0.8725649	844.1063
5145	0	0	0.8776091	730.037
5146	0	0	0.9570191	556.6367
5147	0	0	0.9677872	759.0839
5148	0.002286449	0	1.002292	520.882
5149	0	0	0.9429209	609.517
5150	0.06112252	0	1.065102	621.2812
5151	0	0	0.9404014	813.2783
5152	0	0	0.8302274	994.467
5153	0	0	0.8620667	383.6565
5154	0	0	0.9838133	691.8835
5155	0	0	0.9344645	481.7149
5156	0.01506176	0	1.015292	650.2757
5157	0	0	0.8485892	603.3336
5158	0	0	0.9391694	902.9362
5159	0	0	0.8912044	846.9218
5160	0	0	0.8555975	692.7668
5161	0	0.04859098	0.9740447	1051.073
5162	0.03397791	0	1.035173	873.0533
5163	0	0	0.9631647	776.1082
5164	0	0	0.8681663	824.5322
5165	0	0	0.9397722	639.4894
5166	0	0	0.9842654	870.5632
5167	0	0	0.9866378	689.6368
5168	0	0.007944317	0.9572117	1008.008
5169	0	0	0.9633768	788.0609
5170	0	0	0.9393592	745.6215
5171	0	0	0.9533505	593.2741
5172	0	0	0.9306872	829.7801
5173	0	0	0.939909	575.6919
5174	0	0	0.9732286	839.9022
5175	0	0	0.9419395	431.4448
5176	0	0	0.8583548	505.8894
5177	0	0	0.9971291	597.9802
5178	0.06642446	0	1.071151	572.8333
5179	0	0	0.8952886	506.2411

5180	0	0	0.9329867	492.9788
5181	0	0	0.9996296	714.6425
5182	0	0	0.9590265	581.4726
5183	0	0	0.9911417	617.2507
5184	0.002264685	0	1.00227	538.6888
5185	0	0	0.9278731	934.5966
5186	0	0	0.8611383	814.0242
5187	0.03791747	0	1.039412	594.1393
5188	0.02850922	0	1.029346	430.0055
5189	0	0	0.8322651	716.9944
5190	0	0	0.9679898	836.3036
5191	0	0	0.9444644	742.793
5192	0.01697076	0	1.017264	498.2115
5193	0	0	0.8228304	408.6363
5194	0.004419244	0	1.004439	746.4524
5195	0	0	0.8926484	727.1924
5196	0.01403106	0	1.014231	715.7296
5197	0	0	0.8742603	814.4919
5198	0	0	0.8558124	840.5184
5199	0.005487971	0	1.005518	672.4936
5200	0	0	0.9039605	689.6664
5201	0	0	0.9840958	385.9466
5202	0	0	0.9249276	943.0203
5203	0	0	0.957518	971.9473
5204	0	0	0.9189581	456.6487
5205	0	0	0.8718575	848.0126
5206	0	0	0.9027297	705.8792
5207	0.01263167	0	1.012793	829.3882
5208	0	0	0.9636458	993.6688
5209	0	0	0.8266342	514.8649
5210	0	0	0.8745388	879.5682
5211	0	0	0.9097877	690.273
5212	0	0	0.9675263	693.0705
5213	0.06822374	0	1.073219	688.7188
5214	0.006459931	0	1.006502	590.3355
5215	0	0.01825948	0.9350724	1018.599
5216	0	0	0.8659617	904.1293
5217	0	0	0.9633191	630.2788
5218	0	0	0.9042017	596.0079
5219	0	0	0.8938426	840.9036
5220	0	0	0.9275609	926.324
5221	0	0	0.9477553	965.5916
5222	0	0.02406568	0.9187405	1024.659
5223	0	0	0.8788263	875.7365
5224	0	0	0.8487	707.8055
5225	0	0	0.9957235	837.8528
5226	0	0	0.9509103	930.1952
5227	0.05240332	0	1.055301	884.2898
5228	0.02392935	0	1.024516	693.258
5229	0	0	0.9107962	713.1862
5230	0	0	0.9746745	583.3071
5231	0.003606438	0	1.003619	873.6851
5232	0	0	0.9249595	711.3162
5233	0.03643332	0	1.037811	596.4019
5234	0	0	0.9272611	639.0598
5235	0.0015895	0	1.001592	439.3318
5236	0	0	0.8141599	578.5536
5237	0	0	0.8409006	635.2232
5238	0.01780668	0	1.018129	622.5372
5239	0	0	0.9364539	715.9669
5240	0	0	0.9469787	612.2709
5241	0.02556547	0	1.026236	740.1788
5242	0	0	0.9112435	784.2916
5243	0	0	0.8429443	776.1135
5244	0.02509266	0	1.025738	797.1815
5245	0	0	0.9061323	695.2936
5246	0	0.03825029	0.922868	1039.772
5247	0	0	0.8580651	598.2245
5248	0.03896239	0	1.040542	608.6794
5249	0.03970602	0	1.041348	619.5883
5250	0.05360471	0	1.056641	525.194
5251	0.07889277	0	1.08565	811.7831
5252	0	0	0.8976042	888.7971

5253	0	0	0.8149347	620.3234
5254	0	0	0.9495996	928.8451
5255	0	0	0.9191124	665.0463
5256	0	0	0.9564092	603.0058
5257	0.02912294	0	1.029997	925.1219
5258	0	0	0.937141	803.9517
5259	0	0	0.9205703	768.937
5260	0	0	0.9048367	569.1748
5261	0	0	0.9203736	800.4639
5262	0	0	0.8434582	645.7794
5263	0	0	0.8817639	526.6932
5264	0	0	0.830003	577.9177
5265	0	0	0.8965102	868.4311
5266	0.04194677	0	1.043783	993.416
5267	0.02427988	0	1.024884	534.9226
5268	0.05222441	0	1.055102	647.6248
5269	0	0.04876529	0.9885207	1051.265
5270	0	0	0.8802283	776.9796
5271	0	0	0.9128418	713.0349
5272	0	0	0.8708001	825.3995
5273	0	0	0.9676654	769.715
5274	0	0	0.8733531	503.1717
5275	0	0.06932581	0.8378297	1074.49
5276	0	0	0.890461	839.3226
5277	0.01760833	0	1.017924	543.5148
5278	0	0.0675481	0.9940804	1072.441
5279	0.05299456	0	1.05596	920.7578
5280	0	0	0.9073728	967.9706
5281	0	0	0.8767641	437.8416
5282	0	0	0.8801069	936.3548
5283	0.02928353	0	1.030167	923.4362
5284	0	0	0.9920507	888.5833
5285	0	0	0.8381782	644.4988
5286	0	0	0.9383494	682.6335
5287	0	0	0.8622362	672.7674
5288	0	0	0.9396577	736.0909
5289	0	0	0.9348072	614.9375
5290	0	0	0.9161512	493.0427
5291	0	0	0.8905242	641.6428
5292	0	0	0.9485205	522.3116
5293	0.003390476	0	1.003402	605.2294
5294	0.04385122	0	1.045862	450.5972
5295	0	0.04329049	0.9289161	1045.249
5296	0	0	0.8964723	541.2131
5297	0	0	0.9568922	710.0257
5298	0.08216929	0	1.089526	857.4534
5299	0	0	0.9649497	987.5774
5300	0	0	0.8715439	775.2356
5301	0.00E+00	0	0.9675315	691.5457
5302	0	0	0.9736021	514.5637
5303	0	0	0.9523315	841.212
5304	0	0	0.9608082	542.2747
5305	0	0	0.8861994	785.9498
5306	0.04795215	0	1.050367	830.5908
5307	0	0.001418785	0.9512047	1001.421
5308	0	0	0.9980299	578.2908
5309	0	0	0.9165633	815.5991
5310	2.77E-02	0	1.028459	682.4432
5311	0	0	0.8931543	967.674
5312	0	0	0.8763322	558.0548
5313	0	0	0.989217	787.6899
5314	0	0	0.977678	680.5878
5315	0.0594259	0	1.06318	669.4724
5316	0	0	0.9680609	669.4935
5317	0.0200916	0	1.020504	859.2075
5318	0	0	0.9175864	764.5464
5319	0	0	0.9534826	618.9085
5320	0	0	0.9342356	670.9573
5321	0	0	0.9786864	526.0995
5322	0	0	0.8585823	752.0374
5323	0.02806419	0	1.028875	715.0554
5324	0	0	0.9086021	525.5693
5325	0	0	0.8367417	953.6431

5326	0	0	0.9037624	777.4547
5327	0	0	0.9696006	634.0685
5328	0	0	0.9933594	857.335
5329	0	0	0.8916503	888.4256
5330	0	0	0.932283	507.474
5331	0	0	0.9553182	649.5024
5332	0	0	0.8905168	620.3831
5333	0	0	0.8368695	524.9493
5334	0.02064431	0	1.02108	686.4799
5335	0	0	0.9051226	509.7338
5336	0	0	0.9313926	805.5134
5337	0	0	0.9165801	693.8983
5338	0	0	0.9743109	633.246
5339	0	0	0.9439826	977.5069
5340	0.02469851	0	1.025324	676.6916
5341	0	0	0.8775309	932.852
5342	0.03924323	0	1.040846	773.1464
5343	0	0	0.998169	796.6395
5344	0	0	0.9584302	688.2017
5345	0	0	0.9523098	848.0066
5346	0	0	0.9236357	978.1946
5347	0	0	0.8504677	720.3153
5348	0	0	0.9761803	833.7722
5349	0	0	0.8943516	641.3307
5350	0	0	0.9995077	879.5707
5351	0	0	0.9618663	972.6513
5352	0	0	0.8352261	954.5555
5353	0	0	0.9392789	560.0703
5354	0	0	0.9187062	791.7017
5355	0	0.01727267	0.8064722	1017.576
5356	0	0	0.9015011	678.8991
5357	0	0	0.9496724	707.8331
5358	0.04126332	0	1.043039	718.8746
5359	0	0	0.880054	519.6204
5360	0	0	0.9311564	716.3809
5361	0	0	0.8782358	840.5612
5362	0	0	0.9077077	472.2873
5363	0	0	0.8536657	661.5904
5364	0	0	0.9223026	725.3295
5365	0.003560365	0	1.003573	590.6267
5366	0	0	0.9621937	428.4219
5367	0	0	0.921454	734.9882
5368	0	0	0.969249	734.4258
5369	0	0	0.8532179	819.6642
5370	0	0	0.9871944	713.1302
5371	0	0	0.8937607	809.0466
5372	0.00E+00	0	0.9211922	542.8361
5373	0	0	0.9990938	855.8544
5374	0	0	0.8847161	660.8234
5375	0	0	0.972439	833.6458
5376	0.0375411	0	1.039005	591.4503
5377	0	0	0.8218689	463.1152
5378	0	0	0.9178947	849.2026
5379	0	0	0.9558988	518.4187
5380	0	0	0.9447384	740.2397
5381	0	0	0.9568123	834.1683
5382	0	0	0.8981238	921.5535
5383	0	0	0.8738778	652.569
5384	0	0	0.8535207	558.6266
5385	0	0	0.9766025	832.1396
5386	0.03062081	0	1.031588	769.3257
5387	0.002750145	0	1.002758	700.4642
5388	0.01118006	0	1.011306	608.3963
5389	0	0	0.822225	548.7225
5390	0.07262575	0	1.078313	734.3535
5391	0.03687921	0.05869579	1.038291	1062.356
5392	0	0	0.9784698	884.2977
5393	0	0	0.9356407	491.9207
5394	0	0	0.9042552	819.0471
5395	0	0	0.9228015	479.6452
5396	0	0	0.9672616	730.8834
5397	0	0	0.9955337	666.0467
5398	9.85496E-05	0	1.000099	552.493

5399	0	0	0.9130525	863.5353
5400	0.04891508	0	1.051431	555.4807
5401	0	0	0.9115153	794.024
5402	0	0	0.991556	799.2349
5403	0	0	0.9042355	795.4225
5404	0	0	0.9183918	517.9722
5405	0	0	0.916616	991.6574
5406	0.005994898	0	1.006031	777.9539
5407	0	0	0.8782465	736.4623
5408	0	0.05206841	0.8637449	1054.928
5409	0	0	0.8646233	613.9435
5410	0	0	0.9478886	537.8051
5411	0.008304626	0	1.008374	668.2377
5412	0	0	0.9999304	975.9017
5413	0	0	0.9093109	441.1116
5414	0	0	0.9737076	612.0851
5415	0.04884568	0	1.051354	557.1704
5416	0	0	0.9979522	835.3959
5417	0	0	0.8829015	492.4183
5418	0	0	0.883056	676.9139
5419	0	0	0.9746718	691.8469
5420	0.04712006	0	1.04945	810.5464
5421	0	0	0.961383	600.9065
5422	0	0	0.9497875	571.6172
5423	0	0	0.9757133	441.152
5424	0	0	0.9528039	804.5709
5425	0.01093378	0	1.011055	836.7541
5426	0	0	0.8698494	753.2246
5427	0	0	0.8843106	582.1739
5428	0.02304303	0	1.023587	597.0542
5429	0	0	0.9440395	621.3976
5430	0	0	0.942609	686.8101
5431	0	0	0.9310904	907.513
5432	0	0	0.8162275	786.6937
5433	0	0	0.8241726	547.6295
5434	0.07111077	0	1.076555	791.5992
5435	0	0	0.9132219	558.8248
5436	0	0	0.9766898	702.3048
5437	0	0	0.9052311	676.3035
5438	0	0	0.8911602	984.3448
5439	0	0	0.9932869	788.1993
5440	0	0	0.8728543	763.6667
5441	0	0	0.9872294	480.2889
5442	0	0	0.9709864	637.3396
5443	0	0	0.9167975	512.2554
5444	0	0	0.8370954	557.1812
5445	0	0	0.918097	486.3228
5446	0	0	0.9309086	738.321
5447	0	0	0.9255003	741.4787
5448	0	0	0.948966	736.4128
5449	0.02460677	0	1.025228	615.5991
5450	0.004033285	0	1.00405	757.903
5451	0.03740239	0	1.038856	455.1477
5452	0	0	0.9628729	989.551
5453	0.008957203	0	1.009038	855.1508
5454	0	0	0.9486442	896.6356
5455	0.0197843	0	1.020184	531.913
5456	0	0	0.8881943	830.9626
5457	0	0	0.8380049	706.6202
5458	0	0	0.9381182	991.1172
5459	0	0	0.902384	916.3199
5460	0	0	0.9612901	727.8531
5461	0	0	0.9954699	856.6163
5462	0	0	0.9163606	696.5554
5463	0	0	0.9459002	640.8806
5464	0	0	0.9916556	822.9542
5465	0	0	0.8682779	725.9993
5466	0	0	0.8675654	673.9617
5467	0	0	0.9844569	792.7387
5468	0.01453806	0	1.014753	692.2187
5469	0	0	0.8952732	645.8223
5470	0	0	0.965651	808.1123
5471	0.02213979	0	1.022641	711.8889

5472	0	0	0.9378946	748.4144
5473	0	0	0.9906996	749.2817
5474	0	0.07815547	0.8880578	1084.782
5475	0	0	0.8150368	525.4315
5476	0	0	0.9418755	863.8007
5477	0	0	0.9366472	688.3602
5478	0.03137207	0	1.032388	710.66
5479	0	0	0.8967912	629.8091
5480	0.04311098	0	1.045053	599.2999
5481	0	0	0.9654881	741.1392
5482	0	0	0.941838	881.2661
5483	0.01900685	0	1.019375	697.0411
5484	0.06727227	0	1.072124	788.869
5485	0	0	0.8902956	727.6855
5486	0	0	0.9763425	713.4583
5487	0	0	0.9422529	575.8685
5488	0	0	0.9117535	862.1627
5489	0.05618451	0	1.059529	682.6304
5490	0	0	0.9253144	917.0014
5491	0	0	0.942925	619.1152
5492	0	0	0.953486	748.0536
5493	0	0	0.9872518	766.2602
5494	0	0	0.8827493	645.1417
5495	0	0	0.9510033	651.0493
5496	0	0	0.912532	595.19
5497	0	0	0.9424259	828.6795
5498	0	0	0.9950933	576.4
5499	0	0	0.8472646	815.5875
5500	0	0	0.8983734	791.8641
5501	0	0	0.8303189	679.538
5502	0	0	0.9830031	655.582
5503	0	0	0.9129318	846.7891
5504	0.01216308	0	1.012313	957.2883
5505	0	0	0.9827877	894.9327
5506	0	0	0.8536534	771.968
5507	0	0	0.9736931	956.8693
5508	0	0	0.8925906	830.0691
5509	0	0	0.9190925	920.8235
5510	0	0	0.9691616	653.277
5511	0	0	0.958235	568.9952
5512	0	0	0.8997312	659.9543
5513	0	0	0.9325681	885.6776
5514	0	0	0.9372981	676.3364
5515	0	0	0.9424764	817.0389
5516	0	0	0.9512314	682.1425
5517	0	0	0.8800366	539.8465
5518	0	0	0.8771625	847.0283
5519	0.02403189	0	1.024624	750.7798
5520	0	0	0.9245871	871.804
5521	0.04764592	0	1.05003	892.3278
5522	0	0	0.9728881	905.3391
5523	0	0	0.9643469	683.7455
5524	0	0.0301364	0.9426623	1031.073
5525	0	0	0.9892002	787.2192
5526	0	0	0.9011774	693.7629
5527	0	0	0.881173	672.9034
5528	0.01020988	0	1.010315	904.9782
5529	0	0	0.8745038	947.1161
5530	0	0	0.9635466	971.4254
5531	0	0	0.838299	839.9468
5532	0	0	0.9410072	447.4839
5533	0	0	0.9725552	905.1421
5534	0	0	0.9030837	605.7925
5535	0	0	0.8663655	640.8852
5536	0	0	0.9291189	614.4335
5537	0	0	0.95589	811.7361
5538	0.02934251	0	1.03023	616.3737
5539	0	0	0.8760167	610.0165
5540	0	0	0.8051008	684.7079
5541	0	0	0.8918355	730.7906
5542	0	0	0.8590847	732.2274
5543	0	0	0.9158568	823.9946
5544	0	0	0.9684404	734.7245

5545	0	0	0.8623973	648.6217
5546	0	0	0.9081848	967.6329
5547	0	0	0.9786412	766.1829
5548	0	0	0.9361983	560.6846
5549	0	0	0.9098517	621.6877
5550	0	0	0.9423988	701.7307
5551	0.009921864	0	1.010021	687.7371
5552	0	0	0.9687405	529.1011
5553	0	0	0.8857223	618.343
5554	0	0	0.9011458	835.8462
5555	0	0	0.9507758	709.629
5556	0	0	0.9059237	656.0424
5557	0.0108374	0	1.010956	891.5013
5558	0	0	0.9397965	798.5744
5559	0	0	0.9162349	711.8891
5560	0	0	0.9323353	661.8216
5561	0.03612129	0	1.037475	696.9983
5562	0.002595386	0	1.002602	887.1257
5563	0	0	0.9289902	825.714
5564	0	0	0.8433381	648.5618
5565	0	0	0.8372793	659.8872
5566	0.05742745	0	1.060926	564.3824
5567	0.01427554	0	1.014482	814.8118
5568	0	0	0.8937159	805.1277
5569	0	0	0.9745528	678.4693
5570	0	0	0.9015949	702.0584
5571	0	0	0.8836772	912.6583
5572	0.02368877	0	1.024264	651.5944
5573	0	0	0.8224292	808.8635
5574	0.000328823	0	1.000329	711.2582
5575	0	0	0.9885248	995.2306
5576	0	0	0.88509	560.193
5577	0	0.007109125	0.9251264	1007.16
5578	0	0	0.9326477	663.2862
5579	0	0	0.9002279	547.2775
5580	0	0	0.818655	983.9789
5581	0	0	0.8509365	875.6434
5582	0	0	0.8849562	880.8812
5583	0	0	0.87075	793.0912
5584	0.05609082	0.005469129	1.059424	1005.499
5585	0	0	0.9703333	558.6832
5586	0	0	0.9720851	430.8565
5587	0	0	0.9596018	677.7678
5588	0	0	0.8943008	637.4976
5589	0	0	0.938608	974.1208
5590	0	0	0.9112918	717.728
5591	0	0	0.8386514	636.8964
5592	0	0	0.9119963	531.9283
5593	0	0	0.8486736	610.0035
5594	0	0	0.9480529	557.3049
5595	0	0	0.9530697	588.9883
5596	0	0	0.9292814	624.4908
5597	0	0	0.9965492	741.3226
5598	0	0	0.8922188	619.5443
5599	0	0	0.9837765	871.7847
5600	0	0	0.9399731	768.5656
5601	0.07385758	0	1.079748	507.1245
5602	0	0	0.9717435	659.1132
5603	0	0	0.8570063	716.0505
5604	0	0	0.972631	514.9879
5605	0	0	0.9023698	568.1969
5606	0	0	0.9622066	640.4341
5607	0	0	0.9293822	496.7655
5608	0	0	0.9316353	843.3972
5609	0	0	0.8402089	746.3511
5610	0	0	0.9357634	971.7776
5611	0	0	0.9000717	657.2007
5612	0	0	0.9745355	676.1658
5613	0	0	0.8242781	757.7592
5614	0	0	0.9819873	663.2551
5615	0	0	0.8844069	548.5358
5616	0	0	0.9068472	559.9919
5617	0	0	0.8893334	649.8581

5618	0	0	0.9746215	440.8134
5619	0	0.02828686	0.9799111	1029.11
5620	0.003885528	0	1.003901	746.4323
5621	0	0	0.8542918	739.2126
5622	0	0	0.9895196	757.9125
5623	0	0	0.795774	612.4438
5624	0.01755068	0	1.017864	468.4167
5625	0	0	0.8925359	597.3601
5626	0	0	0.8609165	917.2302
5627	0	0	0.9314171	764.9606
5628	0	0	0.9998401	659.3732
5629	0	0	0.8658582	805.1959
5630	0	0	0.9997494	783.0533
5631	0	0	0.925858	535.6322
5632	0	0	0.9191075	541.7467
5633	0	0	0.8877782	829.0807
5634	0	0	0.9137541	454.6523
5635	0	0	0.9934104	580.7368
5636	0	0	0.9771064	681.9738
5637	0	0	0.9851719	893.8445
5638	0	0	0.8919277	751.656
5639	0.04755845	0	1.049933	792.9658
5640	0	0	0.9980064	668.6926
5641	0	0	0.8915467	664.82
5642	0	0	0.9169192	505.5405
5643	0.00E+00	0	0.992228	508.2767
5644	0.05220173	0	1.055077	576.2453
5645	0.007515327	0	1.007572	718.0233
5646	0	0	0.9732828	785.8934
5647	0	0	0.9976401	738.8444
5648	0.01235022	0	1.012505	703.0967
5649	0.0147468	0	1.014968	615.7917
5650	0	0	0.8155701	588.2292
5651	0	0	0.8564371	666.3397
5652	0	0	0.9318991	734.2161
5653	0	0	0.9737889	915.5997
5654	0	0	0.9012444	456.4857
5655	0	0	0.9558269	665.577
5656	0	0	0.9857952	777.7589
5657	0.005499874	0	1.00553	789.2368
5658	0	0	0.9359086	563.5869
5659	0	0	0.9168605	899.799
5660	0.02839371	0	1.029223	944.8121
5661	0	0	0.8830566	993.9302
5662	0	0	0.8779232	552.6648
5663	0.00E+00	0	0.9072154	700.0294
5664	0	0	0.9338851	579.6904
5665	0.02676374	0	1.0275	890.4007
5666	0	0	0.9289484	587.2487
5667	0	0	0.9970206	771.2352
5668	0	0	0.962991	571.3397
5669	0	0	0.9016466	753.4706
5670	0	0	0.9673023	588.6041
5671	0.01013909	0	1.010243	930.0515
5672	0	0	0.956791	470.2142
5673	0	0	0.9391365	900.2068
5674	0	0	0.9223399	742.0652
5675	0	0	0.8731993	674.3254
5676	0.003253857	0	1.003264	796.7454
5677	0	0	0.9093142	401.7797
5678	0.04406766	0	1.046099	880.0327
5679	0	0	0.986859	723.5024
5680	0	0	0.9042333	627.8695
5681	0	0	0.9952325	532.3517
5682	0	0	0.9811591	502.0475
5683	0	0	0.9999354	796.7473
5684	0	0	0.8510853	805.6104
5685	0	0	0.9769425	983.8499
5686	0	0	0.9441078	938.0071
5687	0	0.01190325	0.9955254	1012.047
5688	0	0	0.877024	611.3909
5689	0.0109936	0	1.011116	581.2797
5690	0	0	0.9422911	662.4305

5691	0	0	0.935271	864.4305
5692	0	0	0.956778	578.8048
5693	0	0	0.930985	855.1317
5694	0.03047325	0	1.031431	662.0972
5695	0	0	0.9229642	537.586
5696	0	0	0.9428324	949.3123
5697	0	0	0.9454136	649.6693
5698	0	0	0.9295454	823.1462
5699	0	0	0.9035327	898.6946
5700	0	0	0.9802858	668.0825
5701	0	0	0.9796159	641.6432
5702	0.02261681	0	1.02314	457.931
5703	0	0	0.8948241	666.5231
5704	0	0	0.9340323	781.9509
5705	0	0	0.9311614	733.2933
5706	0	0	0.9581918	771.0496
5707	0.02706212	0	1.027815	777.0193
5708	0	0	0.9646261	669.997
5709	0	0	0.9558207	717.3253
5710	0	0.02280292	0.9023346	1023.335
5711	0	0	0.9319255	961.4161
5712	0	0	0.9002963	827.0453
5713	0	0	0.89062	690.0392
5714	0	0	0.8586721	715.52
5715	0.08570722	0	1.093742	703.5212
5716	0	0	0.989011	738.2294
5717	0.03582504	0	1.037156	659.1526
5718	0	0	0.8930061	911.1807
5719	0	0	0.9059518	873.1021
5720	0	0	0.8796558	608.9728
5721	0	0	0.9935995	974.2078
5722	0.01454563	0	1.01476	948.0686
5723	0	0	0.9454139	704.4489
5724	0	0	0.8396579	837.9113
5725	0	0	0.9471435	532.8386
5726	0	0	0.9923868	970.2505
5727	0	0	0.9189629	885.563
5728	0	0	0.9519578	582.892
5729	0	0	0.8640676	680.0404
5730	0	0	0.8662308	389.847
5731	0	0	0.920435	695.829
5732	0	0	0.9183964	600.6464
5733	0.01307702	0	1.01325	717.7147
5734	0	0	0.9956528	793.679
5735	0.0140677	0	1.014268	713.9355
5736	0	0	0.931339	904.0048
5737	0	0	0.9399422	715.4307
5738	0	0	0.8818282	656.6364
5739	0	0	0.9262267	760.6552
5740	0.01583126	0	1.016086	506.9402
5741	0	0	0.9193311	885.7816
5742	0	0	0.9120759	525.2717
5743	0	0	0.8802872	762.8446
5744	0.06601127	0	1.070677	742.5599
5745	0	0	0.8289189	710.7328
5746	0	0	0.8357838	751.9468
5747	0	0	0.9244772	875.9388
5748	0	0	0.9498582	648.7142
5749	0	0	0.9374723	648.6647
5750	0	0	0.901334	740.2538
5751	0	0	0.9228942	948.1747
5752	0	0.0134307	0.9000123	1013.614
5753	0	0	0.9604787	800.4876
5754	0	0	0.9492469	794.5737
5755	0	0	0.810042	840.4279
5756	0	0	0.9270829	413.6689
5757	0.0587642	0	1.062433	795.2267
5758	0	0	0.9229816	752.431
5759	0.01004816	0	1.01015	741.4612
5760	0.0431449	0	1.04509	469.6345
5761	0	0	0.8900582	744.7358
5762	0	0	0.8880631	620.0598
5763	0	0	0.9445784	953.5422

5764	0	0	0.8904913	706.8367
5765	0	0	0.9849995	858.37
5766	0	0	0.8414131	734.0712
5767	0	0	0.846658	779.2988
5768	0	0	0.9364609	890.5168
5769	0	0	0.8676127	803.8577
5770	0	0	0.8926959	835.4798
5771	0	0	0.9805987	783.4003
5772	0	0	0.9469423	968.6251
5773	0	0	0.9199574	726.0255
5774	0	0	0.965155	862.7437
5775	0.003233857	0	1.003244	710.8291
5776	0	0	0.8565524	521.2924
5777	0.003040222	0	1.003049	793.6614
5778	0.01926616	0	1.019645	833.6481
5779	0.03288181	0	1.034	830.8452
5780	0	0	0.895079	693.9659
5781	0	0	0.950947	939.8447
5782	0	0	0.9511861	850.7728
5783	0	0	0.9111191	679.1472
5784	0	0	0.8754658	710.702
5785	0	0	0.8903576	722.2084
5786	0.03337459	0	1.034527	755.3793
5787	0	0	0.8963696	683.7383
5788	0	0	0.936859	891.2626
5789	0	0	0.9353808	747.169
5790	0	0	0.844044	712.6286
5791	0	0	0.9497623	839.771
5792	0	0	0.9549093	864.9166
5793	0.0612507	0	1.065247	871.012
5794	0	0	0.8552106	636.5765
5795	0	0	0.9512567	809.4402
5796	0	0.06009193	0.9499813	1063.934
5797	0	0	0.9512395	786.8052
5798	0	0	0.9853632	789.2343
5799	0	0	0.9811423	657.373
5800	0	0	0.8347255	796.1102
5801	0	0	0.9214321	865.4478
5802	0	0	0.9267464	576.0229
5803	0	0	0.9547631	478.4183
5804	0	0	0.8589862	642.3726
5805	0	0.0420054	0.9950122	1043.847
5806	0	0	0.9705844	763.2673
5807	0.0198004	0	1.0202	603.5898
5808	0	0	0.9250578	614.1354
5809	0	0	0.8970573	924.3816
5810	0	0	0.9693156	921.1797
5811	0	0.02729324	0.9890115	1028.059
5812	0	0	0.9351566	724.2124
5813	0	0	0.8902483	693.3711
5814	0.07534312	0	1.081482	832.8353
5815	0	0	0.9070207	588.6866
5816	0	0	0.9367813	571.5115
5817	0	0	0.9767889	710.4663
5818	0	0	0.8613362	719.2523
5819	0.04251581	0	1.044404	655.2715
5820	0	0	0.9343928	660.8148
5821	0	0	0.8330172	513.6135
5822	0	0	0.8395835	596.0209
5823	0	0	0.9002942	750.2712
5824	0	0	0.8896618	476.3291
5825	0	0	0.9356797	554.1069
5826	0	0.02462701	0.9156168	1025.249
5827	0	0	0.9253862	736.2289
5828	0	0	0.9207299	916.2703
5829	0	0	0.9423195	939.2094
5830	0.04504552	0	1.04717	944.8663
5831	0	0	0.9203039	620.1168
5832	0	0	0.9540939	846.5416
5833	0	0	0.9529653	805.9272
5834	0	0	0.8783478	711.3149
5835	0.06442494	0	1.068861	653.1246
5836	0	0	0.9771091	662.8953

