# Appendix K

# CFA Nitrate Evaluation EDF

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# Engineering Design File

# Summary of Nitrate Evaluation, Waste Area Group 4

Prepared for.
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# ENGINEERING DESIGN FILE



1. Project File No. 021048 2. Project/Task CFA-08 Drainfield Remedial Design/Remedial Action

3. Subtask Nitrate Evaluation

4. Title: Summary of Nitrate Evaluation, Waste Area Group 4

5. Summary: The assessment of nitrate concentrations, the nitrogen isotope data, and the GWSCREEN modeling indicate the following:

- The likely source of the nitrate is sewage effluent from the former CFA-08 Sewage Treatment Plant drainfield that ceased operation in 1995. The drainfield will be capped in 2002 with a low permeability cover, thereby reducing infiltration.
- One well, CFA-MON-002, in the Central Facilities Area (CFA) monitoring network shows nitrate concentrations above the lower maximum contaminant level of 10 mg-N/L. Over the past 5 years, the nitrate concentrations in that well have declined from 21 to 16 mg-N/L and show a highly statistically significant downward trend. If the present trend continues, nitrate levels will be below 10 mg-N/L in 10 to 15 years.
- The other well with elevated nitrate, CFA-MON-003, reports an average nitrate concentration of 10 mg-N/L over the past 4 years. Presently, no distinct trend has developed.
- Groundwater modeling demonstrates that the plume is now shrinking in size, the maximum plume concentration is likely no higher than 20 mg-N/L, and the nitrate concentration in CFA-MON-002 is declining.

Nitrate concentrations in CFA-MON-002 and -003 will be monitored, per the Operable Unit 4-12 Post-Record of Decision Monitoring Work Plan, for approximately 25 more years. Because nitrate in both wells is below the higher maximum contaminant level of 20 mg-N/L and the wells are used solely for monitoring purposes, it is recommended that no action be taken at this time. Nitrate concentrations should continue to be monitored and trend analysis should be conducted annually and reported to the Agencies per 40 Code of Federal Regulations 141.11 until the concentration in CFA-MON-002 falls below 10 mg-N/L. At that time, annual reporting will cease, but groundwater monitoring will continue unless the Agencies determine it is not necessary in a Comprehensive Environmental Response, Compensation, and Liability Act 5-year review.

6. Distribution (complete package):

Distribution (summary package only):

7. Review (R) and Approval (A) Signatures: (Minimum reviews and approvals are listed. Additional reviews/approvals may be added as necessary.)

| | R/A | Printed Name | Signature | Date |
|---|---|---|---|---|
| Author | R | Mike Roddy | Michael Roddy | 3/15/02 |
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| Requestor | A | Deborah Wagoner | Deborah Wagoner | 3/15/02 |

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# ACRONYMS

| | |
|---|---|
| CFA | Central Facilities Area |
| CFR | Code of Federal Regulations |
| DOE | Department of Energy |
| DOE-ID | Department of Energy Idaho Operations Office |
| EPA | Environmental Protection Agency |
| FFA/CO | Federal Facility Agreement and Consent Order |
| INEEL | Idaho National Engineering and Environmental Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| MCL | maximum contaminant level |
| NRTS | National Reactor Testing Station |
| OU | operable unit |
| RI/FS | remedial investigation/feasibility study |
| SRPA | Snake River Plain Aquifer |
| USGS | United States Geological Survey |
| WAG | waste area group |

# Summary of Nitrate Evaluation, Waste Area Group 4

## 1. INTRODUCTION

This Engineering Design File addresses the source, extent, and trend in concentrations of nitrate in two monitoring wells at the Central Facilities Area (CFA) of the Idaho National Engineering and Environmental Laboratory (INEEL). Nitrate concentrations in two wells (CFA-MON-A-002 and -003) have reported average concentrations of 19.5 and 10 mg-N/L (milligrams of nitrate as nitrogen per liter), respectively. The nitrate concentration in CFA-MON-002 exceeds one of two maximum contaminant levels (MCLs) identified in the Environmental Protection Agency's (EPA's) National Primary Drinking Water Regulations (40 Code of Federal Regulations [CFR] 141).

One MCL is 10 mg-N/L if the water is available to infants under 6 months of age (40 CFR 141.62); a higher allowable limit is 20 mg-N/L if the water is not available to infants under 6 months of age (40 CFR 141.11). The primary risk from nitrate is "blue baby" syndrome in which nitrate preferentially replaces hemoglobin in a baby's bloodstream.

## 1.1 Site Background and Regulatory History

The INEEL is a government-owned reservation managed by the Department of Energy (DOE). The eastern boundary of the INEEL is located 52 km (32 mi) west of Idaho Falls, Idaho (Figure 1-1). The INEEL site occupies approximately 2,305 $km^2$ (890 $mi^2$) of the northwestern portion of the eastern Snake River Plain in southeast Idaho. The site is nearly 62 km (39 mi) long from north to south and approximately 57 km (36 mi) at its broadest southern portion. The INEEL includes portions of Bingham, Bonneville, Butte, Clark, and Jefferson counties.

The INEEL lands are within the aboriginal land area of the Shoshone-Bannock Tribes. The Tribes have used the land and waters within and surrounding the INEEL for fishing, hunting, plant gathering, and medicinal, religious, ceremonial, and other cultural uses. Tribal oral history indicates that these lands and waters provided the Tribes their home and sustained their way of life since time immemorial. The record of the Tribes' aboriginal presence at the INEEL is considerable, and DOE has documented in excess of 1,500 prehistoric and historic archeological sites at the INEEL. Existing archeological evidence dates the Tribes' presence to between 4,000 and 7,500 years before present.

### 1.1.1 History of the INEEL

During World War II, the U.S. Navy and the U.S. Army Air Corps used portions of what is now the INEEL as a gunnery range. In 1949, the present-day INEEL was designated the National Reactor Testing Station (NRTS) by the U.S. Atomic Energy Commission as a site for building, testing, and operating various nuclear reactors, fuel processing plants, and support facilities. In 1974, the NRTS was redesignated as the Idaho National Engineering Laboratory to reflect the broad scope of engineering activities conducted at the site. In 1997, the site was renamed the INEEL to further reflect its growing environmental focus.

### 1.1.2 Regulatory History

The INEEL was added to the EPA's National Priorities List of Superfund sites on November 21, 1989, as published in the Federal Register (54 FR 44184). A *Federal Facility Agreement and Consent Order* (FFA/CO) for the INEEL was signed by the Department of Energy Idaho Operations Office

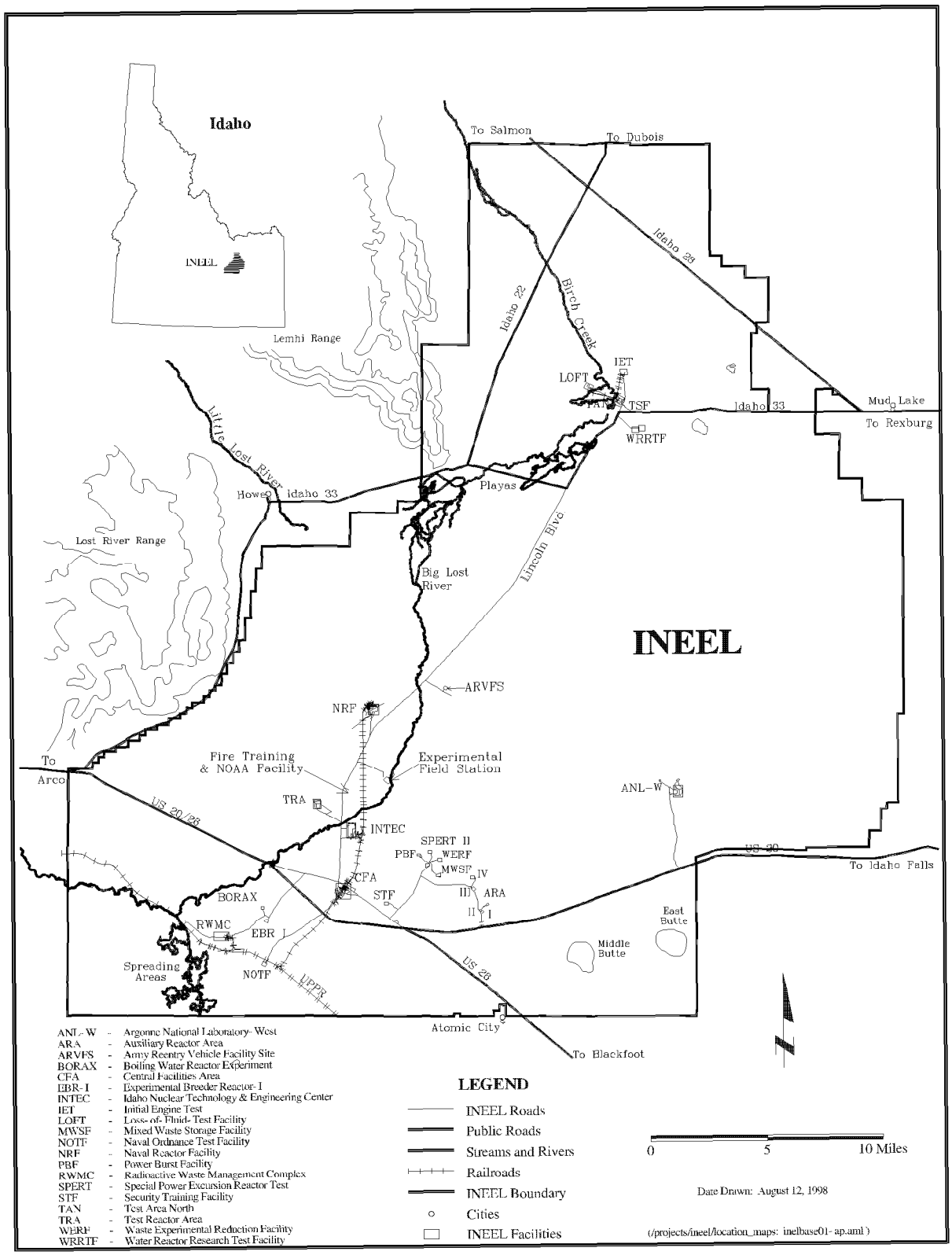



Figure 1-1. Location map of the INEEL and its facilities.

(DOE-ID), EPA, and the State of Idaho in December 1991 (DOE-ID 1991). The goal of this agreement is to ensure that potential or actual releases of hazardous substances to the environment are thoroughly investigated in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan and that appropriate response actions are taken, as necessary, to protect human health and the environment. The CFA is designated as Waste Area Group (WAG) 4 of ten INEEL WAGs identified in the FFA/CO.

## 1.2 Overview of WAG 4

The CFA is located in the south-central portion of the INEEL (Figure 1-1). The original facilities at CFA were built in the 1940s and 1950s to house naval gunnery range personnel. The facilities have been modified over the years to fit the changing needs of the INEEL and now provide four major types of functional space: craft, office, service, and laboratory. Approximately 820 people routinely work at CFA.

WAG 4 consists of 52 potential release sites divided into 12 operable units (OUs). A thirteenth OU consists of all 12 OUs and is designated as the OU 4-13 Comprehensive Remedial Investigation/ Feasibility Study (RI/FS). The OU 4-13 Record of Decision was signed in July 2000 and identified remediation at three WAG 4 soil contamination sites: CFA-04 Pond, CFA-08 Sewage Treatment Plant drainfield, and CFA-10 Transformer Yard Oil Spills. The remaining 49 sites fall into the "No Action" or "Institutional Control" category.

# 2. PHYSICAL SETTING

The following sections present a summary of the geologic and hydrogeologic characteristics that have been identified in the subsurface at CFA. A more detailed description can be found in the OU 4-13 RI/FS (DOE-ID 1999a).

## 2.1 Subsurface Geology

The geology in the vicinity of the CFA can generally be described as a sequence of basalt flows and interbedded sediment that extend from near the land surface to a depth of several thousand feet. Each basalt flow is generally characterized by a lower zone of highly permeable rubble; a lower vesicular zone; a dense, massive, and jointed central zone; an upper vesicular zone; and a thin layer of basalt at the top.

Between eruptive sequences, some of the flows were exposed at land surface long enough to be covered by lake, river, or wind-blown sediment. These sediments, which were eventually covered by later basalt flows, form the sediment interbeds present intermittently throughout the basalt sequence. The interbeds beneath CFA range in thickness from a few feet to approximately 6 m (20 ft). They are comprised of silty sand, fine sand, sand and gravel, and lesser amounts of silty clay.

## 2.2 Aquifer Characteristics

The depth to the Snake River Plain Aquifer (SRPA) at the INEEL ranges from 61 m (200 ft) near the northern portion to more than 274 m (900 ft) near the southern boundary. The depth to groundwater at CFA is approximately 127 m (480 ft). The thickness of the active portion of the SRPA has been estimated between 75 and 250 m (250 and 820 ft) by the United States Geological Survey (USGS) (Ackerman 1991). Preferential flow paths created by the lower rubble zones facilitate groundwater flow and the transport of contamination. In addition, groundwater flow in the aquifer is accomplished through vertical and subvertical fractures.

### 2.2.1 Hydraulic Gradient and Groundwater Flow Velocity

Regional groundwater flow near the CFA is generally to the south-southwest (INEEL 2000; Frederick and Behymer 1999). The hydraulic gradient is estimated to be 8.6E-04 and the groundwater pore velocity in the SRPA is estimated to be 1.8 m/d (5.9 ft/d) (Rood, Arnett, and Barraclough 1989). From CFA south to the site boundary, the velocity has been estimated to decrease to 0.78 m/d (2.56 ft/d).

The SRPA is considered heterogeneous and anisotropic (having properties that differ depending on the direction and location of measurement) because of the permeability variations within the aquifer that are caused by basalt irregularities, fractures, void spaces, rubble zones, and sediment interbeds. The heterogeneity inherent in this system may complicate interpretation of existing chemical and hydrological data with respect to linking any contamination to a potential source.

### 2.2.2 Aquifer Parameters

Field test data collected during aquifer testing in the vicinity of CFA and the Idaho Nuclear Technology and Engineering Center (INTEC) have been used to determine transmissivity. Transmissivity estimates range from 9.0E-1 $m^2/d$ (1.0E+0 $ft^2/d$) to 6.8E+4 $m^2/d$ (7.6E+5 $ft^2/d$) (Rood, Arnett, and Barraclough 1989; Ackerman 1991). Contaminant transport is heavily influenced by the transmissivity, with the higher transmissivity values leading to faster groundwater transport. The median value of these estimates (5.0E+3 $m^2/d$ [5.6E+4 $ft^2/d$]) formed the basis for the permeability values assigned to the

semianalytical models that were used in the OU 4-13 RI/FS modeling (DOE-ID 1999A). Because the transmissivity estimates are based on only a few aquifer tests, no interpretations can be made regarding spatial trends in aquifer properties or noticeable anomalous conditions in or near the CFA facility monitoring wells.

# 3. NITRATE SOURCE ASSESSMENT

## 3.1 Nitrate Groundwater Data

The Post-Record of Decision Monitoring Report for OU 4-12 (INEEL 2000) summarizes the analytical results from 2 years of sampling and analysis at 11 WAG 4 wells. Eight of the wells (LF2-08, LF2-09, LF2-10, LF2-11, LF3-08, LF3-09, LF3-10, and USGS-85) are CFA landfill monitoring wells. Three wells (CFA-MON-001, -002, and -003) were installed in 1995 and 1996 to monitor the new Sewage Treatment Plant lagoon and pivot system that became operational in 1995. With the exception of Wells LF2-10 and USGS-85, all CFA wells are screened at the water table. The pump intakes for Wells LF2-10 and USGS-85 are 76 and 15 m (250 and 50 ft) below the water table, respectively. Figure 3-1 shows the locations of the CFA monitoring wells, the upgradient INTEC monitoring wells, and a CFA production well (CFA-1).

Nitrate concentrations from October 1996 sampling of the CFA and INTEC monitoring wells are also shown on Figure 3-1. Nitrate concentrations in the two deeper wells and CFA-MON-001 were between 1.3 and 2 mg-N/L, which is within the reported background concentration range of 1 to 2 mg-N/L (Knobel, Brennon, and Cecil 1992). Nitrate concentrations in the shallow landfill monitoring wells and the CFA-1 production well ranged between 3 and 4 mg-N/L. Nitrate levels in the upgradient INTEC wells ranged between 0.6 and 5.2 mg-N/L. Nitrate concentrations were elevated in only two wells—CFA-MON-002 and -003—at concentrations of 18.8 and 9.5 mg-N/L, respectively.