5837	0	0	0.9364907	532.2835
5838	0	0	0.9713672	794.1066
5839	0	0	0.8607228	610.0018
5840	0	0	0.8389514	750.7307
5841	0	0	0.9019901	646.9321
5842	0	0	0.8986626	507.6252
5843	0.003552329	0	1.003565	469.6237
5844	0.02722055	0	1.027982	801.3988
5845	0.03738206	0.05670712	1.038834	1060.116
5846	0	0	0.8760782	790.916
5847	0	0	0.919511	777.6588
5848	0	0	0.9280728	528.8488
5849	0	0	0.9911918	960.8147
5850	0.02972523	0	1.030636	686.7157
5851	0.04506733	0	1.047194	451.831
5852	0	0	0.8535414	788.8787
5853	0	0	0.9843436	560.4138
5854	0	0	0.9044495	624.3147
5855	0	0	0.8501722	666.1165
5856	0	0	0.8197675	801.0408
5857	0.0776891	0	1.084233	724.7242
5858	0	0	0.8558178	641.5086
5859	0	0	0.932241	825.7117
5860	0	0	0.9083281	713.3647
5861	0	0	0.9794617	774.5225
5862	0	0	0.9307166	848.192
5863	0	0	0.9271706	980.3073
5864	0	0	0.8214642	463.1141
5865	0.04439012	0	1.046452	649.2419
5866	0.04971898	0	1.05232	692.3994
5867	0	0	0.9420815	842.877
5868	0	0	0.9060348	679.718
5869	0	0	0.8524147	848.6519
5870	0.04872365	0	1.051219	988.2816
5871	0	0	0.9011605	508.4663
5872	0	0	0.980844	705.2305
5873	0.05175555	0	1.05458	650.3441
5874	0	0	0.890837	683.3032
5875	0	0	0.9817045	689.9569
5876	0.03423398	0	1.035447	674.8968
5877	0	0	0.9368662	710.8556
5878	0	0	0.850107	728.3071
5879	0	0	0.8800235	583.3147
5880	0.0184636	0	1.018811	816.932
5881	0	0	0.8807578	975.266
5882	0	0	0.9269546	654.1072
5883	0	0.06839199	0.9321074	1073.413
5884	0	0	0.9977552	761.0302
5885	0	0	0.9159539	806.2618
5886	0	0	0.9478216	815.7701
5887	0	0	0.989924	445.5378
5888	0	0	0.9805213	957.3097
5889	0	0	0.9148333	621.7931
5890	0.0225265	0	1.023046	943.4528
5891	0.01967148	0	1.020066	603.1855
5892	0	0	0.9355294	651.7592
5893	0	0.04699475	0.8955181	1049.312
5894	0	0	0.9238588	783.9551
5895	0.04947263	0	1.052048	723.1931
5896	0.07402985	0	1.079948	810.1376
5897	0	0	0.9663651	687.9374
5898	0	0	0.9543934	618.5258
5899	0	0	0.9774876	614.2593
5900	0	0	0.9618914	848.7157
5901	0	0	0.842183	815.9155
5902	0	0	0.9481916	645.7976
5903	0	0	0.9440736	728.0008
5904	0	0	0.8110919	769.6178
5905	0	0	0.9028428	713.1845
5906	0.003389622	0	1.003401	705.6743
5907	0	0	0.9924913	804.8761
5908	0.05121118	0	1.053975	575.1851
5909	0	0	0.9771214	851.4589

5910	0	0	0.9353669	564.4633
5911	0.02826539	0	1.029088	588.3347
5912	0	0	0.8542224	412.6917
5913	0	0	0.9707811	776.3962
5914	0	0	0.9455528	608.1001
5915	0	0	0.934788	624.0322
5916	0	0	0.897014	527.4492
5917	0	0	0.9703856	906.3666
5918	0	0	0.9298581	707.0518
5919	0	0	0.9528799	584.8036
5920	0	0	0.832086	635.6671
5921	0.04978146	0	1.05239	711.7993
5922	0	0	0.8354643	609.2248
5923	0.002426278	0	1.002432	843.8431
5924	0	0.02603639	0.9113283	1026.732
5925	0	0	0.9594382	410.9588
5926	0	0	0.9860277	664.4117
5927	0	0	0.9174207	705.317
5928	0	0	0.94046	731.1042
5929	0	0	0.9695562	589.1777
5930	0	0	0.8553218	511.6068
5931	0	0	0.8412809	653.5457
5932	0	0	0.9319348	827.9082
5933	0	0	0.9424648	870.4114
5934	0	0	0.9689988	760.6167
5935	0	0.05161595	0.9221963	1054.425
5936	0	0.00774197	0.9407361	1007.802
5937	0	0	0.954636	801.3438
5938	0	0	0.9382492	530.831
5939	0	0	0.9741444	714.529
5940	0	0	0.8747701	760.4161
5941	0	0	0.9572513	716.1765
5942	0	0	0.8785387	700.4724
5943	0	0	0.8359314	546.5893
5944	0	0	0.9368713	731.0505
5945	0.05142685	0	1.054215	885.9973
5946	0	0	0.9510578	878.0383
5947	0.03361236	0	1.034781	750.1429
5948	0.06429032	0	1.068708	496.3842
5949	0	0	0.972867	635.4377
5950	0	0	0.911592	967.2972
5951	0	0	0.9126424	666.7275
5952	0.01712763	0	1.017426	823.3842
5953	0	0	0.9928489	547.5994
5954	0	0	0.9044358	650.5211
5955	0	0	0.9387511	604.0801
5956	0	0	0.9881306	999.4489
5957	0	0	0.8671441	867.7627
5958	0	0	0.9959211	629.9617
5959	0.007615622	0	1.007674	729.3373
5960	0.01028595	0	1.010393	672.2608
5961	0.03600532	0	1.03735	601.0504
5962	0	0	0.9773005	812.6747
5963	0	0	0.97209	441.3421
5964	0.006955439	0	1.007004	834.9124
5965	0	0	0.918146	705.2226
5966	0	0	0.8848221	565.8023
5967	0	0	0.8662301	713.0848
5968	0	0	0.9849385	585.7114
5969	0	0	0.909958	845.3345
5970	0	0	0.9194689	930.0202
5971	0	0	0.9763214	745.9969
5972	0	0	0.8054336	523.6107
5973	0.03203059	0	1.03309	834.5862
5974	0.02009827	0	1.020511	884.6164
5975	0	0	0.9294704	922.5021
5976	0	0	0.9378112	613.4344
5977	0	0	0.9610955	611.5618
5978	0	0	0.8763279	569.4483
5979	0	0	0.9620565	898.7199
5980	0	0	0.9286919	800.1296
5981	0	0.04806772	0.8081451	1050.495
5982	0.01927235	0	1.019651	679.9826

5983	0	0	0.9070688	944.1367
5984	0.002717037	0	1.002724	786.9451
5985	0	0	0.9209417	681.449
5986	0	0	0.9668537	965.9086
5987	0.04855689	0	1.051035	959.5421
5988	0	0	0.9913605	768.3711
5989	0	0	0.8607545	806.8405
5990	0.01948542	0	1.019873	740.592
5991	0	0	0.8731694	864.4458
5992	0	0	0.83108	561.473
5993	0	0	0.873243	669.5141
5994	0	0	0.9596792	871.3353
5995	0.02893909	0	1.029801	598.6364
5996	0.05561187	0	1.058887	510.4203
5997	0	0	0.9517589	950.2884
5998	0.03424227	0	1.035456	695.1514
5999	0	0	0.8731524	835.4814
6000	0.07542551	0	1.081579	692.6404
6001	0	0	0.9864142	605.3019
6002	0	0	0.823687	665.0662
6003	0	0	0.8549222	768.8925
6004	0	0	0.8863152	652.2697
6005	0	0	0.8144248	622.9598
6006	0	0	0.9032562	666.204
6007	0	0	0.9967145	690.7965
6008	0	0	0.8269026	657.4335
6009	0.009632861	0	1.009727	514.9207
6010	0	0	0.8016866	713.0123
6011	0	0	0.9452556	742.8948
6012	0	0	0.9257661	690.8517
6013	0	0	0.8898241	558.4377
6014	0.03275944	0	1.033869	644.0723
6015	0	0	0.9471067	669.0834
6016	0	0	0.9445451	708.6409
6017	0	0	0.9477577	896.7977
6018	0	0	0.9505845	738.8345
6019	0	0	0.922723	833.2886
6020	0	0	0.9140488	817.9504
6021	0.06715264	0	1.071987	492.2253
6022	0	0	0.8885076	554.5648
6023	0	0	0.9574805	674.9849
6024	0	0	0.9512196	754.1417
6025	0	0	0.8886622	692.1474
6026	0.01218783	0	1.012338	776.3999
6027	0.02664838	0	1.027378	860.982
6028	0	0	0.9839315	747.6463
6029	0.007159894	0	1.007212	912.8295
6030	0	0	0.8467892	728.8697
6031	0.04570756	0	1.047897	667.0497
6032	0.04016065	0	1.041841	721.9096
6033	0	0	0.9210393	980.5197
6034	0	0	0.8873525	553.0533
6035	0	0	0.9891165	697.8459
6036	0	0	0.9520744	715.735
6037	0	0	0.9002757	702.2633
6038	0	0	0.9791596	683.7842
6039	0	0	0.9464154	813.9579
6040	0	0	0.9321454	884.1437
6041	0	0	0.940563	661.4081
6042	0	0	0.9060922	695.4508
6043	0	0	0.945118	578.2938
6044	0.03833099	0	1.039859	434.4561
6045	0	0	0.879843	754.1481
6046	0	0	0.9525495	692.3326
6047	0.05819001	0	1.061785	977.9307
6048	0	0	0.9474516	898.8779
6049	0.02394332	0	1.024531	750.3793
6050	0	0	0.9731598	874.7839
6051	0	0	0.8420591	909.0274
6052	0.06594761	0	1.070604	813.5003
6053	0	0	0.8745897	909.3433
6054	0	0	0.9474698	702.8428
6055	0	0	0.8379821	820.834

6056	0.04960551	0	1.052195	812.3246
6057	0	0	0.9159762	625.7482
6058	0.000856142	0	1.000857	795.0804
6059	0	0.04933547	0.9465154	1051.896
6060	0	0	0.9348123	504.1325
6061	0	0	0.8998066	864.0082
6062	0	0	0.9907359	681.8204
6063	0	0	0.9297489	909.2211
6064	0	0	0.9363683	887.5102
6065	0	0	0.895861	683.1926
6066	0	0	0.8854344	631.5021
6067	0	0	0.9988384	857.085
6068	0	0	0.9247313	820.3077
6069	0	0	0.8521687	605.1789
6070	0	0	0.9242535	774.5887
6071	0	0	0.9462456	732.1099
6072	0	0	0.8687534	895.584
6073	0	0	0.875473	677.1755
6074	0	0	0.8876274	578.0088
6075	0	0	0.937202	526.4462
6076	0	0	0.8626775	800.1528
6077	0	0	0.9590576	729.7703
6078	0	0	0.9764614	690.4847
6079	0.03566846	0	1.036988	631.6335
6080	0	0	0.9441575	629.8343
6081	0	0	0.9194818	959.3837
6082	0	0	0.9186756	929.9991
6083	0	0	0.8865218	744.6312
6084	0	0	0.8678814	528.4935
6085	0	0	0.9468865	995.2825
6086	0.000811076	0	1.000812	778.3461
6087	0	0	0.9650959	696.0914
6088	0	0	0.9782772	841.6611
6089	0	0	0.9997527	836.066
6090	0	0	0.8855023	671.4738
6091	0.03764074	0	1.039113	557.9589
6092	0.0253739	0	1.026034	585.5839
6093	0.03583194	0	1.037164	647.9342
6094	0	0	0.9361948	642.8751
6095	0	0	0.9488803	621.1037
6096	0	0	0.855849	636.981
6097	0	0	0.860776	541.5137
6098	0	0	0.982344	835.8436
6099	0	0	0.8954173	525.0191
6100	0	0	0.9749905	677.8997
6101	0	0	0.9249895	691.875
6102	0.03228958	0	1.033367	890.7744
6103	0	0	0.9909769	652.9208
6104	0	0	0.9639177	954.5547
6105	0	0	0.9419634	640.8195
6106	0.007514136	0	1.007571	687.9755
6107	0	0	0.9879455	798.1865
6108	0.01275884	0	1.012924	605.3097
6109	0.000801491	0	1.000802	613.7937
6110	0.009230126	0	1.009316	765.78
6111	0.02013881	0	1.020553	527.0942
6112	0	0	0.9078608	840.1711
6113	0	0	0.8987467	536.6884
6114	0	0	0.9457331	978.0505
6115	0	0	0.8099971	652.0941
6116	0	0	0.8707165	843.36
6117	0.02126914	0	1.021731	731.3428
6118	0	0	0.9134628	861.6854
6119	0	0	0.936025	623.9265
6120	0	0	0.9384419	797.4363
6121	0	0	0.9442042	804.6996
6122	0	0	0.9316205	893.889
6123	0	0	0.9302264	701.7286
6124	0.008870973	0	1.00895	662.2599
6125	0	0.05050417	0.9455661	1053.191
6126	0	0	0.9598077	842.1621
6127	0	0	0.9214852	949.0148
6128	0	0	0.9031093	939.2891

6129	0.05998149	0	1.063809	910.6523
6130	0.07700592	0	1.083431	536.551
6131	0	0	0.9424521	729.8243
6132	0.008803709	0	1.008882	972.6289
6133	0.02892851	0	1.02979	860.3165
6134	0	0.007272426	0.9004095	1007.326
6135	0.003806155	0	1.003821	653.2184
6136	0	0	0.9294791	733.1794
6137	0	0	0.8561912	863.7965
6138	0	0	0.946125	499.0107
6139	0	0	0.9283435	974.7538
6140	0.01324115	0	1.013419	682.2681
6141	0.06274333	0	1.066944	679.5127
6142	0	0	0.9131135	688.9419
6143	0	0	0.9060904	732.2111
6144	0	0	0.9755833	590.3238
6145	0.02980636	0	1.030722	509.0036
6146	0.08281971	0	1.090298	667.9496
6147	0.01821618	0	1.018554	552.4916
6148	0	0	0.9061154	976.3557
6149	0	0	0.9923442	808.4805
6150	0.03635273	0	1.037724	670.3253
6151	0.04178532	0	1.043607	715.4664
6152	0	0	0.8749008	710.4498
6153	0	0	0.9982765	552.562
6154	0	0	0.9624264	593.7739
6155	0	0	0.9666846	895.481
6156	0	0	0.8871272	507.5676
6157	0	0	0.8904406	926.7061
6158	0	0	0.9454425	788.5604
6159	0	0	0.853237	671.0324
6160	0	0	0.9472679	913.9579
6161	0	0	0.8912678	598.0361
6162	0	0	0.9273967	933.0934
6163	0	0	0.9573081	668.0964
6164	0	0	0.9705388	985.0623
6165	0	0	0.9064667	989.5142
6166	0	0	0.9180006	652.6399
6167	0	0	0.9900462	746.603
6168	0	0	0.8818583	845.4734
6169	0	0	0.8842047	513.1187
6170	0	0	0.8048347	795.9794
6171	0	0	0.8617687	955.4344
6172	0	0	0.9550704	862.6136
6173	0	0	0.8695142	809.7394
6174	0	0	0.9879548	524.2797
6175	0	0	0.9237425	735.5862
6176	0	0	0.8351795	658.9212
6177	0	0	0.8472282	862.7134
6178	0	0	0.8662993	771.298
6179	0	0	0.9800526	686.1577
6180	0.0512975	0	1.054071	683.6675
6181	0	0	0.8136378	812.7255
6182	0.01427284	0	1.01448	967.0228
6183	0.05765601	0	1.061184	812.2452
6184	0	0	0.9163979	689.9772
6185	0	0	0.9477676	734.4691
6186	0	0	0.963699	694.3795
6187	0	0	0.9460011	754.582
6188	0	0	0.8780252	589.9816
6189	0.01086186	0	1.010981	696.8066
6190	0	0	0.8937892	854.3618
6191	0	0	0.9007655	589.1204
6192	0	0	0.8027368	632.7853
6193	0	0	0.9099186	759.6699
6194	0	0	0.979569	691.5451
6195	0.001845573	0	1.001849	477.0486
6196	0	0	0.9902684	851.02
6197	0	0	0.8744622	798.1915
6198	0	0	0.9130327	766.4686
6199	0	0	0.908595	744.5609
6200	0	0	0.9505427	679.9684
6201	0	0	0.9017118	819.7591

6202	0	0	0.9085352	983.0146
6203	0	0	0.8477247	586.4365
6204	0.000979992	0	1.000981	848.1565
6205	0	0	0.9118689	725.3342
6206	0	0	0.9778972	821.0401
6207	0	0	0.9583388	790.5778
6208	0.05001633	0	1.05265	582.6859
6209	0	0	0.9999026	665.975
6210	0	0	0.9263117	623.6795
6211	0	0	0.8608509	702.3379
6212	0.06351777	0	1.067826	989.5143
6213	0	0	0.8744231	863.2277
6214	0	0	0.9047848	792.8701
6215	0	0	0.8660896	657.9609
6216	0	0	0.964547	686.2546
6217	0	0	0.9411402	668.5908
6218	0	0	0.944793	730.9813
6219	0	0	0.9773591	768.4564
6220	0	0	0.9659837	878.3828
6221	0	0	0.9630302	988.6181
6222	0	0	0.9721773	709.6553
6223	0	0	0.9748341	679.3026
6224	0	0	0.9784778	857.3865
6225	0	0	0.9367515	669.3645
6226	0	0	0.903133	791.4438
6227	0	0.004167978	0.9001545	1004.185
6228	0	0	0.8590821	563.1047
6229	0	0	0.9416811	941.585
6230	0	0	0.977014	856.501
6231	0	0	0.8543479	717.6454
6232	0.01834224	0.004304809	1.018685	1004.323
6233	0	0	0.8628871	670.2671
6234	0.07659011	0	1.082943	619.3154
6235	0	0	0.9455776	602.0867
6236	0	0	0.9699201	573.805
6237	0.002714518	0	1.002722	708.2419
6238	0	0	0.8781453	826.2836
6239	0	0	0.9813356	554.404
6240	0	0	0.9801173	881.9467
6241	0	0	0.8830827	615.2487
6242	0	0	0.9679946	724.3217
6243	0	0	0.9104488	789.9937
6244	0	0	0.9425132	787.9691
6245	0	0	0.9275059	547.8102
6246	0	0	0.9626666	626.0208
6247	0	0	0.9143837	720.6922
6248	0	0	0.912228	715.7191
6249	0	0	0.9691811	575.6547
6250	0	0	0.8903898	956.1739
6251	0	0	0.8531461	744.2043
6252	0	0	0.9698281	901.4919
6253	0	0	0.9411658	603.3149
6254	0	0	0.9164563	852.1633
6255	0.01353601	0	1.013722	767.8581
6256	0	0	0.9336005	711.3848
6257	0.00E+00	0	0.92774	671.7438
6258	0.01778759	0	1.01811	702.8478
6259	0	0	0.9699957	772.011
6260	0	0	0.8335135	690.955
6261	0	0	0.9611874	971.6026
6262	0	0	0.797502	496.8481
6263	0	0	0.8521637	995.5783
6264	0.00096299	0	1.000964	855.5443
6265	0	0	0.9007441	763.8147
6266	0.002336456	0	1.002342	683.3853
6267	0.06925064	0	1.074403	534.1474
6268	0.00342115	0	1.003433	622.7717
6269	0	0	0.8561291	878.9275
6270	6.0606E-05	0	1.000061	600.4398
6271	0.08752589	0	1.095922	807.6226
6272	0	0	0.8541623	515.4348
6273	0	0	0.9715955	710.5671
6274	0	0	0.9410581	745.3658

6275	0	0	0.9255491	673.5383
6276	0	0	0.9234177	738.4379
6277	0	0	0.974827	485.3401
6278	0	0	0.9878238	880.1479
6279	0.02196134	0.01317758	1.022455	1013.354
6280	0	0	0.9298761	690.2537
6281	0	0	0.9778552	788.4325
6282	0.003890052	0	1.003905	547.6205
6283	0	0	0.937332	567.2468
6284	0	0	0.9034905	667.7958
6285	0	0	0.9954476	973.0709
6286	0	0	0.8706056	655.7722
6287	0	0	0.8187477	643.006
6288	0	0	0.956892	735.038
6289	0	0	0.9270451	746.2769
6290	0	0	0.8942007	579.5779
6291	0.03371628	0	1.034893	532.1219
6292	0	0	0.8837098	690.3168
6293	0	0	0.9782841	770.4285
6294	0	0	0.909896	800.7022
6295	0.00141482	0	1.001417	882.9911
6296	0	0	0.9543545	715.1378
6297	0	0	0.9346538	562.0457
6298	0	0	0.9540371	720.0698
6299	0	0	0.8468671	815.8289
6300	0.02215105	0	1.022653	756.123
6301	0	0	0.8754115	537.8666
6302	0	0	0.8696193	648.6332
6303	0	0	0.9635482	637.0241
6304	0.02086625	0.007597452	1.021311	1007.656
6305	0	0	0.8710985	499.7169
6306	0	0	0.9753867	493.403
6307	0	0	0.9613849	471.0326
6308	0	0	0.8559261	973.4501
6309	0	0	0.9778239	745.8875
6310	0	0	0.9607849	662.8383
6311	0	0	0.9054423	832.1196
6312	0	0	0.8480292	810.2623
6313	0	0	0.8792882	793.5715
6314	0	0	0.8772506	882.8859
6315	0.03062596	0	1.031594	830.4951
6316	0	0	0.974834	768.4212
6317	0	0	0.8314378	658.2553
6318	0	0	0.9333395	574.528
6319	0.0014525	0	1.001455	907.6755
6320	0	0	0.9474693	616.1774
6321	0.07006727	0	1.075347	563.5074
6322	0	0	0.8965911	997.851
6323	0	0	0.8840057	486.8642
6324	0	0	0.8501737	901.3644
6325	0	0	0.9117466	849.0209
6326	0	0	0.9530947	822.7669
6327	0	0	0.973686	660.4392
6328	0	0	0.9350424	635.1626
6329	0	0	0.9031698	880.1818
6330	0.01497606	0.00015833	1.015204	1000.158
6331	0	0	0.8815797	832.1251
6332	0	0	0.9532577	782.1251
6333	0	0.03821554	0.8496582	1039.734
6334	0.003263962	0	1.003275	816.6852
6335	0	0	0.9930619	746.1833
6336	0	0	0.9400717	612.2268
6337	0	0	0.8246258	942.7686
6338	0	0	0.88595	909.7939
6339	0	0	0.8276827	977.2449
6340	0	0	0.8934925	860.7747
6341	0	0	0.955658	664.5598
6342	0.0262254	0	1.026932	590.6943
6343	0	0	0.9332048	571.7178
6344	0	0	0.9951839	468.3753
6345	0	0	0.8559347	476.8192
6346	0	0	0.845776	819.2941
6347	0	0	0.9410496	624.5969

6348	0	0	0.9757878	641.1019
6349	0.04458064	0	1.046661	504.6606
6350	0.01870956	0	1.019066	675.9211
6351	0.009915281	0	1.010015	615.0005
6352	0	0	0.9532554	637.7399
6353	0	0.005681491	0.8769289	1005.714
6354	0	0	0.9352661	674.3588
6355	0.01415436	0	1.014358	732.3478
6356	0	0	0.8424523	690.3762
6357	0.02257203	0	1.023093	607.1575
6358	0	0	0.9755604	554.0672
6359	0	0	0.8775319	948.9632
6360	0	0	0.9121179	630.8678
6361	0	0	0.9949415	384.6412
6362	0	0	0.9762259	707.6995
6363	0	0	0.9282788	739.5945
6364	0	0	0.9220238	589.6534
6365	0	0	0.983126	485.2174
6366	0	0	0.9465772	882.1636
6367	0.04788305	0	1.050291	737.4935
6368	0	0	0.9060012	877.7944
6369	0	0	0.9128599	668.5256
6370	0	0	0.94225	838.5742
6371	0.02356191	0	1.02413	731.4332
6372	0	0	0.9873954	731.6445
6373	0.04686145	0	1.049165	519.4998
6374	0	0	0.9565745	777.3278
6375	0.02608727	0	1.026786	975.1601
6376	0	0	0.9819561	725.7074
6377	0	0	0.9699003	920.1994
6378	0	0	0.9849433	457.7983
6379	0	0	0.916085	652.0963
6380	0	0	0.978174	824.4506
6381	0	0	0.8368438	869.4785
6382	0	0	0.8249274	804.0807
6383	0	0	0.9478088	666.6522
6384	0	0	0.9424933	748.6813
6385	0	0	0.8849483	856.1638
6386	0	0	0.9196095	486.3477
6387	0	0	0.9245965	602.6954
6388	0	0	0.9083112	875.348
6389	0.000529247	0	1.00053	917.3795
6390	0.002673194	0	1.00268	788.56
6391	0.01722171	0	1.017524	518.6774
6392	0	0	0.922007	782.7051
6393	0	0	0.9986253	934.373
6394	0	0	0.9444348	878.5646
6395	0	0	0.9114134	770.5383
6396	0.01833574	0	1.018678	825.2269
6397	0	0	0.9558293	739.2256
6398	0	0	0.8764941	702.1571
6399	0	0	0.8686854	796.8878
6400	0.001441562	0	1.001444	943.455
6401	0.009225988	0	1.009312	494.9584
6402	0	0	0.8733441	949.9907
6403	0	0	0.9668785	863.2376
6404	0	0	0.9488208	506.1675
6405	0	0	0.8986695	832.3728
6406	0.005275183	0	1.005303	929.2202
6407	0	0	0.9321118	823.0916
6408	0.04788185	0	1.05029	993.3855
6409	0	0	0.8648828	736.5736
6410	0	0	0.8846271	766.975
6411	0	0	0.9324858	893.7404
6412	0.07232712	0	1.077966	755.3497
6413	0	0	0.8942008	547.5248
6414	0	0	0.8469252	701.9172
6415	0	0	0.885435	758.5775
6416	0	0	0.9213285	605.4506
6417	0	0	0.9292432	482.2309
6418	0	0	0.9049169	934.0496
6419	0	0	0.8917229	554.2524
6420	0.05135018	0	1.05413	691.2097

6421	0	0	0.9818128	631.5549
6422	0	0	0.9320888	929.2872
6423	0	0	0.9112867	713.5309
6424	0	0	0.950765	644.6331
6425	0	0	0.8884314	708.0515
6426	0	0	0.9614959	825.2403
6427	0	0	0.9852214	748.9437
6428	0	0	0.9807382	760.1969
6429	0	0	0.9479891	850.6332
6430	0	0	0.948988	617.9286
6431	0.01738077	0	1.017688	728.439
6432	0	0	0.9987741	547.1211
6433	0	0.01802271	0.8853466	1018.354
6434	0	0	0.9108912	942.9421
6435	0	0	0.9714904	994.4839
6436	0.06648999	0	1.071226	790.962
6437	0	0	0.927966	799.4705
6438	0	0	0.8993806	713.767
6439	0.01290949	0	1.013078	907.9812
6440	0	0	0.9321786	694.7671
6441	0.03239165	0	1.033476	710.1761
6442	0	0	0.8396946	879.3505
6443	0	0	0.9211506	807.9195
6444	0	0	0.9027079	615.1002
6445	0	0	0.9830179	700.971
6446	0.009515082	0	1.009606	674.459
6447	0	0	0.9890712	624.0981
6448	0.00E+00	0	0.9068339	648.2321
6449	0	0	0.9453783	462.63
6450	0	0	0.8899817	993.4736
6451	0	0	0.9372129	705.3173
6452	0	0	0.8225372	549.5496
6453	0.007155254	0	1.007207	837.7134
6454	0	0	0.9451029	848.3405
6455	0	0	0.8934936	459.8941
6456	0	0	0.9470824	718.1195
6457	0	0	0.9489203	524.0309
6458	0	0	0.9735324	575.0386
6459	0	0	0.9251664	770.7006
6460	0	0	0.9789078	724.1271
6461	0	0	0.930761	567.6457
6462	0	0	0.9915516	666.4716
6463	0	0	0.8889494	607.4559
6464	0	0	0.9706761	897.4391
6465	0	0	0.9679049	785.7427
6466	0	0	0.9232998	720.4831
6467	0	0	0.8845631	868.5695
6468	0.04221393	0	1.044075	979.8126
6469	0	0	0.9105216	870.9353
6470	0	0	0.8248847	919.4628
6471	0.01614373	0	1.016409	836.507
6472	0	0	0.9860489	851.358
6473	0.04749666	0	1.049865	752.5231
6474	0	0	0.9445098	725.2252
6475	0	0	0.8585005	738.0679
6476	0	0	0.9257293	702.626
6477	0	0	0.9150922	900.4357
6478	0	0	0.8462658	827.142
6479	0.04482653	0	1.04693	785.2563
6480	0.006564312	0	1.006608	502.5058
6481	0	0	0.9404685	410.2319
6482	0	0	0.809648	773.8737
6483	0	0	0.9639181	719.1238
6484	0	0	0.9223847	828.019
6485	0	0	0.8922681	994.9775
6486	0	0	0.8627272	583.3889
6487	0	0	0.9264833	898.5598
6488	0	0	0.9949799	631.1459
6489	0	0	0.8177078	749.1792
6490	0	0	0.876225	443.4422
6491	0.03444879	0	1.035678	752.8381
6492	0.008046323	0	1.008112	760.4105
6493	0	0	0.80439	780.0738

6494	0.002299186	0	1.002304	838.6419
6495	0	0	0.9172354	818.1975
6496	0	0	0.9368263	596.2466
6497	0	0	0.9737682	665.1575
6498	0	0	0.9686558	891.5924
6499	0	0.06370857	0.9271326	1068.044
6500	0	0	0.9997563	716.069
6501	0	0	0.9406503	689.0928
6502	0	0	0.9230769	719.9781
6503	0	0	0.947328	742.6463
6504	0	0	0.8312457	864.244
6505	0	0	0.9857259	809.6613
6506	0.01223804	0	1.01239	652.5475
6507	0	0	0.9868596	611.0037
6508	0	0	0.9543901	775.2214
6509	0.04687233	0	1.049177	553.1475
6510	0.009761048	0	1.009857	572.6112
6511	0	0	0.9183658	774.8432
6512	0	0	0.8811139	931.2573
6513	0	0	0.9812447	876.5096
6514	0	0	0.943187	782.8213
6515	0	0	0.9906451	895.3425
6516	0	0.00173352	0.9477	1001.737
6517	0	0	0.9089497	656.6942
6518	0	0	0.9843996	889.9729
6519	0.01428274	0	1.01449	805.2827
6520	0	0	0.8482871	599.5508
6521	0.004166021	0	1.004183	908.9203
6522	0.0245167	0	1.025133	784.4868
6523	0.01700989	0	1.017304	820.9603
6524	0	0	0.8792791	747.2549
6525	0	0	0.8720188	891.0892
6526	0	0	0.9464439	402.5027
6527	0	0	0.9824879	744.0434
6528	0.02282395	0	1.023357	876.3502
6529	0	0	0.8829181	566.7917
6530	0.005339481	0	1.005368	738.5338
6531	0.05039199	0	1.053066	879.8997
6532	0	0	0.9658565	880.4213
6533	0	0	0.9452757	898.2334
6534	0	0	0.9185281	596.1443
6535	0	0	0.992656	426.0356
6536	0.05657615	0	1.059969	420.1473
6537	0	0	0.822167	528.9796
6538	0	0	0.8619336	878.4724
6539	0	0	0.8851442	865.2511
6540	0.04629704	0	1.048545	670.2941
6541	0	0	0.938063	749.6638
6542	0	0	0.8330296	995.2301
6543	0	0	0.8162367	950.3206
6544	0	0	0.9787948	805.982
6545	0	0	0.9182371	706.2215
6546	0	0	0.9183697	737.3843
6547	0	0	0.936426	883.6707
6548	0.03145978	0	1.032482	491.5107
6549	0	0	0.9645713	815.4125
6550	0	0	0.9635062	489.2694
6551	0	0	0.9213858	485.4103
6552	0.03004075	0	1.030971	872.1891
6553	0	0	0.9527574	762.2625
6554	0	0	0.9451047	746.4122
6555	0.003949301	0	1.003965	857.2253
6556	0	0	0.9383962	589.7696
6557	0	0	0.8835925	831.7209
6558	0	0	0.94269	643.8686
6559	0	0	0.92562	544.0558
6560	0.0491047	0	1.051641	754.2986
6561	0	0	0.9583016	859.317
6562	0	0	0.9288737	641.0604
6563	0	0	0.9706588	814.376
6564	0	0	0.8879525	565.8602
6565	0	0	0.9053793	705.2315
6566	0	0	0.9106705	752.878

6567	0	0	0.9517058	690.6168
6568	0	0	0.8577867	838.767
6569	0	0	0.9975421	818.3584
6570	0	0	0.935032	834.1026
6571	0	0	0.9111551	925.9131
6572	0	0	0.9429217	550.1818
6573	0.04397983	0	1.046003	747.7259
6574	0	0	0.9342107	488.3579
6575	0	0	0.9299765	830.8652
6576	0	0	0.9463601	838.0174
6577	0	0	0.9972893	585.8076
6578	0	0	0.9905983	480.974
6579	0	0	0.904568	990.8355
6580	0	0	0.9435108	562.0308
6581	0	0	0.9934927	883.6933
6582	0	0	0.9200311	838.1943
6583	0.0247142	0	1.02534	941.9869
6584	0	0	0.9006902	661.2797
6585	0	0	0.9202098	781.7532
6586	0	0	0.9773943	702.5289
6587	0	0	0.8771655	785.7647
6588	0	0	0.906945	594.3727
6589	0	0	0.9459093	690.8417
6590	0.05093485	0	1.053668	670.7117
6591	0.02289357	0	1.02343	807.3972
6592	0.04635182	0	1.048605	485.7525
6593	0.001558288	0	1.001561	708.0884
6594	0	0	0.8374547	747.6678
6595	0.02095058	0	1.021399	779.7243
6596	0	0	0.9386033	844.166
6597	0	0	0.9275065	563.8382
6598	0	0	0.8897796	415.3186
6599	0.0585468	0	1.062188	794.4332
6600	0	0	0.902684	642.5114
6601	0	0	0.9530855	744.3488
6602	0	0	0.9982775	512.7252
6603	0.02229935	0	1.022808	819.2556
6604	0	0	0.8968945	712.5549
6605	0	0	0.899972	664.6974
6606	0.03435875	0	1.035581	597.1469
6607	0	0	0.9047403	786.514
6608	0	0	0.9241693	823.2953
6609	0	0	0.9216692	774.3647
6610	0	0	0.9812461	666.9294
6611	0	0	0.9214653	607.839
6612	0	0	0.9231843	997.7451
6613	0.02282425	0	1.023357	870.6033
6614	0.01714383	0	1.017443	770.1968
6615	0	0	0.914264	707.6465
6616	0	0	0.8780918	881.1404
6617	0	0	0.859199	576.8505
6618	0	0	0.9966484	837.5891
6619	0	0	0.9972487	614.3719
6620	0	0	0.8472418	607.2739
6621	0	0	0.8850251	585.6223
6622	0.0373756	0	1.038827	813.4053
6623	0	0	0.9296729	788.9203
6624	0	0	0.9969397	727.2823
6625	0	0	0.8694755	760.1124
6626	0.003074977	0	1.003084	768.4896
6627	0.05728349	0	1.060764	740.0329
6628	0	0	0.9248613	704.7018
6629	0.06580007	0	1.070435	683.9622
6630	0.0437429	0	1.045744	457.2469
6631	0	0	0.9748805	785.657
6632	0	0	0.9037799	434.0429
6633	0	0	0.8161716	501.2019
6634	0	0	0.9845124	601.2667
6635	0	0	0.9137554	777.7325
6636	0.0113318	0	1.011462	915.4581
6637	0	0	0.8907446	851.9566
6638	0	0	0.9315163	532.5725
6639	0.08214376	0	1.089495	881.7532

6640	0	0	0.9344621	961.9905
6641	0	0	0.9655662	727.7434
6642	0	0	0.9454582	878.9655
6643	0	0	0.8765664	801.6589
6644	0.02938055	0	1.03027	561.0625
6645	0	0	0.9879898	455.7561
6646	0	0	0.9467157	755.2182
6647	0.03027427	0	1.031219	569.2924
6648	0	0	0.9188766	588.58
6649	0	0	0.9439046	694.2738
6650	0	0	0.8958808	873.1649
6651	0	0	0.9444121	757.8185
6652	0	0	0.8738562	889.8941
6653	0.06297937	0	1.067212	782.9681
6654	0	0.01626791	0.825076	1016.537
6655	0	0	0.9056074	642.4291
6656	0	0	0.9424626	614.9542
6657	0	0	0.9085756	979.5823
6658	0	0	0.8695041	678.9005
6659	0	0	0.8646498	736.0319
6660	0	0	0.9847372	513.1652
6661	0	0	0.9832844	770.515
6662	0	0	0.9269927	934.8066
6663	0	0	0.9259248	832.8336
6664	0	0.04749322	0.9673491	1049.861
6665	0	0	0.8682306	757.8511
6666	0.003322883	0	1.003334	706.5731
6667	0	0	0.9716029	815.4753
6668	0	0	0.8134208	595.7791
6669	0	0	0.950368	798.8385
6670	0	0	0.952507	553.0977
6671	0	0	0.8266845	783.7682
6672	0	0	0.9114509	873.002
6673	0.01536176	0	1.015601	553.0687
6674	0	0	0.993922	770.2027
6675	0.002691125	0	1.002698	570.1284
6676	0	0	0.9957908	671.2997
6677	0	0	0.977905	945.7983
6678	0	0	0.9947234	859.9045
6679	0	0	0.8847901	856.1187
6680	0	0	0.9657407	974.1524
6681	0	0	0.9360365	649.934
6682	0	0	0.9886357	924.9553
6683	0	0	0.8896165	784.5599
6684	0	0	0.9692742	796.3118
6685	0	0	0.9479311	571.7502
6686	0	0	0.990836	739.0186
6687	0	0	0.9057822	988.0221
6688	0.01017549	0	1.01028	679.0323
6689	0	0	0.8917693	862.2348
6690	0.0610456	0	1.065014	766.3248
6691	0.003429781	0	1.003442	766.5951
6692	0.04855335	0	1.051031	805.5093
6693	0.07801282	0	1.084614	876.2981
6694	0.05657952	0	1.059973	940.8399
6695	0.07580077	0	1.082018	432.8343
6696	0	0	0.82682	667.7295
6697	0	0	0.9637644	680.313
6698	0.0253787	0	1.02604	441.2305
6699	0	0	0.9509842	501.7266
6700	0	0	0.9100524	963.1321
6701	0	0	0.9269202	484.6465
6702	0	0	0.8838102	577.7313
6703	0	0	0.9524232	599.389
6704	0.0572556	0	1.060733	517.4123
6705	0.001800679	0	1.001804	905.8461
6706	0.00720854	0	1.007261	898.5721
6707	0.04998943	0	1.05262	578.0132
6708	0	0	0.9053377	638.1896
6709	0	0	0.9058688	502.0123
6710	0	0	0.991244	821.2135
6711	0	0	0.8687447	556.1451
6712	0.01773268	0	1.018053	815.2926

6713	0	0	0.8707441	716.7211
6714	0	0	0.996057	760.7805
6715	0.007989141	0	1.008054	504.7694
6716	0.009679189	0	1.009774	833.7761
6717	0.0011991	0	1.001201	669.2948
6718	0	0	0.9962158	542.2684
6719	0	0	0.9869374	782.7953
6720	0	0	0.9522122	797.5758
6721	0	0	0.9672019	952.2828
6722	0	0	0.9024279	621.0613
6723	0	0	0.8917487	898.2346
6724	0	0	0.9471222	656.8222
6725	0.02524778	0	1.025902	563.9456
6726	0	0	0.9089692	649.3464
6727	0	0	0.8634	716.5439
6728	0	0	0.8934424	749.778
6729	0	0	0.9238379	471.4394
6730	0	0	0.933789	497.6416
6731	0	0	0.9201984	939.5324
6732	0	0	0.9143886	646.705
6733	0.00E+00	0	0.8937397	910.7086
6734	0.03209937	0	1.033164	757.8025
6735	0	0	0.8458403	525.96
6736	0	0	0.9540044	986.1584
6737	0.01077313	0	1.01089	552.1593
6738	0.01277296	0	1.012938	710.8604
6739	0	0	0.9606795	795.0428
6740	0	0	0.8980054	650.3738
6741	0	0	0.8903463	523.2863
6742	0	0	0.9689509	815.9622
6743	0	0	0.9274054	941.5281
6744	0	0	0.8254003	741.478
6745	0.02770856	0	1.028498	949.9788
6746	0	0	0.9858534	596.4741
6747	0	0	0.9622065	783.3361
6748	0	0	0.9230952	763.2926
6749	0	0	0.9306037	730.1699
6750	0	0	0.8161241	870.7137
6751	0	0	0.9848415	748.6921
6752	0.03158443	0	1.032615	600.2161
6753	0	0	0.8572942	858.6161
6754	0.007566799	0	1.007625	761.8317
6755	0	0	0.8780368	595.2905
6756	0	0	0.8177175	806.9103
6757	0	0	0.8809035	710.9208
6758	0	0	0.8835256	612.1526
6759	0	0	0.9786082	818.8787
6760	0	0	0.9458688	827.5532
6761	0	0	0.8786069	822.0192
6762	0	0	0.8530074	523.6177
6763	0	0	0.8957635	734.437
6764	0	0	0.894125	669.6133
6765	0	0	0.9207507	472.1355
6766	0.01260969	0	1.012771	626.7402
6767	0	0	0.8733874	689.9423
6768	0	0	0.851073	749.1085
6769	0	0	0.9509411	840.8274
6770	0	0	0.9863392	696.4858
6771	0.01192551	0	1.012069	800.9644
6772	0	0	0.9315527	644.1262
6773	0	0	0.8325097	578.8683
6774	0	0	0.9536938	782.3516
6775	0	0	0.9207609	521.3799
6776	0	0	0.9052018	438.4148
6777	0	0	0.9382229	678.19
6778	0	0	0.9819065	839.5596
6779	0	0	0.8449634	659.923
6780	0	0	0.9828734	671.4307
6781	0	0	0.8377211	663.4842
6782	0	0	0.939927	694.805
6783	0.01520669	0	1.015442	723.6461
6784	0	0	0.8299333	822.5764
6785	0	0	0.8859684	377.5868

6786	0	0	0.8779925	747.0877
6787	0	0	0.9246842	768.6737
6788	0	0	0.9363796	724.2813
6789	0	0	0.9678906	860.0133
6790	0.002879649	0	1.002888	659.3698
6791	0	0	0.9072173	935.2956
6792	0	0	0.9155661	909.5355
6793	0	0	0.89042	440.3372
6794	0.04004095	0	1.041711	704.0891
6795	0	0	0.980197	793.5535
6796	0	0	0.9852954	672.0109
6797	0	0	0.8931949	743.241
6798	0	0	0.9475217	586.4649
6799	0.03490306	0	1.036165	616.3287
6800	0	0	0.9851612	958.2206
6801	0.0828381	0	1.09032	619.4193
6802	0	0	0.9075608	611.9129
6803	0	0	0.986923	710.8306
6804	0	0	0.8342077	692.5721
6805	0	0	0.9524765	705.565
6806	0	0	0.9282231	636.6656
6807	0	0	0.9706358	692.0106
6808	0	0	0.96288	674.5001
6809	0.00E+00	0	0.8849128	733.2661
6810	0.05724368	0	1.060719	639.8975
6811	0.003953917	0	1.00397	773.6434
6812	0	0	0.9049451	530.1214
6813	0	0	0.9528176	976.5152
6814	0	0	0.9128971	959.246
6815	0	0	0.9908053	954.6415
6816	0	0	0.9912603	471.8038
6817	0	0	0.99686	596.1587
6818	0	0	0.9462868	739.2672
6819	0	0	0.8930292	917.7387
6820	0	0.0010315	0.9307361	1001.033
6821	0	0	0.8985125	811.2284
6822	0	0	0.9785051	786.8859
6823	0	0	0.9523465	517.8272
6824	0	0	0.902226	777.8854
6825	0	0	0.9675246	634.5833
6826	0.03762195	0	1.039093	761.3711
6827	0	0.03459571	0.8828468	1035.835
6828	0	0	0.9433016	803.6467
6829	0	0	0.937083	861.7245
6830	0.04495273	0	1.047069	841.7479
6831	0	0	0.8836833	893.9876
6832	0	0	0.8240384	504.5869
6833	0	0	0.8293132	892.2575
6834	0	0	0.9818303	837.1058
6835	0.005399487	0	1.005429	753.7495
6836	0	0.02808637	0.8992043	1028.898
6837	0	0	0.9701549	942.692
6838	0	0	0.9782034	684.5778
6839	0.03752156	0	1.038984	875.1691
6840	0	0	0.9385985	764.5582
6841	0	0	0.9421962	836.7743
6842	0.0688519	0	1.073943	749.387
6843	0.01758103	0	1.017896	931.846
6844	0	0	0.8820502	802.7632
6845	0	0	0.9441208	958.0616
6846	0	0	0.881537	839.0993
6847	0	0	0.8760571	791.6807
6848	0	0	0.9372697	702.2162
6849	0.07973599	0	1.086645	661.5541
6850	0	0	0.9279339	651.6404
6851	0	0	0.9802843	823.8282
6852	0.005287349	0	1.005315	797.8349
6853	0	0	0.8599253	917.3067
6854	0	0	0.7992087	678.5177
6855	0.007838845	0	1.007901	636.8905
6856	0	0	0.9650972	867.6677
6857	0	0	0.9032191	736.5213
6858	0	0	0.9751786	587.4874

6859	0.0360897	0	1.037441	739.1611
6860	0	0	0.9279656	766.3974
6861	0	0	0.9917046	812.1937
6862	0	0	0.8799876	691.384
6863	0	0	0.9065534	518.5287
6864	0	0	0.8596942	759.0029
6865	0	0	0.9064656	844.2898
6866	0.006615336	0	1.006659	657.5666
6867	0	0	0.9944918	786.6393
6868	0	0	0.8691306	789.6085
6869	0	0	0.9073172	994.0449
6870	0	0	0.894203	863.2375
6871	0	0	0.9932158	662.8624
6872	0	0	0.9505167	759.8419
6873	0	0	0.7925344	858.9599
6874	0	0	0.9431133	848.4762
6875	0	0	0.873481	498.157
6876	0	0	0.8950028	910.1635
6877	0	0	0.8256509	612.7302
6878	0.032139	0	1.033206	506.0946
6879	0.03042256	0	1.031377	488.6168
6880	0	0	0.9910309	572.7365
6881	0	0	0.8532066	557.5296
6882	0	0	0.8398436	596.7752
6883	0	0	0.8365912	725.8425
6884	0.06753074	0	1.072421	470.4274
6885	0	0	0.8844104	719.9408
6886	0	0	0.8329116	932.075
6887	0	0	0.9372608	895.5421
6888	0	0	0.9406223	737.8246
6889	0	0	0.9240885	738.9143
6890	0	0	0.8832287	523.8274
6891	0	0	0.9752031	610.291
6892	0	0	0.8150424	966.406
6893	0	0	0.8970612	560.7222
6894	0	0	0.9601789	774.9216
6895	0	0	0.9624968	637.2093
6896	0.06372698	0	1.068065	519.4033
6897	0	0	0.963941	870.337
6898	0	0	0.9090897	658.6003
6899	0	0	0.8686299	938.9752
6900	0	0	0.9141107	423.0573
6901	0	0	0.9285589	720.1356
6902	0.02508534	0	1.025731	688.5302
6903	0	0	0.8874474	946.8847
6904	0	0	0.8921844	642.8833
6905	0.01103155	0	1.011155	917.1404
6906	0	0	0.9392772	642.834
6907	0	0	0.9538095	777.6375
6908	0	0	0.877692	794.9423
6909	0	0	0.9590942	633.4899
6910	0	0	0.8867553	824.7624
6911	0.03399733	0	1.035194	554.8444
6912	0	0.006707599	0.8758751	1006.753
6913	0	0	0.9453802	816.6113
6914	0.05690094	0	1.060334	786.5717
6915	0	0	0.9149672	741.3639
6916	0	0	0.9117033	585.3391
6917	0	0	0.9014571	726.2932
6918	0	0	0.9930763	923.1904
6919	0	0	0.9258592	483.4668
6920	0.06698367	0	1.071793	669.7884
6921	0	0.000740205	0.82819	1000.741
6922	0	0	0.8533443	904.4025
6923	0	0	0.8820797	719.0117
6924	0	0	0.9719796	408.7723
6925	0.007340463	0	1.007395	933.559
6926	0.04548582	0	1.047653	789.0819
6927	0	0	0.977424	766.4832
6928	0	0	0.8793947	557.3273
6929	0	0	0.8705719	937.3622
6930	0	0.05146495	0.8768951	1054.257
6931	0.03174189	0	1.032782	562.0291

6932	0.02961535	0	1.030519	906.2899
6933	0	0	0.9016964	906.1825
6934	0	0	0.9513539	767.2084
6935	0	0	0.9430303	514.6868
6936	0	0	0.9634312	567.1547
6937	0.03182098	0	1.032867	803.5631
6938	0	0	0.8860441	745.9962
6939	0	0	0.9069288	654.9897
6940	0	0	0.9520772	428.8666
6941	0	0	0.9464912	765.4916
6942	0	0.008358202	0.924227	1008.429
6943	0	0	0.9051771	583.8571
6944	0	0	0.9599305	707.0597
6945	0	0	0.9668869	687.2831
6946	0	0	0.946881	573.9974
6947	0.01818866	0	1.018526	647.7902
6948	0	0	0.9207798	881.2474
6949	0.05278146	0	1.055723	668.9769
6950	0	0	0.9059057	744.0229
6951	0	0	0.9845023	900.9473
6952	0	0	0.9213731	786.2601
6953	0	0	0.8722825	611.1471
6954	0	0.004000674	0.8931897	1004.017
6955	0.0183559	0	1.018699	732.3128
6956	0	0	0.9133494	823.9819
6957	0	0	0.9220839	833.1555
6958	0	0.04883502	0.9672691	1051.342
6959	0	0	0.8073067	770.1149
6960	0	0	0.9468687	501.2349
6961	0	0	0.9683243	940.7527
6962	0.002963555	0	1.002972	382.239
6963	0	0	0.9338644	779.0177
6964	0	0.000873085	0.9147354	1000.874
6965	0	0	0.9292325	801.6517
6966	0	0	0.8573576	608.1788
6967	0	0	0.8756064	850.1538
6968	0	0	0.9054644	873.9774
6969	0	0	0.9630817	843.8358
6970	0	0	0.9523425	683.5284
6971	0	0	0.9343978	797.956
6972	0.02308528	0	1.023631	737.7661
6973	0	0	0.9488537	820.4714
6974	0	0	0.944442	733.5443
6975	0	0	0.9285646	615.1524
6976	0	0	0.8236416	686.2374
6977	0	0	0.8707508	638.216
6978	0	0	0.9939644	489.4266
6979	0	0	0.9436676	973.0366
6980	0.04848972	0	1.050961	744.6131
6981	0	0	0.9215558	681.1485
6982	0.05389643	0	1.056967	887.4227
6983	0	0	0.9084924	591.163
6984	0.0193412	0	1.019723	859.7753
6985	0	0	0.9400989	786.3364
6986	0	0	0.8623982	545.7666
6987	0	0	0.9740046	847.1757
6988	0.02617769	0	1.026881	546.9611
6989	0.01917189	0	1.019547	673.9042
6990	0.01793093	0	1.018258	834.1351
6991	0	0	0.9413046	724.0781
6992	0	0	0.9858545	853.5831
6993	0.01816086	0	1.018497	451.4314
6994	0.005779561	0	1.005813	625.2581
6995	0	0	0.9491267	991.0514
6996	0.02950568	0	1.030403	723.3751
6997	0.03401595	0	1.035214	997.8169
6998	0	0	0.9548464	700.7208
6999	0.01566784	0	1.015917	794.4025
7000	0.009584608	0	1.009677	838.3963
7001	0	0	0.9695368	575.3223
7002	0	0	0.924048	835.9576
7003	0.03366206	0	1.034835	942.5897
7004	0	0	0.9532102	618.0811

7005	0	0	0.8870192	535.0085
7006	0	0	0.8690852	733.7623
7007	0	0	0.8163438	740.8627
7008	0	0	0.9413354	717.1715
7009	0.03933787	0	1.040949	688.8687
7010	0	0	0.9667252	743.3961
7011	0.04479339	0	1.046894	780.1347
7012	0.005412893	0	1.005442	537.4059
7013	0	0	0.9413159	649.0062
7014	0	0	0.9281792	674.0551
7015	0	0	0.8909987	838.6677
7016	0.003732285	0	1.003746	788.1254
7017	0	0	0.9530407	839.6967
7018	0	0	0.9206108	669.8154
7019	0	0	0.9945661	973.1797
7020	0	0	0.9531144	629.2211
7021	0	0	0.9153332	717.4064
7022	0	0	0.9159856	636.9861
7023	0	0	0.9516506	927.756
7024	0	0	0.875404	856.3152
7025	0.04739151	0	1.049749	771.7891
7026	0	0	0.9028931	597.2758
7027	0	0	0.9517191	526.6298
7028	0	0	0.9212692	585.2723
7029	0	0	0.8878963	921.3981
7030	0	0	0.9544917	446.7527
7031	0	0	0.9405669	998.142
7032	0	0	0.9541199	642.5392
7033	0	0	0.8842163	825.1968
7034	0	0	0.8881385	895.4266
7035	0.03831164	0	1.039838	542.4154
7036	0	0	0.8979834	806.1437
7037	0	0	0.9596502	655.8248
7038	0	0	0.9223148	702.2855
7039	0	0	0.956053	889.7446
7040	0.046111	0	1.04834	781.1431
7041	0	0	0.8775852	763.0128
7042	0	0	0.8870118	679.8297
7043	0	0	0.8820826	621.1469
7044	0	0	0.8880541	736.0291
7045	0	0	0.8789183	876.0658
7046	0	0	0.9893582	730.4982
7047	0	0	0.9173472	789.2572
7048	0	0	0.8938873	902.2822
7049	0	0	0.9775261	414.9322
7050	0	0	0.9500932	932.3967
7051	0	0	0.8926399	810.6456
7052	0	0	0.9731483	736.7764
7053	0	0	0.8353255	674.2269
7054	0.03034896	0	1.031299	924.4916
7055	0	0	0.8062183	645.7136
7056	0	0	0.9776527	887.8995
7057	0.01770065	0	1.01802	681.8618
7058	0	0	0.8929832	488.3215
7059	0.04935062	0	1.051913	875.4625
7060	0	0	0.9456211	808.9797
7061	0	0	0.8788946	581.4661
7062	0	0	0.958865	646.647
7063	0	0	0.9401775	610.5765
7064	0	0	0.9708272	822.3719
7065	0	0	0.9260436	612.8311
7066	0.04503791	0	1.047162	719.1019
7067	0	0	0.9660358	634.4496
7068	0.02959639	0	1.030499	531.4951
7069	0	0	0.9469595	853.0439
7070	0	0	0.8250895	557.8268
7071	0	0	0.9555795	672.5229
7072	0	0	0.9135963	731.4496
7073	0	0.0373153	0.9174932	1038.762
7074	0	0	0.8460708	709.7667
7075	0	0	0.9274159	537.3885
7076	0	0	0.9208471	730.139
7077	0	0	0.9476919	713.6248

7078	0	0	0.991815	492.4598
7079	2.76E-02	0	1.028401	974.1503
7080	0	0	0.9386758	752.5775
7081	0	0	0.9251238	628.4456
7082	0	0	0.9039943	842.4893
7083	0	0	0.9049286	788.8459
7084	0	0	0.8435203	585.9845
7085	0	0	0.9836645	908.552
7086	0	0	0.9916101	848.3628
7087	0	0	0.9104137	887.8373
7088	0.006789209	0	1.006836	390.3453
7089	0	0	0.9973785	814.8231
7090	0	0	0.9402676	738.6799
7091	0.009409543	0	1.009499	737.8928
7092	0	0	0.9949921	521.3073
7093	0	0	0.8564208	547.4154
7094	0	0	0.8004206	583.7178
7095	0.009202724	0.01411108	1.009288	1014.313
7096	0	0	0.9845282	819.2131
7097	0	0	0.9322134	785.1177
7098	0	0	0.9613711	624.1068
7099	0	0	0.8889069	823.5213
7100	0	0	0.8802481	654.8291
7101	0	0	0.9733844	780.7728
7102	0	0	0.968701	744.5308
7103	0	0	0.9745004	907.7699
7104	0	0	0.9773175	630.653
7105	0.0576876	0	1.061219	688.134
7106	0.04603914	0	1.048261	758.6791
7107	0	0	0.9866745	944.6683
7108	0	0	0.9510283	832.7397
7109	0	0	0.9181201	830.2159
7110	0	0	0.8389628	435.6338
7111	0.06423096	0	1.06864	748.0342
7112	0	0	0.9802895	832.8682
7113	0	0	0.8617617	517.8292
7114	0	0	0.8879085	604.3636
7115	0	0	0.9159282	703.7188
7116	0	0	0.8213196	749.8132
7117	0	0	0.9539763	686.2735
7118	0	0	0.9576923	924.7531
7119	0	0	0.9212568	941.1996
7120	0	0	0.9590273	450.209
7121	0.01156932	0	1.011705	671.4816
7122	0.03905644	0.02704377	1.040644	1027.795
7123	0	0	0.9875454	637.5617
7124	0.04407106	0.01743073	1.046103	1017.74
7125	0	0	0.8734463	662.9496
7126	0	0	0.9490364	684.9869
7127	0.06867492	0	1.073739	847.5373
7128	0	0	0.9632289	774.1062
7129	0.06759845	0	1.072499	637.1448
7130	0	0	0.9083766	835.1124
7131	0.03191724	0	1.03297	840.8511
7132	0.003506381	0	1.003519	793.2195
7133	0	0	0.9880775	774.2675
7134	0.07248525	0	1.07815	990.6729
7135	0	0	0.8081661	712.2469
7136	0.001756674	0	1.00176	751.84
7137	0.02154086	0	1.022015	411.8095
7138	0	0	0.8239489	795.3968
7139	0	0	0.9922307	600.1861
7140	0	0	0.9413201	517.2549
7141	0	0	0.8952953	880.4041
7142	0	0	0.8720055	711.2932
7143	0	0	0.9699162	756.1465
7144	0	0	0.9582587	674.6474
7145	0	0	0.8759053	967.7763
7146	0.03760111	0	1.03907	775.34
7147	0	0	0.8209733	934.4608
7148	0	0	0.9536064	450.2105
7149	0	0	0.8628601	880.9266
7150	0	0	0.9007083	629.0421

7151	0	0	0.8928803	740.3054
7152	0.01685817	0	1.017147	895.8849
7153	0	0	0.8761052	654.9526
7154	0	0	0.967033	506.3462
7155	0.05695447	0	1.060394	697.1758
7156	0	0	0.979204	623.1393
7157	0	0	0.9604571	473.3384
7158	0.01128315	0	1.011412	799.2516
7159	0	0	0.9684717	386.5845
7160	0	0	0.8444002	851.5732
7161	0.01484996	0	1.015074	938.3431
7162	0	0	0.887684	825.0134
7163	0	0	0.9176831	721.2584
7164	0	0	0.8751243	973.7321
7165	0	0	0.9466443	751.0331
7166	0	0	0.9571788	977.4216
7167	0	0	0.8656864	667.1834
7168	0	0	0.8698355	610.5653
7169	0.01665626	0	1.016938	588.3851
7170	0	0	0.9869339	717.1035
7171	0	0	0.9841163	787.2388
7172	0.02322082	0	1.023773	864.5114
7173	0	0	0.9944768	619.9794
7174	0.00E+00	0	0.9812049	592.714
7175	0	0	0.9774701	745.2468
7176	0	0	0.9758075	771.066
7177	0	0	0.9906778	749.3039
7178	0.05022685	0	1.052883	650.1927
7179	0	0	0.9868932	912.7228
7180	0	0	0.8838485	780.6446
7181	0	0	0.8923751	999.838
7182	0	0	0.9762101	575.1732
7183	0	0	0.9496718	657.3122
7184	0	0	0.8789128	925.5366
7185	0.0314911	0	1.032515	670.411
7186	0	0	0.909119	785.4928
7187	0	0	0.8564495	526.5856
7188	0	0	0.8952366	712.291
7189	0.062557	0	1.066732	646.1072
7190	0	0	0.9487318	924.8165
7191	0	0	0.8910282	715.5178
7192	0	0	0.9240878	736.845
7193	0	0	0.9863798	745.632
7194	0	0	0.9725935	695.1309
7195	0	0	0.9792687	862.0071
7196	0	0	0.8229653	617.1932
7197	0	0	0.9548053	731.5995
7198	0	0	0.9198532	521.7301
7199	0	0	0.9820673	777.3348
7200	0	0	0.8155739	701.2464
7201	0	0	0.8922374	718.9355
7202	0	0	0.8198918	870.899
7203	0	0	0.9278355	609.9886
7204	0	0	0.8826929	570.9855
7205	0	0	0.9569782	600.3817
7206	0	0	0.8916028	745.816
7207	0.0419175	0	1.043751	962.6092
7208	0.04614582	0	1.048378	971.9282
7209	0	0	0.9621123	817.2958
7210	0.05852513	0	1.062163	763.5609
7211	0	0	0.8838562	936.0201
7212	0	0	0.9172597	830.4896
7213	0	0	0.9328426	704.6056
7214	0	0	0.8516064	722.8852
7215	0	0	0.842966	905.2609
7216	0	0	0.8653263	503.4391
7217	0	0	0.9137424	845.9739
7218	0	0.0197348	0.8990374	1020.132
7219	0	0	0.9589326	636.4374
7220	0	0	0.9611653	702.9597
7221	0.003343222	0	1.003354	436.8034
7222	0.008978218	0	1.00906	504.7637
7223	0	0	0.8416122	857.3679

7224	0	0	0.8800372	639.6574
7225	0	0	0.9735311	549.4859
7226	0	0	0.9519688	906.9069
7227	0	0	0.922778	889.9099
7228	0	0	0.9202872	969.337
7229	0	0	0.9441707	710.2502
7230	0.06311388	0	1.067366	467.1132
7231	0	0	0.9567873	543.0648
7232	0	0	0.9629365	835.5356
7233	0	0	0.987856	750.1992
7234	0	0	0.8619639	559.6996
7235	0.02628961	0	1.026999	561.2479
7236	0	0	0.9519197	793.7606
7237	0.0373984	0	1.038851	721.0071
7238	0	0	0.9220325	529.5758
7239	0	0	0.923754	665.4882
7240	0	0	0.8522271	689.0505
7241	0.07002817	0.01350112	1.075301	1013.686
7242	0.02619537	0	1.0269	469.1974
7243	0	0	0.94474	966.8143
7244	0	0	0.8776987	678.2402
7245	0	0	0.8977535	842.9232
7246	0	0	0.8801069	532.9377
7247	0	0	0.9514197	707.6096
7248	0	0	0.9411267	964.6861
7249	0	0	0.8750898	660.7278
7250	0	0	0.9332551	824.2229
7251	0.03346894	0	1.034628	819.0607
7252	0	0	0.837427	848.5076
7253	0.02399958	0	1.02459	807.2118
7254	0.05084471	0	1.053568	730.829
7255	0	0	0.9360307	701.982
7256	0	0.02788426	0.9077146	1028.684
7257	0.001246926	0	1.001248	826.5341
7258	0.04836227	0	1.05082	909.3549
7259	0	0	0.8901164	552.4607
7260	0	0	0.8519998	798.2855
7261	0.07368681	0	1.079548	694.9882
7262	0	0	0.9834216	683.3696
7263	0	0	0.9904194	579.8549
7264	0	0	0.9337572	846.3802
7265	0	0	0.8927221	613.2051
7266	0	0	0.9258838	900.0718
7267	0.04900443	0	1.05153	972.6166
7268	0	0	0.9775233	525.4769
7269	0	0	0.8981122	626.0944
7270	0.07250325	0	1.078171	431.8548
7271	0	0	0.8777701	677.3225
7272	0	0	0.9766507	725.3826
7273	0	0	0.8640636	882.3433
7274	0	0	0.9849306	856.2103
7275	0	0	0.8849434	677.6356
7276	0.02931519	0	1.0302	814.0159
7277	0	0	0.9460939	947.0875
7278	0	0	0.9162574	755.0997
7279	0.007639943	0	1.007699	998.0725
7280	0	0	0.8022466	978.7103
7281	0	0	0.9018576	778.477
7282	0	0	0.9349195	965.7451
7283	0.007980851	0	1.008045	508.6919
7284	0	0	0.8380073	862.8983
7285	0	0	0.9922152	996.7875
7286	0	0	0.9298664	572.8024
7287	0	0	0.9424566	888.0834
7288	0	0	0.9467078	680.6
7289	0.02174259	0	1.022226	503.8046
7290	0.01251812	0	1.012677	564.5741
7291	0.04726341	0	1.049608	854.1913
7292	0	0	0.8946969	721.9795
7293	0	0	0.961148	765.4224
7294	0	0	0.9462577	709.1384
7295	0	0	0.904368	910.5663
7296	0	0	0.8899781	921.0903