Nitrate concentrations in CFA-MON-002 have ranged from 21 mg-N/L in 1995 to 16 mg-N/L in March of 2000. The nitrate level in CFA-MON-003 has fluctuated slightly above and slightly below 10 mg-N/L, ranging between 11 mg-N/L in 1996 and 8.65 mg-N/L in 1997. The most recent analysis in March 2000 reported concentrations of 9.6 and 9.7 mg-N/L in a sample and a duplicate.

As mentioned previously, there are two MCLs for nitrate in the EPA National Primary Drinking Water Regulations (40 CFR 141). One MCL is 10 mg-N/L if the water is available to infants below 6 months of age (40 CFR 141.62); a higher allowable limit is 20 mg-N/L if the water is not available to infants below 6 months of age (40 CFR 141.11).

## 3.2 Trend Analysis of Nitrate Concentrations in CFA-MON-002 and CFA-MON-003

Trend analysis of the nitrate data from CFA-MON-002 and CFA-MON-003 was performed to determine if statistically significant trends could be identified. Data from 1995 through March 2000 were used to construct the trend lines and a linear regression analysis was used to estimate the slope of the data trend. The slope is significant if p (the probability associated with the t-test for trend) is less than 0.05. The sign of the slope parameter gives the direction of the potential trend (Neter and Wasserman 1974). R-squared is a measure of the goodness-of-fit of the regression equation to the data (EPA 1992). It ranges from 0 to 1, with 0 indicating a complete lack of fit and 1 indicating a perfect fit (that is, all of the data points lie on the regression line). The linear regression and statistical parameters are shown in Figures 3-2 and 3-3.

The slope of the CFA-MON-002 best-fit regression line is -0.00256 with an R-squared value of 0.84. The p value for the CFA-MON-002 slope is 0.00034. Therefore, the negative slope or decrease in concentration at CFA-MON-002 is highly statistically significant. If the current trend continues, nitrate concentrations will probably be lower than the MCL by the year 2008 and certainly below the MCL by 2095. In contrast, the regression line for the nitrate data from CFA-MON-003 has a p-value of 0.32 and does not demonstrate a statistically significant slope. In other words, although concentrations are not increasing, the slope may be zero, or flat, for CFA-MON-003 nitrate concentrations.

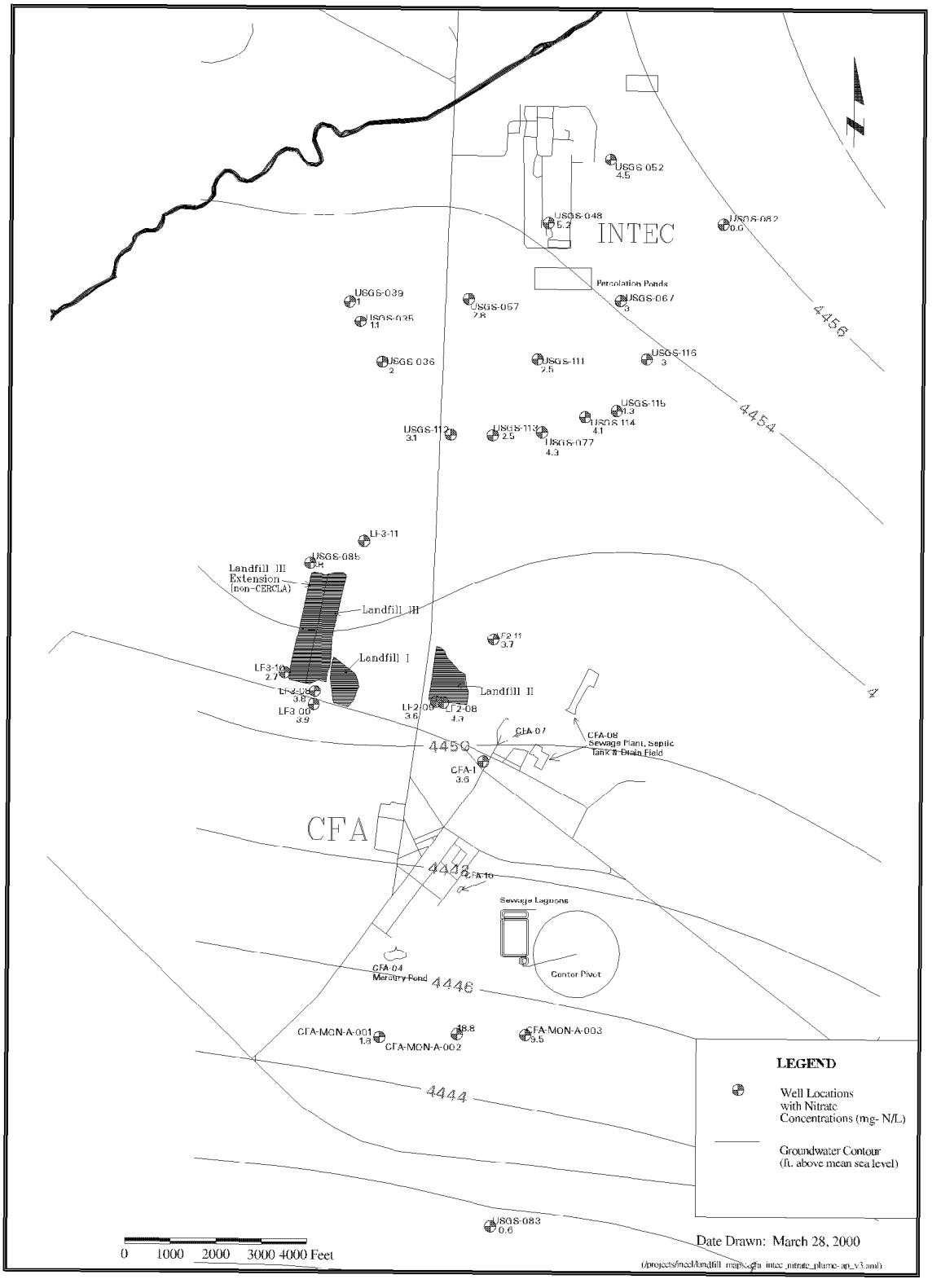
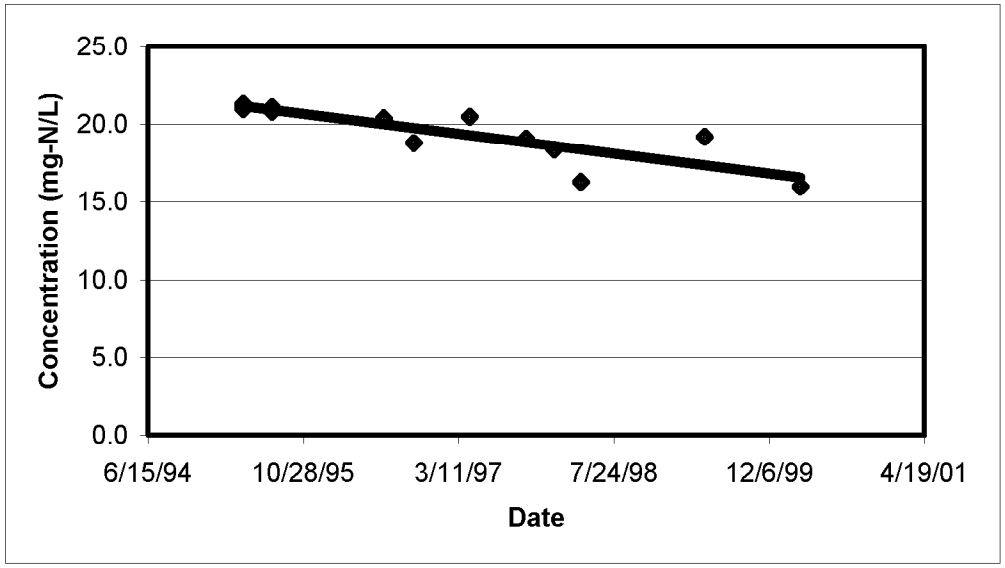



Figure 3-1. CFA area monitoring wells and nitrate concentrations in groundwater—October 1996 data.

| Sample Date | Concentration |
|---|---|
| 3/15/00 | 16.0 |
| 5/12/99 | 19.2 |
| 4/8/98 | 16.3 |
| 1/13/98 | 18.4 |
| 10/14/97 | 19.1 |
| 4/16/97 | 20.5 |
| 10/17/96 | 18.8 |
| 7/12/96 | 20.4 |
| 7/12/96 | 20.4 |
| 7/19/95 | 21.1 |
| 7/19/95 | 20.8 |
| 4/17/95 | 21.3 |
| 4/17/95 | 21 |




SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.83860 |
| R Square | 0.70325 |
| Adjusted R Square | 0.67627 |
| Standard Error | 0.99633 |
| Observations | 13 |

Best Fit Line

y=(-0.00256)x+110.297

| date | concentration |
|---|---|
| 5/1/95 | 21.16 |
| 3/11/97 | 19.42 |
| 7/7/99 | 17.25 |
| 1/1/05 | 12.11 |
| 1/1/08 | 9.31 |

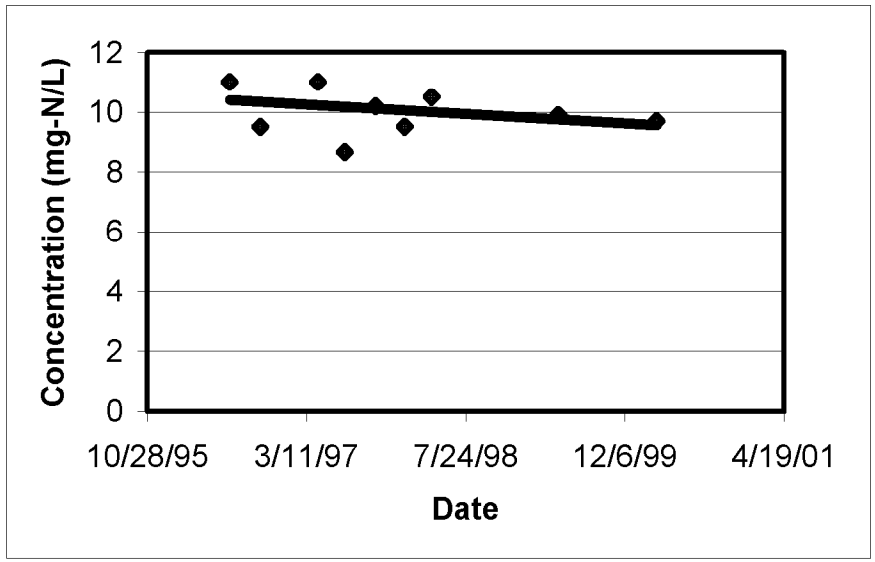
ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 25.87743957 | 25.87744 | 26.06825 | 0.000340993 |
| Residual | 11 | 10.9194835 | 0.99268 | | |
| Total | 12 | 36.79692308 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* |
|---|---|---|---|---|---|---|
| Intercept | 110.2968802 | 17.78856717 | 6.200436 | 6.71E-05 | 71.144488 | 149.4492723 |
| X Variable 1 | -0.002560161 | 0.000501431 | -5.105708 | 0.000341 | -0.0036638 | -0.00145652 |

Figure 3-2. Analysis of nitrate trend in groundwater at CFA-MON-002.

| Sample Date | Concentration |
|---|---|
| 3/15/00 | 9.7 |
| 5/11/99 | 9.9 |
| 4/8/98 | 10.5 |
| 1/13/98 | 9.52 |
| 10/14/97 | 10.2 |
| 7/9/97 | 8.65 |
| 4/16/97 | 11 |
| 10/17/96 | 9.52 |
| 7/12/96 | 11 |
| 7/12/96 | 11 |




SUMMARY OUTPUT

| *Regression Statistics* | |
|---|---|
| Multiple R | 0.349519342 |
| R Square | 0.122163771 |
| Adjusted R Square | 0.012434242 |
| Standard Error | 0.782159794 |
| Observations | 10 |

ANOVA

| | *df* | *SS* | *MS* | *F* | *Significance F* |
|---|---|---|---|---|---|
| Regression | 1 | 0.681098449 | 0.681098 | 1.113317 | 0.322182472 |
| Residual | 8 | 4.894191551 | 0.611774 | | |
| Total | 9 | 5.57529 | | | |

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* |
|---|---|---|---|---|---|---|
| Intercept | 32.45411171 | 21.18834224 | 1.531697 | 0.164133 | -16.40632471 | 81.3145481 |
| X Variable 1 | -0.000625605 | 0.000592913 | -1.055138 | 0.322182 | -0.001992864 | 0.00074165 |

Note: the P-value indicates that the slope of the regression line is not statistically significant and could actually be zero.

Best Fit Line

y=(-0.00078)x+37.85

| Date | Concentratio |
|---|---|
| 6/1/96 | 10.38 |
| 7/7/97 | 10.07 |
| 7/7/99 | 9.50 |
| 1/1/05 | 7.93 |
| 1/1/11 | 6.23 |

Figure 3-3. Analysis of nitrate trend in groundwater at CFA-MON-003.

## 3.3 Nitrogen Isotope Study

A nitrogen isotope study was undertaken to aid in identifying the source of elevated nitrate in CFA-MON-002 and -003. Groundwater samples were collected from seven wells in and around the CFA monitoring network and analyzed for nitrogen-15. Additionally, nitrogen isotope data from four area wells were included in the study.

### 3.3.1 Background

Isotopes are defined as elements having an identical number of protons in their nuclei, but differing numbers of neutrons. They have the same atomic number, differing atomic weights, and similar chemical properties. Isotopic fractionation is the process resulting in relative enrichment of one isotope in a mixture.

The stable isotope nitrogen-15 (reported as delta 15 nitrogen, $\delta^{15}N$, in parts per thousand or per mil) has been used extensively as a means of evaluating potential sources of nitrate contamination in groundwater (Clark and Fritz 1997). The $\delta^{15}N$ values can be obtained from the nitrate ion, $NO_3^-$, or the ammonium ion, $NH_4^+$. The ammonium ion is quickly converted to the nitrate ion in aerobic conditions. Field logbook entries for the SRPA in the vicinity of CFA indicate very high levels of dissolved oxygen. Consequently, ammonia would not be expected in groundwater at CFA and sampling results did not indicate any ammonia in the groundwater. All $\delta^{15}N$ values referenced herein are from nitrate.

***3.3.1.1*** **Source Identification.** The $\delta^{15}N$ nitrate values have been used chiefly to distinguish between animal/human wastes and manmade sources such as fertilizers. Typical $\delta^{15}N$ nitrate values for various sources are as follows: dairies and feedlots (>10 per mil), sewage treatment plants (9–14 per mil), fertilizers (-4 to +4 per mil), and natural sources such as organic carbon in the subsurface (4–9 per mil) (Gellenbeck 1994; Seiler 1996). The expected value for an inorganic source of $\delta^{15}N$ is 0±4 per mil, because nitrogen for industrial uses is usually obtained from the atmosphere.

Fractionation processes such as denitrification and nitrification can alter the nitrogen isotopic signature. Denitrification is the conversion of nitrate to nitrogen gas under anaerobic conditions with an accessible organic substrate. Denitrification is usually carried out by anaerobic bacteria, but localized organic sources can also cause denitrification. Nitrification is the oxidation of ammonia to nitrate by nitrifying bacteria and occurs under aerobic conditions. The only fractionation process thought to be occurring in the SRPA is nitrification, due to the high dissolved oxygen content in the groundwater and because ammonia was not detected in the CFA wells. There are no known organic sources in the vadose zone that would result in denitrification.

### 3.3.2 Nitrogen Isotope Sampling and Analytical Results

In 1999, seven groundwater samples from the CFA vicinity were collected and submitted to Lawrence Berkeley National Laboratory for $\delta^{15}N$ analyses; samples were obtained from one well upgradient of CFA (USGS-77), three shallow landfill wells (LF2-09, LF2-11, and LF3-09), and the three CFA-MON wells. Additionally, $\delta^{15}N$ data from a 1999 USGS report for the CFA-1 production well and three upgradient INTEC wells (DOE-ID 1999b) were included in the evaluation. The $\delta^{15}N$ results are summarized in Table 3-1.

The Berkeley Laboratory analyzed two samples of the $K(NO_3)_2$ standard for $\delta^{15}N$ during the analysis of the groundwater samples. The accepted value for the standard is 1.2 per mil; the Berkeley Laboratory reported values of 0.3 and 1.9 per mil. According to laboratory personnel, very small sample

volumes used in the standard analyses may have contributed to the variation in the analytical results. Because the average was close to the accepted value, the values obtained for the groundwater samples were not adjusted. It should be noted that the sample from CFA-MON-002 was split and the resulting values show good correlation; also, the sample from LF2-11 was analyzed twice and the results are essentially equal.

### 3.3.3 Nitrogen Isotope Data Interpretation

The nitrogen isotope data in the groundwater indicate that there are two distinct populations in the CFA vicinity. The $\delta^{15}N$ values in the landfill and INTEC wells range from 4.6 to 6 per mil and average 5.2 per mil; the $\delta^{15}N$ values for the three CFA-MON wells and the CFA-1 production well range from 7.6 to 8.4 per mil and average 8 per mil. These data indicate that the nitrate in the CFA-MON wells and CFA-1 is enriched in the $\delta^{15}N$ isotope relative to the upgradient wells. Based on the range of $\delta^{15}N$ values and potential source areas at CFA, the nitrate in these wells is most likely derived from sewage effluent. The distribution of $\delta^{15}N$ values is shown on Figure 3-4.

The $\delta^{15}N$ values of 8 per mil in the CFA-MON wells and CFA-1 are slightly lower than the typical range for $\delta^{15}N$ values of 9 to 14 per mil for Sewage Treatment Plant or septic system sources. However, two studies showed similar values downgradient of sewage source areas (Aravena and Wassermaar 1993; Gellenbeck 1994). Higher $\delta^{15}N$ values often occur near source areas with higher ammonia concentrations due to increased fractionation between ammonia and nitrate. The complete conversion of ammonia and other reduced nitrogen species to nitrate in groundwater further from the source area leads to lower $\delta^{15}N$ values.

### 3.3.4 Nitrate Source Evaluation

The CFA-MON wells and CFA-1 average $\delta^{15}N$ concentration of 8 per mil indicates that the most likely source of the nitrate contamination is sewage effluent. The potential sources of sewage effluent in the CFA are the former CFA-08 Sewage Treatment Plant drainfield or the new Sewage Treatment Plant lagoon and pivot system that began operating in 1995. Because CFA-1 is upgradient of the new Sewage Treatment Plant and because the new Sewage Treatment Plant system went online shortly before the first nitrate detections, the former CFA-08 Sewage Treatment Plant drainfield is the most likely source area (Figure 3-4). The fact that the CFA-1 production well reports a high $\delta^{15}N$ value, even though it is not directly downgradient of the drainfield, is due to the pumping influence from the production well. It should be noted that the nitrate concentration in CFA-1 is 3.6 mg-N/L, indicating that the pumping action is not seriously deflecting the nitrate plume.

Table 3-1. Summary of $\delta^{15}N$ results.

| Sample | $\delta^{15}N$ value in per mil |
|---|---|
| CFA-MON-001 | 8.4 |
| CFA-MON-002 | 7.8 |
| CFA-MON-002 (split) | 8.2 |
| CFA-MON-003 | 7.6 |
| CFA-1 | 8.1* |
| LF2-9 | 5.2 |
| LF2-11 | 5.1 |
| LF2-11 (rerun) | 5.2 |
| LF3-09 | 4.6 |
| USGS-77 | 4.6 |
| USGS-85 | 5.4* |
| USGS-20 | 5.1* |
| USGS-112 | 6.0* |

* These data are from a 1999 USGS report (DOE-ID 1999b).

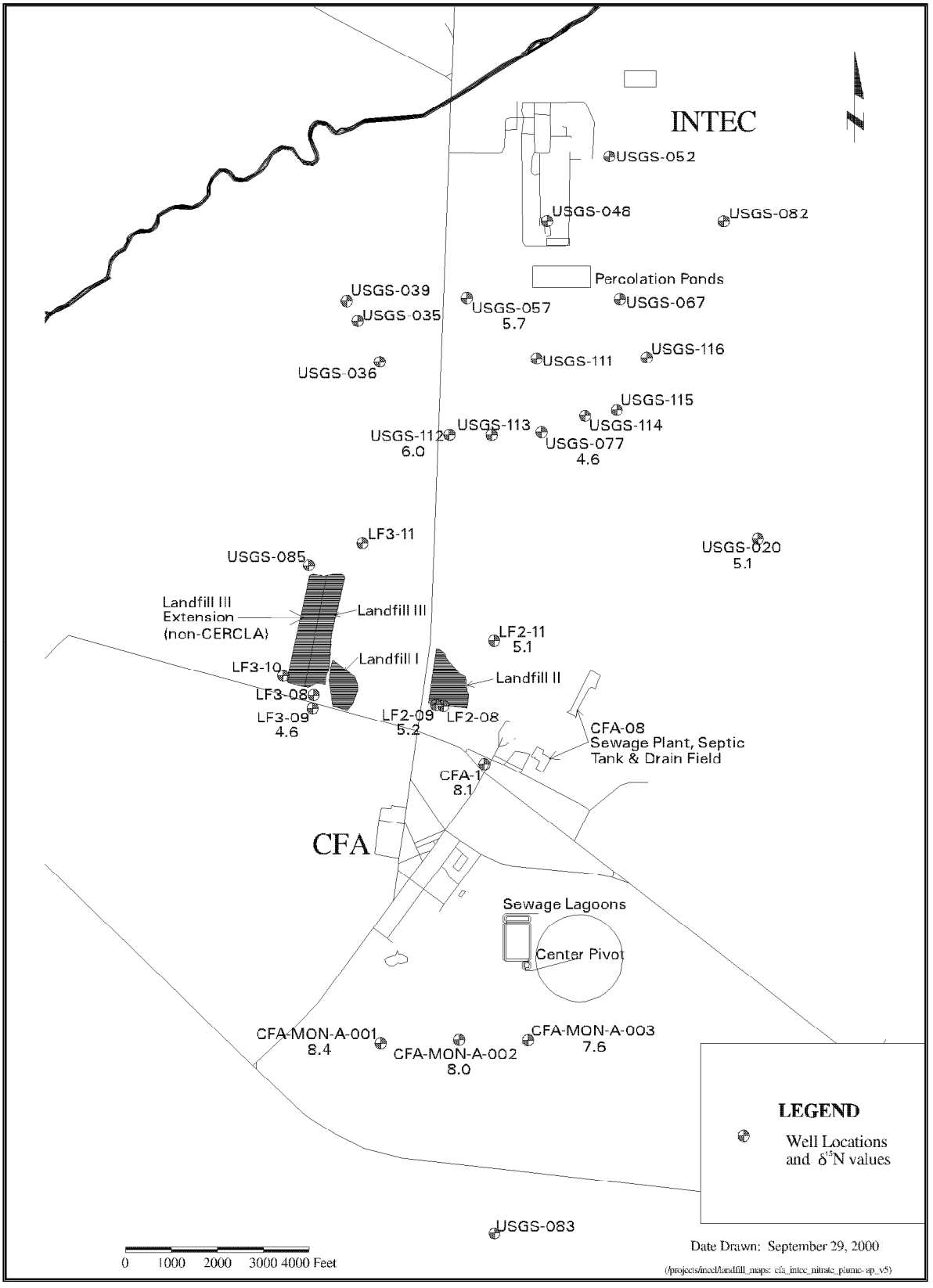



Figure 3-4. Nitrogen isotope data in the CFA vicinity.

# 4. NATURE AND EXTENT EVALUATION

To better understand the nature and extent of a contaminant plume sourced from the former Sewage Treatment Plant drainfield, limited groundwater modeling was conducted using the semianalytical model GWSCREEN. The goal of the GWSCREEN modeling effort was to determine the extent of nitrate contamination today, a likely plume shape, a maximum nitrate concentration at CFA-MON-002, and when the nitrate concentrations would fall below 10 mg-N/L in CFA-MON-002.

## 4.1 Conceptual Model and Assumptions

The pond model, as described in GWSCREEN Version 2.5 (Rood 1999), was used to model the nitrate concentrations. The conceptual model implemented in GWSCREEN for an infiltration pond (Figure 4-1) considers a rectangular percolation pond where liquid effluent is discharged at a constant rate over the period of operation. Moisture content and water flow rates in the underlying strata are assumed to be at steady state and equal to the water flow rate into the pond. Water movement in the unsaturated zone is assumed to be gravity-driven and in the vertical direction only; no appreciable horizontal movement is assumed. The SRPA is assumed to be a homogeneous, isotropic medium of infinite lateral extent and finite thickness. Flow is assumed to be unidirectional and at steady state. There is no water mass balance in GWSCREEN, because it is assumed that the water entering the aquifer from the source is insignificant compared to the flow in the aquifer. For the volumes of water considered in an infiltration pond, this assumption may be violated. Therefore, GWSCREEN Version 2.5 incorporates a dilution factor that accounts for water entering the aquifer from the pond or drainfield.

The unsaturated zone underlying the INEEL is composed of massive fractured basalt flows, interrupted by relatively thin sediment interbeds. Both field investigation and modeling studies have suggested that the water travel time through the basalt can be relatively fast (several days) and that the sediment interbeds control water movement in the unsaturated zone. The Track 1 and 2 methodologies have applied this assumption. Based on that precedence, in addition to field observations, water travel time through the fractured basalt is assumed to be instantaneous. Therefore, only the hydraulic properties of the interbeds are important in terms of estimating water travel time in the unsaturated zone. Consequently, the unsaturated zone is assumed to be only the thickness of the sedimentary interbeds.

Dissolved-phase ammonia is introduced into the system via the liquid effluent flowing into the pond. The ammonia is converted rapidly into nitrate in the aerobic environment, and the nitrate is then transported through the unsaturated zone to the saturated zone. Transport properties in the unsaturated and saturated zone include advection and mechanical dispersion. Water fluxes are assumed to have achieved steady state before nitrate is introduced into the system. Nitrate discharges are assumed to take place at a constant rate for 42 years (1953–1995). After 1995, sewage effluent discharges cease, but water flow through the system is assumed to continue. The assumption of continuous water flow through the pond after 1995 contradicts our historical knowledge (liquid effluent discharges to the pond are believed to have ceased after 1995). However, this assumption greatly simplified the calculations and is inherent in the GWSCREEN pond model. Under most circumstances, it provides a bounding estimate of contaminant impacts to groundwater.

## 4.2 Model Input

A summary of model input parameters is provided in Table 4-1. Parameters that require additional justification are discussed below. Listing of GWSCREEN input and output files can be found in Appendix A.

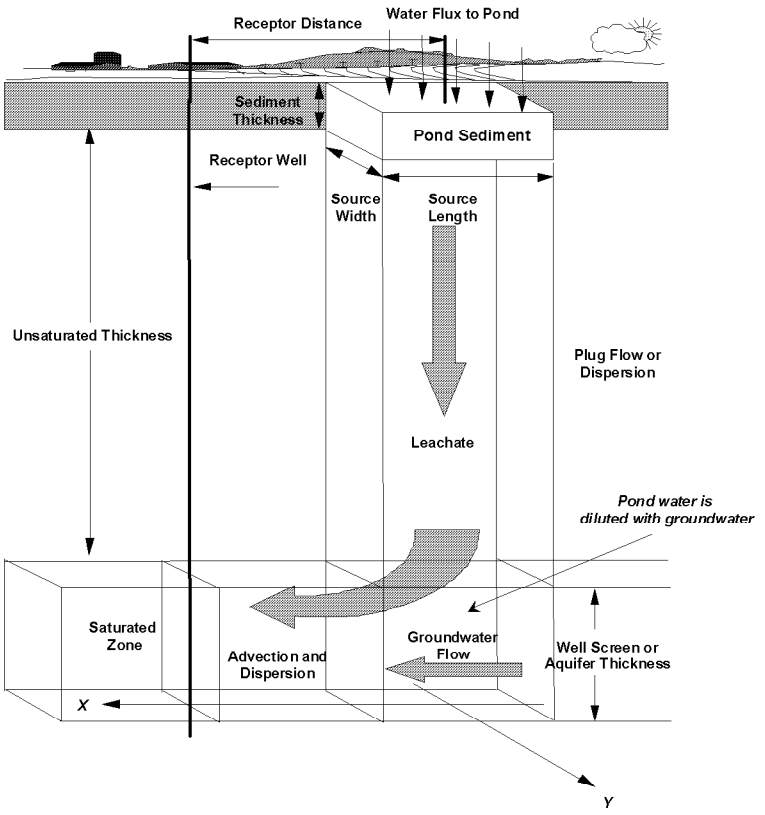



Figure 4-1. Conceptual model for water flow and nitrate transport at the CFA sewage pond.

Table 4-1. GWSCREEN model parameters and values used in simulation.

| Parameter Name | Value | Reference or Justification |
|---|---|---|
| Source length (m) | 305 | Personal communication with C. Craiglow[a] |
| Source width (m) | 61 | Personal communication with C. Craiglow[a] |
| Background percolation (m $y^{-1}$) | 0.1 | DOE-ID 1994 |
| Pond operation time (y) | 42 | Personal communication with C. Craiglow[a] |
| Water flow rate into pond ($m^3$ $y^{-1}$) | 260,000 | Calibrated and personal communication with C. Craiglow[a] |
| Moisture content in sediments underlying pond | 0.48 | Figure 2 in Rood 1999 (saturated conditions) |
| Sediment thickness underlying drain field (m) | 2.8 | Site knowledge—only includes surficial sediments underlying the drainfield |
| Unsaturated zone thickness (m) | 22.8 | Personal communication with C. Craiglow[a] |
| Unsaturated bulk density (g $cm^{-3}$) | 1.9 | DOE-ID 1994 |
| Unsaturated dispersivity (m) | 2.28 | Assumed 1/10 the unsaturated thickness |
| Aquifer thickness (m) | 76 | DOE-ID 1994 |
| Aquifer bulk density (g $cm^{-3}$) | 1.9 | DOE-ID 1994 |
| Aquifer porosity | 0.06 | Magnuson and Sondrup 1999 |
| Aquifer Darcy Velocity (m $y^{-1}$) | 30 | Estimated from the OU 3-13 RI/FS model |
| Longitudinal dispersivity | — | Variable—see discussion |
| Transverse/longitudinal ratio | 0.5 | Calibrated value—see discussion |
| Vertical/longitudinal ratio | 0.001 | Calibrated value—see discussion |
| Nitrate release rate (mg $y^{-1}$) | $1.6 \times 10^{10}$ | Calibrated and site knowledge |

a. Data provided by C. Craiglow were derived from previous analysis and published and unpublished reports.

## 4.3 Dispersivity

For environmental assessments performed using the Track 1 and 2 methodology (DOE-ID 1992, 1994), a fixed longitudinal dispersivity value of 9 m was used for a receptor located on the downgradient edge of the source. Dispersivity, however, is a scale-dependent phenomenon and a larger model domain typically requires large values for dispersivity. The scale-dependent nature of dispersivity has been incorporated into the GWSCREEN Version 2.5 model. Instead of using a fixed value for longitudinal dispersivity for all receptors in the model domain, the longitudinal dispersivity is allowed to vary as a function of receptor distance and is given by

$$\alpha_L = 0.83(\log_{10} L)^{2.414} \quad (4\text{-}1)$$

where $\alpha_L$ = the longitudinal dispersivity (m), and L = the receptor distance (m). Using Equation (4-1) and a receptor located on the downgradient edge of the source (152 m downgradient from the source

center) yields a value for $\alpha_L$ of 5.5 m. The transverse and vertical dispersivity are some fraction of the longitudinal dispersivity. In this assessment, we "calibrated" the ratio of the transverse to longitudinal and vertical to longitudinal dispersivity input parameter in GWSCREEN to obtain the best qualitative fit to the monitoring data. Using this procedure, the ration of transverse to longitudinal dispersivity was found to be 0.5 and the ratio of the vertical to longitudinal dispersivity was found to be 0.001.

## 4.4 Pond Effluent Flow Rate and Concentration

Liquid effluent discharge rates to the drainfield included the design maximum flow rate (1,325,000 L $day^{-1}$), maximum recorded flow rate (757,000 L $day^{-1}$), summer average flow rate (662,000 L $day^{-1}$), and winter average flow rate (416,400 L $day^{-1}$). Nitrate concentrations in the effluent were estimated to be between ~30–70 mg/L. The liquid effluent release rate along with the nitrate concentrations in the effluent were used as calibration parameters and these parameters varied to obtain the best qualitative fit to the monitoring data. A liquid effluent flow rate of 260,000 $m^3$ $y^{-1}$ (71,233 L $d^{-1}$) and effluent concentration of 61.5 mg-N/L were used in the simulation.