7297	0	0	0.9013827	637.182
7298	0.05299182	0	1.055957	879.9555
7299	0	0	0.8055174	656.4459
7300	0	0	0.9142165	651.6779
7301	0.03438593	0	1.03561	471.7283
7302	0	0	0.9491147	757.9565
7303	0	0	0.9922386	692.5057
7304	0	0	0.9782109	698.7888
7305	0.05795926	0	1.061525	941.452
7306	0	0	0.9383181	919.5864
7307	0	0	0.9756815	976.4949
7308	0	0	0.9316593	540.2922
7309	0	0.02368118	0.9761026	1024.256
7310	0	0	0.8651127	771.4849
7311	0.000662429	0	1.000663	731.2495
7312	0	0	0.9691838	830.4424
7313	0	0	0.8991888	819.0063
7314	0	0	0.9130096	882.2388
7315	0	0	0.9642	511.6899
7316	0	0	0.9252238	521.8193
7317	0	0	0.8830053	991.5091
7318	0	0	0.9152291	984.0715
7319	0.002251616	0.06819868	1.002257	1073.19
7320	0	0	0.8820407	538.9385
7321	0	0	0.9937428	774.7086
7322	0	0	0.9918637	929.8289
7323	0	0	0.8570402	845.0814
7324	0	0	0.9674641	718.0089
7325	0	0	0.9579617	745.2056
7326	0	0	0.8043946	549.717
7327	0	0	0.9784712	951.9282
7328	0	0	0.972513	612.1312
7329	0	0	0.9278018	981.1886
7330	0	0	0.8508387	756.3331
7331	0	0	0.9645032	841.0598
7332	0	0	0.9875391	759.1083
7333	0	0	0.8663065	671.2344
7334	0	0	0.8860492	751.4532
7335	0	0	0.8220789	939.5858
7336	0	0	0.9192535	976.6206
7337	0	0	0.8271378	557.1445
7338	0	0.03922059	0.9450759	1040.822
7339	0	0	0.837274	907.6089
7340	0	0	0.841018	697.0089
7341	0	0	0.9348583	645.4122
7342	0	0	0.8025696	832.8066
7343	0	0	0.9409107	898.1894
7344	0	0	0.8938006	864.4946
7345	0.01055583	0	1.010668	879.4702
7346	0.003567281	0	1.00358	845.2886
7347	0	0	0.8563997	922.6837
7348	0	0	0.903679	611.2255
7349	0.02069393	0	1.021131	778.9426
7350	0	0	0.9032512	844.829
7351	0	0	0.9324612	609.0803
7352	0	0	0.943145	607.0184
7353	0	0	0.9781519	640.2917
7354	0.03711569	0	1.038546	628.3741
7355	0	0	0.9915613	884.9702
7356	0	0	0.9857734	900.1974
7357	0	0	0.987622	755.0174
7358	0.04999442	0	1.052625	651.8629
7359	0	0	0.9428742	824.7372
7360	0	0	0.853383	732.8698
7361	0	0	0.9775647	727.4631
7362	0	0	0.9692129	701.1519
7363	0	0	0.9491429	861.8541
7364	0	0	0.970346	549.8262
7365	0	0	0.9097995	832.9028
7366	0.04786671	0	1.050273	617.8359
7367	0	0	0.9720586	601.7275
7368	0	0	0.9557538	592.9094
7369	0	0	0.8078637	906.9211

7370	0.03078622	0	1.031764	808.6611
7371	0	0	0.9132296	834.0651
7372	0	0	0.9890598	818.5679
7373	0	0	0.8519147	665.5329
7374	0	0	0.8987701	683.5016
7375	0	0	0.9801753	644.7051
7376	0.06233522	0	1.066479	559.083
7377	0	0	0.9399989	548.8669
7378	0	0	0.9049629	450.3681
7379	0	0	0.9546769	602.7524
7380	0	0	0.9835387	644.3893
7381	0	0	0.9004436	876.1368
7382	0.0415214	0	1.04332	611.109
7383	0	0	0.9518633	414.7401
7384	0.007944045	0	1.008008	425.6102
7385	0	0	0.8949995	690.1741
7386	0	0	0.9420987	756.6212
7387	0.003944508	0	1.00396	591.5131
7388	0	0	0.9477835	969.7678
7389	0.05162847	0	1.054439	752.5822
7390	0	0	0.9485698	774.8912
7391	0	0	0.9558232	654.1831
7392	0	0	0.8255339	673.1021
7393	0.06906562	0	1.07419	720.9113
7394	0	0	0.9053958	821.5629
7395	0	0	0.9706026	789.0238
7396	0	0	0.8365492	749.5075
7397	0	0	0.9394147	771.5442
7398	0	0	0.9028055	661.8766
7399	0.03207773	0	1.033141	546.7233
7400	0.007388121	0	1.007443	863.8632
7401	0	0	0.9328465	736.2126
7402	0	0	0.9951414	779.9445
7403	0	0	0.9568763	685.7645
7404	0	0	0.8594093	775.9962
7405	0	0.04388183	0.8342765	1045.896
7406	0.04223932	0	1.044102	749.6361
7407	0	0	0.9687951	938.8987
7408	0	0	0.9964722	574.308
7409	0	0	0.9932246	786.6578
7410	0	0	0.9891255	768.6365
7411	0	0	0.8615279	699.037
7412	0	0	0.9572576	443.2091
7413	0	0	0.8740904	816.7162
7414	0	0	0.9322753	895.4431
7415	0	0	0.9231284	699.5972
7416	0	0	0.9388679	928.873
7417	0	0	0.9573119	997.0957
7418	0	0.002344751	0.9250003	1002.35
7419	0	0	0.9830084	792.0407
7420	0	0	0.9798797	902.0867
7421	0.05242755	0	1.055328	666.3026
7422	0.03181444	0	1.03286	800.0551
7423	0	0	0.936563	613.5159
7424	0	0	0.8298331	443.1739
7425	0	0	0.884055	837.7542
7426	0	0	0.980402	696.1725
7427	0	0	0.9341539	724.3191
7428	0	0	0.8423688	950.9517
7429	0	0	0.8404016	714.4556
7430	0	0	0.8091428	864.4077
7431	0.03127838	0	1.032288	944.3958
7432	0	0	0.9084291	616.8862
7433	0	0	0.9605675	811.2202
7434	0	0	0.8037825	627.9777
7435	0	0	0.98342	695.1249
7436	0	0	0.9634343	838.2403
7437	0	0	0.931681	415.472
7438	0	0	0.9834694	662.0422
7439	0	0	0.9596561	776.3703
7440	0	0	0.9710748	789.8787
7441	0.001829759	0	1.001833	805.7175
7442	0	0	0.9309552	775.6957

7443	0.07604679	0	1.082306	711.7698
7444	0	0	0.9747091	608.7763
7445	0	0	0.9239675	912.5142
7446	0	0	0.97093	543.7686
7447	0	0	0.873449	650.017
7448	0	0	0.9859715	972.7784
7449	0	0	0.9012332	977.1439
7450	0	0	0.9472544	757.6899
7451	0	0	0.9341504	878.825
7452	0	0	0.8591066	683.1891
7453	0	0	0.9636484	728.1935
7454	0	0	0.8489633	514.3742
7455	0.04037273	0.02000048	1.042071	1020.409
7456	0	0	0.9986358	883.5787
7457	0	0	0.9335323	581.7461
7458	0	0	0.9024445	920.9934
7459	0	0	0.8569407	767.6057
7460	0.05849247	0	1.062126	668.6387
7461	0	0	0.8003089	787.2208
7462	0.02830342	0	1.029128	702.8644
7463	0	0	0.9143773	923.0706
7464	0.03306145	0	1.034192	613.1511
7465	0	0	0.9837121	948.8326
7466	0	0	0.9526723	782.036
7467	0	0	0.9844542	771.9758
7468	0.03026871	0	1.031214	874.9207
7469	0	0	0.8856135	777.4904
7470	0	0	0.8853661	738.8721
7471	0	0	0.868967	688.7377
7472	0.03194875	0	1.033003	659.8363
7473	0	0	0.865098	824.565
7474	0	0	0.9303208	609.24
7475	0	0	0.9654723	625.1815
7476	0	0	0.8334756	728.8635
7477	0.01653389	0	1.016812	664.0471
7478	0	0	0.9056069	915.1852
7479	0	0	0.9719145	876.3757
7480	0	0	0.9604801	637.7057
7481	0.02753315	0.0393826	1.028313	1040.997
7482	0	0	0.9997362	746.9696
7483	0	0	0.9807937	742.8351
7484	0	0	0.9038064	714.4481
7485	0	0	0.9950274	812.1026
7486	0	0	0.8854365	467.8445
7487	0	0	0.9846792	886.7716
7488	0	0	0.9625555	719.1368
7489	0	0	0.9568336	795.9351
7490	0	0	0.963562	429.1936
7491	0	0	0.9566908	729.3266
7492	0	0	0.9152465	780.5229
7493	0	0	0.9884509	825.29
7494	0.006758114	0	1.006804	385.0195
7495	0	0	0.8645841	587.7853
7496	0	0	0.9203766	707.7978
7497	0	0	0.9914511	725.4189
7498	0	0	0.8891501	565.1143
7499	0	0	0.9619698	643.1744
7500	0	0	0.8660863	704.9287
7501	0	0	0.9704024	711.3473
7502	0	0	0.9687729	688.9503
7503	0.03868126	0	1.040238	546.9003
7504	0	0	0.811569	694.6902
7505	0	0	0.8718182	549.3267
7506	0	0	0.8023741	636.4489
7507	0	0	0.8786582	719.3367
7508	0	0	0.9677511	566.9505
7509	5.81275E-05	0	1.000058	692.8314
7510	0	0	0.9161929	784.8851
7511	0.01652889	0	1.016807	696.5845
7512	0	0	0.9580995	884.0979
7513	0	0	0.9266803	656.5104
7514	0	0	0.8874037	860.1819
7515	0	0	0.9523389	767.6295

7516	0	0	0.9715053	594.7596
7517	0.02224053	0	1.022746	709.4078
7518	0	0	0.9444311	663.8953
7519	0	0	0.9397863	528.6828
7520	0	0	0.8567727	580.2249
7521	0	0	0.8902704	664.347
7522	0.01618211	0	1.016448	583.1787
7523	0	0	0.9589788	812.4791
7524	0.03239	0	1.033474	736.4347
7525	0	0	0.992889	705.2124
7526	0	0	0.8569431	695.0459
7527	0.02609286	0	1.026792	398.8974
7528	0.000733309	0	1.000734	949.8496
7529	0	0	0.9479538	598.301
7530	0	0	0.9662138	650.2775
7531	0.04503664	0	1.047161	878.2715
7532	0	0	0.8306487	884.8325
7533	0	0	0.8469651	864.5396
7534	0	0	0.9644685	877.7688
7535	0	0	0.9557062	715.1731
7536	0	0	0.9444281	541.923
7537	0.02335726	0	1.023916	673.027
7538	0	0	0.9140549	949.1631
7539	0.04693925	0	1.049251	895.1442
7540	0	0	0.9488351	792.5833
7541	0	0	0.9051623	586.863
7542	0.05948968	0	1.063253	923.7821
7543	0	0	0.9009374	821.324
7544	0	0	0.9306775	875.1182
7545	0	0	0.9035361	505.1791
7546	0	0	0.9422528	798.4225
7547	0	0	0.9625776	404.3512
7548	0.01230475	0.01266498	1.012458	1012.827
7549	0	0	0.9098536	895.592
7550	0	0	0.9254702	959.9424
7551	0	0	0.9566765	827.9959
7552	0.03344104	0	1.034598	622.7294
7553	0	0	0.8701505	758.5181
7554	0	0	0.8293338	596.8275
7555	0	0	0.9733782	576.5522
7556	0.00010917	0.01089751	1.000109	1011.018
7557	0	0	0.832468	709.1464
7558	0	0	0.9183956	985.0034
7559	0	0	0.8949082	963.2841
7560	0.05415968	0	1.057261	490.5593
7561	0	0	0.9490436	604.3629
7562	0	0	0.8517763	804.348
7563	0	0	0.9520774	882.5668
7564	0	0	0.9363465	621.4389
7565	0	0	0.9990748	648.9153
7566	0.006866231	0	1.006914	543.0825
7567	0.07458045	0	1.080591	851.1392
7568	0	0	0.9272869	748.1037
7569	0.01601337	0	1.016274	881.3177
7570	0	0	0.9247013	431.0883
7571	0	0	0.9598663	656.7104
7572	0	0	0.863135	671.4938
7573	0	0	0.8737244	484.6499
7574	0.03885662	0	1.040427	861.7975
7575	0	0	0.9339179	848.9083
7576	0.00E+00	0	0.9298105	765.285
7577	0	0.05730813	0.8734674	1060.792
7578	0.03469065	0	1.035937	629.7703
7579	0	0	0.9011792	859.5954
7580	0	0	0.8841276	674.9152
7581	0	0	0.9192205	649.0911
7582	0	0	0.9995823	431.3644
7583	0	0	0.9257032	668.6112
7584	0	0	0.9167324	706.6761
7585	0.004426908	0.02772105	1.004447	1028.511
7586	0	0	0.8121235	746.3824
7587	0	0	0.9662414	712.5688
7588	0.003982843	0	1.003999	678.0114

7589	0	0	0.9512839	740.451
7590	0.03583805	0	1.03717	872.578
7591	0.07210587	0	1.077709	836.3611
7592	0	0	0.8654552	515.5387
7593	0	0	0.9951371	723.9158
7594	0.07105961	0	1.076495	865.1219
7595	0	0	0.8794755	786.9847
7596	0	0	0.9444066	981.6358
7597	0	0	0.8895025	907.5412
7598	0	0	0.9119716	882.4523
7599	0	0	0.9851544	556.1393
7600	0	0	0.898517	832.3581
7601	0	0	0.9013422	774.5327
7602	0.01673504	0	1.01702	536.4927
7603	0	0	0.9620484	802.3328
7604	0.02277436	0	1.023305	657.7916
7605	0	0	0.9437748	793.3539
7606	0.003278509	0	1.003289	537.3394
7607	0	0	0.886672	772.6294
7608	0.003706314	0	1.00372	613.245
7609	0.004460884	0	1.004481	721.2886
7610	0	0	0.8321108	987.5113
7611	0	0	0.9827064	621.2011
7612	0	0	0.9880531	764.3699
7613	0.00E+00	0	0.9075063	592.2874
7614	0	0	0.9609846	930.5934
7615	0	0	0.9936118	975.0546
7616	0	0	0.9707053	724.3781
7617	0	0	0.9147765	914.5396
7618	0.04651819	0	1.048788	867.0175
7619	0.02661203	0	1.02734	682.0769
7620	0	0	0.9755505	920.3235
7621	0.07592848	0	1.082167	644.4918
7622	0	0	0.9628853	455.9412
7623	0	0	0.8972511	947.7516
7624	0	0	0.8692353	934.4308
7625	0.00E+00	0	0.9521213	422.974
7626	0	0	0.9511672	694.9325
7627	0.06353761	0	1.067849	850.8671
7628	0.05524942	0	1.05848	840.6713
7629	0	0	0.9985904	682.2743
7630	0	0	0.9871317	480.8835
7631	0	0	0.9340853	610.3266
7632	0.06633799	0.04092351	1.071051	1042.67
7633	0	0	0.8652056	595.1155
7634	0	0	0.8017624	849.0151
7635	0.07433782	0	1.080308	635.2493
7636	0	0	0.9191263	932.2587
7637	0	0	0.9308715	861.8604
7638	0	0	0.981438	779.2426
7639	0	0	0.9636071	962.4761
7640	0	0.02010266	0.8950449	1020.515
7641	0	0	0.8640818	937.7906
7642	0	0	0.8910438	747.337
7643	0	0	0.8409132	743.7945
7644	0.02877169	0	1.029624	793.9893
7645	0	0	0.9777651	548.0253
7646	0	0	0.9242641	578.3779
7647	0.02823108	0	1.029051	774.3599
7648	0.04697346	0	1.049289	849.3998
7649	0	0	0.9644496	593.3248
7650	0	0.02211155	0.8910987	1022.612
7651	0	0	0.9084532	649.3713
7652	0	0	0.9978031	565.4567
7653	0	0	0.9090998	782.8712
7654	0	0.04268277	0.9555355	1044.586
7655	0	0	0.9809666	706.9682
7656	0	0	0.9421206	648.7126
7657	0	0	0.9216857	793.5129
7658	0.01507751	0	1.015308	753.6366
7659	0	0	0.857625	872.6494
7660	0	0	0.9000743	599.949
7661	0	0	0.8768913	949.576

7662	0	0	0.8444107	441.6006
7663	0	0	0.9631456	805.8902
7664	0	0	0.8170202	593.8555
7665	0	0	0.9163553	850.2188
7666	0	0	0.9233128	819.2006
7667	0	0	0.9049505	579.7584
7668	0	0	0.93328	954.2933
7669	0	0	0.8847831	712.2311
7670	0	0	0.9775258	788.1313
7671	0	0	0.9556751	616.6205
7672	0.02147794	0	1.021949	806.6937
7673	0	0	0.8155153	844.7989
7674	0	0	0.953639	671.6603
7675	0	0	0.8791034	599.9821
7676	0	0	0.8830915	835.9756
7677	0	0	0.9701288	887.7933
7678	0.04185255	0	1.043681	728.1865
7679	0.02216666	0	1.022669	543.4139
7680	0	0	0.8901643	897.5485
7681	0.002985769	0	1.002995	888.396
7682	0	0	0.9908617	945.2319
7683	0	0	0.9873604	717.4652
7684	0	0	0.9989234	858.4269
7685	0	0	0.9530598	765.451
7686	0	0	0.9022191	728.475
7687	0	0	0.8348584	920.9641
7688	0	0	0.9886166	730.2802
7689	0	0	0.9238123	655.1948
7690	0	0	0.9912968	754.0356
7691	0	0	0.9141777	726.2537
7692	0	0	0.9559508	571.4669
7693	0.03384715	0	1.035033	726.0978
7694	0	0	0.9321945	711.8024
7695	0	0	0.8858615	867.4877
7696	0	0	0.9733626	782.6227
7697	0	0	0.8584957	765.0259
7698	0.06170036	0	1.065758	590.4551
7699	0	0	0.9699356	801.5172
7700	0	0	0.8247148	679.1477
7701	0.06515816	0	1.0697	810.0634
7702	0	0.03752819	0.9375496	1038.991
7703	0	0	0.9335905	799.5419
7704	0	0	0.9044271	439.7876
7705	0	0	0.9586579	570.5284
7706	0	0	0.9795999	722.7081
7707	0	0	0.9729748	500.0402
7708	0	0	0.8817895	757.2147
7709	0.006882999	0	1.006931	602.2498
7710	0	0	0.9437304	752.5753
7711	0	0	0.8731377	489.2187
7712	0	0	0.9560804	697.6845
7713	0	0	0.9475461	896.2897
7714	0	0	0.9345605	634.6564
7715	0	0	0.8492435	677.7446
7716	0	0	0.8359693	821.5663
7717	0.06522362	0	1.069775	604.0037
7718	0.000220095	0	1.00022	634.3958
7719	0	0	0.9443096	624.5351
7720	0	0.05302152	0.9130937	1055.99
7721	0	0	0.9671634	811.8826
7722	0	0	0.9131669	900.1944
7723	0	0	0.943695	554.0347
7724	0	0	0.823977	623.0013
7725	0	0	0.9749103	619.9647
7726	0	0	0.8981849	812.5985
7727	0	0	0.9096674	638.1055
7728	0	0	0.9708921	649.3799
7729	0	0	0.8095757	844.6148
7730	0.02390082	0	1.024486	584.4006
7731	0	0	0.9489322	581.767
7732	0.01296218	0	1.013132	636.89
7733	0.01452826	0	1.014742	917.3716
7734	0	0	0.9908978	886.719

7735	0	0	0.8526636	740.7242
7736	0	0	0.8848365	952.5994
7737	0.02567474	0	1.026351	758.132
7738	0.005401434	0	1.005431	857.0699
7739	0	0	0.8653868	903.1907
7740	0	0	0.8881485	630.6586
7741	0	0	0.9028728	835.8389
7742	0	0	0.9428823	625.2955
7743	0	0	0.8870838	927.9172
7744	0	0	0.9235875	844.4856
7745	0	0	0.9327126	526.6887
7746	0	0	0.9451019	982.528
7747	0.03417084	0	1.03538	997.0391
7748	0	0	0.9471501	687.0069
7749	0.05967462	0	1.063462	488.8409
7750	0	0	0.9139845	739.2073
7751	0	0	0.8695383	779.4394
7752	0	0	0.835763	840.6213
7753	0	0	0.934961	951.8419
7754	0.000448826	0.0379759	1.000449	1039.475
7755	0	0	0.8619449	691.5929
7756	0	0	0.927792	920.0385
7757	0	0	0.991861	939.0087
7758	0	0	0.9751337	954.5889
7759	0	0	0.922357	751.9652
7760	0	0	0.9232464	712.0027
7761	0.01959608	0	1.019988	858.3365
7762	0	0	0.8905666	610.3438
7763	0.000448079	0	1.000448	712.2894
7764	0	0	0.9500549	702.3924
7765	0	0	0.920059	993.4716
7766	0	0	0.8479626	877.7758
7767	0	0	0.8769467	819.5873
7768	0	0	0.9205332	653.9164
7769	0	0	0.9446574	672.2385
7770	0	0	0.8931331	751.5905
7771	0	0	0.9289324	782.9631
7772	0	0	0.9857209	946.1299
7773	0	0	0.8546757	781.2563
7774	0	0	0.9914275	635.4475
7775	0	0	0.9607047	714.3996
7776	0	0	0.9489281	516.3755
7777	0	0	0.8815188	416.6302
7778	0	0	0.9542716	727.7526
7779	0	0	0.9616486	696.9804
7780	0	0	0.9562575	825.8336
7781	0	0	0.943656	513.61
7782	0	0	0.8829463	615.1093
7783	0.00E+00	0	0.9426708	718.9732
7784	0	0	0.883531	720.9551
7785	0.0122897	0	1.012443	547.2996
7786	0.003246622	0	1.003257	691.4415
7787	0.01677364	0	1.01706	934.7753
7788	0	0	0.903182	639.9228
7789	0	0	0.8397995	898.6478
7790	0.02839335	0	1.029223	818.6971
7791	0.008636464	0	1.008712	682.5606
7792	0	0	0.9273345	864.3591
7793	0	0	0.9165599	632.912
7794	0	0	0.9508984	884.2465
7795	0.009163941	0	1.009249	804.8799
7796	0	0	0.8811258	913.326
7797	0	0	0.9836928	680.1326
7798	0.009800794	0	1.009898	875.2523
7799	0	0	0.8443779	728.2057
7800	0	0	0.9225492	708.6444
7801	0	0	0.8935417	612.5321
7802	0	0	0.9551889	468.0332
7803	0	0	0.9015578	605.459
7804	0	0	0.964373	822.3648
7805	0	0	0.8781883	934.3256
7806	0.02266239	0	1.023188	822.4087
7807	0.03019402	0	1.031134	943.8063

7808	0.03298004	0	1.034105	807.7751
7809	0	0	0.9475552	542.5546
7810	0	0	0.9685544	674.1018
7811	0	0.0368029	0.9312509	1038.209
7812	0	0	0.9923303	829.7646
7813	0	0	0.8823939	772.1558
7814	0	0	0.9181336	844.2347
7815	0	0	0.8246106	784.4971
7816	0	0	0.8973621	745.771
7817	0	0	0.9535142	563.0203
7818	0	0	0.9453098	579.7036
7819	0.03005621	0	1.030988	939.4619
7820	0	0	0.9215134	811.6086
7821	0	0	0.913757	604.5805
7822	0	0	0.8367338	582.9576
7823	0	0	0.9390918	887.3472
7824	0	0	0.9639308	705.0613
7825	0	0	0.9690126	534.9484
7826	0	0	0.8762321	497.281
7827	0	0	0.9319484	699.8212
7828	0.0725207	0	1.078191	876.0455
7829	0	0	0.9428105	507.9351
7830	0	0	0.9829745	687.3464
7831	0.007451904	0	1.007508	669.3472
7832	0	0	0.9521024	944.7245
7833	0	0	0.9293593	974.0549
7834	0.02062724	0	1.021062	811.0074
7835	0	0	0.8950216	493.3195
7836	0	0	0.9455093	720.1481
7837	0	0	0.983243	694.4956
7838	0.01054649	0	1.010659	757.9483
7839	0	0.0491544	0.913699	1051.695
7840	0	0	0.9649383	963.8159
7841	0	0	0.9059606	529.7194
7842	0.03838376	0	1.039916	979.1279
7843	0	0	0.984382	800.7136
7844	0	0	0.9617308	658.1978
7845	0	0	0.994562	770.7161
7846	0	0	0.8341012	864.7792
7847	0	0	0.9404105	887.0773
7848	0	0	0.9823863	918.9373
7849	0	0	0.9389659	939.1307
7850	0	0	0.8070845	718.5215
7851	0	0	0.8648444	718.0756
7852	0	0	0.9430739	801.2142
7853	0	0	0.9984463	744.9085
7854	0	0	0.944506	598.0843
7855	0	0	0.859348	832.201
7856	0	0	0.940935	796.3599
7857	0	0	0.9652525	914.1929
7858	0	0	0.9116001	940.5712
7859	0	0.02424084	0.9363869	1024.843
7860	0	0	0.8961156	792.9954
7861	0	0	0.8967729	727.2299
7862	0	0	0.8415321	691.15
7863	0	0	0.9211603	841.4106
7864	0.03685676	0	1.038267	878.2292
7865	0	0	0.9995086	580.9269
7866	0	0	0.9444917	780.3317
7867	0.01130695	0	1.011436	758.1959
7868	0	0	0.9661803	981.9603
7869	0	0	0.9156948	691.4639
7870	0	0	0.9231535	424.1357
7871	0.02263212	0	1.023156	830.5632
7872	0	0	0.9238052	969.9384
7873	0	0	0.9555328	635.5096
7874	0	0	0.9981879	784.7372
7875	0	0	0.9492952	816.3342
7876	0.07216325	0	1.077776	919.9339
7877	0	0	0.9760816	641.4109
7878	0.0597466	0	1.063543	681.2249
7879	0.01245363	0	1.012611	744.6285
7880	0.03454799	0	1.035784	742.1924

7881	0.02200945	0	1.022505	684.7754
7882	0	0	0.9239892	723.6473
7883	0	0	0.999527	674.7431
7884	0	0	0.9459962	741.1082
7885	0	0	0.9190199	668.9358
7886	0	0	0.8875759	796.4942
7887	0	0	0.869669	828.6801
7888	0	0	0.9456296	669.1209
7889	0	0	0.9839346	978.3212
7890	0	0	0.9991043	801.8613
7891	0.06769684	0	1.072613	873.2524
7892	0	0	0.9019054	685.5412
7893	0	0	0.9915103	693.2722
7894	0	0	0.8885667	423.926
7895	0	0	0.8786169	720.6892
7896	0.02797231	0	1.028777	525.1835
7897	0	0.0226334	0.973384	1023.158
7898	0	0	0.951528	812.218
7899	0.004581076	0	1.004602	559.3622
7900	0	0	0.9950581	447.1473
7901	0.03688677	0	1.0383	774.2
7902	0.0374094	0	1.038863	532.5911
7903	0.03051276	0	1.031473	816.1937
7904	0	0	0.8256209	769.2362
7905	0	0	0.9650459	635.6367
7906	0	0	0.9175452	989.7275
7907	0	0	0.9234936	676.5782
7908	0	0	0.943458	873.8685
7909	0.006360147	0	1.006401	925.2173
7910	0.006818643	0	1.006866	798.572
7911	0	0	0.9841799	788.1914
7912	0	0	0.9573428	722.7078
7913	0	0	0.9896444	826.39
7914	0.005285433	0	1.005314	522.8794
7915	0	0	0.9362959	699.9606
7916	0.03800039	0	1.039501	931.0184
7917	0	0	0.8429222	708.7419
7918	0	0	0.9416643	880.1099
7919	0	0	0.8172953	775.8501
7920	0.03490519	0	1.036168	707.8939
7921	0	0	0.8868034	901.7373
7922	0	0	0.9715418	740.6592
7923	0	0	0.9242447	734.9962
7924	0	0	0.9295139	696.3414
7925	0.05083896	0	1.053562	962.2732
7926	0	0	0.9155539	710.117
7927	0	0	0.9578551	686.4415
7928	0	0	0.9782647	907.7166
7929	0	0	0.8373853	720.7606
7930	0	0	0.8954333	523.3711
7931	0	0	0.9592715	639.4181
7932	0	0	0.9215066	761.4687
7933	0	0	0.993651	840.8415
7934	0	0	0.9816369	867.9418
7935	0	0	0.9359362	897.8367
7936	0	0	0.9431904	508.7969
7937	0	0	0.9833571	916.668
7938	0.00E+00	0	0.9140691	679.2773
7939	0.03042131	0	1.031376	662.3209
7940	0	0	0.8335335	814.4385
7941	0	0	0.8372182	633.266
7942	0	0	0.8857222	820.8344
7943	0	0	0.9126123	573.2474
7944	0	0	0.8537605	665.6389
7945	0	0	0.845402	647.0472
7946	0.03343034	0	1.034587	797.861
7947	0.08542371	0	1.093403	571.3928
7948	0	0	0.9239077	886.1179
7949	0.005277877	0	1.005306	653.4559
7950	0	0	0.8867104	640.5308
7951	0.00E+00	0	0.9467064	472.3438
7952	0.02843938	0	1.029272	810.8306
7953	0	0	0.9289301	804.3976