## 4.5 GWSCREEN Results

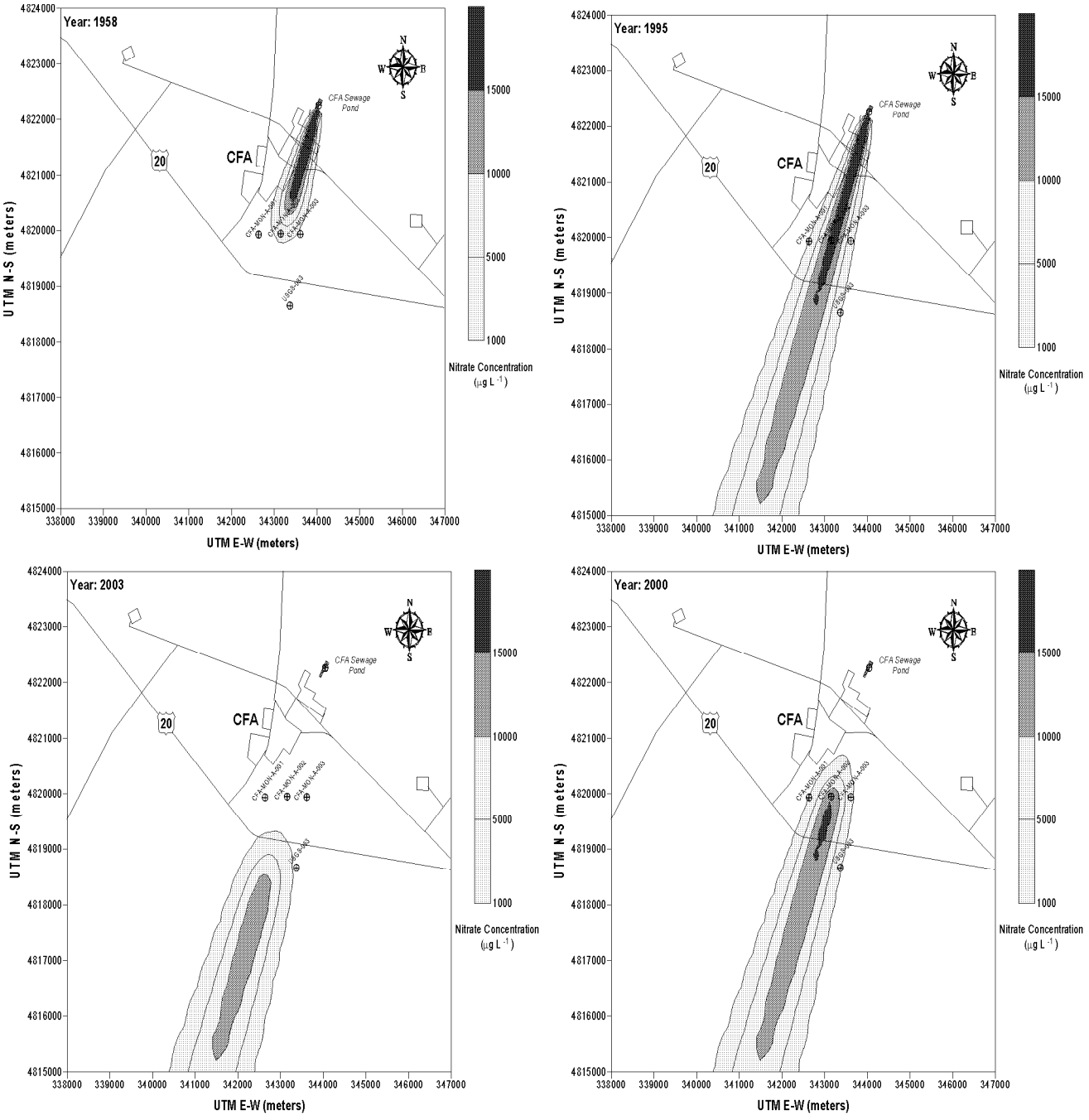
Isopleth maps of the nitrate plume in the aquifer were constructed for times that spanned from 1954 to 2008. These maps were then placed in a Microsoft Powerpoint™ presentation and used to animate the development and retreat of the nitrate plume between the years 1954 and 2008. The stages of the nitrate plume are depicted in Figure 4-2. Going in a clockwise motion from the top left corner of Figure 4-2, the plume develops in 1958, reaches its maximum extent before the Sewage Treatment Plant shutdown in 1995, shows its current estimated extent (year 2000), and predicts the extent for the year 2003. Maximum nitrate concentrations in the aquifer were achieved in 1995, the last year of operation of the sewage plant, and were near the maximum contaminant limit for nitrate of 20 mg-N/L. After that, nitrate concentrations were predicted to decrease over time.

Figure 4-3 shows the predicted time history of nitrate concentrations in three wells (CFA-MON-001, -002 and -003 and USGS-83) and the corresponding measured concentrations in the CFA-MON-002 and -003 wells. The model slightly under predicted concentrations for CFA-MON-002 and CFA-MON-003. Recent measurements indicate concentrations in CFA-MON-002 are around 16 mg-N/ L, which is close to the model-predicted value of ~17 mg-N/L.

It is important to keep in mind the uncertainties in the model and measurements. At best, a model of this type provides an order-of-magnitude estimate of the true concentration. However, predicted and observed concentrations differ by less than a factor of 2. This apparent outstanding model performance is not attributed to the quality of the model, rather to the fact that the model was calibrated to arrive at a reasonable match between predicted and observed values. This exercise does not demonstrate that the model is validated, only that it is calibrated within the time constraints of the measurements. Only with continued monitoring followed by comparisons to model predictions will the validity of the model be demonstrated.

## 4.6 GWSCREEN Modeling Conclusions

Based on the model results and the assumption that the source of the nitrate is from the former CFA Sewage Treatment Plant drainfield, concentrations of nitrate in the aquifer are not expected to exceed current levels and are predicted to decrease over time. Maximum concentrations were predicted to be approximately 20 mg-N/L. The likely extent of the nitrate plume is depicted in the lower right map in Figure 4-2. The model predicts that the nitrate concentration in CFA-MON-002 will drop below 10 mg-N/L in less than 5 years.




*Note:* Concentrations are in parts per billion; divide by 1,000 to get equivalent concentration in parts per million. Medium gray denotes the area with nitrate concentrations above 10 mg-N/L.

Figure 4-2. Isopleth maps of the evolution and retreat of the former CFA Sewage Treatment Plant drainfield nitrate plume over time as predicted by GWSCREEN Version 2.5.

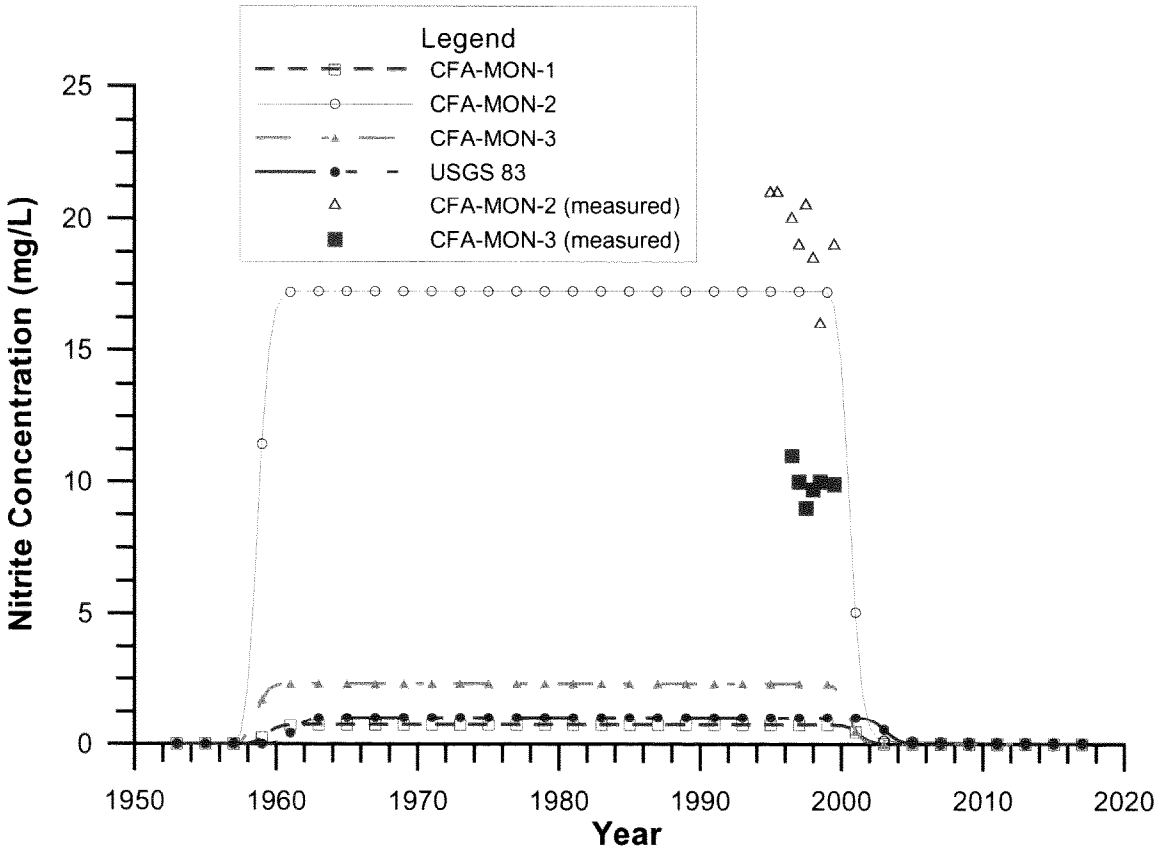



Figure 4-3. Predicted and observed nitrate concentrations as a function of time in monitoring wells downgradient from the CFA Sewage Treatment Plant.

# 5. CONCLUSIONS AND RECOMMENDATIONS

The assessment of nitrate concentrations, the nitrogen isotope data, and the GWSCREEN modeling indicate the following:

- The likely source of the nitrate is sewage effluent from the former CFA-08 Sewage Treatment Plant drainfield that ceased operation in 1995. The drainfield will be capped in 2002 with a low permeability cover, thereby reducing infiltration.

- One well, CFA-MON-002, in the CFA monitoring network shows nitrate concentrations above the lower MCL of 10 mg-N/L. Over the past 5 years, the nitrate concentrations in that well have declined from 21 to 16 mg-N/L and show a highly statistically significant downward trend. If the present trend continues, nitrate levels will be below 10 mg-N/L in 10 to 15 years.

- The other well with elevated nitrate, CFA-MON-003, reports an average nitrate concentration of 10 mg-N/L over the past 4 years. Presently, no distinct trend has developed.

- Groundwater modeling demonstrates that the plume is now shrinking in size, the maximum plume concentration is likely no higher than 20 mg-N/L and the nitrate concentration in CFA-MON-002 is declining.

Nitrate concentrations in CFA-MON-002 and -003 will be monitored, per the OU 4-12 Post-Record of Decision Monitoring Work Plan, for approximately 25 more years. Because nitrate in both wells is below the higher MCL of 20 mg-N/L and the wells are used solely for monitoring purposes, it is recommended that no action be taken at this time. Nitrate concentrations should continue to be monitored and trend analysis should be conducted annually and reported to the Agencies per 40 CFR 141.11 until the concentration in CFA-MON-002 falls below 10 mg-N/L. At that time, annual reporting will cease but groundwater monitoring will continue unless the Agencies determine it is not necessary in a Comprehensive Environmental Response, Compensation, and Liability Act 5-year review.

# 6. REFERENCES


40 CFR 141, July 2000, "National Primary Drinking Water Regulations," *Code of Federal Regulations,* Office of the Federal Register.

Ackerman, D. J., 1991, "Transmissivity of the Snake River Plain Aquifer at the Idaho National Engineering Laboratory, Idaho," U.S. Geological Survey Water-Resources Investigations Report 91-4058.

Aravena, R. and L. I. Wassenaar, 1993, "Dissolved Organic Carbon and Methane in a Regional Confined Aquifer: Evidence for Associated Subsurface Sources," *Applied Geochemistry*, Vol. 8, pp. 483–493.

Aravena, R. and W. D. Robertson, 1998, "Use of Multiple Isotope Tracers to Evaluate Denitrification in Ground Water: Study of Nitrate from a Large-Flux Septic System Plume," *Ground Water*, Vol. 36, No. 6, pp. 975–982, November-December.

Clark, I. D. and P. Fritz, 1997, "Environmental Isotopes in Hydrogeology," Lewis Publishers.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order and Action Plan*, U.S. Department of Energy, U.S. Environmental Protection Agency, and Idaho Department of Health and Welfare.

DOE-ID, 1995, *Community Relations Plan for Remedial Investigation at the Idaho National Engineering Laboratory*, Environmental Restoration Department, U.S. Department of Energy Field Office, May 1995.

DOE-ID, 1992, "Track 1 Sites: Guidance for Assessing Low Probability Hazard Site at INEL," DOE/ID-10340(92), U.S. Department of Energy Idaho Field Office, Idaho Falls, ID, Revision 1, July 1992.

DOE-ID, 1994, "Track 2 Sites: Guidance for Assessing Low Probability Hazard Sites at INEL," DOE/ID-10389, U.S. Department of Energy Idaho Field Office, Idaho Falls, ID, Revision 6, July 1994.

DOE-ID, 1997, *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites*, Department of Energy Idaho Operations Office, DOE/ID-10587, December 1997.

DOE-ID, 1999a, *Comprehensive Remedial Investigation/Feasibility Study for the Central Facilities Area Operable Unit 4-13 at the Idaho National Engineering and Environmental Laboratory*, Department of Energy Idaho Operations Office, DOE/ID-10680, Revision 0, April 1999.

DOE-ID, 1999b, "Chemical Constituents in Groundwater from 39 Selected Sites with an Evaluation of Associated Quality Assurance Data," Idaho National Engineering and Environmental Laboratory and Vicinity, Idaho, USGS Open File Report 99-246, p. 58, August 1999.

EPA, 1988, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final," U.S. Environmental Protection Agency, EPA/540/G-89/004, October 1998.

EPA, 1992, "Methods for Evaluating the Attainment of Cleanup Standards," U.S. Environmental Protection Agency, Volume 2, *Ground Water,* PB94-138815.

EPA, 1994, "Guidance for the Data Quality Objectives Process," U.S. Environmental Protection Agency, EPA QA/G-4, EPA/600/R-96-055, September 1994.

EPA, 1998, "Guidance on Preparing Superfund Decision Documents," U.S. Environmental Protection Agency, EPA/540/G-89/007, June 1998.

Feth, J. H., 1966, "Nitrogen Compounds in Natural Water—A Review," *Water Resources Research*, V. 2, No. 1, pp. 41–58.

Frederick, D. B. and B. Behymer, 1999, *Concentrations of Chloride, Nitrate, Sulfate, and Tritium in the Snake River Plain Aquifer at the Idaho National Engineering and Environmental Laboratory, Idaho 1949 to 1996*, Idaho National Engineering and Environmental Laboratory.

Gellenbeck, D. J., 1994, "Isotopic Compositions and Sources of Nitrate in Ground Water from Western Salt River Valley, Arizona," U.S. Geological Survey—Water-Resources Investigations Report 94-4063.

INEEL, 1999, *Hydrogeologic Assessment of Nitrate Contamination in Central Facilities Area Monitoring Wells*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-99-00168, EDF-ER-059, April 1999.

INEEL, 2000, *Post Record of Decision Monitoring Report at Operable Unit 4-12, Central Facilities Area Landfills I, II, and III (CFA-01, CFA-02, and CFA-03)*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-99-00353, September 2000.

INEL, 1995, *Data Management Plan for the Idaho National Engineering Laboratory Environmental Restoration Program*, Idaho National Engineering Laboratory, Rev. 1, INEL-95/0257.

Knobel, L. L., R. O. Brennon, L. D. Cecil, 1992, "Summary of Background Concentrations of Selected Radiochemical and Chemical Constituents in Groundwater from the Snake River Plain Aquifer, Idaho: Estimated from an Analysis of Previously Published Data," *Journal of the Idaho Academy of Science*, Vol. 28, No. 1, June 1992.

Magnuson, S. O. and A. J. Sondrup, 1998, *Development, Calibration, and Predictive Results of a Simulator for Subsurface Pathway Fate and Transport of Aqueous- and Gaseous-Phase Contaminants in the Subsurface Disposal Area at the Idaho National Engineering and Environmental Laboratory,* Idaho National Engineering and Environmental Laboratory, INEEL/EXT-97-00609, Revision 0, July 1998.

Mengis M., S. L. Schiff, M. Harris, M. C. English, R. Aravena, R. J. Elgood, A. MacLean, 1999, "Multiple Geochemical and Isotopic Approaches for Assessing Ground Water $NO_3^-$ Elimination in a Riparian Zone," *Ground Water*, May-June, pp. 448–457.

Neter, J. and W. Wasserman, 1974, *Applied Linear Statistical Models*, Richard D. Irwin, Inc.

Rood, A. S., R. C. Arnett, J. T. Barraclough, 1989, "Contaminant Transport in the Snake River Plain Aquifer: Phase I, Part I: Simple Analytical Model of Individual Plumes," EGG-ER-8623, May 1989.

Rood, A. S., 1999, "GWSCREEN: A Semi-Analytical Model for Assessment of the Groundwater Pathway from Surface or Buried Contamination Theory and Users Manual Version 2.5.," Idaho National Engineering and Environmental Laboratory, INEEL/EXT-98-00750, Revision 1, February 1999.

Seiler, Ralph L., 1996, "Methods for Identifying Nitrogen Contamination of Ground Water in Valleys in Washoe County, Nevada," USGS Open File Report 96-461, p. 20.

# Appendix A

# GWSCREEN Input and Output Files

# Appendix A
# GWSCREEN Input and Output Files

This appendix contains the GWSCREEN input file for creating an isopleth map of nitrate concentrations for the year 1954. Isoplenth maps for other years were created using the exact same file but changing the value of the output time in card 13. The corresponding GWSCREEN output file follows the input file and contains the concentrations as a function of distance from the CFA Sewage Treatment Plant for the year, 1954.

***Input File***

```
Nitrate at CFA-08; base case 51.1 mg/L grid output stat at 1953; b            (Card 1)
4 3 3 3 2                              (Card 2) imode,itype,idisp,kflag,idil
2 1 1 1 1                             (Card 3) imodel,isolve,isolveu,imoist,imoistu
6 12 0.001                            (Card 4) jstart jmax eps
70. 2.555E+04 2.0  350.  1.  1.0      (Card 5) bw,at,wi,ef,ed,dlim
0.  0.                                (Card 6) x0,y0
305.0  61.0  0.1                      (Card 7) l,w,perc
42. 2.6E5 0.0 0.4804                     toper, pndflx, evap, thetap
2.8 1.5                               (Card 8b) thicks,rhos
0.4                                   (Card 8c) thetas
22.8 1.9  0.2                        (Card 9) depth,rhou,axu
0.4                                   (Card 9a) thetau
9.0  .5  0.001   76.  6.1            (Card 10) ax,ay,az,b,z  0.5 and .002
30. 0.06  1.9                          (Card 11) u,phi,rhoa
..\..\mapfiles\grid.dat                              (card 12c)
1.                                    (Card 13) output at year 1954
1                                     (Card 14) ncontam
0   0.  0.  62. 0.0 1.6E10 1;0e6 0.0 (Card 14a) nprog kds kdu zmw q0 rmi sl other
NO3  1E38 0.0 1.5E-09                 (Card 14b) cname(i),thalf(i),kda(i),dcf(i)
```

***Output File***

```
 TIME OF RUN: 16:41:18.60  DATE OF RUN: 12/01/99
   ************************************************
   *                                              *
   *     This output was produced by the model:   *
   *                                              *
   *                    GWSCREEN                  *
   *                  Version 2.5                 *
   *    A semi-analytical model for the assessment *
   *    of the groundwater pathway from the leaching *
   *    of surficial and buried contamination and  *
   *  release of contaminants from percolation ponds *
   *                   11/10/99                   *
   *                Arthur S. Rood                *
   * Idaho National Engineering and Environmental  *
   *  Laboratory, Lockheed Martin Idaho Technologies *
   *   Company, Integrated Earth Sciences Unit    *
   *                PO Box 1625                   *
   *            Idaho Falls, Idaho 83415          *
   ************************************************
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 its use would not infringe on privately owned rights. Subroutines GOLDEN,
 QSIMP, QGAUS, and TRAPZD are Copyright (C) 1992, Numerical Recipes
 Software.  Reproduced by permission from the book, Numerical Recipes,
 Cambridge University Press.
 ===============================================================================

OUTPUT FILE NAME: yr1954.out
INPUT FILE NAME: yr1954.par
Title: Nitrate at CFA-08; base case 51.1 mg/L grid output statrt 1953; b
-------------------------------------------------------------------------------
Model Run Options
-------------------------------------------------------------------------------
IMODE Contaminant Type and Impacts:                                    4
ITYPE (1) Vert Avg (2) 3D Point (3) 3d Avg:                            3
IDISP (0) Fixed Dispersivity (1-3) Spatially Varying:                  3
KFLAG (1) Max Conc (2) Conc vs Time (3) Grid Output:                   3
IDIL (1) No dilution factor (2) Include Dilution Factor:               2
IMOIST Source Moisture Content Option:                                 1
IMOISTU Unsaturated Moisture Content Option:                           1
IMODEL (1) Surface/Burried Src (2) Pond (3) Usr Def:                   2
ISOLVE (1) Gaussian Quarature (2) Simpsons Rule: (Aquifer)             1
ISOLVEU (1) Gaussian Quarature (2) Simpsons Rule: (Unsat Zone)         1
Grid File Name: ..\..\mapfiles\grid.dat
Grid Output Time (y):  1.0000E+00
Health Effects: Ratio of groundwater concentration to MCL
Output mass/activity units:   mg
Output concentration units:   mg/m**3
Dose/Risk Conversion Units:   mg/m**3
Output health effects units:  Ratio of Cp/Cmcl
Cp = Peak groundwater concentration, Cmcl = Maximum contaminant limit
-------------------------------------------------------------------------------
Exposure Parameters
--------------------------+----------------------------------------------------
Body Mass (kg):           70.       Averaging Time (days):       25550.
Water Ingestion (L/d):    2.000E+00 Exposure Freq (day/year):    3.500E+02
Exposure Duration (y):    1.000E+00 Limiting Dose:               1.000E+00
-------------------------------------------------------------------------------
Site Parameters
-------------------------------------------------------------------------------
X Coordinate:             0.000E+00  Y Coordinate:               0.000E+00
Source Length (m):        3.050E+02  Source Width (m):           6.100E+01
Percolation Rate (m/y):   1.000E-01
Pond Operation Time (y):  4.200E+01  Water Input Rate (m3/y):    2.600E+05
Evap Rate Constant (1/y): 0.000E+00  Pond Moisture Content:      4.804E-01
Source Thickness (m):     2.800E+00  Src Bulk Density (g/cc):   1.500E+00
Source Moisture Content:  4.000E-01
-------------------------------------------------------------------------------
Unsaturated Zone Parameters
-------------------------------------------------------------------------------
Unsat Zone Thickness (m):  2.280E+01  Unsat Bulk Density:        1.900E+00
Unsat Dispersivity (m):    2.000E-01  Unsat Moisture Content:    4.000E-01
-------------------------------------------------------------------------------
Aquifer Zone Parameters
-------------------------------------------------------------------------------
Transverse/Longitud Ratio: 5.000E-01  Vertical/Longitud Ratio:  1.000E-03
Aquifer Thickness (m):     7.600E+01  Well Screen Thickness (m): 6.100E+00
Darcy Velocity (m/y):      3.000E+01  Aquifer Porosity:          6.000E-02
Bulk Density (g/cc):       1.900E+00
-------------------------------------------------------------------------------
Calculated Flow Parameters
-------------------------------------------------------------------------------
Percolation Water Flux (m3/y): 1.8605E+03
Total Water Flux (m3/y):       2.6186E+05
Unsat Pore Velocity (m/y):     3.5187E+01
Aquifer Pore Velocity (m/y):   5.0000E+02
-------------------------------------------------------------------------------
Contaminant Data
-------------------------------------------------------------------------------
 Contaminant Name:             NO3
 Half Life (y):                1.000E+38
```

| | |
|---|---|
| Other Source Loss Rate (1/y): | 0.000E+00 |
| Kd Source (ml/g): | 0.000E+00 |
| Solubility Limit (mg/L): | 1.000E+06 |
| Molecular Weight (mg/L): | 6.200E+01 |
| Initial mass/activity: | 0.000E+00 |
| Mass/act input (mg or Ci/y): | 1.600E+10 |
| Kd Unsat (ml/g): | 0.000E+00 |
| Kd Aquifer (ml/g): | 0.000E+00 |
| Risk/Dose Conversion Factor: | 1.500E-09 |

Calculated Contaminant Values

| | |
|---|---|
| Decay Constants (1/y): | 6.9315E-39 |
| Leach Rate Constant (1/y): | 8.9286E-02 |
| Pond Leach Rate Constant (1/y): | 1.0389E+01 |
| Pond Effluent Conc (Ci or mg/m**3): | 6.1538E+04 |
| Solubility Limited Mass (mg): | 0.0000E+00 |
| Unsaturated Retardation Factor: | 1.0000E+00 |
| Mean Unsaturated Transit Time (y): | 6.4797E-01 |
| Leading Edge Arrival Time (y): | 2.6428E-01 |
| Aquifer Retardation Factor: | 1.000E+00 |

Concentration Grid at Time (years) 1.00000E+00

| X Rec (m) | Y Rec (m) | Conc Mbr 1 |
|---|---|---|
| 5.00000E+01 | 5.00000E+01 | 3.228E+03 |
| 5.00000E+01 | 1.05500E+02 | 2.455E+01 |
| 5.00000E+01 | 1.67100E+02 | 1.255E-02 |
| 5.00000E+01 | 2.35490E+02 | 2.685E-07 |
| 5.00000E+01 | 3.11390E+02 | 1.400E-13 |
| 5.00000E+01 | 3.95640E+02 | 3.502E-26 |
| 5.00000E+01 | 4.89160E+02 | 0.000E+00 |
| 5.00000E+01 | 5.92970E+02 | 0.000E+00 |
| 5.00000E+01 | 7.08200E+02 | 0.000E+00 |
| 5.00000E+01 | 8.36100E+02 | 0.000E+00 |
| 5.00000E+01 | 9.78070E+02 | 0.000E+00 |
| 5.00000E+01 | 1.13570E+03 | 0.000E+00 |
| 5.00000E+01 | 1.31060E+03 | 0.000E+00 |
| 5.00000E+01 | 1.50470E+03 | 0.000E+00 |
| 5.00000E+01 | 1.72030E+03 | 0.000E+00 |
| 5.00000E+01 | 1.95950E+03 | 0.000E+00 |
| 1.05500E+02 | 5.00000E+01 | 3.409E+03 |
| 1.05500E+02 | 1.05500E+02 | 3.038E+01 |
| 1.05500E+02 | 1.67100E+02 | 2.092E-02 |
| 1.05500E+02 | 2.35490E+02 | 6.368E-07 |
| 1.05500E+02 | 3.11390E+02 | 4.615E-13 |
| 1.05500E+02 | 3.95640E+02 | 2.843E-25 |
| 1.05500E+02 | 4.89160E+02 | 0.000E+00 |
| 1.05500E+02 | 5.92970E+02 | 0.000E+00 |
| 1.05500E+02 | 7.08200E+02 | 0.000E+00 |
| 1.05500E+02 | 8.36100E+02 | 0.000E+00 |
| 1.05500E+02 | 9.78070E+02 | 0.000E+00 |
| 1.05500E+02 | 1.13570E+03 | 0.000E+00 |
| 1.05500E+02 | 1.31060E+03 | 0.000E+00 |
| 1.05500E+02 | 1.50470E+03 | 0.000E+00 |
| 1.05500E+02 | 1.72030E+03 | 0.000E+00 |
| 1.05500E+02 | 1.95950E+03 | 0.000E+00 |
| 1.67100E+02 | 5.00000E+01 | 3.434E+03 |
| 1.67100E+02 | 1.05500E+02 | 3.740E+01 |
| 1.67100E+02 | 1.67100E+02 | 3.606E-02 |
| 1.67100E+02 | 2.35490E+02 | 1.870E-06 |
| 1.67100E+02 | 3.11390E+02 | 2.776E-12 |
| 1.67100E+02 | 3.95640E+02 | 4.099E-22 |
| 1.67100E+02 | 4.89160E+02 | 0.000E+00 |
| 1.67100E+02 | 5.92970E+02 | 0.000E+00 |
| 1.67100E+02 | 7.08200E+02 | 0.000E+00 |
| 1.67100E+02 | 8.36100E+02 | 0.000E+00 |
| 1.67100E+02 | 9.78070E+02 | 0.000E+00 |
| 1.67100E+02 | 1.13570E+03 | 0.000E+00 |
| 1.67100E+02 | 1.31060E+03 | 0.000E+00 |
| 1.67100E+02 | 1.50470E+03 | 0.000E+00 |

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|---|---|---|
| 1.67100E+02 | 1.72030E+03 | 0.000E+00 |
| 1.67100E+02 | 1.95950E+03 | 0.000E+00 |
| 2.35490E+02 | 5.00000E+01 | 2.303E+03 |
| 2.35490E+02 | 1.05500E+02 | 5.819E+01 |
| 2.35490E+02 | 1.67100E+02 | 1.308E-01 |
| 2.35490E+02 | 2.35490E+02 | 2.207E-05 |
| 2.35490E+02 | 3.11390E+02 | 1.714E-10 |
| 2.35490E+02 | 3.95640E+02 | 2.140E-17 |
| 2.35490E+02 | 4.89160E+02 | 0.000E+00 |
| 2.35490E+02 | 5.92970E+02 | 0.000E+00 |
| 2.35490E+02 | 7.08200E+02 | 0.000E+00 |
| 2.35490E+02 | 8.36100E+02 | 0.000E+00 |
| 2.35490E+02 | 9.78070E+02 | 0.000E+00 |
| 2.35490E+02 | 1.13570E+03 | 0.000E+00 |
| 2.35490E+02 | 1.31060E+03 | 0.000E+00 |
| 2.35490E+02 | 1.50470E+03 | 0.000E+00 |
| 2.35490E+02 | 1.72030E+03 | 0.000E+00 |
| 2.35490E+02 | 1.95950E+03 | 0.000E+00 |
| 3.11390E+02 | 5.00000E+01 | 8.263E+02 |
| 3.11390E+02 | 1.05500E+02 | 4.644E+01 |
| 3.11390E+02 | 1.67100E+02 | 2.523E-01 |
| 3.11390E+02 | 2.35490E+02 | 1.099E-04 |
| 3.11390E+02 | 3.11390E+02 | 2.723E-09 |
| 3.11390E+02 | 3.95640E+02 | 2.086E-15 |
| 3.11390E+02 | 4.89160E+02 | 0.000E+00 |
| 3.11390E+02 | 5.92970E+02 | 0.000E+00 |
| 3.11390E+02 | 7.08200E+02 | 0.000E+00 |
| 3.11390E+02 | 8.36100E+02 | 0.000E+00 |
| 3.11390E+02 | 9.78070E+02 | 0.000E+00 |
| 3.11390E+02 | 1.13570E+03 | 0.000E+00 |
| 3.11390E+02 | 1.31060E+03 | 0.000E+00 |
| 3.11390E+02 | 1.50470E+03 | 0.000E+00 |
| 3.11390E+02 | 1.72030E+03 | 0.000E+00 |
| 3.11390E+02 | 1.95950E+03 | 0.000E+00 |
| 3.95640E+02 | 5.00000E+01 | 1.436E+02 |
| 3.95640E+02 | 1.05500E+02 | 1.420E+01 |
| 3.95640E+02 | 1.67100E+02 | 1.792E-01 |
| 3.95640E+02 | 2.35490E+02 | 2.057E-04 |
| 3.95640E+02 | 3.11390E+02 | 1.505E-08 |
| 3.95640E+02 | 3.95640E+02 | 4.263E-14 |
| 3.95640E+02 | 4.89160E+02 | 4.764E-26 |
| 3.95640E+02 | 5.92970E+02 | 0.000E+00 |
| 3.95640E+02 | 7.08200E+02 | 0.000E+00 |
| 3.95640E+02 | 8.36100E+02 | 0.000E+00 |
| 3.95640E+02 | 9.78070E+02 | 0.000E+00 |
| 3.95640E+02 | 1.13570E+03 | 0.000E+00 |
| 3.95640E+02 | 1.31060E+03 | 0.000E+00 |
| 3.95640E+02 | 1.50470E+03 | 0.000E+00 |
| 3.95640E+02 | 1.72030E+03 | 0.000E+00 |
| 3.95640E+02 | 1.95950E+03 | 0.000E+00 |
| 4.89160E+02 | 5.00000E+01 | 7.638E+00 |
| 4.89160E+02 | 1.05500E+02 | 1.114E+00 |
| 4.89160E+02 | 1.67100E+02 | 2.739E-02 |
| 4.89160E+02 | 2.35490E+02 | 7.593E-05 |
| 4.89160E+02 | 3.11390E+02 | 1.569E-08 |
| 4.89160E+02 | 3.95640E+02 | 1.501E-13 |
| 4.89160E+02 | 4.89160E+02 | 8.565E-22 |
| 4.89160E+02 | 5.92970E+02 | 0.000E+00 |
| 4.89160E+02 | 7.08200E+02 | 0.000E+00 |
| 4.89160E+02 | 8.36100E+02 | 0.000E+00 |
| 4.89160E+02 | 9.78070E+02 | 0.000E+00 |
| 4.89160E+02 | 1.13570E+03 | 0.000E+00 |
| 4.89160E+02 | 1.31060E+03 | 0.000E+00 |
| 4.89160E+02 | 1.50470E+03 | 0.000E+00 |
| 4.89160E+02 | 1.72030E+03 | 0.000E+00 |
| 4.89160E+02 | 1.95950E+03 | 0.000E+00 |
| 5.92970E+02 | 5.00000E+01 | 1.111E-01 |
| 5.92970E+02 | 1.05500E+02 | 2.134E-02 |
| 5.92970E+02 | 1.67100E+02 | 8.721E-04 |
| 5.92970E+02 | 2.35490E+02 | 5.029E-06 |
| 5.92970E+02 | 3.11390E+02 | 2.625E-09 |