7954	0	0	0.8875068	771.2968
7955	0	0	0.9541376	697.9473
7956	0	0	0.9271796	670.9216
7957	0	0	0.8278635	834.8557
7958	0	0	0.9236851	752.3816
7959	0	0	0.9587858	702.3893
7960	0	0	0.9262261	737.541
7961	0.0778491	0	1.084421	711.5872
7962	0	0	0.9724132	700.4344
7963	0	0	0.9556273	691.3026
7964	0.06932151	0	1.074485	857.246
7965	0.05823208	0	1.061833	457.9984
7966	0	0	0.8703604	817.1147
7967	0	0	0.874657	724.0161
7968	0.02309781	0	1.023644	805.6775
7969	0	0	0.9779254	646.8925
7970	0	0	0.9996902	780.1894
7971	0	0	0.9914475	918.4282
7972	0.03402773	0	1.035226	753.0668
7973	0	0	0.9751177	772.7664
7974	0	0	0.9447544	725.0056
7975	0	0	0.904286	767.3297
7976	0	0	0.9152015	761.2374
7977	0	0	0.9131276	852.6251
7978	0.03256014	0	1.033656	723.1437
7979	0	0	0.9528821	448.7643
7980	0.003477601	0	1.00349	600.6097
7981	0.03607619	0	1.037426	531.0873
7982	0	0	0.9660119	755.1769
7983	0	0	0.9608571	798.8281
7984	0.0108806	0	1.011	880.3647
7985	0.02518741	0	1.025838	698.3166
7986	0.04022808	0	1.041914	918.0872
7987	0	0.03184834	0.8996123	1032.896
7988	0	0	0.867718	864.6678
7989	0	0	0.8619452	603.5822
7990	0	0	0.9437616	583.2217
7991	0	0	0.8974143	744.4539
7992	0	0	0.8941785	850.8798
7993	0.000381757	0	1.000382	905.2087
7994	0.01728462	0	1.017589	754.4389
7995	0	0	0.8559567	720.8986
7996	0	0	0.9392216	480.6675
7997	0	0	0.9891319	634.0883
7998	0.0507349	0	1.053447	935.696
7999	0	0	0.912574	845.6238
8000	0	0	0.9428522	536.4717
8001	0	0	0.9251239	715.3521
8002	0	0	0.8615735	656.738
8003	0	0	0.9184496	826.6435
8004	0	0	0.9538527	747.4121
8005	0	0	0.9777948	710.4481
8006	0	0	0.87965	666.6928
8007	0	0	0.8652176	504.8383
8008	0	0	0.9684263	839.278
8009	0.007963335	0	1.008027	787.3769
8010	0	0	0.9835208	820.9855
8011	0	0	0.9475356	880.1974
8012	0.04094544	0	1.042693	823.5115
8013	0	0	0.9456584	700.6176
8014	0.02341485	0	1.023976	771.9321
8015	0	0	0.9385635	736.2934
8016	0	0	0.9718291	758.9127
8017	0	0	0.9433414	792.7051
8018	0	0	0.9238803	565.0303
8019	0	0	0.9722632	576.189
8020	0	0	0.8944005	718.2283
8021	0	0	0.9887233	563.0455
8022	0	0	0.9923843	557.4142
8023	0	0	0.9502875	629.079
8024	0	0	0.9178752	829.986
8025	0	0	0.9290041	657.0219
8026	0.02617216	0	1.026875	667.936

8027	0	0	0.9704347	859.7747
8028	0.002878359	0	1.002887	937.5833
8029	0.009660823	0	1.009755	821.5779
8030	0	0	0.9212491	986.0471
8031	0.02583752	0	1.026523	581.785
8032	0	0	0.8933108	516.7635
8033	0	0	0.9613366	745.2051
8034	0	0	0.9128252	452.9657
8035	0	0	0.8934836	897.8218
8036	0	0	0.9113031	931.6498
8037	0	0	0.9135891	730.7621
8038	0.04422504	0	1.046271	679.8174
8039	0	0	0.8498521	821.9824
8040	0	0	0.9648697	444.0572
8041	0	0	0.9970473	853.538
8042	0	0	0.8776828	950.3547
8043	0	0	0.9779532	639.5383
8044	0	0	0.9348462	756.7281
8045	0	0	0.9529632	974.7477
8046	0.01576485	0	1.016017	667.6863
8047	0	0	0.8988544	865.7476
8048	0.01235423	0	1.012509	659.221
8049	0.007146143	0	1.007198	617.2274
8050	0	0	0.9143825	685.5143
8051	0	0	0.9728768	869.7945
8052	0	0	0.9800403	655.5511
8053	0	0	0.9555196	775.7384
8054	0	0	0.9674161	997.8124
8055	0	0	0.8924868	677.6336
8056	0	0	0.9069381	613.4072
8057	0	0	0.9297853	917.4795
8058	0	0	0.9145771	427.0446
8059	0.01201067	0	1.012157	514.1584
8060	0	0	0.9802539	927.8372
8061	0	0	0.8899372	674.8722
8062	0	0	0.9503419	954.7266
8063	0	0	0.8968956	695.7227
8064	0.002688446	0.03755616	1.002696	1039.022
8065	0.003710521	0	1.003724	810.8574
8066	0	0.01033376	0.854987	1010.442
8067	0.003059177	0	1.003069	814.7666
8068	0	0	0.9447554	686.3545
8069	0	0	0.9475545	927.2106
8070	0.05324802	0	1.056243	562.3604
8071	0	0	0.986668	770.7074
8072	0	0	0.8986119	744.2908
8073	0	0	0.871002	589.5135
8074	0	0	0.9040501	952.7471
8075	0	0	0.8548569	884.3169
8076	0	0	0.9347207	895.0464
8077	0	0	0.957808	545.5515
8078	0	0	0.9847525	669.1551
8079	0	0	0.9469965	985.9287
8080	0	0	0.866152	653.2174
8081	0	0	0.9369428	797.5013
8082	0	0	0.9299027	725.2064
8083	0	0	0.9448346	772.649
8084	0	0	0.968098	833.2701
8085	0.022764	0	1.023294	605.8062
8086	0.00502105	0	1.005046	690.0748
8087	0.004240683	0	1.004259	399.3141
8088	0.03848027	0	1.04002	893.8106
8089	0	0	0.9193914	516.632
8090	0	0	0.9775235	587.7653
8091	0	0	0.9412624	638.5957
8092	0	0	0.9576159	726.1361
8093	0	0	0.9488991	556.6357
8094	0	0	0.910006	767.7278
8095	0.02639061	0	1.027106	591.722
8096	0	0	0.9013573	837.8738
8097	0	0	0.9035538	646.9708
8098	0.000649315	0	1.00065	753.0664
8099	0	0	0.9862317	825.1384

8100	0	0	0.9026111	689.3494
8101	0	0	0.9574559	481.7405
8102	0	0	0.8741561	515.5264
8103	0	0	0.9243308	866.7832
8104	0	0	0.9519631	972.5419
8105	0.007700216	0	1.00776	707.6502
8106	0	0	0.9716024	546.9806
8107	0	0	0.9325237	656.7985
8108	0	0	0.9306153	677.4215
8109	0	0	0.8927926	565.5186
8110	0.006209858	0	1.006249	890.358
8111	0	0	0.8160262	846.6987
8112	0.05017887	0	1.05283	619.0292
8113	0.007025175	0	1.007075	879.0952
8114	0.01676561	0	1.017051	824.7739
8115	0	0	0.9409671	393.5845
8116	0	0.01995954	0.9516442	1020.366
8117	0	0	0.9220998	936.0071
8118	0	0	0.9656389	753.51
8119	0	0	0.8471785	569.1573
8120	0	0	0.9852622	602.1837
8121	0	0	0.9250785	680.4658
8122	0	0	0.924363	712.7975
8123	0	0	0.9881418	543.3161
8124	0	0	0.9187601	430.6214
8125	0	0	0.9887537	707.573
8126	0.02102773	0	1.021479	498.8901
8127	0.03708714	0	1.038516	824.7728
8128	0	0	0.9463613	639.8975
8129	0	0	0.9843061	797.8691
8130	0	0	0.8835316	761.2468
8131	0.02261519	0	1.023139	606.7682
8132	0	0	0.9831168	662.5712
8133	0	0	0.9891366	710.358
8134	0.04603349	0	1.048255	596.9262
8135	0	0	0.9661953	649.3304
8136	0.00333938	0	1.003351	689.3719
8137	0	0	0.8600664	851.0089
8138	0.02936338	0	1.030252	836.0971
8139	0	0	0.9141833	641.084
8140	0	0	0.913634	797.6071
8141	0	0	0.8074245	565.0256
8142	0.007159301	0	1.007211	634.7363
8143	0	0	0.8603451	625.5699
8144	0	0	0.8858138	601.0806
8145	0.006864926	0	1.006912	942.6363
8146	0	0	0.890906	700.1415
8147	0	0	0.958566	843.4098
8148	0	0	0.9560264	661.4518
8149	0	0	0.9202251	768.4162
8150	0	0	0.8928669	778.396
8151	0	0	0.9789124	712.0905
8152	0	0	0.8669973	800.0396
8153	0	0	0.8439202	764.8613
8154	0.03206642	0	1.033129	767.227
8155	0	0	0.8832313	796.0698
8156	0	0	0.9417641	647.3896
8157	0	0	0.9934803	867.1554
8158	0	0	0.8089281	840.9334
8159	0	0	0.990209	538.6391
8160	0.02353611	0	1.024103	685.1182
8161	0.014565	0	1.01478	560.3155
8162	0	0	0.8533612	656.2579
8163	0	0	0.9801066	580.5214
8164	0	0	0.9712513	551.6117
8165	0	0	0.9779029	733.0146
8166	0	0	0.9250212	647.7313
8167	0	0	0.9432723	790.8707
8168	0	0	0.9741827	435.9003
8169	0	0	0.9464673	595.5116
8170	0	0	0.8990527	493.2221
8171	0	0.04041634	0.9386683	1042.119
8172	0	0	0.8306122	866.4015

8173	0	0	0.9568683	800.7402
8174	0	0	0.9761392	924.9203
8175	0	0	0.9665695	694.9828
8176	0.04689926	0	1.049207	706.3103
8177	0.04253522	0	1.044425	889.5142
8178	0	0	0.8495658	947.4802
8179	0	0	0.8846166	469.1661
8180	0.03733108	0	1.038779	532.4929
8181	0	0	0.8553873	901.4651
8182	0	0	0.9318676	891.0613
8183	0.01207266	0	1.01222	590.4848
8184	0	0	0.9954844	799.3252
8185	0	0	0.8845196	517.6999
8186	0	0	0.9340857	539.8424
8187	0	0	0.9916956	665.5665
8188	0	0	0.8871874	707.7208
8189	0	0	0.9256736	404.2731
8190	0	0	0.859422	573.98
8191	0.04594079	0	1.048153	793.5013
8192	0	0	0.9592356	748.2022
8193	0	0	0.8907792	880.1539
8194	0	0	0.8964245	741.9724
8195	0	0	0.8827022	646.7305
8196	0	0.06052385	0.9331826	1064.423
8197	0.02209896	0	1.022598	700.0798
8198	0	0	0.95429	553.5765
8199	0	0	0.8389253	544.3746
8200	0	0	0.9419008	764.8202
8201	0	0	0.9465594	755.1581
8202	0	0	0.9118995	735.7458
8203	0	0.00234674	0.9440958	1002.352
8204	0	0	0.9008417	689.5684
8205	0	0	0.9816497	534.2761
8206	0.00308348	0	1.003093	744.3878
8207	0.03882063	0	1.040389	921.0295
8208	0	0	0.9344935	952.299
8209	0.05861824	0	1.062268	796.192
8210	0	0	0.9671249	640.7834
8211	0	0	0.965556	820.6125
8212	0	0	0.9625608	584.2317
8213	0	0	0.9621196	775.2067
8214	0	0	0.8281776	943.1509
8215	0.04749946	0	1.049868	855.7352
8216	0	0	0.9903664	863.3286
8217	0	0	0.9378911	636.036
8218	0.01654313	0	1.016821	752.0773
8219	0	0	0.9656018	487.6135
8220	0	0	0.9276021	794.371
8221	0	0	0.9551521	746.1409
8222	0	0	0.9732537	978.0461
8223	0	0	0.9238907	714.5089
8224	0.005801084	0	1.005835	621.2007
8225	0	0	0.9495291	626.8512
8226	0	0	0.8557852	785.8953
8227	0	0	0.9693487	629.5514
8228	0.006504207	0	1.006547	802.1144
8229	0	0	0.8445137	614.7126
8230	0	0	0.863652	835.4885
8231	0	0	0.9953547	706.3018
8232	0	0	0.9825879	765.1043
8233	0.0624302	0	1.066587	574.0311
8234	0	0	0.8933796	896.9545
8235	0	0	0.9532817	717.0876
8236	0.01520259	0	1.015437	588.9328
8237	0	0	0.9919277	817.549
8238	0	0.03863057	0.9665151	1040.183
8239	0	0	0.9505985	674.8617
8240	0.00186639	0	1.00187	954.1695
8241	0.01575615	0	1.016008	678.8102
8242	0	0	0.9748585	638.6322
8243	0	0	0.826872	732.962
8244	0	0	0.9550663	569.4964
8245	0	0	0.9585191	643.5122

8246	0.01045698	0	1.010567	385.5606
8247	0	0	0.862878	570.1082
8248	0	0	0.9786543	599.3144
8249	0	0	0.8863167	894.2108
8250	0.00964229	0	1.009736	800.4897
8251	0	0	0.9821553	422.546
8252	0	0	0.9383291	921.2648
8253	0	0	0.9995313	570.6729
8254	0	0	0.9594293	868.218
8255	0	0	0.9705991	555.0699
8256	0	0	0.9743145	793.9295
8257	0	0	0.8792166	846.6891
8258	0	0	0.9621759	537.6146
8259	0	0	0.9422818	773.8037
8260	0	0	0.9403118	732.0936
8261	0	0	0.9724651	548.6941
8262	0	0	0.9677495	746.6993
8263	0	0	0.9414065	744.3065
8264	0	0	0.9006923	993.8276
8265	0	0	0.8879119	767.2297
8266	0	0	0.9953839	875.1254
8267	0	0	0.9050657	691.2039
8268	0	0	0.9797441	557.0049
8269	0	0	0.864533	513.8862
8270	0.03135335	0	1.032368	753.0289
8271	0	0	0.9748592	696.7015
8272	0.007260831	0	1.007314	487.3514
8273	0	0	0.9178073	713.5616
8274	0	0	0.9483922	641.5648
8275	0	0	0.9858678	756.1516
8276	0	0	0.9605798	826.2643
8277	0	0	0.9413468	765.7122
8278	0	0	0.8973588	417.5709
8279	0	0	0.9636084	652.5822
8280	0	0	0.9385878	656.7244
8281	0	0	0.9785823	814.8185
8282	0	0	0.8952324	449.0903
8283	0.07015444	0	1.075447	616.6182
8284	0.04816196	0	1.050599	774.2439
8285	0	0	0.9952161	815.4699
8286	0	0	0.8567789	655.5817
8287	0	0	0.9967662	940.4905
8288	0	0	0.9498561	830.5947
8289	0	0	0.847783	498.9007
8290	0	0	0.9100685	778.593
8291	0	0	0.9196703	575.6362
8292	0	0	0.871702	962.1066
8293	0	0	0.8681736	726.7075
8294	0	0	0.8803082	833.9699
8295	0	0	0.8750667	466.0409
8296	0	0	0.8701065	514.5613
8297	0	0	0.9998212	693.9865
8298	0	0	0.9141999	762.8275
8299	0	0	0.9054764	842.2639
8300	0.03890635	0	1.040481	513.0018
8301	0	0	0.8923143	634.6536
8302	0	0	0.9040281	926.9869
8303	0	0	0.9252742	753.0171
8304	0	0	0.9379802	793.3808
8305	0.02437415	0.02791273	1.024983	1028.714
8306	0	0	0.8723264	727.2293
8307	0	0	0.8801758	757.86
8308	0	0	0.9568651	681.2071
8309	0	0	0.8962596	640.9731
8310	0.03541271	0	1.036713	785.8406
8311	0	0	0.9174392	610.0351
8312	0	0	0.9977148	905.8328
8313	0	0	0.8591319	728.9104
8314	0	0	0.9687312	594.2241
8315	0	0	0.921267	604.6965
8316	0	0	0.9633009	908.038
8317	0	0	0.9888864	515.9857
8318	0	0	0.8248296	866.7273

8319	0	0	0.9939486	849.1349
8320	0.03615306	0	1.037509	842.7136
8321	0	0	0.9467323	888.06
8322	0	0	0.8663217	739.3564
8323	0	0	0.9894207	952.4482
8324	0	0	0.9657322	631.1866
8325	0	0	0.9431316	644.1473
8326	0	0	0.8661603	546.9734
8327	0	0	0.9846663	493.9159
8328	0	0	0.9725631	487.3594
8329	0	0	0.875645	553.2891
8330	0	0	0.9509027	716.2994
8331	0.02795111	0	1.028755	770.2722
8332	0	0	0.8461577	808.0679
8333	0.06641001	0	1.071134	471.1199
8334	0	0	0.9376569	773.7428
8335	0	0	0.9667451	619.9236
8336	0	0	0.9724292	651.067
8337	0	0	0.8762904	969.4391
8338	0	0	0.8609075	858.9499
8339	0	0	0.87326	636.1075
8340	0.01120125	0	1.011328	824.1724
8341	0	0	0.8362119	999.2313
8342	0	0	0.9756606	582.2991
8343	0.06206229	0	1.066169	837.3745
8344	0	0	0.820604	946.078
8345	0.007871819	0	1.007934	812.0165
8346	0	0	0.9142346	695.5405
8347	0	0	0.8697918	737.5669
8348	0	0	0.8829384	772.4685
8349	0	0	0.9236569	755.4679
8350	0.007106237	0	1.007157	660.6451
8351	0	0	0.8665144	718.2163
8352	0	0	0.9380871	929.0459
8353	0	0	0.8518021	737.3233
8354	0	0	0.9257771	970.9984
8355	0	0.004588004	0.8518263	1004.609
8356	0	0	0.8637653	832.7476
8357	0	0	0.9686145	711.3882
8358	0	0	0.9069533	548.7768
8359	0	0	0.9546437	679.7141
8360	0.01824618	0	1.018585	712.5329
8361	0	0	0.8979502	696.674
8362	0	0	0.9326303	547.9166
8363	0	0	0.8844524	572.2748
8364	0	0	0.9427882	842.7518
8365	0	0	0.9826127	781.8618
8366	0.02733085	0	1.028099	572.244
8367	0	0	0.9697591	580.3331
8368	0.01584015	0	1.016095	522.487
8369	0	0	0.9507315	765.0549
8370	0	0	0.9399689	748.8552
8371	0	0	0.9211624	769.4089
8372	0.0119516	0	1.012096	753.981
8373	0	0	0.879958	695.0935
8374	0	0	0.8588194	593.5769
8375	0	0.006165039	0.9329962	1006.203
8376	0	0	0.8531726	697.8566
8377	0	0	0.9640408	829.9249
8378	0	0	0.9574391	793.0939
8379	0	0	0.8998865	975.7802
8380	0	0	0.9736593	676.0336
8381	0	0	0.9299097	724.5448
8382	0	0	0.9453673	882.1965
8383	0	0	0.9261292	720.59
8384	0	0	0.9634994	747.4504
8385	0.05220124	0	1.055076	613.03
8386	0	0	0.9047105	519.0853
8387	0	0	0.827237	763.3514
8388	0	0	0.9160594	709.0469
8389	0	0	0.946547	731.1081
8390	0	0	0.9586146	843.1268
8391	0	0	0.9468278	616.6102

8392	0.05616128	0	1.059503	545.631
8393	0	0	0.991186	610.7944
8394	0	0	0.974358	492.5127
8395	0	0	0.9813468	578.6953
8396	0.06509437	0	1.069627	650.0526
8397	0	0	0.9602987	650.0767
8398	0	0	0.915906	682.6364
8399	0	0	0.9507201	846.0578
8400	0	0	0.8516538	688.6237
8401	0	0	0.9771782	795.02
8402	0	0	0.9264552	663.463
8403	0.03142272	0	1.032442	588.8309
8404	0	0	0.9953871	991.418
8405	0.03177431	0	1.032817	686.4329
8406	0	0	0.9052716	735.5353
8407	0	0	0.9715703	511.5021
8408	0	0	0.9458799	675.5017
8409	0	0	0.8969415	530.1863
8410	0	0	0.8737217	546.2753
8411	0	0	0.8139525	774.6187
8412	0	0	0.8754078	606.2169
8413	0	0	0.929091	644.7342
8414	0	0	0.888343	966.054
8415	0	0	0.9513779	887.9936
8416	0	0	0.9865582	678.5952
8417	0.01700742	0	1.017302	545.1071
8418	0.05372972	0	1.056781	499.5713
8419	0	0	0.9395366	703.7267
8420	0	0	0.9842363	769.2548
8421	0.007603815	0	1.007662	789.5577
8422	0	0	0.8248759	747.5751
8423	0	0	0.9087309	520.7175
8424	0	0	0.8758996	842.4447
8425	0.06242587	0	1.066582	647.4879
8426	0	0	0.9559197	687.4026
8427	0.01586346	0	1.016119	809.218
8428	0.04101303	0	1.042767	815.8538
8429	0	0	0.9414189	753.8176
8430	0	0	0.8943849	656.8002
8431	0	0	0.9443132	719.7002
8432	0	0	0.9735903	577.2396
8433	0	0	0.9787254	625.3333
8434	0	0	0.8413135	824.9188
8435	0	0	0.8476218	754.397
8436	0.04782592	0	1.050228	832.5035
8437	0	0	0.8738208	965.1828
8438	0	0	0.8382504	838.54
8439	0	0	0.9223937	655.2881
8440	0	0	0.9219171	707.9476
8441	0	0	0.9389703	886.0716
8442	0	0	0.963846	915.8716
8443	0.02176395	0	1.022248	498.9612
8444	0	0	0.9376898	753.2956
8445	0	0	0.9239833	769.1685
8446	0	0	0.9245578	614.1821
8447	0	0	0.9504086	929.8107
8448	0	0.01627518	0.9805649	1016.544
8449	0	0	0.9290287	918.1987
8450	0	0	0.8349928	633.2816
8451	0	0.01432497	0.9282292	1014.533
8452	0.04331157	0	1.045272	816.6909
8453	0.03994574	0	1.041608	557.5137
8454	0	0	0.8524107	805.2566
8455	0.01088215	0	1.011002	855.5656
8456	0	0	0.8629362	678.064
8457	0.04693869	0	1.04925	910.516
8458	0	0.04957759	0.8581267	1052.164
8459	0	0	0.9674897	766.3964
8460	0	0	0.9531776	806.5774
8461	0	0	0.9151147	868.6504
8462	0	0	0.9487684	854.3411
8463	0	0	0.9188578	522.262
8464	0	0	0.7949585	616.4445

8465	0.008475261	0	1.008548	410.3116
8466	0	0	0.8964022	675.193
8467	0	0	0.9626362	759.1006
8468	0	0.0494845	0.9855215	1052.061
8469	0.04220167	0	1.044061	762.9816
8470	0.05858149	0	1.062227	776.3191
8471	0.03983654	0	1.041489	636.9647
8472	0	0	0.8398936	843.4727
8473	0.03218913	0	1.03326	753.5854
8474	0	0	0.9242715	764.7799
8475	0	0	0.9670821	707.7234
8476	0.02467403	0	1.025298	716.8405
8477	0	0	0.9361268	689.0195
8478	0	0	0.988461	802.3682
8479	0	0	0.860619	874.6201
8480	0	0	0.9306209	971.3594
8481	0	0	0.9907969	666.2662
8482	0.006029324	0	1.006066	714.8681
8483	0	0	0.9353629	750.9711
8484	0.0075082	0	1.007565	668.5244
8485	0	0	0.8544286	683.8639
8486	0	0	0.8930818	731.0466
8487	0	0	0.8424461	591.6523
8488	0.03868214	0	1.040239	516.3917
8489	0	0	0.9178302	957.9083
8490	0	0	0.9199259	889.7302
8491	0	0	0.8701093	739.0868
8492	0	0	0.9606543	488.1952
8493	0	0	0.9630981	723.9206
8494	0	0	0.9930053	849.1896
8495	0	0	0.9535927	480.9321
8496	0	0	0.9938927	683.2808
8497	0	0	0.9503813	749.1292
8498	0	0	0.8421929	716.946
8499	0	0	0.9813756	828.9025
8500	0	0	0.9681847	998.519
8501	0	0.0137655	0.9000986	1013.958
8502	0	0	0.8559691	741.1603
8503	0	0	0.9163457	533.5975
8504	0.001707574	0	1.001711	879.4061
8505	0	0	0.8481714	989.7034
8506	0	0	0.842694	998.2426
8507	0	0	0.9269115	485.2403
8508	0	0	0.9571788	455.9272
8509	0.03896839	0	1.040548	595.4789
8510	0	0	0.9450977	670.2589
8511	0	0	0.9683284	813.1704
8512	0	0	0.9890786	897.8981
8513	0	0	0.9000333	536.5215
8514	0	0	0.860046	806.5851
8515	0	0	0.9911388	979.1525
8516	0	0	0.8696402	527.1843
8517	0	0	0.9956128	683.0798
8518	0	0	0.9399962	685.0913
8519	0	0	0.9733912	511.1778
8520	0.03286095	0	1.033978	754.0644
8521	0.01449973	0	1.014713	695.4333
8522	0	0	0.9528488	695.7427
8523	0	0	0.9886054	894.0432
8524	0.004083349	0	1.0041	938.5461
8525	0	0	0.8914241	700.7689
8526	0	0	0.9673791	677.473
8527	0	0	0.8911319	839.1688
8528	0.01334104	0	1.013521	744.3732
8529	0	0	0.9922425	908.9539
8530	0	0	0.9681228	813.9218
8531	0	0	0.8779459	624.2975
8532	0	0	0.839182	614.4853
8533	0	0	0.8651083	793.1409
8534	0	0	0.9456909	787.289
8535	0	0	0.9078099	744.3043
8536	0	0	0.9270103	795.7998
8537	0	0	0.8709033	730.3582

8538	0.00E+00	0	0.8478838	553.8386
8539	0	0	0.9690466	917.1545
8540	0	0	0.9029849	598.1073
8541	0.04078477	0	1.042519	682.9552
8542	0	0	0.9126169	689.8348
8543	0.04318225	0	1.045131	729.8276
8544	0	0	0.9159436	929.1028
8545	0	0	0.9034551	539.165
8546	0	0	0.9571488	876.0521
8547	0	0	0.9052528	548.8341
8548	0	0	0.8210002	619.682
8549	0.00E+00	0	0.9049981	668.4971
8550	0	0	0.9972971	697.4993
8551	0	0	0.9031864	899.8062
8552	0	0	0.8772447	769.8063
8553	0	0	0.9347202	883.5122
8554	0	0	0.9359453	616.3271
8555	0	0	0.9618386	817.1007
8556	0	0	0.951606	973.5509
8557	0	0	0.9349707	786.654
8558	0	0	0.9754505	872.5831
8559	0.05182023	0	1.054652	461.4446
8560	0	0	0.9684327	867.0546
8561	0	0	0.9235372	847.0756
8562	0	0	0.9924825	519.0222
8563	0	0	0.9284867	703.1294
8564	0	0	0.9185561	855.1567
8565	0	0	0.9794656	648.636
8566	0	0	0.9353535	882.6754
8567	0	0	0.9615594	958.1141
8568	0.01175265	0	1.011892	656.6476
8569	0.05290141	0	1.055856	641.0931
8570	0.007909105	0	1.007972	728.3152
8571	0.04472835	0	1.046823	932.7899
8572	0	0	0.9408714	738.068
8573	0	0	0.9371732	728.3154
8574	0	0	0.9228086	724.6331
8575	0.01334822	0	1.013529	891.5018
8576	0	0	0.8005438	614.7062
8577	0	0.008366444	0.9836371	1008.437
8578	0	0	0.9319012	975.6346
8579	0	0	0.8031674	663.7463
8580	0.07858448	0	1.085287	886.5692
8581	0	0	0.9055098	564.7736
8582	0.02601462	0	1.026709	974.1435
8583	0	0	0.8052818	811.3696
8584	0	0	0.8806857	435.7664
8585	0	0	0.9225003	967.7556
8586	0	0	0.973581	590.3456
8587	0.05438495	0	1.057513	537.1481
8588	0	0	0.9946067	693.4276
8589	0	0	0.9234088	690.3824
8590	0	0	0.8130143	869.8342
8591	0	0	0.9977301	495.7115
8592	0	0	0.9114136	731.3956
8593	0	0	0.9537611	747.4356
8594	0	0	0.8354239	727.0045
8595	0	0	0.9129892	931.4698
8596	0	0	0.864404	874.9131
8597	0	0	0.8694502	436.4904
8598	0	0	0.8963711	781.6975
8599	0	0	0.9547395	881.2357
8600	0	0	0.9856602	500.0827
8601	0	0	0.8647532	483.9027
8602	0.01092956	0	1.01105	750.282
8603	0	0	0.9373292	852.2752
8604	0	0	0.973345	728.4489
8605	0	0	0.9274091	578.0045
8606	0	0	0.908558	953.0677
8607	0	0	0.9487565	530.4553
8608	0	0	0.8305972	581.3399
8609	0.00572819	0	1.005761	627.5569
8610	0	0	0.9393773	625.5518

8611	0	0	0.9382755	580.7755
8612	0	0	0.8911011	531.0801
8613	0	0	0.8496941	653.4976
8614	0	0	0.9050566	537.9284
8615	0.05029769	0	1.052962	585.1356
8616	0	0	0.986527	633.9647
8617	0	0	0.9318214	596.0842
8618	0	0	0.9951345	515.9802
8619	0.06541358	0	1.069992	802.1933
8620	0	0	0.9471577	552.2859
8621	0	0	0.9756104	645.7054
8622	0	0	0.9348869	856.3161
8623	0	0	0.9219713	558.5178
8624	0.003458373	0	1.00347	422.5255
8625	0	0	0.9544529	874.0516
8626	0	0	0.9537406	546.7473
8627	0	0	0.8640372	682.5364
8628	0	0	0.9141116	713.214
8629	0	0	0.8711189	943.9843
8630	0	0	0.8114541	836.0787
8631	0	0	0.947477	847.4023
8632	0	0	0.9714819	742.3904
8633	0	0	0.8991442	526.0237
8634	0	0	0.9732141	731.1432
8635	0.005183991	0	1.005211	684.4276
8636	0	0	0.9375026	442.611
8637	0	0.05919425	0.9790993	1062.919
8638	0	0	0.9648303	666.0837
8639	0.07154178	0	1.077054	509.9471
8640	0.07461948	0	1.080637	839.343
8641	0.06127766	0	1.065278	570.4591
8642	0	0	0.8809453	738.8112
8643	0	0	0.9916914	585.4295
8644	0	0	0.9519883	594.2787
8645	0.01142329	0	1.011555	657.5668
8646	0	0	0.8164188	631.4438
8647	0	0	0.9136719	766.8887
8648	0.0130413	0	1.013214	726.4388
8649	0	0	0.8565677	802.8414
8650	0	0	0.9482102	525.3815
8651	0	0	0.8232785	639.9813
8652	0.008593814	0	1.008668	480.4336
8653	0	0	0.8745328	691.5055
8654	0	0	0.8897347	454.3142
8655	0	0	0.9800048	958.8276
8656	0	0	0.9236785	546.5707
8657	0.03414345	0	1.03535	872.0451
8658	0	0	0.9919938	832.368
8659	0	0	0.892	946.0499
8660	0	0	0.9003992	574.588
8661	0	0	0.9307497	754.538
8662	0.01857164	0	1.018923	755.6432
8663	0.08563334	0	1.093653	740.1813
8664	0	0	0.8804265	692.441
8665	0	0	0.8860605	645.1424
8666	0.02094258	0	1.021391	763.9331
8667	0	0	0.8419601	488.9088
8668	0	0	0.998664	906.8069
8669	0	0	0.9635068	571.4029
8670	0	0	0.9328989	702.7759
8671	0.06500357	0	1.069523	885.8233
8672	0	0	0.847177	682.6531
8673	0.01607744	0	1.01634	633.4597
8674	0	0	0.9870248	708.9988
8675	0	0	0.9438257	857.0641
8676	0	0	0.9467512	706.9943
8677	0.03111271	0	1.032112	861.5923
8678	0	0	0.930813	957.2402
8679	0.07590868	0	1.082144	998.0485
8680	0	0	0.9639268	987.1301
8681	0	0.03775926	0.9315928	1039.241
8682	0	0	0.9460735	850.6951
8683	0	0	0.8728095	902.5578

8684	0	0.04617197	0.9897906	1048.407
8685	0.02613935	0	1.026841	785.5566
8686	0	0	0.8840053	653.1576
8687	0	0	0.9744958	701.9843
8688	0	0	0.8415354	871.0861
8689	0	0	0.9731747	773.9988
8690	0	0	0.8647521	959.8763
8691	0	0	0.9303383	459.7777
8692	0	0	0.9760397	603.0229
8693	0	0	0.881173	597.603
8694	0	0	0.952997	523.2452
8695	0	0	0.985279	592.0903
8696	0	0	0.9307743	859.5721
8697	0	0.003869142	0.9514218	1003.884
8698	0	0	0.9709986	538.7618
8699	0	0	0.9813947	749.4976
8700	0	0	0.8917395	625.2792
8701	0	0	0.9971705	617.5331
8702	0	0	0.9746632	863.928
8703	0	0	0.8280433	714.3438
8704	0	0	0.86503	646.9291
8705	0	0	0.9920015	811.9531
8706	0	0	0.9313173	656.3882
8707	0	0	0.8954654	863.0646
8708	0	0	0.9573715	875.4111
8709	0	0	0.8967718	709.8082
8710	0	0	0.890234	688.66
8711	0	0	0.9070711	763.5212
8712	0	0	0.9332225	726.8847
8713	0	0	0.9500571	788.5249
8714	0	0	0.991302	683.9238
8715	0	0	0.9980126	603.2602
8716	0	0	0.9446533	839.3974
8717	0	0	0.8818771	995.6616
8718	0	0	0.9644583	861.4978
8719	0.06530413	0	1.069867	771.944
8720	0	0	0.9660074	900.2162
8721	0.01662624	0	1.016907	823.7657
8722	0.06765801	0	1.072568	569.2374
8723	0	0	0.9463346	556.1949
8724	0	0	0.9518222	947.2384
8725	0	0	0.9580836	923.5739
8726	0.001818074	0	1.001821	633.7035
8727	0	0	0.9404153	727.3939
8728	0	0	0.988583	714.1984
8729	0	0	0.9659011	872.3659
8730	0.01257508	0	1.012735	911.8798
8731	0	0	0.9135228	699.2217
8732	0	0	0.8499342	627.0107
8733	0	0	0.9391204	457.32
8734	0.005834789	0	1.005869	627.7791
8735	0	0	0.9124931	524.1128
8736	0.03116798	0	1.032171	791.9436
8737	0.005209859	0	1.005237	668.3307
8738	0	0	0.999505	964.8999
8739	0	0	0.8224925	857.9947
8740	0.03227242	0.001200837	1.033349	1001.202
8741	0	0	0.9918825	819.1909
8742	0	0	0.9236059	913.6211
8743	0	0	0.935252	675.8744
8744	0.02638203	0	1.027097	617.8237
8745	0	0	0.9167616	561.1576
8746	0.000594583	0	1.000595	673.7283
8747	0	0	0.9524798	919.8135
8748	0.007322149	0.00294548	1.007376	1002.954
8749	0	0	0.9184149	733.3105
8750	0	0	0.919138	476.7741
8751	0.02899905	0	1.029865	819.7983
8752	0.06727419	0	1.072126	757.8432
8753	0	0	0.9472582	903.8029
8754	0	0	0.8667911	948.6538
8755	0	0	0.8207694	534.5503
8756	0.03895435	0	1.040533	730.1115

8757	0.00E+00	0	0.9515641	722.7607
8758	0	0	0.9659129	723.332
8759	0	0	0.9820989	703.5035
8760	0	0	0.8904763	532.9254
8761	0.03522972	0	1.036516	980.7948
8762	0	0	0.989859	846.0132
8763	0	0	0.9924787	765.7332
8764	0	0	0.9218957	661.0027
8765	0	0	0.9326407	976.4131
8766	0	0	0.9737517	906.6996
8767	0.04781019	0	1.050211	942.6579
8768	0	0	0.999524	693.4994
8769	0	0	0.9172111	635.6243
8770	0	0	0.9876995	921.209
8771	0	0	0.9496044	412.1143
8772	0.04186455	0	1.043694	854.0551
8773	0	0	0.9357685	683.7472
8774	0	0	0.8717157	447.5913
8775	0	0	0.8904318	980.8229
8776	0	0	0.8744368	726.6304
8777	0	0	0.9654073	688.9334
8778	0	0	0.8386552	721.5637
8779	0	0.0256171	0.9660392	1026.291
8780	0	0	0.8498906	759.0407
8781	0	0	0.9586807	617.5095
8782	0	0	0.9233301	614.8848
8783	0.05979167	0	1.063594	421.5016
8784	0	0	0.9525646	560.0253
8785	0	0	0.8343636	571.2399
8786	0	0	0.9084653	768.1315
8787	0.02832149	0	1.029147	840.281
8788	0.002941036	0	1.00295	819.9957
8789	0	0	0.8738058	737.4002
8790	0	0	0.9522113	632.6849
8791	0	0	0.9804975	849.8295
8792	0.02168397	0	1.022165	854.1301
8793	0	0	0.9068776	586.5529
8794	0	0	0.9520586	704.6176
8795	0	0	0.9343164	963.7166
8796	0	0	0.9855684	787.7649
8797	0.01415686	0	1.01436	582.5124
8798	0	0	0.983178	556.2093
8799	0.02608193	0	1.02678	846.9678
8800	0	0	0.9576148	604.9454
8801	0.02320584	0	1.023757	948.254
8802	0	0	0.9298337	907.5375
8803	0	0	0.999392	704.5346
8804	0	0	0.9482443	676.2739
8805	0	0	0.8865764	706.5748
8806	0	0	0.935181	774.1865
8807	0	0	0.8733307	806.6748
8808	0	0	0.9468541	701.9994
8809	0	0	0.9263712	693.9482
8810	0	0	0.9091951	614.1725
8811	0	0	0.9004811	596.7433
8812	0	0	0.9581644	662.0063
8813	0	0	0.9843419	544.2573
8814	0	0	0.9199381	700.0366
8815	0.03978745	0	1.041436	715.3552
8816	0	0	0.7961456	706.8716
8817	0	0	0.8500381	814.8561
8818	0	0	0.9173609	957.0537
8819	0	0	0.9683993	424.6558
8820	0	0	0.9744943	709.5831
8821	0	0	0.8374482	912.9417
8822	0	0	0.9686739	652.8851
8823	0	0	0.9274901	613.5939
8824	0	0	0.9606834	689.4615
8825	0	0	0.9312627	824.4631
8826	0	0	0.9319854	644.6154
8827	0	0	0.9075204	701.7537
8828	0.03658444	0	1.037974	557.2353
8829	0.000708521	0	1.000709	579.0585

8830	0	0	0.8579516	720.9945
8831	0	0	0.9849916	849.8764
8832	0	0	0.9941314	505.8438
8833	0	0	0.9560124	655.3398
8834	0	0	0.8383747	549.3541
8835	0	0	0.8302959	940.973
8836	0.004660022	0	1.004682	541.0631
8837	0.006382218	0	1.006423	793.2128
8838	0	0	0.9976329	388.6155
8839	0	0	0.8360484	879.459
8840	0	0	0.8881065	708.1295
8841	0	0	0.9661974	748.0893
8842	0	0	0.9225677	910.8923
8843	0	0	0.9829695	566.6148
8844	0.04446514	0	1.046534	953.9009
8845	0	0	0.9218031	840.2291
8846	0.0553499	0	1.058593	601.7798
8847	0	0	0.9308567	824.4165
8848	0	0	0.8464853	750.5413
8849	0	0	0.9440175	685.7721
8850	0	0	0.9370558	784.1899
8851	0	0	0.9200133	754.3269
8852	0	0	0.9492131	567.1617
8853	0	0	0.973381	904.4474
8854	0	0	0.8440655	746.2631
8855	0	0	0.9326382	554.9746
8856	0	0.0480266	0.8954151	1050.449
8857	0	0	0.8644432	464.3488
8858	0.004933459	0	1.004958	919.2263
8859	0	0.06396731	0.9723882	1068.339
8860	0	0	0.8996876	601.8718
8861	0	0	0.9673024	585.0581
8862	0	0	0.9390711	694.989
8863	0	0	0.9935526	717.6103
8864	0	0	0.8699725	792.2766
8865	0	0	0.9169858	980.7173
8866	0	0	0.9941025	616.1884
8867	0	0	0.8206182	937.9214
8868	0	0	0.9137218	599.9772
8869	0	0	0.9924281	764.1598
8870	0	0	0.9178702	722.1622
8871	0	0	0.9029899	819.6548
8872	0	0	0.9462184	825.8726
8873	0	0	0.9574052	584.0734
8874	0	0	0.9027451	749.9791
8875	3.46483E-05	0	1.000035	972.5391
8876	0	0	0.9004391	694.6063
8877	0	0	0.9107687	744.8699
8878	0.001808076	0	1.001811	603.3622
8879	0	0	0.8701267	708.0741
8880	0	0	0.9524488	656.6413
8881	0	0	0.9985676	507.2845
8882	0.000714253	0	1.000715	760.1708
8883	0	0	0.9855626	814.3421
8884	0	0	0.9495257	729.9684
8885	0	0	0.9118304	962.3196
8886	0	0	0.9867656	626.7371
8887	0	0	0.9318063	819.0441
8888	0.03945841	0	1.041079	888.5199
8889	0	0	0.8613762	522.0475
8890	0	0	0.9737861	622.664
8891	0	0	0.9487929	657.4302
8892	0	0	0.9295672	870.9686
8893	0	0	0.9372065	628.154
8894	0	0	0.8640593	587.5835
8895	0	0	0.9418223	653.7605
8896	0	0	0.8445954	873.257
8897	0	0	0.8806763	877.212
8898	0.06748432	0	1.072368	514.1282
8899	0	0	0.9123374	748.0384
8900	0	0	0.9000842	795.9293
8901	0	0	0.9368376	723.8898
8902	0	0	0.9052888	429.5121

8903	0.02485134	0	1.025485	718.6658
8904	0	0	0.8708377	707.1417
8905	0	0	0.9931096	473.1918
8906	0	0	0.9156641	773.4336
8907	0.01215337	0	1.012303	875.0643
8908	0	0	0.8154717	825.6974
8909	0	0	0.930307	992.899
8910	0	0	0.9844351	817.0355
8911	0	0	0.885501	582.7345
8912	0	0	0.9766159	902.5325
8913	0.004066392	0	1.004083	877.4684
8914	0	0	0.9353002	819.9576
8915	0.05188413	0	1.054723	975.6202
8916	0.05132009	0	1.054096	724.8782
8917	0	0	0.9429822	494.5646
8918	0.07520886	0	1.081325	486.4635
8919	0.06043581	0	1.064323	813.2703
8920	0	0	0.8988444	800.2823
8921	0	0	0.9962766	725.4427
8922	0	0	0.9598626	692.0697
8923	0	0	0.9662082	648.4821
8924	0	0	0.8722011	595.5013
8925	0	0	0.9048463	668.7774
8926	0	0	0.8628073	631.2412
8927	0	0	0.981694	675.9842
8928	0	0	0.9494885	843.7125
8929	0	0	0.949434	685.4579
8930	0	0	0.9415354	608.0516
8931	0	0	0.9397773	584.4285
8932	0.001216424	0	1.001218	714.7453
8933	0.01149245	0	1.011626	634.7515
8934	0	0	0.8948929	953.4585
8935	0	0	0.8600621	743.5808
8936	0.007323292	0	1.007377	871.4091
8937	0	0	0.9349591	494.8206
8938	0	0	0.8469222	713.0743
8939	0	0	0.8760237	878.6876
8940	0	0	0.9091941	946.0906
8941	0	0	0.8854706	700.085
8942	0	0	0.9402726	605.84
8943	0	0	0.8213799	850.1309
8944	0	0	0.9029747	728.0115
8945	0	0	0.8922179	603.6702
8946	0	0	0.9410625	498.4908
8947	0	0	0.9568632	705.2543
8948	0	0	0.9735905	704.0221
8949	0.05571062	0	1.058997	817.7466
8950	0	0	0.8961548	555.1995
8951	0	0	0.8366564	863.8329
8952	0	0	0.8396131	608.3728
8953	0	0	0.8506408	895.3326
8954	0.02772373	0	1.028514	924.5677
8955	0	0	0.9891663	958.8686
8956	0	0	0.8661093	458.8525
8957	0	0	0.8042988	654.265
8958	0	0	0.9810681	695.7536
8959	0.02552333	0	1.026192	457.019
8960	0	0	0.9623851	676.3856
8961	0.05381954	0	1.056881	547.1391
8962	0	0	0.9107535	523.2101
8963	0	0	0.9946201	647.9828
8964	0	0	0.8135774	767.5358
8965	0	0	0.9250018	761.9043
8966	0.04129179	0	1.04307	580.9174
8967	0	0	0.8814324	608.2603
8968	0	0	0.9104218	629.6571
8969	0	0	0.8912656	911.4286
8970	0	0	0.8484786	490.3295
8971	0	0.03794213	0.9629828	1039.438
8972	0	0	0.9627362	931.3088
8973	0	0	0.8610703	523.0131
8974	0	0	0.8696586	683.4733
8975	0	0	0.9728391	634.4583

8976	0	0	0.9802846	500.3279
8977	0	0	0.9917559	682.825
8978	0.02016202	0	1.020577	491.645
8979	0	0	0.8381806	876.8565
8980	0	0	0.953011	856.4042
8981	0	0	0.9758508	596.6351
8982	0.017876	0	1.018201	884.2828
8983	0	0	0.932623	838.6556
8984	0	0	0.9812584	606.8365
8985	0	0	0.911327	939.6094
8986	0.02953683	0	1.030436	658.7147
8987	0	0	0.9801536	773.5776
8988	0	0	0.9324701	743.4315
8989	0	0	0.9173208	760.4288
8990	0	0	0.9341033	619.7872
8991	0	0	0.9530933	973.1812
8992	0	0	0.8309057	608.9709
8993	0	0	0.9443095	582.8955
8994	0	0	0.9217663	526.431
8995	0.01209254	0	1.012241	698.6689
8996	0	0	0.8800284	513.4869
8997	0	0	0.9908688	648.7144
8998	0	0	0.8557081	834.3998
8999	0	0.05487693	0.8880281	1058.063
9000	0	0	0.9742416	502.2898
9001	0	0	0.8359941	738.2021
9002	0.01231573	0	1.012469	921.2179
9003	0	0	0.9477254	819.9168
9004	0	0	0.9187556	721.5389
9005	0	0	0.9552899	759.1086
9006	0	0	0.9389735	847.1731
9007	0.0478333	0	1.050236	780.1077
9008	0	0	0.8295808	717.689
9009	0	0	0.8531568	681.5453
9010	0	0	0.9731929	539.4212
9011	0	0	0.8206065	702.2937
9012	0	0	0.8974107	782.9686
9013	0	0	0.9060332	853.3652
9014	0	0	0.9956442	419.802
9015	0	0.02583285	0.8211262	1026.518
9016	0	0	0.8965901	971.4481
9017	0	0	0.9759114	840.7574
9018	0	0	0.942468	793.6231
9019	0	0	0.9049368	948.8043
9020	0	0	0.8735888	754.6474
9021	0	0	0.816288	543.1689
9022	0	0	0.9911534	621.7621
9023	0	0	0.8449398	695.8686
9024	0	0	0.8447337	741.4766
9025	0	0.003126658	0.9397562	1003.136
9026	0	0	0.8932871	510.3985
9027	0	0	0.839077	605.3118
9028	0	0	0.9074737	824.29
9029	0	0	0.8901623	640.3371
9030	0	0	0.8960376	583.9203
9031	0	0	0.888862	766.2981
9032	0	0	0.9341956	850.912
9033	0	0	0.9919309	709.0811
9034	0.02233163	0	1.022842	603.998
9035	0	0	0.9295375	743.0956
9036	0	0	0.9129161	729.5724
9037	0	0	0.9697751	539.2422
9038	0	0	0.8894739	762.4132
9039	0	0	0.958984	864.7059
9040	0	0	0.9443005	734.3802
9041	0.002494243	0.05496807	1.002501	1058.165
9042	0	0	0.9902383	765.307
9043	0	0	0.9883749	700.7574
9044	0	0	0.9152547	713.9828
9045	0.03105295	0	1.032048	614.7455
9046	0	0	0.8366135	632.8474
9047	0	0	0.8781105	829.9854
9048	0.003031634	0	1.003041	786.8018

9049	0	0	0.9614449	931.0982
9050	0	0	0.8894483	576.0676
9051	0.04687703	0	1.049183	628.1423
9052	0	0	0.9409074	747.7751
9053	0	0	0.9053143	718.9257
9054	0	0	0.9398692	779.6169
9055	0.06902546	0	1.074143	778.6498
9056	0.05233887	0	1.05523	880.4097
9057	0	0.01103623	0.9051182	1011.159
9058	0	0	0.9530994	996.2112
9059	0	0	0.9642811	716.6136
9060	0	0	0.9686713	856.0327
9061	0	0	0.9637893	898.0145
9062	0	0	0.9160896	815.7441
9063	0	0	0.9535998	561.8727
9064	0	0	0.96841	844.0189
9065	0	0	0.9119892	581.499
9066	0	0	0.9169362	758.8818
9067	0	0	0.9492829	990.287
9068	0	0	0.8322346	796.137
9069	0	0	0.9135835	879.4962
9070	0.02146268	0	1.021933	854.4811
9071	0.01258833	0	1.012749	635.8267
9072	0	0	0.9601699	743.9636
9073	0	0	0.9713559	478.3582
9074	0	0	0.9299047	664.0283
9075	0	0	0.8562235	431.8117
9076	0	0	0.9020264	467.4283
9077	0.01689842	0	1.017189	701.0262
9078	0.03832291	0	1.03985	779.5724
9079	0	0.03153531	0.8223366	1032.562
9080	0	0	0.934443	867.4117
9081	0	0	0.9121484	710.5528
9082	0	0	0.9910373	803.4421
9083	0.07012042	0	1.075408	816.4435
9084	0	0	0.9254053	698.8703
9085	0	0	0.911844	611.4789
9086	0	0	0.842711	604.2426
9087	0	0	0.9791874	767.9846
9088	0	0	0.9604909	768.7413
9089	0.0153832	0	1.015624	589.5678
9090	0	0	0.8929269	812.6629
9091	0	0	0.9890167	755.0292
9092	0	0	0.9885557	882.4202
9093	0	0	0.903277	900.978
9094	0	0	0.8897728	790.0085
9095	0	0	0.9758264	872.8917
9096	0	0	0.93638	775.207
9097	0	0	0.9411945	520.0702
9098	0	0	0.8922722	792.5381
9099	0.01290914	0	1.013078	618.5203
9100	0	0.0422439	0.9375067	1044.107
9101	0	0	0.9425427	717.0901
9102	0.000971635	0	1.000973	813.6677
9103	0	0	0.9091128	738.1469
9104	0	0	0.9766241	702.6981
9105	0	0.0601154	0.9217435	1063.96
9106	0	0	0.9969525	634.1521
9107	0	0	0.8685237	598.8058
9108	0	0	0.8025941	872.7141
9109	0	0	0.8897262	607.4962
9110	0	0	0.9438953	524.0479
9111	0	0	0.9573542	833.9777
9112	0	0	0.99607	687.2893
9113	0	0	0.9862065	889.0031
9114	0.003033528	0	1.003043	671.4627
9115	0	0	0.9114263	579.653
9116	0	0	0.9459211	575.4226
9117	0	0	0.9180788	897.2661
9118	0	0	0.9992524	976.2046
9119	0	0	0.9807155	743.7995
9120	0.01686761	0	1.017157	952.3566
9121	0	0	0.9363298	476.6847

9122	0	0	0.9147286	538.5372
9123	0	0	0.8345516	959.9249
9124	0	0	0.9129534	486.9028
9125	0.03950451	0	1.041129	781.6705
9126	0	0	0.9348968	903.839
9127	0	0	0.9767969	797.7021
9128	0.05342833	0	1.056444	641.3318
9129	0	0	0.922131	779.9875
9130	0	0	0.9871041	892.2712
9131	0	0	0.985072	839.4386
9132	0	0	0.8719123	840.1465
9133	0.008611615	0	1.008686	654.4528
9134	0.02389948	0	1.024485	796.0656
9135	0	0	0.9960381	593.2014
9136	0.03177525	0	1.032818	975.7603
9137	0	0	0.8794852	757.379
9138	0	0	0.9118844	779.5879
9139	0	0	0.9812493	935.8132
9140	0.02410834	0	1.024704	725.2371
9141	0.07218229	0	1.077798	529.5861
9142	0	0	0.9350703	986.1835
9143	0	0	0.9355435	748.2096
9144	0	0	0.9830569	834.8692
9145	0	0	0.8665367	449.7524
9146	0	0	0.9716669	545.8522
9147	0	0	0.8749204	732.6172
9148	0	0	0.8721035	938.0818
9149	0.04676623	0	1.049061	908.9908
9150	0	0	0.9655539	809.3172
9151	0	0	0.9194587	554.743
9152	0	0	0.9906651	878.7382
9153	0.02196247	0	1.022456	878.9408
9154	0	0	0.8955901	722.1995
9155	0.01378879	0	1.013982	554.1469
9156	0.03443681	0	1.035665	603.0607
9157	0	0	0.9851785	664.3354
9158	0	0	0.8591319	772.9308
9159	0	0	0.962754	605.2324
9160	0	0	0.881585	612.7815
9161	0	0	0.9840831	983.4614
9162	0	0	0.9565136	587.6147
9163	0	0	0.961224	784.6723
9164	0.007600241	0	1.007658	511.2079
9165	0	0	0.9911557	665.7689
9166	0	0	0.974933	880.4572
9167	0	0	0.9689045	756.9111
9168	0	0	0.8848932	797.401
9169	0	0	0.8954011	790.1552
9170	0	0	0.9371574	878.3486
9171	0	0	0.8719827	609.4528
9172	1.54E-02	0	1.015665	723.9806
9173	0	0	0.9289899	576.2752
9174	0.0430508	0	1.044988	718.9495
9175	0	0	0.9120452	733.0875
9176	0	0	0.8386874	492.446
9177	0.04509275	0	1.047222	770.3046
9178	0	0	0.9387249	860.109
9179	0	0	0.8840147	849.8236
9180	0	0	0.968333	513.0842
9181	0	0	0.899363	608.1655
9182	0	0	0.9766355	693.71
9183	0	0	0.8491356	776.8306
9184	0	0	0.9426289	702.6761
9185	0	0	0.8905228	751.35
9186	0	0	0.9058992	779.4898
9187	0.03677616	0	1.03818	527.0607
9188	0.03150559	0	1.03253	539.616
9189	0	0	0.8982382	539.877
9190	0	0	0.8829811	850.1149
9191	0.02842308	0	1.029255	876.7031
9192	0	0	0.9801054	831.2173
9193	0	0	0.9579644	741.1472
9194	0.02635241	0	1.027066	632.1661

9195	0	0	0.960771	439.7816
9196	0	0	0.8798793	840.3602
9197	0	0	0.9640498	798.9922
9198	0.04622371	0	1.048464	876.4902
9199	0	0	0.955337	470.997
9200	0	0	0.9022126	829.8286
9201	0	0	0.894571	641.704
9202	0	0	0.9159023	571.7883
9203	0	0	0.8789497	724.7532
9204	0.03145662	0	1.032478	651.5997
9205	0	0	0.8915492	695.3642
9206	0.02561898	0	1.026293	591.4014
9207	0	0	0.9427032	573.768
9208	0	0	0.84084	915.4656
9209	0	0	0.9997972	758.2687
9210	0	0	0.9754212	901.1052
9211	0.01893413	0	1.0193	456.6007
9212	0	0	0.9093097	834.3793
9213	0	0	0.9287211	950.0372
9214	0	0	0.9944787	543.5604
9215	0.04824546	0	1.050691	704.4409
9216	0	0	0.8902814	766.4989
9217	0	0	0.9549527	883.1238
9218	0.04265736	0.03467988	1.044558	1035.926
9219	0	0	0.9007754	827.1176
9220	0	0	0.9415098	874.9647
9221	0	0	0.9413999	399.0421
9222	0	0	0.9184899	452.9941
9223	0.02783906	0	1.028636	754.1488
9224	0	0	0.9245291	699.6368
9225	0	0	0.9324188	808.0242
9226	0	0	0.9046265	878.2095
9227	0	0	0.9991947	552.0814
9228	0	0	0.8513571	795.6616
9229	0	0	0.9610353	688.7827
9230	0	0	0.9531172	666.7269
9231	0	0	0.8405944	703.9467
9232	0.0413752	0	1.043161	515.8828
9233	0	0	0.9830208	601.8459
9234	0.006889281	0	1.006937	899.4874
9235	0.06954234	0	1.07474	947.4014
9236	0	0	0.8878738	781.3942
9237	0	0	0.9351599	527.2144
9238	0	0	0.9920799	894.9574
9239	0.05238675	0	1.055283	827.5872
9240	0.01332775	0	1.013508	780.6445
9241	0	0	0.9483218	406.5785
9242	0.02423965	0	1.024842	701.5432
9243	0	0	0.9518686	735.8166
9244	0.02994952	0	1.030874	547.226
9245	0	0	0.9044195	670.849
9246	0.03404543	0	1.035245	509.3243
9247	0.01041526	0	1.010525	663.8051
9248	0.003135803	0	1.003146	890.7191
9249	0	0	0.9596599	682.347
9250	0.003909276	0	1.003925	726.5834
9251	0	0	0.9391283	571.997
9252	0.01443431	0	1.014646	833.8417
9253	0	0	0.9109039	697.5209
9254	0	0	0.8992918	892.1862
9255	0	0	0.866601	633.7551
9256	0	0	0.9440212	982.8279
9257	0	0	0.8478951	621.1945
9258	0	0	0.948043	719.6486
9259	0	0	0.8999567	819.8525
9260	0	0	0.9296227	518.1498
9261	0	0	0.9035188	664.2103
9262	0	0	0.863321	660.2993
9263	0	0	0.8803097	878.6544
9264	0	0	0.8995948	712.1891
9265	0	0	0.9525242	443.3433
9266	0	0	0.9426329	938.96
9267	0	0	0.9463521	805.4408

9268	0	0	0.9469538	922.6901
9269	0	0	0.9208424	635.4641
9270	0.08230519	0	1.089687	694.8317
9271	0.02131303	0	1.021777	878.3569
9272	0.04674743	0	1.04904	870.6724
9273	0.004317856	0	1.004337	962.8958
9274	0	0	0.8936809	761.83
9275	0	0	0.9751173	409.7481
9276	0	0	0.8686463	670.6727
9277	0.04618922	0	1.048426	754.914
9278	0	0	0.9751757	928.5698
9279	0	0	0.8967509	849.5596
9280	0.03087567	0	1.031859	987.822
9281	0	0	0.9436162	454.2246
9282	0	0	0.9046383	886.9973
9283	0	0	0.8525447	645.8979
9284	0	0	0.9101589	802.5413
9285	0	0	0.9728855	554.0466
9286	0	0	0.9440596	961.3888
9287	0	0	0.9307298	620.1281
9288	0	0	0.8899218	485.9583
9289	0	0	0.9256766	811.7717
9290	0	0	0.8750135	603.9158
9291	0	0	0.8919581	688.6741
9292	0	0	0.8657022	643.7055
9293	0	0	0.9319072	736.0702
9294	0	0	0.9309711	786.8954
9295	0.004140398	0	1.004158	602.8218
9296	0.06089877	0	1.064848	882.1545
9297	0	0	0.9894059	608.4732
9298	0	0	0.9162484	495.3698
9299	0	0	0.9287717	779.5782
9300	0	0	0.9857103	923.6703
9301	0	0	0.8884907	535.5822
9302	0.01677232	0	1.017058	416.1726
9303	0	0	0.8705143	638.7142
9304	0	0	0.936752	885.3878
9305	0	0	0.9416453	701.8127
9306	0	0	0.9219151	455.4841
9307	0	0	0.8747014	447.1763
9308	0	0	0.8414871	503.5482
9309	0	0	0.8571931	632.44
9310	0.05557244	0	1.058842	601.6719
9311	0	0	0.9059849	712.0455
9312	0	0	0.9296129	694.7542
9313	0	0	0.9866426	750.0363
9314	0	0	0.9264617	723.7938
9315	0.0364437	0	1.037822	551.8748
9316	0	0	0.9001517	679.073
9317	0	0	0.9872868	985.6253
9318	0	0	0.8291129	544.1605
9319	0	0	0.8727533	590.907
9320	0	0	0.9391131	478.2443
9321	0	0	0.9531941	565.405
9322	0	0	0.8990483	597.8517
9323	0	0	0.9532496	672.5899
9324	0.006144828	0	1.006183	754.0676
9325	0	0	0.9160675	590.4014
9326	0	0	0.8975496	892.1088
9327	0.05952672	0	1.063294	633.1385
9328	0.0166259	0	1.016907	673.2634
9329	0	0	0.9047256	620.7145
9330	0	0	0.8995129	829.2277
9331	0	0	0.9788171	970.8096
9332	0.05518104	0	1.058404	691.3387
9333	0	0	0.9416836	660.4694
9334	0	0	0.9965912	570.8162
9335	0	0	0.9480979	859.4618
9336	0	0	0.9373415	725.7981
9337	0.02332325	0	1.02388	933.2348
9338	0	0	0.8910258	542.1844
9339	0	0	0.9349098	417.2132
9340	0	0	0.9796563	479.0914

9341	0	0	0.8905717	724.7665
9342	0.02384553	0	1.024428	789.2354
9343	0	0.01324722	0.9753278	1013.425
9344	0.07481655	0	1.080867	895.2268
9345	0	0	0.9687119	694.1488
9346	0	0	0.9310344	909.8717
9347	0	0	0.9493847	669.6497
9348	0	0.008263742	0.9796684	1008.333
9349	0	0	0.9147729	788.0309
9350	0	0	0.8729753	551.3643
9351	0	0	0.8685106	745.0569
9352	0	0	0.9437485	845.62
9353	0	0	0.9678916	889.7632
9354	0	0	0.9266994	763.7948
9355	0	0.05675681	0.9761429	1060.172
9356	0	0	0.9002852	399.783
9357	0	0	0.8577193	905.1339
9358	0	0	0.949649	681.4288
9359	0.02130777	0	1.021772	668.1514
9360	0	0.04265013	0.966569	1044.55
9361	0.01077173	0	1.010889	881.5292
9362	0	0	0.9703787	787.7605
9363	0	0.01631616	0.9218114	1016.587
9364	0	0	0.930607	803.7421
9365	0	0	0.9419759	463.1506
9366	0	0	0.9650562	777.1575
9367	0	0	0.9229137	707.4188
9368	0	0	0.8960214	808.7598
9369	0	0	0.9538375	667.533
9370	0	0	0.9364721	731.1917
9371	0.06410799	0	1.068499	661.7789
9372	0	0	0.9967192	384.2756
9373	0	0	0.832931	869.2202
9374	0	0	0.9796528	844.6074
9375	0	0	0.9633337	748.1473
9376	0	0	0.8966246	429.5219
9377	0	0	0.9701957	642.0143
9378	0.0369184	0	1.038334	737.1313
9379	0	0	0.9287689	805.4819
9380	0	0	0.9630662	861.7754
9381	0	0	0.8307179	644.1306
9382	0	0	0.9528605	918.1106
9383	0	0	0.8246382	669.9894
9384	0	0	0.8551891	623.9901
9385	0	0	0.9174665	640.4064
9386	0	0	0.9697437	842.748
9387	0	0	0.9250957	658.0043
9388	0	0	0.9603575	773.7004
9389	0.08292479	0	1.090423	746.7972
9390	0	0	0.8423553	551.0325
9391	0	0	0.9065326	799.6686
9392	0	0	0.9330629	773.5203
9393	0	0	0.959301	588.8677
9394	0.02709847	0	1.027853	829.2504
9395	0	0	0.9739447	434.9196
9396	0	0.02359441	0.9008257	1024.165
9397	0	0	0.8794449	633.341
9398	0	0	0.9768081	803.7844
9399	0	0	0.9651292	791.7959
9400	0	0	0.8919543	574.0542
9401	0	0	0.9945168	726.5453
9402	0	0	0.9439014	755.5199
9403	0	0	0.986659	963.8497
9404	0.01832634	0	1.018668	777.2924
9405	0.04137561	0	1.043161	715.1815
9406	0.000874326	0	1.000875	586.5665
9407	0	0	0.8685409	684.0538
9408	0	0	0.8322263	779.3323
9409	0	0	0.983545	843.2944
9410	0	0	0.9732272	904.7852
9411	0	0	0.9667417	677.9657
9412	0	0	0.8474158	951.8811
9413	0.07737686	0	1.083866	891.4211