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|---|---|---|
| 5.92970E+02 | 3.95640E+02 | 7.580E-14 |
| 5.92970E+02 | 4.89160E+02 | 2.287E-20 |
| 5.92970E+02 | 5.92970E+02 | 0.000E+00 |
| 5.92970E+02 | 7.08200E+02 | 0.000E+00 |
| 5.92970E+02 | 8.36100E+02 | 0.000E+00 |
| 5.92970E+02 | 9.78070E+02 | 0.000E+00 |
| 5.92970E+02 | 1.13570E+03 | 0.000E+00 |
| 5.92970E+02 | 1.31060E+03 | 0.000E+00 |
| 5.92970E+02 | 1.50470E+03 | 0.000E+00 |
| 5.92970E+02 | 1.72030E+03 | 0.000E+00 |
| 5.92970E+02 | 1.95950E+03 | 0.000E+00 |
| 7.08200E+02 | 5.00000E+01 | 3.568E-04 |
| 7.08200E+02 | 1.05500E+02 | 8.426E-05 |
| 7.08200E+02 | 1.67100E+02 | 5.085E-06 |
| 7.08200E+02 | 2.35490E+02 | 5.310E-08 |
| 7.08200E+02 | 3.11390E+02 | 6.136E-11 |
| 7.08200E+02 | 3.95640E+02 | 4.745E-15 |
| 7.08200E+02 | 4.89160E+02 | 1.007E-20 |
| 7.08200E+02 | 5.92970E+02 | 0.000E+00 |
| 7.08200E+02 | 7.08200E+02 | 0.000E+00 |
| 7.08200E+02 | 8.36100E+02 | 0.000E+00 |
| 7.08200E+02 | 9.78070E+02 | 0.000E+00 |
| 7.08200E+02 | 1.13570E+03 | 0.000E+00 |
| 7.08200E+02 | 1.31060E+03 | 0.000E+00 |
| 7.08200E+02 | 1.50470E+03 | 0.000E+00 |
| 7.08200E+02 | 1.72030E+03 | 0.000E+00 |
| 7.08200E+02 | 1.95950E+03 | 0.000E+00 |
| 8.36100E+02 | 5.00000E+01 | 1.945E-07 |
| 8.36100E+02 | 1.05500E+02 | 5.388E-08 |
| 8.36100E+02 | 1.67100E+02 | 4.425E-09 |
| 8.36100E+02 | 2.35490E+02 | 7.484E-11 |
| 8.36100E+02 | 3.11390E+02 | 1.693E-13 |
| 8.36100E+02 | 3.95640E+02 | 3.111E-17 |
| 8.36100E+02 | 4.89160E+02 | 2.644E-22 |
| 8.36100E+02 | 5.92970E+02 | 0.000E+00 |
| 8.36100E+02 | 7.08200E+02 | 0.000E+00 |
| 8.36100E+02 | 8.36100E+02 | 0.000E+00 |
| 8.36100E+02 | 9.78070E+02 | 0.000E+00 |
| 8.36100E+02 | 1.13570E+03 | 0.000E+00 |
| 8.36100E+02 | 1.31060E+03 | 0.000E+00 |
| 8.36100E+02 | 1.50470E+03 | 0.000E+00 |
| 8.36100E+02 | 1.72030E+03 | 0.000E+00 |
| 8.36100E+02 | 1.95950E+03 | 0.000E+00 |
| 9.78070E+02 | 5.00000E+01 | 1.309E-11 |
| 9.78070E+02 | 1.05500E+02 | 4.120E-12 |
| 9.78070E+02 | 1.67100E+02 | 4.337E-13 |
| 9.78070E+02 | 2.35490E+02 | 1.090E-14 |
| 9.78070E+02 | 3.11390E+02 | 4.349E-17 |
| 9.78070E+02 | 3.95640E+02 | 1.697E-20 |
| 9.78070E+02 | 4.89160E+02 | 3.675E-25 |
| 9.78070E+02 | 5.92970E+02 | 0.000E+00 |
| 9.78070E+02 | 7.08200E+02 | 0.000E+00 |
| 9.78070E+02 | 8.36100E+02 | 0.000E+00 |
| 9.78070E+02 | 9.78070E+02 | 0.000E+00 |
| 9.78070E+02 | 1.13570E+03 | 0.000E+00 |
| 9.78070E+02 | 1.31060E+03 | 0.000E+00 |
| 9.78070E+02 | 1.50470E+03 | 0.000E+00 |
| 9.78070E+02 | 1.72030E+03 | 0.000E+00 |
| 9.78070E+02 | 1.95950E+03 | 0.000E+00 |
| 1.13570E+03 | 5.00000E+01 | 7.113E-17 |
| 1.13570E+03 | 1.05500E+02 | 2.498E-17 |
| 1.13570E+03 | 1.67100E+02 | 3.244E-18 |
| 1.13570E+03 | 2.35490E+02 | 1.143E-19 |
| 1.13570E+03 | 3.11390E+02 | 7.429E-22 |
| 1.13570E+03 | 3.95640E+02 | 5.602E-25 |
| 1.13570E+03 | 4.89160E+02 | 2.826E-29 |
| 1.13570E+03 | 5.92970E+02 | 9.183E-38 |
| 1.13570E+03 | 7.08200E+02 | 0.000E+00 |
| 1.13570E+03 | 8.36100E+02 | 0.000E+00 |
| 1.13570E+03 | 9.78070E+02 | 0.000E+00 |
| 1.13570E+03 | 1.13570E+03 | 0.000E+00 |

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|---|---|---|
| 1.13570E+03 | 1.31060E+03 | 0.000E+00 |
| 1.13570E+03 | 1.50470E+03 | 0.000E+00 |
| 1.13570E+03 | 1.72030E+03 | 0.000E+00 |
| 1.13570E+03 | 1.95950E+03 | 0.000E+00 |
| 1.31060E+03 | 5.00000E+01 | 2.622E-25 |
| 1.31060E+03 | 1.05500E+02 | 1.097E-25 |
| 1.31060E+03 | 1.67100E+02 | 2.000E-26 |
| 1.31060E+03 | 2.35490E+02 | 1.218E-27 |
| 1.31060E+03 | 3.11390E+02 | 1.759E-29 |
| 1.31060E+03 | 3.95640E+02 | 3.908E-32 |
| 1.31060E+03 | 4.89160E+02 | 7.733E-36 |
| 1.31060E+03 | 5.92970E+02 | 6.580E-41 |
| 1.31060E+03 | 7.08200E+02 | 0.000E+00 |
| 1.31060E+03 | 8.36100E+02 | 0.000E+00 |
| 1.31060E+03 | 9.78070E+02 | 0.000E+00 |
| 1.31060E+03 | 1.13570E+03 | 0.000E+00 |
| 1.31060E+03 | 1.31060E+03 | 0.000E+00 |
| 1.31060E+03 | 1.50470E+03 | 0.000E+00 |
| 1.31060E+03 | 1.72030E+03 | 0.000E+00 |
| 1.31060E+03 | 1.95950E+03 | 0.000E+00 |
| 1.50470E+03 | 5.00000E+01 | 0.000E+00 |
| 1.50470E+03 | 1.05500E+02 | 0.000E+00 |
| 1.50470E+03 | 1.67100E+02 | 0.000E+00 |
| 1.50470E+03 | 2.35490E+02 | 0.000E+00 |
| 1.50470E+03 | 3.11390E+02 | 0.000E+00 |
| 1.50470E+03 | 3.95640E+02 | 0.000E+00 |
| 1.50470E+03 | 4.89160E+02 | 0.000E+00 |
| 1.50470E+03 | 5.92970E+02 | 0.000E+00 |
| 1.50470E+03 | 7.08200E+02 | 0.000E+00 |
| 1.50470E+03 | 8.36100E+02 | 0.000E+00 |
| 1.50470E+03 | 9.78070E+02 | 0.000E+00 |
| 1.50470E+03 | 1.13570E+03 | 0.000E+00 |
| 1.50470E+03 | 1.31060E+03 | 0.000E+00 |
| 1.50470E+03 | 1.50470E+03 | 0.000E+00 |
| 1.50470E+03 | 1.72030E+03 | 0.000E+00 |
| 1.50470E+03 | 1.95950E+03 | 0.000E+00 |
| 1.72030E+03 | 5.00000E+01 | 0.000E+00 |
| 1.72030E+03 | 1.05500E+02 | 0.000E+00 |
| 1.72030E+03 | 1.67100E+02 | 0.000E+00 |
| 1.72030E+03 | 2.35490E+02 | 0.000E+00 |
| 1.72030E+03 | 3.11390E+02 | 0.000E+00 |
| 1.72030E+03 | 3.95640E+02 | 0.000E+00 |
| 1.72030E+03 | 4.89160E+02 | 0.000E+00 |
| 1.72030E+03 | 5.92970E+02 | 0.000E+00 |
| 1.72030E+03 | 7.08200E+02 | 0.000E+00 |
| 1.72030E+03 | 8.36100E+02 | 0.000E+00 |
| 1.72030E+03 | 9.78070E+02 | 0.000E+00 |
| 1.72030E+03 | 1.13570E+03 | 0.000E+00 |
| 1.72030E+03 | 1.31060E+03 | 0.000E+00 |
| 1.72030E+03 | 1.50470E+03 | 0.000E+00 |
| 1.72030E+03 | 1.72030E+03 | 0.000E+00 |
| 1.72030E+03 | 1.95950E+03 | 0.000E+00 |
| 1.95950E+03 | 5.00000E+01 | 0.000E+00 |
| 1.95950E+03 | 1.05500E+02 | 0.000E+00 |
| 1.95950E+03 | 1.67100E+02 | 0.000E+00 |
| 1.95950E+03 | 2.35490E+02 | 0.000E+00 |
| 1.95950E+03 | 3.11390E+02 | 0.000E+00 |
| 1.95950E+03 | 3.95640E+02 | 0.000E+00 |
| 1.95950E+03 | 4.89160E+02 | 0.000E+00 |
| 1.95950E+03 | 5.92970E+02 | 0.000E+00 |
| 1.95950E+03 | 7.08200E+02 | 0.000E+00 |
| 1.95950E+03 | 8.36100E+02 | 0.000E+00 |
| 1.95950E+03 | 9.78070E+02 | 0.000E+00 |
| 1.95950E+03 | 1.13570E+03 | 0.000E+00 |
| 1.95950E+03 | 1.31060E+03 | 0.000E+00 |
| 1.95950E+03 | 1.50470E+03 | 0.000E+00 |
| 1.95950E+03 | 1.72030E+03 | 0.000E+00 |
| 1.95950E+03 | 1.95950E+03 | 0.000E+00 |
| 2.22500E+03 | 5.00000E+01 | 0.000E+00 |
| 2.22500E+03 | 1.05500E+02 | 0.000E+00 |
| 2.22500E+03 | 1.67100E+02 | 0.000E+00 |

| | | |
|---|---|---|
| 2.22500E+03 | 2.35490E+02 | 0.000E+00 |
| 2.22500E+03 | 3.11390E+02 | 0.000E+00 |
| 2.22500E+03 | 3.95640E+02 | 0.000E+00 |
| 2.22500E+03 | 4.89160E+02 | 0.000E+00 |
| 2.22500E+03 | 5.92970E+02 | 0.000E+00 |
| 2.22500E+03 | 7.08200E+02 | 0.000E+00 |
| 2.22500E+03 | 8.36100E+02 | 0.000E+00 |
| 2.22500E+03 | 9.78070E+02 | 0.000E+00 |
| 2.22500E+03 | 1.13570E+03 | 0.000E+00 |
| 2.22500E+03 | 1.31060E+03 | 0.000E+00 |
| 2.22500E+03 | 1.50470E+03 | 0.000E+00 |
| 2.22500E+03 | 1.72030E+03 | 0.000E+00 |
| 2.22500E+03 | 1.95950E+03 | 0.000E+00 |
| 2.51980E+03 | 5.00000E+01 | 0.000E+00 |
| 2.51980E+03 | 1.05500E+02 | 0.000E+00 |
| 2.51980E+03 | 1.67100E+02 | 0.000E+00 |
| 2.51980E+03 | 2.35490E+02 | 0.000E+00 |
| 2.51980E+03 | 3.11390E+02 | 0.000E+00 |
| 2.51980E+03 | 3.95640E+02 | 0.000E+00 |
| 2.51980E+03 | 4.89160E+02 | 0.000E+00 |
| 2.51980E+03 | 5.92970E+02 | 0.000E+00 |
| 2.51980E+03 | 7.08200E+02 | 0.000E+00 |
| 2.51980E+03 | 8.36100E+02 | 0.000E+00 |
| 2.51980E+03 | 9.78070E+02 | 0.000E+00 |
| 2.51980E+03 | 1.13570E+03 | 0.000E+00 |
| 2.51980E+03 | 1.31060E+03 | 0.000E+00 |
| 2.51980E+03 | 1.50470E+03 | 0.000E+00 |
| 2.51980E+03 | 1.72030E+03 | 0.000E+00 |
| 2.51980E+03 | 1.95950E+03 | 0.000E+00 |
| 2.84700E+03 | 5.00000E+01 | 0.000E+00 |
| 2.84700E+03 | 1.05500E+02 | 0.000E+00 |
| 2.84700E+03 | 1.67100E+02 | 0.000E+00 |
| 2.84700E+03 | 2.35490E+02 | 0.000E+00 |
| 2.84700E+03 | 3.11390E+02 | 0.000E+00 |
| 2.84700E+03 | 3.95640E+02 | 0.000E+00 |
| 2.84700E+03 | 4.89160E+02 | 0.000E+00 |
| 2.84700E+03 | 5.92970E+02 | 0.000E+00 |
| 2.84700E+03 | 7.08200E+02 | 0.000E+00 |
| 2.84700E+03 | 8.36100E+02 | 0.000E+00 |
| 2.84700E+03 | 9.78070E+02 | 0.000E+00 |
| 2.84700E+03 | 1.13570E+03 | 0.000E+00 |
| 2.84700E+03 | 1.31060E+03 | 0.000E+00 |
| 2.84700E+03 | 1.50470E+03 | 0.000E+00 |
| 2.84700E+03 | 1.72030E+03 | 0.000E+00 |
| 2.84700E+03 | 1.95950E+03 | 0.000E+00 |
| 3.21010E+03 | 5.00000E+01 | 0.000E+00 |
| 3.21010E+03 | 1.05500E+02 | 0.000E+00 |
| 3.21010E+03 | 1.67100E+02 | 0.000E+00 |
| 3.21010E+03 | 2.35490E+02 | 0.000E+00 |
| 3.21010E+03 | 3.11390E+02 | 0.000E+00 |
| 3.21010E+03 | 3.95640E+02 | 0.000E+00 |
| 3.21010E+03 | 4.89160E+02 | 0.000E+00 |
| 3.21010E+03 | 5.92970E+02 | 0.000E+00 |
| 3.21010E+03 | 7.08200E+02 | 0.000E+00 |
| 3.21010E+03 | 8.36100E+02 | 0.000E+00 |
| 3.21010E+03 | 9.78070E+02 | 0.000E+00 |
| 3.21010E+03 | 1.13570E+03 | 0.000E+00 |
| 3.21010E+03 | 1.31060E+03 | 0.000E+00 |
| 3.21010E+03 | 1.50470E+03 | 0.000E+00 |
| 3.21010E+03 | 1.72030E+03 | 0.000E+00 |
| 3.21010E+03 | 1.95950E+03 | 0.000E+00 |
| 3.61330E+03 | 5.00000E+01 | 0.000E+00 |
| 3.61330E+03 | 1.05500E+02 | 0.000E+00 |
| 3.61330E+03 | 1.67100E+02 | 0.000E+00 |
| 3.61330E+03 | 2.35490E+02 | 0.000E+00 |
| 3.61330E+03 | 3.11390E+02 | 0.000E+00 |
| 3.61330E+03 | 3.95640E+02 | 0.000E+00 |
| 3.61330E+03 | 4.89160E+02 | 0.000E+00 |
| 3.61330E+03 | 5.92970E+02 | 0.000E+00 |
| 3.61330E+03 | 7.08200E+02 | 0.000E+00 |
| 3.61330E+03 | 8.36100E+02 | 0.000E+00 |

| | | |
|---|---|---|
| 3.61330E+03 | 9.78070E+02 | 0.000E+00 |
| 3.61330E+03 | 1.13570E+03 | 0.000E+00 |
| 3.61330E+03 | 1.31060E+03 | 0.000E+00 |
| 3.61330E+03 | 1.50470E+03 | 0.000E+00 |
| 3.61330E+03 | 1.72030E+03 | 0.000E+00 |
| 3.61330E+03 | 1.95950E+03 | 0.000E+00 |
| 4.06070E+03 | 5.00000E+01 | 0.000E+00 |
| 4.06070E+03 | 1.05500E+02 | 0.000E+00 |
| 4.06070E+03 | 1.67100E+02 | 0.000E+00 |
| 4.06070E+03 | 2.35490E+02 | 0.000E+00 |
| 4.06070E+03 | 3.11390E+02 | 0.000E+00 |
| 4.06070E+03 | 3.95640E+02 | 0.000E+00 |
| 4.06070E+03 | 4.89160E+02 | 0.000E+00 |
| 4.06070E+03 | 5.92970E+02 | 0.000E+00 |
| 4.06070E+03 | 7.08200E+02 | 0.000E+00 |
| 4.06070E+03 | 8.36100E+02 | 0.000E+00 |
| 4.06070E+03 | 9.78070E+02 | 0.000E+00 |
| 4.06070E+03 | 1.13570E+03 | 0.000E+00 |
| 4.06070E+03 | 1.31060E+03 | 0.000E+00 |
| 4.06070E+03 | 1.50470E+03 | 0.000E+00 |
| 4.06070E+03 | 1.72030E+03 | 0.000E+00 |
| 4.06070E+03 | 1.95950E+03 | 0.000E+00 |
| 4.55740E+03 | 5.00000E+01 | 0.000E+00 |
| 4.55740E+03 | 1.05500E+02 | 0.000E+00 |
| 4.55740E+03 | 1.67100E+02 | 0.000E+00 |
| 4.55740E+03 | 2.35490E+02 | 0.000E+00 |
| 4.55740E+03 | 3.11390E+02 | 0.000E+00 |
| 4.55740E+03 | 3.95640E+02 | 0.000E+00 |
| 4.55740E+03 | 4.89160E+02 | 0.000E+00 |
| 4.55740E+03 | 5.92970E+02 | 0.000E+00 |
| 4.55740E+03 | 7.08200E+02 | 0.000E+00 |
| 4.55740E+03 | 8.36100E+02 | 0.000E+00 |
| 4.55740E+03 | 9.78070E+02 | 0.000E+00 |
| 4.55740E+03 | 1.13570E+03 | 0.000E+00 |
| 4.55740E+03 | 1.31060E+03 | 0.000E+00 |
| 4.55740E+03 | 1.50470E+03 | 0.000E+00 |
| 4.55740E+03 | 1.72030E+03 | 0.000E+00 |
| 4.55740E+03 | 1.95950E+03 | 0.000E+00 |
| 5.10870E+03 | 5.00000E+01 | 0.000E+00 |
| 5.10870E+03 | 1.05500E+02 | 0.000E+00 |
| 5.10870E+03 | 1.67100E+02 | 0.000E+00 |
| 5.10870E+03 | 2.35490E+02 | 0.000E+00 |
| 5.10870E+03 | 3.11390E+02 | 0.000E+00 |
| 5.10870E+03 | 3.95640E+02 | 0.000E+00 |
| 5.10870E+03 | 4.89160E+02 | 0.000E+00 |
| 5.10870E+03 | 5.92970E+02 | 0.000E+00 |
| 5.10870E+03 | 7.08200E+02 | 0.000E+00 |
| 5.10870E+03 | 8.36100E+02 | 0.000E+00 |
| 5.10870E+03 | 9.78070E+02 | 0.000E+00 |
| 5.10870E+03 | 1.13570E+03 | 0.000E+00 |
| 5.10870E+03 | 1.31060E+03 | 0.000E+00 |
| 5.10870E+03 | 1.50470E+03 | 0.000E+00 |
| 5.10870E+03 | 1.72030E+03 | 0.000E+00 |
| 5.10870E+03 | 1.95950E+03 | 0.000E+00 |
| 5.72070E+03 | 5.00000E+01 | 0.000E+00 |
| 5.72070E+03 | 1.05500E+02 | 0.000E+00 |
| 5.72070E+03 | 1.67100E+02 | 0.000E+00 |
| 5.72070E+03 | 2.35490E+02 | 0.000E+00 |
| 5.72070E+03 | 3.11390E+02 | 0.000E+00 |
| 5.72070E+03 | 3.95640E+02 | 0.000E+00 |
| 5.72070E+03 | 4.89160E+02 | 0.000E+00 |
| 5.72070E+03 | 5.92970E+02 | 0.000E+00 |
| 5.72070E+03 | 7.08200E+02 | 0.000E+00 |
| 5.72070E+03 | 8.36100E+02 | 0.000E+00 |
| 5.72070E+03 | 9.78070E+02 | 0.000E+00 |
| 5.72070E+03 | 1.13570E+03 | 0.000E+00 |
| 5.72070E+03 | 1.31060E+03 | 0.000E+00 |
| 5.72070E+03 | 1.50470E+03 | 0.000E+00 |
| 5.72070E+03 | 1.72030E+03 | 0.000E+00 |
| 5.72070E+03 | 1.95950E+03 | 0.000E+00 |
| 6.39990E+03 | 5.00000E+01 | 0.000E+00 |

| | | |
|---|---|---|
| 6.39990E+03 | 1.05500E+02 | 0.000E+00 |
| 6.39990E+03 | 1.67100E+02 | 0.000E+00 |
| 6.39990E+03 | 2.35490E+02 | 0.000E+00 |
| 6.39990E+03 | 3.11390E+02 | 0.000E+00 |
| 6.39990E+03 | 3.95640E+02 | 0.000E+00 |
| 6.39990E+03 | 4.89160E+02 | 0.000E+00 |
| 6.39990E+03 | 5.92970E+02 | 0.000E+00 |
| 6.39990E+03 | 7.08200E+02 | 0.000E+00 |
| 6.39990E+03 | 8.36100E+02 | 0.000E+00 |
| 6.39990E+03 | 9.78070E+02 | 0.000E+00 |
| 6.39990E+03 | 1.13570E+03 | 0.000E+00 |
| 6.39990E+03 | 1.31060E+03 | 0.000E+00 |
| 6.39990E+03 | 1.50470E+03 | 0.000E+00 |
| 6.39990E+03 | 1.72030E+03 | 0.000E+00 |
| 6.39990E+03 | 1.95950E+03 | 0.000E+00 |
| 7.15390E+03 | 5.00000E+01 | 0.000E+00 |
| 7.15390E+03 | 1.05500E+02 | 0.000E+00 |
| 7.15390E+03 | 1.67100E+02 | 0.000E+00 |
| 7.15390E+03 | 2.35490E+02 | 0.000E+00 |
| 7.15390E+03 | 3.11390E+02 | 0.000E+00 |
| 7.15390E+03 | 3.95640E+02 | 0.000E+00 |
| 7.15390E+03 | 4.89160E+02 | 0.000E+00 |
| 7.15390E+03 | 5.92970E+02 | 0.000E+00 |
| 7.15390E+03 | 7.08200E+02 | 0.000E+00 |
| 7.15390E+03 | 8.36100E+02 | 0.000E+00 |
| 7.15390E+03 | 9.78070E+02 | 0.000E+00 |
| 7.15390E+03 | 1.13570E+03 | 0.000E+00 |
| 7.15390E+03 | 1.31060E+03 | 0.000E+00 |
| 7.15390E+03 | 1.50470E+03 | 0.000E+00 |
| 7.15390E+03 | 1.72030E+03 | 0.000E+00 |
| 7.15390E+03 | 1.95950E+03 | 0.000E+00 |
| 7.99090E+03 | 5.00000E+01 | 0.000E+00 |
| 7.99090E+03 | 1.05500E+02 | 0.000E+00 |
| 7.99090E+03 | 1.67100E+02 | 0.000E+00 |
| 7.99090E+03 | 2.35490E+02 | 0.000E+00 |
| 7.99090E+03 | 3.11390E+02 | 0.000E+00 |
| 7.99090E+03 | 3.95640E+02 | 0.000E+00 |
| 7.99090E+03 | 4.89160E+02 | 0.000E+00 |
| 7.99090E+03 | 5.92970E+02 | 0.000E+00 |
| 7.99090E+03 | 7.08200E+02 | 0.000E+00 |
| 7.99090E+03 | 8.36100E+02 | 0.000E+00 |
| 7.99090E+03 | 9.78070E+02 | 0.000E+00 |
| 7.99090E+03 | 1.13570E+03 | 0.000E+00 |
| 7.99090E+03 | 1.31060E+03 | 0.000E+00 |
| 7.99090E+03 | 1.50470E+03 | 0.000E+00 |
| 7.99090E+03 | 1.72030E+03 | 0.000E+00 |
| 7.99090E+03 | 1.95950E+03 | 0.000E+00 |
| 8.91990E+03 | 5.00000E+01 | 0.000E+00 |
| 8.91990E+03 | 1.05500E+02 | 0.000E+00 |
| 8.91990E+03 | 1.67100E+02 | 0.000E+00 |
| 8.91990E+03 | 2.35490E+02 | 0.000E+00 |
| 8.91990E+03 | 3.11390E+02 | 0.000E+00 |
| 8.91990E+03 | 3.95640E+02 | 0.000E+00 |
| 8.91990E+03 | 4.89160E+02 | 0.000E+00 |
| 8.91990E+03 | 5.92970E+02 | 0.000E+00 |
| 8.91990E+03 | 7.08200E+02 | 0.000E+00 |
| 8.91990E+03 | 8.36100E+02 | 0.000E+00 |
| 8.91990E+03 | 9.78070E+02 | 0.000E+00 |
| 8.91990E+03 | 1.13570E+03 | 0.000E+00 |
| 8.91990E+03 | 1.31060E+03 | 0.000E+00 |
| 8.91990E+03 | 1.50470E+03 | 0.000E+00 |
| 8.91990E+03 | 1.72030E+03 | 0.000E+00 |
| 8.91990E+03 | 1.95950E+03 | 0.000E+00 |
| 5.00000E+01 | -5.00000E+01 | 3.228E+03 |
| 5.00000E+01 | -1.05500E+02 | 2.455E+01 |
| 5.00000E+01 | -1.67100E+02 | 1.255E-02 |
| 5.00000E+01 | -2.35490E+02 | 2.685E-07 |
| 5.00000E+01 | -3.11390E+02 | 1.400E-13 |
| 5.00000E+01 | -3.95640E+02 | 3.502E-26 |
| 5.00000E+01 | -4.89160E+02 | 0.000E+00 |
| 5.00000E+01 | -5.92970E+02 | 0.000E+00 |

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|---|---|---|
| 5.00000E+01 | -7.08200E+02 | 0.000E+00 |
| 5.00000E+01 | -8.36100E+02 | 0.000E+00 |
| 5.00000E+01 | -9.78070E+02 | 0.000E+00 |
| 5.00000E+01 | -1.13570E+03 | 0.000E+00 |
| 5.00000E+01 | -1.31060E+03 | 0.000E+00 |
| 5.00000E+01 | -1.50470E+03 | 0.000E+00 |
| 5.00000E+01 | -1.72030E+03 | 0.000E+00 |
| 5.00000E+01 | -1.95950E+03 | 0.000E+00 |
| 1.05500E+02 | -5.00000E+01 | 3.409E+03 |
| 1.05500E+02 | -1.05500E+02 | 3.038E+01 |
| 1.05500E+02 | -1.67100E+02 | 2.092E-02 |
| 1.05500E+02 | -2.35490E+02 | 6.368E-07 |
| 1.05500E+02 | -3.11390E+02 | 4.615E-13 |
| 1.05500E+02 | -3.95640E+02 | 2.843E-25 |
| 1.05500E+02 | -4.89160E+02 | 0.000E+00 |
| 1.05500E+02 | -5.92970E+02 | 0.000E+00 |
| 1.05500E+02 | -7.08200E+02 | 0.000E+00 |
| 1.05500E+02 | -8.36100E+02 | 0.000E+00 |
| 1.05500E+02 | -9.78070E+02 | 0.000E+00 |
| 1.05500E+02 | -1.13570E+03 | 0.000E+00 |
| 1.05500E+02 | -1.31060E+03 | 0.000E+00 |
| 1.05500E+02 | -1.50470E+03 | 0.000E+00 |
| 1.05500E+02 | -1.72030E+03 | 0.000E+00 |
| 1.05500E+02 | -1.95950E+03 | 0.000E+00 |
| 1.67100E+02 | -5.00000E+01 | 3.434E+03 |
| 1.67100E+02 | -1.05500E+02 | 3.740E+01 |
| 1.67100E+02 | -1.67100E+02 | 3.606E-02 |
| 1.67100E+02 | -2.35490E+02 | 1.870E-06 |
| 1.67100E+02 | -3.11390E+02 | 2.776E-12 |
| 1.67100E+02 | -3.95640E+02 | 4.099E-22 |
| 1.67100E+02 | -4.89160E+02 | 0.000E+00 |
| 1.67100E+02 | -5.92970E+02 | 0.000E+00 |
| 1.67100E+02 | -7.08200E+02 | 0.000E+00 |
| 1.67100E+02 | -8.36100E+02 | 0.000E+00 |
| 1.67100E+02 | -9.78070E+02 | 0.000E+00 |
| 1.67100E+02 | -1.13570E+03 | 0.000E+00 |
| 1.67100E+02 | -1.31060E+03 | 0.000E+00 |
| 1.67100E+02 | -1.50470E+03 | 0.000E+00 |
| 1.67100E+02 | -1.72030E+03 | 0.000E+00 |
| 1.67100E+02 | -1.95950E+03 | 0.000E+00 |
| 2.35490E+02 | -5.00000E+01 | 2.303E+03 |
| 2.35490E+02 | -1.05500E+02 | 5.819E+01 |
| 2.35490E+02 | -1.67100E+02 | 1.308E-01 |
| 2.35490E+02 | -2.35490E+02 | 2.207E-05 |
| 2.35490E+02 | -3.11390E+02 | 1.714E-10 |
| 2.35490E+02 | -3.95640E+02 | 2.140E-17 |
| 2.35490E+02 | -4.89160E+02 | 0.000E+00 |
| 2.35490E+02 | -5.92970E+02 | 0.000E+00 |
| 2.35490E+02 | -7.08200E+02 | 0.000E+00 |
| 2.35490E+02 | -8.36100E+02 | 0.000E+00 |
| 2.35490E+02 | -9.78070E+02 | 0.000E+00 |
| 2.35490E+02 | -1.13570E+03 | 0.000E+00 |
| 2.35490E+02 | -1.31060E+03 | 0.000E+00 |
| 2.35490E+02 | -1.50470E+03 | 0.000E+00 |
| 2.35490E+02 | -1.72030E+03 | 0.000E+00 |
| 2.35490E+02 | -1.95950E+03 | 0.000E+00 |
| 3.11390E+02 | -5.00000E+01 | 8.263E+02 |
| 3.11390E+02 | -1.05500E+02 | 4.644E+01 |
| 3.11390E+02 | -1.67100E+02 | 2.523E-01 |
| 3.11390E+02 | -2.35490E+02 | 1.099E-04 |
| 3.11390E+02 | -3.11390E+02 | 2.723E-09 |
| 3.11390E+02 | -3.95640E+02 | 2.086E-15 |
| 3.11390E+02 | -4.89160E+02 | 0.000E+00 |
| 3.11390E+02 | -5.92970E+02 | 0.000E+00 |
| 3.11390E+02 | -7.08200E+02 | 0.000E+00 |
| 3.11390E+02 | -8.36100E+02 | 0.000E+00 |
| 3.11390E+02 | -9.78070E+02 | 0.000E+00 |
| 3.11390E+02 | -1.13570E+03 | 0.000E+00 |
| 3.11390E+02 | -1.31060E+03 | 0.000E+00 |
| 3.11390E+02 | -1.50470E+03 | 0.000E+00 |
| 3.11390E+02 | -1.72030E+03 | 0.000E+00 |