9414	0.009455217	0	1.009545	509.4558
9415	0.02397044	0	1.024559	708.1337
9416	0	0.005932373	0.9768005	1005.968
9417	0	0	0.8872408	743.097
9418	0.02316745	0	1.023717	909.7671
9419	0	0	0.9427184	930.2977
9420	0	0	0.8751364	862.1036
9421	0	0	0.8202206	877.3105
9422	0	0	0.9201345	448.4476
9423	0	0	0.9199855	648.0474
9424	0	0	0.888482	661.7443
9425	0	0	0.9777355	656.92
9426	0.008742367	0	1.008819	770.4389
9427	0	0	0.9064556	583.1803
9428	0.003881418	0	1.003897	620.4466
9429	0	0	0.9237371	613.4624
9430	0	0	0.8427854	776.102
9431	0	0	0.871267	882.8116
9432	0.00E+00	0	0.9121529	496.1272
9433	0	0	0.8790643	535.5708
9434	0	0	0.8281856	846.3483
9435	0	0	0.9051713	879.4013
9436	0	0	0.9549619	814.3277
9437	0	0	0.8822359	690.1039
9438	0	0	0.9515399	491.127
9439	0	0	0.9689165	711.5912
9440	0	0	0.8329834	877.1004
9441	0	0	0.9810726	842.6617
9442	0	0	0.926005	601.4252
9443	0.01054786	0	1.01066	479.4817
9444	0	0	0.8942468	776.1255
9445	0	0	0.9815217	518.481
9446	0.02038353	0	1.020808	535.8035
9447	0	0	0.9484806	792.3853
9448	0	0	0.902148	708.8146
9449	0.01451322	0	1.014727	776.7399
9450	0	0	0.9925511	644.356
9451	0	0	0.9776734	930.1881
9452	0	0	0.9063663	682.1541
9453	0.02997647	0	1.030903	953.1973
9454	0.000394843	0	1.000395	774.9597
9455	0	0	0.9305472	614.4139
9456	0	0	0.8063454	588.7422
9457	0.03383372	0	1.035019	640.0739
9458	0.05484742	0	1.05803	976.771
9459	0	0	0.9516321	721.9376
9460	0.01407325	0	1.014274	904.6978
9461	0.03701255	0	1.038435	745.7
9462	0	0	0.8470052	829.4424
9463	0	0	0.8190441	681.3715
9464	0	0	0.8645548	586.4935
9465	0	0	0.8772995	623.554
9466	0	0	0.9718874	951.3394
9467	0	0	0.9307875	694.7141
9468	0	0	0.9920091	894.3725
9469	0	0	0.9095837	699.7074
9470	0	0	0.8540549	705.4711
9471	0	0	0.8512865	672.0653
9472	0	0	0.8975939	674.587
9473	0	0	0.8850413	574.3658
9474	0	0	0.959711	553.0057
9475	0	0	0.9332651	562.3177
9476	0	0	0.9459069	509.3678
9477	0	0	0.8704176	766.9238
9478	0	0	0.8976711	884.6044
9479	0.05608384	0	1.059416	637.8712
9480	0	0	0.8800461	703.5295
9481	0	0	0.913928	721.873
9482	0	0	0.8743642	673.3429
9483	0	0	0.8625608	488.3276
9484	0	0	0.835625	786.803
9485	0	0	0.9928125	834.8535
9486	0.02626265	0	1.026971	881.6736

9487	0	0	0.9351826	689.5074
9488	0	0	0.8325838	846.0753
9489	0	0	0.9618078	658.37
9490	0	0	0.8705677	613.5899
9491	0	0	0.8924057	829.7994
9492	0	0	0.8528723	804.2855
9493	0	0	0.9621342	801.9148
9494	0	0	0.901935	648.0245
9495	0	0	0.9884715	672.6722
9496	0	0	0.9247833	538.0986
9497	0	0	0.9750714	748.0703
9498	0	0	0.9395524	625.277
9499	0.03721424	0	1.038653	803.173
9500	0	0	0.8679795	719.0435
9501	0	0	0.949686	903.7871
9502	0	0	0.8127272	673.7701
9503	0.01753103	0	1.017844	806.4559
9504	0	0	0.9474037	875.6651
9505	0	0	0.8954065	712.8395
9506	0	0	0.8201661	967.3875
9507	0	0	0.9779478	771.8984
9508	0	0	0.8597198	488.3761
9509	0	0	0.9764376	846.3799
9510	0	0	0.9598391	925.4265
9511	0	0	0.9847445	702.0899
9512	0	0	0.9651016	756.561
9513	0	0	0.9103087	927.5117
9514	0	0	0.9260617	740.7868
9515	0.03301972	0	1.034147	835.643
9516	0.003953577	0	1.003969	605.1812
9517	0	0	0.7959579	563.325
9518	0	0	0.9837853	592.8885
9519	0.07739735	0	1.08389	771.3131
9520	0	0	0.9576377	448.2453
9521	0	0	0.9646474	883.924
9522	0	0	0.9936767	677.4323
9523	0	0	0.926635	653.9209
9524	0.03974311	0	1.041388	866.8114
9525	4.99E-02	0	1.052555	851.2365
9526	0	0	0.9094317	961.8407
9527	0	0	0.9549112	579.3875
9528	0	0	0.8420795	938.8425
9529	0	0	0.9211009	683.9052
9530	0.05862187	0	1.062272	872.4606
9531	0.008661535	0	1.008737	623.6061
9532	0.02260204	0	1.023125	725.7699
9533	0	0	0.9143037	689.7566
9534	0.01354309	0	1.013729	789.7092
9535	0	0	0.973722	681.3369
9536	0.01252827	0	1.012687	645.0964
9537	0.04449772	0	1.04657	933.2525
9538	0	0	0.8692112	791.6019
9539	0	0	0.8116729	748.6275
9540	0.01214762	0	1.012297	816.7425
9541	0	0	0.8811392	946.5117
9542	0	0	0.9969496	755.6418
9543	0	0	0.9268602	792.6482
9544	0	0	0.9039719	656.0201
9545	0.02148153	0	1.021953	769.545
9546	0	0	0.9933555	499.064
9547	0	0	0.9210574	775.408
9548	0.07577202	0	1.081984	639.6887
9549	0	0	0.9331434	818.7036
9550	0	0	0.883801	535.3154
9551	0.001144572	0	1.001146	885.6452
9552	0.04380969	0	1.045817	605.634
9553	0	0	0.9930689	461.2814
9554	0	0	0.9274725	824.6617
9555	0	0	0.9481722	933.1147
9556	0	0	0.8633919	829.951
9557	0.04538087	0	1.047538	837.8253
9558	0	0	0.9430985	933.2056
9559	0	0	0.8697397	600.6435

9560	0	0	0.9292236	765.2682
9561	0	0	0.8940899	770.4374
9562	0	0	0.8863411	829.1803
9563	0.00E+00	0	0.9447107	881.5663
9564	0.05546097	0	1.058717	777.7982
9565	0.0279044	0	1.028705	935.5861
9566	0	0	0.8771104	692.3638
9567	0	0	0.8857868	533.7697
9568	0.003611999	0	1.003625	529.9861
9569	0	0	0.9660544	698.8622
9570	0	0	0.8805989	911.6989
9571	0	0	0.8845263	584.9913
9572	0	0	0.8882021	800.739
9573	0.01257417	0	1.012734	631.6044
9574	0	0	0.9329287	449.9734
9575	0	0	0.9984339	739.3111
9576	0.00E+00	0	0.9905649	678.3573
9577	0	0	0.8914664	736.9175
9578	0	0	0.9758792	851.9133
9579	0.00E+00	0	0.8255826	806.8335
9580	0	0	0.8945889	885.5446
9581	0	0	0.8596348	666.9673
9582	0	0	0.9866148	735.9905
9583	0	0	0.9533147	665.2123
9584	0	0	0.953429	705.176
9585	0	0	0.8445209	800.2844
9586	0	0	0.9979326	715.0826
9587	0.003995141	0	1.004011	770.2017
9588	0.01640599	0	1.01668	461.0596
9589	0	0	0.9485053	813.9279
9590	0	0	0.875309	696.4083
9591	0	0	0.9609645	867.7584
9592	0	0	0.9757249	549.4796
9593	0	0	0.9104899	748.709
9594	0	0	0.9240671	784.6573
9595	0	0	0.9528815	895.3464
9596	0.01948071	0	1.019868	679.2755
9597	0.00537106	0	1.0054	979.02
9598	0	0	0.9283388	816.0242
9599	0.02010761	0	1.02052	759.9476
9600	0	0	0.9306033	575.7657
9601	0	0	0.9456717	555.7333
9602	0	0	0.9242638	422.4218
9603	0	0.01530132	0.9952195	1015.539
9604	0.01260271	0	1.012764	777.5157
9605	0	0	0.9415387	794.4944
9606	0	0	0.9132318	467.714
9607	0	0	0.9075521	580.5468
9608	0	0	0.9412982	898.1146
9609	0	0	0.9807291	565.1479
9610	0.04446037	0	1.046529	443.5192
9611	0	0.006856002	0.9557235	1006.903
9612	0	0	0.9027008	685.5477
9613	0.05162866	0	1.054439	952.8198
9614	0	0	0.8952485	847.0755
9615	0	0	0.9023477	881.6378
9616	0.01870763	0	1.019064	613.6879
9617	0.04232469	0	1.044195	900.3399
9618	0	0	0.9437505	538.2776
9619	0.01211664	0	1.012265	700.5425
9620	0	0	0.8500494	876.2975
9621	0.04275881	0	1.044669	566.4619
9622	0.03367852	0	1.034852	670.7028
9623	0.003090118	0	1.0031	758.8984
9624	0	0	0.977266	722.1442
9625	0	0	0.9910364	921.0469
9626	0	0	0.9196301	779.1004
9627	0.03102585	0	1.032019	465.6578
9628	0	0	0.9044381	583.6636
9629	0	0	0.85077	786.6154
9630	0	0	0.9427082	629.5598
9631	0	0	0.9980208	669.2556
9632	0	0	0.9592606	437.4532

9633	0	0	0.8603041	659.4482
9634	0	0	0.9023107	996.441
9635	0	0	0.8398385	816.1572
9636	0	0.05864891	0.9392475	1062.303
9637	0	0	0.903867	872.3882
9638	0	0	0.9652715	653.7643
9639	0	0	0.942275	740.277
9640	0	0	0.9708914	515.9263
9641	0	0	0.9787993	653.1502
9642	0	0.000580241	0.9188695	1000.581
9643	0	0	0.936815	942.8477
9644	0	0	0.9042743	890.1888
9645	0	0	0.8113036	771.6915
9646	0	0	0.8779542	739.5452
9647	0	0	0.9950124	551.2242
9648	0	0	0.9776555	510.1323
9649	0	0	0.8525753	544.4146
9650	0.05095757	0	1.053694	767.1923
9651	0.08156694	0	1.088811	635.7636
9652	0	0	0.8962678	768.4624
9653	0.04141133	0	1.0432	707.3356
9654	0	0	0.9783385	683.7413
9655	0	0.03792472	0.986245	1039.42
9656	0	0	0.9238774	702.3896
9657	0	0	0.9003469	717.4965
9658	0	0	0.8847915	987.7364
9659	0	0	0.8993194	790.5031
9660	0	0	0.9679981	732.8452
9661	0.02447951	0.02422104	1.025094	1024.822
9662	0	0	0.9914128	795.1053
9663	0.08526033	0	1.093207	849.8712
9664	0	0	0.9580768	902.1252
9665	0	0	0.9252141	880.3937
9666	0.01143673	0	1.011569	617.9409
9667	0	0	0.9204885	727.1068
9668	0.04385282	0	1.045864	609.7838
9669	0	0	0.9828272	610.7961
9670	0	0	0.9856111	686.0269
9671	0	0	0.9606098	860.1602
9672	0.05953041	0	1.063299	842.5335
9673	0	0	0.9692156	450.5237
9674	0	0	0.924273	728.3359
9675	0	0.05137069	0.8518337	1054.153
9676	0	0	0.9512721	878.7841
9677	0	0	0.8923047	624.3346
9678	0	0	0.9350927	818.6512
9679	0	0	0.8989589	730.941
9680	0	0	0.9452912	417.746
9681	0	0	0.9736531	814.3091
9682	0	0	0.902084	649.6235
9683	0.01019884	0	1.010304	962.7926
9684	0	0	0.9443097	772.1299
9685	0	0	0.9128408	610.5884
9686	0	0	0.9056846	806.8717
9687	0	0	0.9336724	625.298
9688	0.00E+00	0	0.9358589	869.5218
9689	0	0	0.9364525	780.5969
9690	0	0	0.9174759	468.0703
9691	0	0	0.9639981	727.7083
9692	0	0	0.9153637	756.1686
9693	0	0	0.9566638	799.6671
9694	0	0	0.8955787	741.6444
9695	0	0	0.9273003	698.566
9696	0	0	0.9863533	660.6852
9697	0	0	0.8494322	725.071
9698	0	0	0.9475517	465.5276
9699	0	0	0.9164979	666.2838
9700	0	0	0.9586642	572.2386
9701	0	0	0.8392243	425.3661
9702	0	0	0.9714524	663.8901
9703	0	0	0.8907613	761.6316
9704	0.03860332	0.002442077	1.040153	1002.448
9705	0	0	0.8728237	745.6411

9706	0	0	0.9043164	934.7822
9707	0	0	0.9644843	880.1466
9708	0.06126606	0	1.065265	579.9832
9709	0	0	0.8953293	584.0289
9710	0	0	0.9319782	609.2838
9711	0	0	0.9054469	726.3419
9712	0	0	0.9688635	663.3611
9713	0	0	0.9684365	647.8983
9714	0	0	0.9610741	969.9742
9715	0	0	0.9613146	890.6774
9716	0	0	0.9809884	719.8453
9717	0.02868692	0	1.029534	932.859
9718	0	0	0.8935398	704.2378
9719	0.04980224	0	1.052413	855.4705
9720	0	0	0.9798399	567.6088
9721	0	0	0.9104543	688.0769
9722	0.08515337	0	1.093079	412.0255
9723	0	0	0.8396147	931.2351
9724	0.01372687	0	1.013918	689.7407
9725	0	0	0.9282392	847.9686
9726	0	0	0.9888499	757.3182
9727	0	0	0.9548018	725.0826
9728	0	0	0.911674	536.8667
9729	0	0	0.9352596	563.4115
9730	0	0	0.9217731	608.8551
9731	0	0	0.8178148	701.0502
9732	0.01321885	0	1.013396	847.3494
9733	0	0	0.9619389	836.0829
9734	0.009412028	0	1.009501	630.11
9735	0	0	0.8665764	819.444
9736	0	0	0.9167024	759.168
9737	0.008556665	0	1.008631	713.9316
9738	0	0	0.9900622	891.2113
9739	0	0	0.9956457	857.12
9740	0.07505441	0	1.081145	741.1849
9741	0	0	0.945558	726.6906
9742	0	0	0.9424563	680.8618
9743	0	0	0.9382972	580.9999
9744	0	0	0.8432665	960.5109
9745	0.009425863	0	1.009516	562.717
9746	0.05169905	0	1.054518	989.1072
9747	0	0	0.8290712	615.7563
9748	0	0	0.8429896	544.9844
9749	0	0	0.8834535	889.8776
9750	0	0	0.8756056	567.1349
9751	0	0	0.9654511	629.0167
9752	0	0	0.9972316	654.1316
9753	0	0	0.8479987	934.8976
9754	0	0	0.8042023	677.7377
9755	0	0	0.970835	685.5157
9756	0	0	0.8551816	680.6033
9757	0	0	0.9275181	644.1183
9758	0	0	0.9399338	692.0257
9759	0	0	0.9882026	851.9124
9760	0	0	0.9783056	822.2875
9761	0	0	0.8528452	840.8654
9762	0	0	0.9553112	800.5989
9763	0.05080583	0	1.053525	900.835
9764	0	0	0.9755914	438.6007
9765	0	0	0.9962332	948.3698
9766	0	0	0.9984207	683.194
9767	0.0231516	0	1.0237	685.8165
9768	0	0	0.9293069	775.3043
9769	0.06563327	0	1.070244	602.0764
9770	0	0	0.9813608	512.7592
9771	0	0	0.8864729	801.1272
9772	0	0	0.937803	664.1442
9773	0.02258788	0	1.02311	502.1718
9774	0	0	0.9744086	638.2522
9775	0	0	0.8793575	578.8923
9776	0	0	0.8793064	466.8562
9777	0	0	0.924623	628.5844
9778	0	0	0.9413164	847.4235

9779	0	0	0.9346263	615.8341
9780	0	0	0.9452376	572.9915
9781	0	0	0.9262179	900.045
9782	0	0	0.9758544	950.0701
9783	0	0.0118254	0.8832158	1011.967
9784	0.01164941	0	1.011787	837.0248
9785	0	0	0.9489663	658.3439
9786	0	0	0.8621452	588.5186
9787	0	0	0.954021	755.2677
9788	0	0	0.9602337	790.3101
9789	0	0	0.9099203	875.6776
9790	0	0	0.9257904	858.8436
9791	0	0	0.9587259	820.4269
9792	0	0	0.9319436	735.2733
9793	0.07734554	0	1.083829	944.7182
9794	0	0	0.9815083	902.4225
9795	0	0	0.934945	933.465
9796	0	0	0.9238473	789.6683
9797	0	0	0.9539773	792.4427
9798	0	0	0.9561439	736.7341
9799	0	0	0.9971521	778.3338
9800	0	0	0.9413478	863.8787
9801	0.0653659	0	1.069937	487.3006
9802	0	0	0.9990142	914.3383
9803	0	0	0.937675	709.8176
9804	0.01259807	0	1.012759	788.9739
9805	0	0	0.9965398	714.8006
9806	0	0	0.9494653	773.597
9807	0	0	0.9850275	741.1826
9808	0	0	0.942857	893.7081
9809	0	0	0.9226955	824.8961
9810	0	0	0.9296448	571.334
9811	0.05966156	0	1.063447	750.2742
9812	0.01397387	0	1.014172	464.4863
9813	0	0	0.8895327	718.27
9814	0	0	0.9973285	612.0609
9815	0	0	0.887893	535.8655
9816	0.06432958	0	1.068752	970.5082
9817	0	0	0.8171045	886.6747
9818	0	0	0.8856649	846.3512
9819	0	0	0.9997541	484.3587
9820	0	0	0.9338292	755.7498
9821	0	0	0.9443957	631.4083
9822	0	0	0.9446662	747.485
9823	0	0	0.9759288	916.2001
9824	0.004799774	0	1.004823	664.0428
9825	0	0	0.9127395	517.3298
9826	0.01343436	0	1.013617	665.838
9827	0	0	0.9616951	797.9929
9828	0	0	0.8504298	741.8854
9829	0.01877947	0	1.019139	559.9063
9830	0	0	0.9010941	434.907
9831	0.01748642	0	1.017798	691.4688
9832	0	0	0.8278729	634.1021
9833	0	0	0.8652493	733.4013
9834	0	0.02014137	0.8302845	1020.555
9835	0	0	0.8803993	889.4279
9836	0.0353715	0	1.036669	565.1841
9837	0.01379065	0	1.013983	637.9192
9838	0	0	0.9821212	497.7062
9839	0	0	0.9345402	648.2778
9840	0	0	0.9275198	653.6934
9841	0	0	0.9224663	495.9438
9842	0.01552076	0	1.015765	842.5529
9843	0	0	0.853475	862.294
9844	0.004197698	0	1.004215	815.0634
9845	0	0	0.970679	731.1812
9846	0	0	0.8204025	601.7562
9847	0	0	0.9285552	975.4118
9848	0	0	0.9196879	638.2111
9849	0	0	0.9803857	605.0899
9850	0	0	0.8806195	703.9604
9851	0.03020838	0	1.031149	682.1044

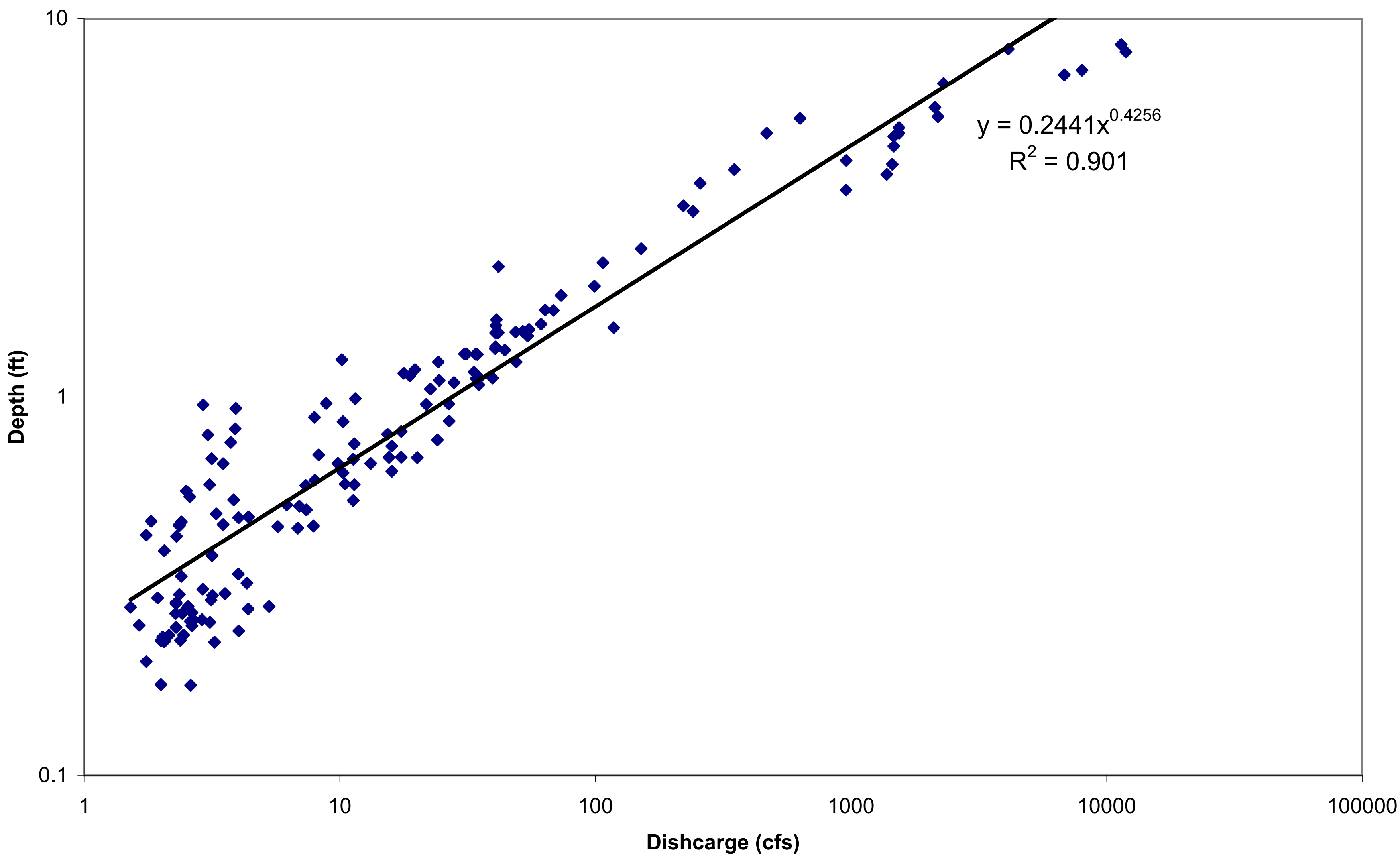
9852	0	0	0.9785596	728.8723
9853	0.06134041	0	1.065349	622.8437
9854	0.006529785	0	1.006573	513.2568
9855	0	0	0.9369872	865.0177
9856	0	0	0.9165356	677.9819
9857	0	0	0.922617	674.1435
9858	0	0	0.9254121	476.891
9859	0.02125578	0	1.021717	940.2378
9860	0	0	0.8778578	835.6865
9861	0	0	0.9055566	931.6875
9862	0	0	0.9745129	768.5128
9863	0	0	0.8993353	858.5272
9864	0	0	0.9590814	698.4595
9865	0	0	0.8559904	766.4105
9866	0	0	0.9423701	779.7806
9867	0.0186755	0	1.019031	780.9297
9868	0	0	0.9862412	447.7162
9869	0	0	0.9280506	405.4208
9870	0	0	0.9315481	866.4602
9871	0.01089885	0	1.011019	579.2964
9872	0	0	0.9185602	491.5047
9873	0.04124095	0	1.043015	836.1807
9874	0	0	0.9050345	698.228
9875	0	0	0.8289725	770.9679
9876	0	0	0.9665905	958.7286
9877	0	0	0.9181126	533.2485
9878	0.02813422	0	1.028949	745.1573
9879	0	0	0.9675164	633.0517
9880	0	0	0.9479666	796.7112
9881	0	0.002673582	0.9770563	1002.681
9882	0	0	0.9262483	423.5723
9883	0	0	0.9502174	636.7927
9884	0	0	0.8171483	634.8997
9885	0	0	0.8640484	774.2802
9886	0	0	0.9678029	995.3829
9887	0	0	0.9835631	630.5772
9888	0	0	0.9043096	611.9301
9889	0	0	0.9017694	579.233
9890	0.0288036	0	1.029658	551.4436
9891	0	0.01802932	0.9980145	1018.36
9892	0	0	0.8509961	946.6174
9893	0.04563485	0	1.047817	545.1862
9894	0	0	0.8985303	718.664
9895	0	0	0.9437822	762.2657
9896	0.07294232	0	1.078682	713.5405
9897	0	0	0.9782851	852.4432
9898	0	0	0.9506624	712.0086
9899	0	0	0.9181466	756.0336
9900	0	0	0.9416272	540.4055
9901	0	0	0.877044	841.35
9902	0	0	0.9820673	561.9308
9903	0	0	0.8743976	484.0018
9904	0	0	0.8269528	816.4901
9905	0	0	0.9611591	607.1627
9906	0	0	0.8244724	700.8553
9907	0	0	0.8818647	479.3732
9908	0.06360503	0	1.067925	493.8958
9909	0	0	0.9141659	934.058
9910	0	0	0.9885762	960.2361
9911	0.04102353	0	1.042778	993.8019
9912	0	0	0.8711723	930.6309
9913	0.003502991	0	1.003515	671.7515
9914	0	0	0.9536651	726.2237
9915	0	0	0.8522426	795.5306
9916	0	0	0.873077	752.4961
9917	0	0	0.9499322	468.6938
9918	0.05040625	0	1.053082	719.4451
9919	0	0	0.9889358	828.3172
9920	0	0	0.872866	430.0682
9921	0	0	0.8748339	467.4211
9922	0.013368	0	1.013549	653.0666
9923	0	0	0.9489569	740.3527
9924	0	0	0.969192	520.4805

9925	0	0	0.9697226	664.8377
9926	0	0	0.817718	474.8518
9927	0	0	0.8307	800.662
9928	0	0	0.9642931	945.0908
9929	0	0	0.9638031	542.42
9930	0	0	0.8587977	616.6979
9931	0.05697592	0	1.060418	696.5021
9932	0	0	0.8508942	424.3547
9933	0	0	0.9048518	751.9656
9934	0	0	0.8890497	817.5521
9935	0	0	0.9507961	787.2368
9936	0	0	0.901881	921.1796
9937	0	0.02517201	0.9073342	1025.822
9938	0.04710018	0	1.049428	809.9277
9939	0.01930746	0	1.019688	625.7181
9940	0	0	0.9875907	607.0703
9941	0.0226224	0	1.023146	806.08
9942	0	0	0.9557	655.2115
9943	0	0	0.9603052	796.479
9944	0.05453891	0	1.057685	551.8845
9945	0	0.006058444	0.8875875	1006.095
9946	0	0	0.9498368	618.5171
9947	0	0	0.9416844	526.156
9948	0	0	0.9968154	625.3993
9949	0	0	0.8248771	575.985
9950	0	0	0.9583867	563.5497
9951	0	0	0.8938711	633.0934
9952	0	0	0.9615211	700.7302
9953	0	0	0.8797827	988.0222
9954	0	0	0.8626872	811.1882
9955	0	0	0.9146469	677.5045
9956	0	0	0.8763116	724.3649
9957	0	0	0.8336384	785.6463
9958	0.02429556	0	1.024901	898.7483
9959	0	0	0.9503705	907.8878
9960	0	0	0.9975303	876.4491
9961	0	0	0.9774774	534.6818
9962	0	0	0.8452744	488.1949
9963	0	0	0.9728894	631.5006
9964	0	0	0.9254838	885.1503
9965	0	0	0.9495654	660.5125
9966	0	0	0.8735544	621.6407
9967	0.02865587	0	1.029501	728.9813
9968	0	0	0.9502732	623.5745
9969	0	0	0.9053437	614.9612
9970	0	0	0.9982797	815.8982
9971	0	0	0.9607937	822.7042
9972	0	0	0.8855344	558.4749
9973	0	0	0.9535618	520.6694
9974	0	0	0.8301067	720.0034
9975	0	0	0.9597922	602.7471
9976	0	0	0.9983216	969.0846
9977	0	0	0.9646356	810.0732
9978	0	0	0.8673943	663.6876
9979	0	0	0.9493102	823.8957
9980	0	0	0.9328788	670.0622
9981	0	0	0.9324979	960.1531
9982	0	0	0.9583682	691.3353
9983	0.02634474	0	1.027058	767.7993
9984	0	0	0.937468	428.6507
9985	0	0	0.9107609	977.0289
9986	0.01133161	0	1.011461	694.5235
9987	0	0	0.8955067	657.6861
9988	0	0	0.9145474	887.1046
9989	0	0.04109855	0.9350464	1042.86
9990	0	0	0.8726263	825.0175
9991	0	0	0.91187	964.7681
9992	0.03087496	0	1.031859	458.1918
9993	0.008156249	0	1.008223	766.1744
9994	0.03520207	0	1.036487	833.2939
9995	0	0	0.9218474	646.0378
9996	0	0	0.997643	736.321
9997	0	0	0.9296613	660.3116

9998	0.02553996	0	1.026209	681.326
9999	0.03260166	0	1.0337	635.4565
10000	0	0	0.994348	670.2835

Appendix C
Rating Curve for Stream Depth

Depth Rating Curve for Casey Fork from Gage 05595820



Appendix D
Streeter-Phelps Analyses

Casey Fork Watershed
Aeration Coefficient Summary

Location	Date	DO observed	BOD @ DO observed	Ka @ DO observed	Ka at DO = 6 mg/L
NJ10	7/31/1995	2.9	9.6	0.2	9.53
NJ10	2/22/1996	11.1	6.4	24.5	-3.40
NJ14	8/17/1995	4.1	2.0	1.729070525	7.59
NJC	8/3/1995	4.8	10.4	4.599532477	9.08
NJC	2/22/1996	10.5	5.9	15.27970055	-3.27
NJC	7/17/2000	3.2	7.8	0.1	6.25
NJC	9/25/2000	5.8	11.1	1.074005954	1.77

Definitions

D	DO Deficit = DO at saturation minus observed DO
$\mathbf{D_o}$	Initial DO deficit
$\mathbf{k_a}$	Reaeration rate
$\mathbf{k_d}$	BOD5 decay rate
x	Distance downstream of discharge
U	Stream velocity
$\mathbf{L_o}$	Initial BOD5 at x=0
$\mathbf{C_s}$	DO at saturation
C	Observed DO
H	Stream depth
T	Stream temperature
Q	Streamflow

Used Q from USGS Derived Flows and H from transect data. *Ka is lowest possible and Kd is calculated from that.*

		20 °C	@ T									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
5.00	4	6.95897	0.2	1	5280	0.5	9.6	7.9	2.9	1.2	27.3	0.4
4.99												
									x	y	m	b
									25	8.4	-0.16	12.4
									30	7.6		
									DO @ Temp	8.0		
									x	y	m	b
									0	8.4	-0.0003	8.4
									2000	7.8		
									Elevation	475	feet	
									DO @ Elev.	8.3	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	7.9	mg/L	

Used Q from USGS Derived Flows and H from transect data. *Ka is lowest possible value and Kd is calibrated from that.*

		20 °C	@ T									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
1.90	4	6.95897	9.5272539	1	5280	0.5	9.6	7.9	6	1.2	27.3	0.4
1.90												
									x	y	m	b
									25	8.4	-0.16	12.4
									30	7.6		
									DO @ Temp	8.0		
									x	y	m	b
									0	8.4	-0.0003	8.4
									2000	7.8		
									Elevation	475	feet	
									DO @ Elev.	8.3	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	7.9	mg/L	

Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
0.63	4	37.26577	24.5	0.605754	5280	0.7	6.4	11.7	11.1	0.4	7.9	4
0.62												
									x	y	m	b
									5	12.8	-0.3	14.3
									10	11.3		
									DO @ Temp	11.9		
									x	y	m	b
									0	11.3	-0.0004	11.3
									2000	10.5		
									Elevation	475	feet	
									DO @ Elev.	11.1	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	11.7	mg/L	

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Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
5.73	4	37.26577	-3.398729	0.605754	5280	0.7	6.4	11.7	6	0.4	7.9	4
5.73												

x	y	m	b
5	12.8	-0.3	14.3
10	11.3		
DO @ Temp	11.9		
x	y	m	b
0	11.3	-0.0004	11.3
2000	10.5		
Elevation	475	feet	
DO @ Elev.	11.1	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	11.7	mg/L	

Used Q from Facility Related Stream Surveys and H calculated from Q. Kd is temp corrected and Ka is calibrated.

D	D_o	20 °C k_a	@ T k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
3.70	4	201.0942	1.729071	2.651785	5280	0.5	2.0	7.8	4.1	0.1	28	0.2
3.70												

x	y	m	b
25	8.4	-0.16	12.4
30	7.6		
DO @ Temp	7.9		
x	y	m	b
0	7.6	-0.00025	7.6
2000	7.1		
Elevation	450	feet	
DO @ Elev.	7.5	mg/L	
DO Elev Factor	0.99		
DO @ Temp/Elev	7.8	mg/L	

Used Q from Facility Related Stream Surveys and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	D_o	k_a	k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
1.80	4	201.0942	7.594702	2.651785	5280	0.5	2.0	7.8	6	0.1	28	0.2
1.80												

x	y	m	b
25	8.4	-0.16	12.4
30	7.6		
DO @ Temp	7.9		
x	y	m	b
0	7.6	-0.00025	7.6
2000	7.1		
Elevation	450	feet	
DO @ Elev.	7.5	mg/L	
DO Elev Factor	0.99		
DO @ Temp/Elev	7.8	mg/L	

Used Q from USGS Derived Flows and H from transect data. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
3.28	4	14.65076	4.599532	1.134095	5280	0.5	10.4	8.1	4.8	0.72	26.2	0.3
3.28												
									x	y	m	b
									25	8.4	-0.16	12.4
									30	7.6		
									DO @ Temp	8.2		
									x	y	m	b
									0	8.4	-0.0003	8.4
									2000	7.8		
									Elevation	450	feet	
									DO @ Elev.	8.3	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	8.1	mg/L	

Used Q from USGS Derived Flows and H from transect data. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	D_o	k_a	k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
2.08	4	14.65076	9.079638	1.134095	5280	0.5	10.4	8.1	6	0.72	26.2	0.3
2.08												

x	y	m	b
25	8.4	-0.16	12.4
30	7.6		
DO @ Temp	8.2		
x	y	m	b
0	8.4	-0.0003	8.4
2000	7.8		
Elevation	450	feet	
DO @ Elev.	8.3	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	8.1	mg/L	

Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

D	D_o	20 °C k_a	@ T k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
1.21	4	41.52613	15.2797	0.630555	5280	0.7	5.9	11.7	10.5	0.4	8	3.3
1.21												
									x	y	m	b
									5	12.8	-0.3	14.3
									10	11.3		
									DO @ Temp	11.9		
									x	y	m	b
									0	11.3	-0.0004	11.3
									2000	10.5		
									Elevation	450	feet	
									DO @ Elev.	11.1	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	11.7	mg/L	

Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	D_o	k_a	k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
5.71	4	41.52613	-3.27235	0.630555	5280	0.7	5.9	11.7	6	0.4	8	3.3
5.71												
									x	y	m	b
									5	12.8	-0.3	14.3
									10	11.3		
									DO @ Temp	11.9		
									x	y	m	b
									0	11.3	-0.0004	11.3
									2000	10.5		
									Elevation	450	feet	
									DO @ Elev.	11.1	mg/L	
									DO Elev Factor	0.98		
									DO @ Temp/Elev	11.7	mg/L	

Used Q from USGS Derived Flows and H from transect data. *Ka is lowest possible value and Kd is calibrated from that.*

D	D_o	20 °C k_a	@ T k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
5.46	4	9.081004	0.1	2.311941	5280	0.7	7.8	8.7	3.2	1.1	22.5	2.4
5.46												

x	y	m	b
20	9.2	-0.16	12.4
25	8.4		
DO @ Temp	8.8		
x	y	m	b
0	8.4	-0.0003	8.4
2000	7.8		
Elevation	450	feet	
DO @ Elev.	8.3	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	8.7	mg/L	

Used Q from USGS Derived Flows and H from transect data. *Ka is lowest possible value and Kd is calibrated from that.*

		20 °C	**@ T**									
D	**D_o**	**k_a**	**k_a**	**k_d**	**x**	**U**	**L_o**	**C_s**	**C**	**H**	**T**	**Q**
mg/L	**mg/L**	**1/day**	**1/day**	**1/day**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**ft**	**°C**	**cfs**
2.66	4	9.081004	6.252877	0.796094	5280	0.7	7.8	8.7	6	1.1	22.5	2.4
2.66												

x	y	m	b
20	9.2	-0.16	12.4
25	8.4		
DO @ Temp	8.8		
x	y	m	b
0	8.4	-0.0003	8.4
2000	7.8		
Elevation	450	feet	
DO @ Elev.	8.3	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	8.7	mg/L	

Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	D_o	k_a	k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
4.24	4	22.37924	1.074006	0.709938	5280	0.8	11.1	10.0	5.8	0.6	15	9.9
4.24												

x	y	m	b
15	10.2	-0.2	13.2
20	9.2		
DO @ Temp	10.2		
x	y	m	b
0	10.2	-0.00035	10.2
2000	9.5		
Elevation	450	feet	
DO @ Elev.	10.0	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	10.0	mg/L	

NJC_092500

Used Q from USGS Derived Flows and H calculated from Q. Kd is temp corrected and Ka is calibrated.

		20 °C	@ T									
D	D_o	k_a	k_a	k_d	x	U	L_o	C_s	C	H	T	Q
mg/L	mg/L	1/day	1/day	1/day	ft	ft/s	mg/L	mg/L	mg/L	ft	°C	cfs
4.04	4	22.37924	1.774705	0.709938	5280	0.8	11.1	10.0	6	0.6	15	9.9
4.04												

x	y	m	b
15	10.2	-0.2	13.2
20	9.2		
DO @ Temp	10.2		
x	y	m	b
0	10.2	-0.00035	10.2
2000	9.5		
Elevation	450	feet	
DO @ Elev.	10.0	mg/L	
DO Elev Factor	0.98		
DO @ Temp/Elev	10.0	mg/L	

Appendix E
Error Analyses

E.1 Monte Carlo Analysis Development and Results

This appendix provides the results of the Monte-Carlo DO error analysis. The analysis was run on the range of possible values for the BOD_5 decay rate coefficient (k_d) and the reaeration rate coefficient (k_a). The Monte-Carlo program requires a distribution of k_a and k_d values. For each DO sample date, a triangle distribution was chosen to analyze the Casey Fork segments since data for these sites was extremely limited.

Each DO sample date was evaluated separately using @RISK, which is a Microsoft® *Excel* Add-in for the Monte-Carlo analysis. The @RISK analysis package performed 10,000 iterations to determine the range of possible DO predictions over 10,000 combinations of randomly selected k_a and k_d values.

A triangular distribution assumes that the values of a given data set are most often at or near the mode and linearly distributed to the minimum and maximum values. The minimum is the smallest concentration of the sample data set. The maximum value is the largest sample in the sample data set. The mode is the value that is most likely to be observed in a long time series of sample data. Water quality data were not available to determine the actual k_a and k_d, so the estimated values discussed in Section 7.3 and shown in Table 7-4 were used as the mode for each sample date.

In order to define a more appropriate distribution than triangular, more data needs to be collected. In the absence of any drift, or non-random error, 10 samples can be used to define a distribution. As the data set increases, so does the ability to define an appropriate distribution, such a lognormal, normal, etc. The number of samples needed to define the true data distribution depends upon the severity of the drift.

The Monte Carlo simulation was run using 10,000 iterations with the triangular distribution. For each iteration, a DO concentration is randomly generated according to random sampling of the triangular distribution of k_a and k_d. The output of the Monte-Carlo simulation is a population of 10,000 DO concentrations that could be observed across the literature range of k_a and k_d values. Statistics were performed on the Monte-Carlo output to determine the 95^{th} and 99.9^{th} percentile confidence intervals. A confidence interval means that the stated percent of the simulated concentrations fall within the low and high concentrations of the interval.

This appendix shows the set-up for the Monte-Carlo simulation for each segment sample date, a summary of the output, and the 95^{th} and 99.9^{th} percentile confidence intervals for each sample date.

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.7	6.37	11.7	11.1	5.318	=RiskTriang(0.01,25.1,100)	=RiskTriang(0.02,0.575,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	6.83	0.14	0.03
Maximum =	11.72	99.32	3.39
Mean =	11.13	41.92	1.33
Std Deviation =	0.65	21.30	0.74
Variance =	0.43	453.80	0.54
Skewness =	-2.21	0.42	0.50
Kurtosis =	8.87	2.39	2.42
Errors Calculated =	0.00	0.00	0.00
Mode =	10.62	43.58	0.66

95th Percent Confidence Interval

9.8	12.4

99.9th Percent Confidence Interval

9.0	13.3

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.6	9.62	7.9	2.9	1.7	=RiskTriang(0.01,0.1,100)	=RiskTriang(0.02,1.2,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	1.54	0.03	0.04
Maximum =	7.89	99.48	3.38
Mean =	6.65	33.39	1.54
Std Deviation =	1.34	23.56	0.70
Variance =	1.80	554.93	0.50
Skewness =	-1.44	0.55	0.27
Kurtosis =	4.20	2.38	2.38
Errors Calculated =	0.00	0.00	0.00
Mode =	6.82	44.88	2.10

95th Percent Confidence Interval

4.0 9.3

99.9th Percent Confidence Interval

2.2 11.1

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.5	2	7.8	4.1	0.7	=RiskTriang(0.01,1.7,100)	=RiskTriang(0.02,2.104,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	3.33	0.04	0.06
Maximum =	7.80	99.70	3.38
Mean =	7.08	34.01	1.85
Std Deviation =	0.97	23.39	0.70
Variance =	0.94	547.22	0.49
Skewness =	-1.72	0.56	-0.22
Kurtosis =	5.10	2.39	2.39
Errors Calculated =	0.00	0.00	0.00
Mode =	6.74	9.19	1.22

95th Percent Confidence Interval

5.2	9.0

99.9th Percent Confidence Interval

3.9	10.3

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.7	5.85	11.7	10.5	4.405	=RiskTriang(0.01,15.8,100)	=RiskTriang(0.02,0.598,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	6.69	0.44	0.04
Maximum =	11.70	99.49	3.38
Mean =	10.99	38.34	1.34
Std Deviation =	0.77	21.96	0.75
Variance =	0.59	482.35	0.56
Skewness =	-1.76	0.51	0.50
Kurtosis =	6.21	2.39	2.39
Errors Calculated =	0.00	0.00	0.00
Mode =	10.71	37.82	0.72

95th Percent Confidence Interval

9.5	12.5

99.9th Percent Confidence Interval

8.5	13.5

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.7	7.8	8.7	3.2	3.52	=RiskTriang(0.01,0.1,100)	=RiskTriang(0.02,2.4,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	2.84	0.02	0.05
Maximum =	8.65	99.19	3.37
Mean =	7.36	33.44	1.94
Std Deviation =	1.32	23.50	0.70
Variance =	1.73	552.26	0.49
Skewness =	-1.32	0.56	-0.37
Kurtosis =	3.80	2.38	2.43
Errors Calculated =	0.00	0.00	0.00
Mode =	4.45	35.78	2.28

95th Percent Confidence Interval

4.8	9.9

99.9th Percent Confidence Interval

3.0	11.7

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	D_o	x	U	L_o	D_s	DO_{obs}	Q		
	mg/L	mg/L	ft	ft/s	mg/L	mg/L	mg/L	cfs	Ka	Kd
Row 3	=F3-G3	4	5280	0.6	10.4	8.1	4.8	1.428	=RiskTriang(0.01,5.1,100)	=RiskTriang(0.02,1.134,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	1.57	0.11	0.04
Maximum =	8.07	98.98	3.38
Mean =	7.00	35.11	1.53
Std Deviation =	1.11	22.76	0.70
Variance =	1.23	517.82	0.50
Skewness =	-1.55	0.55	0.29
Kurtosis =	4.84	2.41	2.38
Errors Calculated =	0.00	0.00	0.00
Mode =	6.02	31.54	1.35

95th Percent Confidence Interval

4.8	9.2

99.9th Percent Confidence Interval

3.3	10.7

	Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J
	D	**D_o**	**x**	**U**	**L_o**	**D_s**	**DO_{obs}**	**Q**		
	mg/L	**mg/L**	**ft**	**ft/s**	**mg/L**	**mg/L**	**mg/L**	**cfs**	**Ka**	**Kd**
Row 3	=F3-G3	4	5280	0.8	11.05	10.0	5.8	11.013	=RiskTriang(0.01,1.02,100)	=RiskTriang(0.02,0.696,3.4)

DO= =$F$3-(($B$3*EXP((-$I$3*$C$3)/($D$3*86400)))+($E$3*$J$3/($I$3-$J$3))*(EXP(-$J$3*$C$3/($D$3*86400))-EXP(-$I$3*$C$3/($D$3*86400))))

Summary of Monte Carlo Results

	DO	Ka	Kd
Minimum =	4.10	0.13	0.04
Maximum =	10.02	99.40	3.38
Mean =	8.67	33.84	1.37
Std Deviation =	1.30	23.36	0.73
Variance =	1.68	545.58	0.53
Skewness =	-1.19	0.56	0.49
Kurtosis =	3.49	2.42	2.44
Errors Calculated =	0.00	0.00	0.00
Mode =	7.65	62.84	0.54

95th Percent Confidence Interval

6.1	11.2

99.9th Percent Confidence Interval

4.4	12.9

Appendix F
Watershed Management Model (WMM) Analyses

F.1 Watershed Management Model (WMM)

As discussed in Sections 6.2.1.1 and 7.3, the WMM model was run as a screening tool to assess the BOD_5 loads that are typically generated annually for the watershed. This appendix provides the output files from the WMM analysis for each sampled date in the Casey Fork Watershed and for the average annual precipitation event.

The output tables in this appendix use the following column headings. They are defined as follows:

Baseflow - Annual dry weather flow (cfs/sq. mile)
Point Source - Wastewater Treatment Plant or industrial process wastewater discharge
ISDS – Individual septic disposal system
Agriculture - Agriculture or pasture land
COM - Office or commercial land
Extractive - Mining type land use
Farm - Small or medium farm land
IND - Light to heavy industrial land
Institutional - University, school, or institution
Roads - Highways or surface roads
Water - Rivers, lakes, or wetlands
Forest - Forest land
Res High - High density residential land
Res Med - Medium density residential land
Urban Open - Urban open space
Vacant – Urban land with no development
LU1 - User defined land use
LU2 - User defined land use

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	20	0	0	0	0	0	0	22	60	1	2	0	0	0	0	106
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	445	0	0	0	0	0	0	0	325	51	95	0	0	0	0	915
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,835	0	0	0	0	0	0	0	8,293	298	558	0	0	0	0	11,984
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	17,789	0	0	0	0	0	0	0	14,179	112	211	0	0	0	0	32,292
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	5,559	0	0	0	0	0	0	0	16,261	359	672	0	0	0	0	22,851
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	142	0	0	0	0	0	0	2	20	1	1	0	0	0	0	166
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	5	0	0	0	0	0	0	2	5	1	2	0	0	0	0	15
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	511	0	0	0	0	0	0	61	210	5	6	0	0	0	0	794
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	258	0	0	0	0	0	0	35	58	4	5	0	0	0	0	360
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	253	0	0	0	0	0	0	26	152	2	2	0	0	0	0	435
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	3	14	0	0	0	0	0	0	18
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	82	0	0	0	0	0	0	87	239	5	10	0	0	0	0	423
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,779	0	0	0	0	0	0	0	1,301	202	379	0	0	0	0	3,661
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	11,341	0	0	0	0	0	0	0	33,172	1,190	2,232	0	0	0	0	47,935
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	71,157	0	0	0	0	0	0	0	56,717	450	843	0	0	0	0	129,167
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	22,237	0	0	0	0	0	0	0	65,042	1,434	2,689	0	0	0	0	91,403
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	569	0	0	0	0	0	0	10	78	3	3	0	0	0	0	663
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	20	0	0	0	0	0	0	9	20	4	7	0	0	0	0	60
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,046	0	0	0	0	0	0	243	842	22	26	0	0	0	0	3,178
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,032	0	0	0	0	0	0	140	234	14	19	0	0	0	0	1,439
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,014	0	0	0	0	0	0	103	608	7	7	0	0	0	0	1,739
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	22	0	1	0	0	0	0	23
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	9
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	13	55	2	2	0	0	0	0	72
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	61	0	0	0	0	0	0	65	179	4	7	0	0	0	0	317
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,334	0	0	0	0	0	0	0	976	152	284	0	0	0	0	2,746
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	8,506	0	0	0	0	0	0	0	24,879	893	1,674	0	0	0	0	35,951
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	53,368	0	0	0	0	0	0	0	42,538	337	633	0	0	0	0	96,876
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	16,677	0	0	0	0	0	0	0	48,782	1,076	2,017	0	0	0	0	68,552
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	427	0	0	0	0	0	0	7	59	2	3	0	0	0	0	498
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	15	0	0	0	0	0	0	7	15	3	5	0	0	0	0	45
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,534	0	0	0	0	0	0	182	631	16	19	0	0	0	0	2,383
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	774	0	0	0	0	0	0	105	175	11	14	0	0	0	0	1,079
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	760	0	0	0	0	0	0	77	456	5	5	0	0	0	0	1,304
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	16	0	1	0	0	0	0	17
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	7
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	9	41	1	1	0	0	0	0	54
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	20	0	0	0	0	0	0	22	60	1	2	0	0	0	0	106
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	445	0	0	0	0	0	0	0	325	51	95	0	0	0	0	915
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,835	0	0	0	0	0	0	0	8,293	298	558	0	0	0	0	11,984
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	17,789	0	0	0	0	0	0	0	14,179	112	211	0	0	0	0	32,292
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	5,559	0	0	0	0	0	0	0	16,261	359	672	0	0	0	0	22,851
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	142	0	0	0	0	0	0	2	20	1	1	0	0	0	0	166
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	5	0	0	0	0	0	0	2	5	1	2	0	0	0	0	15
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	511	0	0	0	0	0	0	61	210	5	6	0	0	0	0	794
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	258	0	0	0	0	0	0	35	58	4	5	0	0	0	0	360
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	253	0	0	0	0	0	0	26	152	2	2	0	0	0	0	435
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	3	14	0	0	0	0	0	0	18
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	104	0	0	0	0	0	0	110	303	7	13	0	0	0	0	537
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,255	0	0	0	0	0	0	0	1,649	256	481	0	0	0	0	4,642
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	14,378	0	0	0	0	0	0	0	42,057	1,509	2,830	0	0	0	0	60,775
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	90,217	0	0	0	0	0	0	0	71,909	570	1,069	0	0	0	0	163,766
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	28,193	0	0	0	0	0	0	0	82,465	1,819	3,410	0	0	0	0	115,886
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	722	0	0	0	0	0	0	12	99	4	4	0	0	0	0	841
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	25	0	0	0	0	0	0	12	25	5	9	0	0	0	0	76
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,594	0	0	0	0	0	0	308	1,067	27	33	0	0	0	0	4,029
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,308	0	0	0	0	0	0	178	297	18	24	0	0	0	0	1,824
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,286	0	0	0	0	0	0	130	771	9	9	0	0	0	0	2,205
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	28	1	1	0	0	0	0	29
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	11
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	16	70	2	2	0	0	0	0	91
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	102	0	0	0	0	0	0	109	299	7	12	0	0	0	0	529
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,224	0	0	0	0	0	0	0	1,626	253	474	0	0	0	0	4,577
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	14,176	0	0	0	0	0	0	0	41,465	1,488	2,790	0	0	0	0	59,919
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	88,946	0	0	0	0	0	0	0	70,896	562	1,054	0	0	0	0	161,459
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	27,796	0	0	0	0	0	0	0	81,303	1,793	3,362	0	0	0	0	114,253
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	712	0	0	0	0	0	0	12	98	4	4	0	0	0	0	829
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	25	0	0	0	0	0	0	12	24	5	9	0	0	0	0	75
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,557	0	0	0	0	0	0	304	1,052	27	32	0	0	0	0	3,972
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,290	0	0	0	0	0	0	175	292	18	23	0	0	0	0	1,799
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,267	0	0	0	0	0	0	128	760	9	9	0	0	0	0	2,174
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	27	1	1	0	0	0	0	29
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	11
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	16	69	2	2	0	0	0	0	90
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	196	0	0	0	0	0	0	208	572	13	24	0	0	0	0	1,013
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	4,257	0	0	0	0	0	0	0	3,113	484	907	0	0	0	0	8,761
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	27,137	0	0	0	0	0	0	0	79,375	2,849	5,341	0	0	0	0	114,702
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	170,269	0	0	0	0	0	0	0	135,716	1,076	2,018	0	0	0	0	309,079
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	53,209	0	0	0	0	0	0	0	155,637	3,432	6,435	0	0	0	0	218,714
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,362	0	0	0	0	0	0	23	187	7	8	0	0	0	0	1,588
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	48	0	0	0	0	0	0	23	47	9	17	0	0	0	0	144
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	4,895	0	0	0	0	0	0	581	2,015	52	61	0	0	0	0	7,604
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,469	0	0	0	0	0	0	336	560	34	45	0	0	0	0	3,443
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	2,426	0	0	0	0	0	0	246	1,455	17	17	0	0	0	0	4,161
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	1	52	1	2	0	0	0	0	56
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	1	20	0	0	0	0	0	0	21
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	30	132	5	4	0	0	0	0	171
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 1-A
CASEY FORK WATERSHED
AVERAGE CASEY FORK LOADS BY SUBBASIN
ANNUAL

Constituent	(units)	Basin	Jurisdiction	Baseflow	Point Source	ISDS	Agriculture	COM	Extractive	Farm	IND	Institutional	Roads	Water	Forest	Res High	Res Med	Urban Open	Vacant	LU1	LU2	Total
Runoff	(ac-ft/yr)	Casey Fork	Jefferson	0	0	0	6,075	0	0	0	0	0	0	6,465	17,769	392	735	0	0	0	0	31,435
BOD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	132,149	0	0	0	0	0	0	0	96,634	15,024	28,169	0	0	0	0	271,976
COD	(lbs/yr)	Casey Fork	Jefferson	0	0	0	842,450	0	0	0	0	0	0	0	2,464,179	88,437	165,819	0	0	0	0	3,560,884
TSS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	5,285,960	0	0	0	0	0	0	0	4,213,262	33,414	62,652	0	0	0	0	9,595,289
TDS	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,651,863	0	0	0	0	0	0	0	4,831,723	106,550	199,782	0	0	0	0	6,789,918
Total-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	42,288	0	0	0	0	0	0	720	5,814	215	252	0	0	0	0	49,288
Dissolved-P	(lbs/yr)	Casey Fork	Jefferson	0	0	0	1,487	0	0	0	0	0	0	703	1,450	288	539	0	0	0	0	4,467
Total-N	(lbs/yr)	Casey Fork	Jefferson	0	0	0	151,971	0	0	0	0	0	0	18,051	62,542	1,602	1,908	0	0	0	0	236,074
TKN	(lbs/yr)	Casey Fork	Jefferson	0	0	0	76,646	0	0	0	0	0	0	10,421	17,375	1,069	1,382	0	0	0	0	106,894
NO2+NO3	(lbs/yr)	Casey Fork	Jefferson	0	0	0	75,325	0	0	0	0	0	0	7,629	45,167	533	526	0	0	0	0	129,180
Lead	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	22	1,618	33	54	0	0	0	0	1,727
Copper	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	25	609	9	11	0	0	0	0	654
Zinc	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	940	4,109	142	129	0	0	0	0	5,320
Manganese	(lbs/yr)	Casey Fork	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix G
Responsiveness Summary

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Responsiveness Summary

This responsiveness summary responds to substantive questions and comments received during the public comment period from November 18, 2003 through January 20, 2004 postmarked, including those from the December 16, 2003 public meeting discussed below.

What is a TMDL?

A Total Maximum Daily Load (TMDL) is the sum of the allowable amount of a pollutant that a water body can receive from all contributing sources and still meet water quality standards or designated uses. The Casey Fork TMDL report contains a plan detailing the actions necessary to reduce pollutant loads to the impaired water bodies and ensure compliance with applicable water quality standards. The Illinois EPA implements the TMDL program in accordance with Section 303(d) of the federal Clean Water Act and regulations thereunder.

Background

The watershed targeted for TMDL development is Casey Fork (ILNJ07), which originates in the north central portion of Jefferson County, Illinois. The watershed encompasses an area of approximately 74 square miles. Land use in the watershed is predominately grassland followed by forested and agricultural land uses. The targeted water body segments are Casey Fork NJ10 and NJ14, and Sevenmile Creek NJC. In the 1998 Section 303(d) List, and subsequent 2002 303(d) List, Casey Fork (NJ10) was listed as impaired for the following parameters: manganese, low dissolved oxygen (DO), and total dissolved solids (TDS); Casey Fork (NJ14) was listed for manganese and low DO; and Sevenmile Creek (NJC) was listed for low DO and other habitat alterations. The Clean Water Act and USEPA regulations require that states develop TMDLs for waters on the Section 303(d) List. Illinois EPA is currently developing TMDLs for pollutants that have numeric water quality standards. Therefore, the other habitat alterations parameter was not considered during TMDL development for segment NJC. The Illinois EPA contracted with Camp Dresser & McKee (CDM) to prepare a TMDL report for the Casey Fork watershed.

Public Meetings

Public meetings were held in the city of Springfield on June 5, 2001 and in the city of Mt. Vernon on December 5, 2001 and December 16, 2003. The Illinois EPA provided public notice for the December 16, 2003 meeting by placing display ads in the “Mt. Vernon Register News” on November 18, 2003. This notice gave the date, time, location, and purpose of the meeting. The notice also provided references to obtain additional information about this specific site, the TMDL Program and other related issues. Approximately 43 individuals and organizations were also sent the public notice by first class mail. The draft TMDL Report was available for review at the Roland W.

Louis Community Building offices and also on the Agency's web page at http://www.epa.state.il.us/water/tmdl .

The final public meeting started at 6:30 p.m. on Tuesday, December 16, 2003. It was attended by approximately seven people and concluded at 7:40 p.m. with the meeting record remaining open until midnight, January 20, 2004.

Questions and Comments

1. Where does Illinois EPA collect its water quality samples for the impaired stream segments in the Casey Fork Watershed?

Response: For Segment NJC on Sevenmile Creek water quality samples were collected at station NJC-01, which is located on County Road 1250 N., in Section 34, T2S, R3E.
For Segment NJ 10 on Casey Fork, water quality samples were collected at station NJ-10, which is located on County Road 1750 N., in Section 6, T2S, R3E.
For Segment NJ 14 on Casey Fork, one water quality sample was collected at station NJ-14, which is located at the end of Park Avenue in Mt. Vernon in the NE quarter of Section 29, T2S, R3E.
The Illinois EPA also collects water samples from Casey Fork at NJ-07 every 6 weeks on a routine basis. Station NJ-07 is located downstream of segment NJ 14 on Illinois Route 37.

2. What are the sources of manganese impairment in the watershed?

Response: The TMDL report states that potential sources of manganese could be from groundwater potentially contaminated by oil and gas activities and abandoned coal mines, however, further source identification is recommended.

3. Employees at the Mt. Vernon wastewater treatment plant have continued to take DO, temperature, and pH data above and below the discharge point, approximately once a week for the past several years even though they are no longer required to do so. Could this information be of any use to the study?

Response: The wastewater treatment plant discharges into the very north end of Casey Fork segment NJ07, which is not an impaired stream segment, so the plant itself has no impact on segment NJ14. The additional data could be helpful in comparing the water quality of the two segments.

4. During the analysis, was land that is currently enrolled in CRP taken into account?

Response: Yes. The land use incorporated into the model used GIS land coverage from the Illinois Department of Natural Resources' Critical Trends Assesment Land Use Coverage. Any land that is in grassland as a result of CRP enrollment would be represented in the grassland category of this land use coverage.

5. Are TMDL projects typically done with such little water quality data?

Response: The threshold for a violation of state water quality standards used to put the waters on the list of impaired waters is low -less than once in three years. It has been problematic that in some TMDLs there is not much historical data to analyze for the TMDL. The Implementation Plan for this watershed includes a continuing

monitoring plan, and future data that are taken from the impaired streams will be reassessed to determine if the waters are fully supporting their designated uses. Furthermore, future TMDL development in other watersheds will include a component that allows additional water quality data to be taken, if needed, during the course of the watershed study, prior to water quality modeling.

6. What program or BMP could be used to correct contamination from oil well brine?

Response: Further assessment of oil well activities within the watershed and additional water quality data needs to be undertaken to identify potential "hot spots" of contamination. Federal Section 319 funds, administered by the Illinois EPA, could provide financial assistance for practices that control brine contamination once it is located and verified.

7. Is there a way to calculate what the natural background level is for manganese? Is there any way to model what the manganese levels in the stream were 200 years ago, before settlers came?

Response: The current natural background levels for manganese can be attributed to groundwater concentrations. However, there is no way to model what the natural manganese levels were before human influence.

8. Could it be that the manganese levels in the creek are caused from natural background, and the impaired stream segments may never be able to achieve their water quality standards?

Response: Manganese levels in the creek could be due to natural background. Before this determination could be made, further source identification, as outlined in the implementation section, should be conducted.

9. Now that the TMDL study is completed, what is the next step in the process?

Response: The impaired stream segments will continue to be monitored through the Agency's Ambient Water Quality Network and Intensive Basin Surveys, with new assessments being made every two years. Since all of the BMP measures suggested in the implementation plan are voluntary, initiating the implementation of BMPs is encouraged at the local level. Technical and financial support could be guided by the local SWCD, NRCS, and IEPA.

DISTRIBUTION OF RESPONSIVENESS SUMMARY

Additional copies of this responsiveness summary are available from Mark Britton, Illinois EPA Office of Community Relations, phone 217-524-7342 or email Mark.Britton@epa.state.il.us

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Questions regarding the public record and access of the exhibits should be directed to Hearing Officer Sanjay Sofat, 217-782-5544.

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