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|---|---|---|
| 3.11390E+02 | -1.95950E+03 | 0.000E+00 |
| 3.95640E+02 | -5.00000E+01 | 1.436E+02 |
| 3.95640E+02 | -1.05500E+02 | 1.420E+01 |
| 3.95640E+02 | -1.67100E+02 | 1.792E-01 |
| 3.95640E+02 | -2.35490E+02 | 2.057E-04 |
| 3.95640E+02 | -3.11390E+02 | 1.505E-08 |
| 3.95640E+02 | -3.95640E+02 | 4.263E-14 |
| 3.95640E+02 | -4.89160E+02 | 4.764E-26 |
| 3.95640E+02 | -5.92970E+02 | 0.000E+00 |
| 3.95640E+02 | -7.08200E+02 | 0.000E+00 |
| 3.95640E+02 | -8.36100E+02 | 0.000E+00 |
| 3.95640E+02 | -9.78070E+02 | 0.000E+00 |
| 3.95640E+02 | -1.13570E+03 | 0.000E+00 |
| 3.95640E+02 | -1.31060E+03 | 0.000E+00 |
| 3.95640E+02 | -1.50470E+03 | 0.000E+00 |
| 3.95640E+02 | -1.72030E+03 | 0.000E+00 |
| 3.95640E+02 | -1.95950E+03 | 0.000E+00 |
| 4.89160E+02 | -5.00000E+01 | 7.638E+00 |
| 4.89160E+02 | -1.05500E+02 | 1.114E+00 |
| 4.89160E+02 | -1.67100E+02 | 2.739E-02 |
| 4.89160E+02 | -2.35490E+02 | 7.593E-05 |
| 4.89160E+02 | -3.11390E+02 | 1.569E-08 |
| 4.89160E+02 | -3.95640E+02 | 1.501E-13 |
| 4.89160E+02 | -4.89160E+02 | 8.565E-22 |
| 4.89160E+02 | -5.92970E+02 | 0.000E+00 |
| 4.89160E+02 | -7.08200E+02 | 0.000E+00 |
| 4.89160E+02 | -8.36100E+02 | 0.000E+00 |
| 4.89160E+02 | -9.78070E+02 | 0.000E+00 |
| 4.89160E+02 | -1.13570E+03 | 0.000E+00 |
| 4.89160E+02 | -1.31060E+03 | 0.000E+00 |
| 4.89160E+02 | -1.50470E+03 | 0.000E+00 |
| 4.89160E+02 | -1.72030E+03 | 0.000E+00 |
| 4.89160E+02 | -1.95950E+03 | 0.000E+00 |
| 5.92970E+02 | -5.00000E+01 | 1.111E-01 |
| 5.92970E+02 | -1.05500E+02 | 2.134E-02 |
| 5.92970E+02 | -1.67100E+02 | 8.721E-04 |
| 5.92970E+02 | -2.35490E+02 | 5.029E-06 |
| 5.92970E+02 | -3.11390E+02 | 2.625E-09 |
| 5.92970E+02 | -3.95640E+02 | 7.580E-14 |
| 5.92970E+02 | -4.89160E+02 | 2.287E-20 |
| 5.92970E+02 | -5.92970E+02 | 0.000E+00 |
| 5.92970E+02 | -7.08200E+02 | 0.000E+00 |
| 5.92970E+02 | -8.36100E+02 | 0.000E+00 |
| 5.92970E+02 | -9.78070E+02 | 0.000E+00 |
| 5.92970E+02 | -1.13570E+03 | 0.000E+00 |
| 5.92970E+02 | -1.31060E+03 | 0.000E+00 |
| 5.92970E+02 | -1.50470E+03 | 0.000E+00 |
| 5.92970E+02 | -1.72030E+03 | 0.000E+00 |
| 5.92970E+02 | -1.95950E+03 | 0.000E+00 |
| 7.08200E+02 | -5.00000E+01 | 3.568E-04 |
| 7.08200E+02 | -1.05500E+02 | 8.426E-05 |
| 7.08200E+02 | -1.67100E+02 | 5.085E-06 |
| 7.08200E+02 | -2.35490E+02 | 5.310E-08 |
| 7.08200E+02 | -3.11390E+02 | 6.136E-11 |
| 7.08200E+02 | -3.95640E+02 | 4.745E-15 |
| 7.08200E+02 | -4.89160E+02 | 1.007E-20 |
| 7.08200E+02 | -5.92970E+02 | 0.000E+00 |
| 7.08200E+02 | -7.08200E+02 | 0.000E+00 |
| 7.08200E+02 | -8.36100E+02 | 0.000E+00 |
| 7.08200E+02 | -9.78070E+02 | 0.000E+00 |
| 7.08200E+02 | -1.13570E+03 | 0.000E+00 |
| 7.08200E+02 | -1.31060E+03 | 0.000E+00 |
| 7.08200E+02 | -1.50470E+03 | 0.000E+00 |
| 7.08200E+02 | -1.72030E+03 | 0.000E+00 |
| 7.08200E+02 | -1.95950E+03 | 0.000E+00 |
| 8.36100E+02 | -5.00000E+01 | 1.945E-07 |
| 8.36100E+02 | -1.05500E+02 | 5.388E-08 |
| 8.36100E+02 | -1.67100E+02 | 4.425E-09 |
| 8.36100E+02 | -2.35490E+02 | 7.484E-11 |
| 8.36100E+02 | -3.11390E+02 | 1.693E-13 |
| 8.36100E+02 | -3.95640E+02 | 3.111E-17 |

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|---|---|---|
| 8.36100E+02 | -4.89160E+02 | 2.644E-22 |
| 8.36100E+02 | -5.92970E+02 | 0.000E+00 |
| 8.36100E+02 | -7.08200E+02 | 0.000E+00 |
| 8.36100E+02 | -8.36100E+02 | 0.000E+00 |
| 8.36100E+02 | -9.78070E+02 | 0.000E+00 |
| 8.36100E+02 | -1.13570E+03 | 0.000E+00 |
| 8.36100E+02 | -1.31060E+03 | 0.000E+00 |
| 8.36100E+02 | -1.50470E+03 | 0.000E+00 |
| 8.36100E+02 | -1.72030E+03 | 0.000E+00 |
| 8.36100E+02 | -1.95950E+03 | 0.000E+00 |
| 9.78070E+02 | -5.00000E+01 | 1.309E-11 |
| 9.78070E+02 | -1.05500E+02 | 4.120E-12 |
| 9.78070E+02 | -1.67100E+02 | 4.337E-13 |
| 9.78070E+02 | -2.35490E+02 | 1.090E-14 |
| 9.78070E+02 | -3.11390E+02 | 4.349E-17 |
| 9.78070E+02 | -3.95640E+02 | 1.697E-20 |
| 9.78070E+02 | -4.89160E+02 | 3.675E-25 |
| 9.78070E+02 | -5.92970E+02 | 0.000E+00 |
| 9.78070E+02 | -7.08200E+02 | 0.000E+00 |
| 9.78070E+02 | -8.36100E+02 | 0.000E+00 |
| 9.78070E+02 | -9.78070E+02 | 0.000E+00 |
| 9.78070E+02 | -1.13570E+03 | 0.000E+00 |
| 9.78070E+02 | -1.31060E+03 | 0.000E+00 |
| 9.78070E+02 | -1.50470E+03 | 0.000E+00 |
| 9.78070E+02 | -1.72030E+03 | 0.000E+00 |
| 9.78070E+02 | -1.95950E+03 | 0.000E+00 |
| 1.13570E+03 | -5.00000E+01 | 7.113E-17 |
| 1.13570E+03 | -1.05500E+02 | 2.498E-17 |
| 1.13570E+03 | -1.67100E+02 | 3.244E-18 |
| 1.13570E+03 | -2.35490E+02 | 1.143E-19 |
| 1.13570E+03 | -3.11390E+02 | 7.429E-22 |
| 1.13570E+03 | -3.95640E+02 | 5.602E-25 |
| 1.13570E+03 | -4.89160E+02 | 2.826E-29 |
| 1.13570E+03 | -5.92970E+02 | 9.183E-38 |
| 1.13570E+03 | -7.08200E+02 | 0.000E+00 |
| 1.13570E+03 | -8.36100E+02 | 0.000E+00 |
| 1.13570E+03 | -9.78070E+02 | 0.000E+00 |
| 1.13570E+03 | -1.13570E+03 | 0.000E+00 |
| 1.13570E+03 | -1.31060E+03 | 0.000E+00 |
| 1.13570E+03 | -1.50470E+03 | 0.000E+00 |
| 1.13570E+03 | -1.72030E+03 | 0.000E+00 |
| 1.13570E+03 | -1.95950E+03 | 0.000E+00 |
| 1.31060E+03 | -5.00000E+01 | 2.622E-25 |
| 1.31060E+03 | -1.05500E+02 | 1.097E-25 |
| 1.31060E+03 | -1.67100E+02 | 2.000E-26 |
| 1.31060E+03 | -2.35490E+02 | 1.218E-27 |
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| 1.31060E+03 | -3.95640E+02 | 3.908E-32 |
| 1.31060E+03 | -4.89160E+02 | 7.733E-36 |
| 1.31060E+03 | -5.92970E+02 | 6.580E-41 |
| 1.31060E+03 | -7.08200E+02 | 0.000E+00 |
| 1.31060E+03 | -8.36100E+02 | 0.000E+00 |
| 1.31060E+03 | -9.78070E+02 | 0.000E+00 |
| 1.31060E+03 | -1.13570E+03 | 0.000E+00 |
| 1.31060E+03 | -1.31060E+03 | 0.000E+00 |
| 1.31060E+03 | -1.50470E+03 | 0.000E+00 |
| 1.31060E+03 | -1.72030E+03 | 0.000E+00 |
| 1.31060E+03 | -1.95950E+03 | 0.000E+00 |
| 1.50470E+03 | -5.00000E+01 | 0.000E+00 |
| 1.50470E+03 | -1.05500E+02 | 0.000E+00 |
| 1.50470E+03 | -1.67100E+02 | 0.000E+00 |
| 1.50470E+03 | -2.35490E+02 | 0.000E+00 |
| 1.50470E+03 | -3.11390E+02 | 0.000E+00 |
| 1.50470E+03 | -3.95640E+02 | 0.000E+00 |
| 1.50470E+03 | -4.89160E+02 | 0.000E+00 |
| 1.50470E+03 | -5.92970E+02 | 0.000E+00 |
| 1.50470E+03 | -7.08200E+02 | 0.000E+00 |
| 1.50470E+03 | -8.36100E+02 | 0.000E+00 |
| 1.50470E+03 | -9.78070E+02 | 0.000E+00 |
| 1.50470E+03 | -1.13570E+03 | 0.000E+00 |
| 1.50470E+03 | -1.31060E+03 | 0.000E+00 |

| | | |
|---|---|---|
| 1.50470E+03 | -1.50470E+03 | 0.000E+00 |
| 1.50470E+03 | -1.72030E+03 | 0.000E+00 |
| 1.50470E+03 | -1.95950E+03 | 0.000E+00 |
| 1.72030E+03 | -5.00000E+01 | 0.000E+00 |
| 1.72030E+03 | -1.05500E+02 | 0.000E+00 |
| 1.72030E+03 | -1.67100E+02 | 0.000E+00 |
| 1.72030E+03 | -2.35490E+02 | 0.000E+00 |
| 1.72030E+03 | -3.11390E+02 | 0.000E+00 |
| 1.72030E+03 | -3.95640E+02 | 0.000E+00 |
| 1.72030E+03 | -4.89160E+02 | 0.000E+00 |
| 1.72030E+03 | -5.92970E+02 | 0.000E+00 |
| 1.72030E+03 | -7.08200E+02 | 0.000E+00 |
| 1.72030E+03 | -8.36100E+02 | 0.000E+00 |
| 1.72030E+03 | -9.78070E+02 | 0.000E+00 |
| 1.72030E+03 | -1.13570E+03 | 0.000E+00 |
| 1.72030E+03 | -1.31060E+03 | 0.000E+00 |
| 1.72030E+03 | -1.50470E+03 | 0.000E+00 |
| 1.72030E+03 | -1.72030E+03 | 0.000E+00 |
| 1.72030E+03 | -1.95950E+03 | 0.000E+00 |
| 1.95950E+03 | -5.00000E+01 | 0.000E+00 |
| 1.95950E+03 | -1.05500E+02 | 0.000E+00 |
| 1.95950E+03 | -1.67100E+02 | 0.000E+00 |
| 1.95950E+03 | -2.35490E+02 | 0.000E+00 |
| 1.95950E+03 | -3.11390E+02 | 0.000E+00 |
| 1.95950E+03 | -3.95640E+02 | 0.000E+00 |
| 1.95950E+03 | -4.89160E+02 | 0.000E+00 |
| 1.95950E+03 | -5.92970E+02 | 0.000E+00 |
| 1.95950E+03 | -7.08200E+02 | 0.000E+00 |
| 1.95950E+03 | -8.36100E+02 | 0.000E+00 |
| 1.95950E+03 | -9.78070E+02 | 0.000E+00 |
| 1.95950E+03 | -1.13570E+03 | 0.000E+00 |
| 1.95950E+03 | -1.31060E+03 | 0.000E+00 |
| 1.95950E+03 | -1.50470E+03 | 0.000E+00 |
| 1.95950E+03 | -1.72030E+03 | 0.000E+00 |
| 1.95950E+03 | -1.95950E+03 | 0.000E+00 |
| 2.22500E+03 | -5.00000E+01 | 0.000E+00 |
| 2.22500E+03 | -1.05500E+02 | 0.000E+00 |
| 2.22500E+03 | -1.67100E+02 | 0.000E+00 |
| 2.22500E+03 | -2.35490E+02 | 0.000E+00 |
| 2.22500E+03 | -3.11390E+02 | 0.000E+00 |
| 2.22500E+03 | -3.95640E+02 | 0.000E+00 |
| 2.22500E+03 | -4.89160E+02 | 0.000E+00 |
| 2.22500E+03 | -5.92970E+02 | 0.000E+00 |
| 2.22500E+03 | -7.08200E+02 | 0.000E+00 |
| 2.22500E+03 | -8.36100E+02 | 0.000E+00 |
| 2.22500E+03 | -9.78070E+02 | 0.000E+00 |
| 2.22500E+03 | -1.13570E+03 | 0.000E+00 |
| 2.22500E+03 | -1.31060E+03 | 0.000E+00 |
| 2.22500E+03 | -1.50470E+03 | 0.000E+00 |
| 2.22500E+03 | -1.72030E+03 | 0.000E+00 |
| 2.22500E+03 | -1.95950E+03 | 0.000E+00 |
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| 2.51980E+03 | -1.05500E+02 | 0.000E+00 |
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| 2.51980E+03 | -1.31060E+03 | 0.000E+00 |
| 2.51980E+03 | -1.50470E+03 | 0.000E+00 |
| 2.51980E+03 | -1.72030E+03 | 0.000E+00 |
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| 2.84700E+03 | -1.05500E+02 | 0.000E+00 |
| 2.84700E+03 | -1.67100E+02 | 0.000E+00 |
| 2.84700E+03 | -2.35490E+02 | 0.000E+00 |

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4.55740E+03 -1.72030E+03  0.000E+00
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5.10870E+03 -8.36100E+02  0.000E+00
5.10870E+03 -9.78070E+02  0.000E+00
5.10870E+03 -1.13570E+03  0.000E+00
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5.72070E+03 -9.78070E+02  0.000E+00
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6.39990E+03 -1.05500E+02  0.000E+00
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7.15390E+03 -1.72030E+03  0.000E+00
7.15390E+03 -1.95950E+03  0.000E+00
7.99090E+03 -5.00000E+01  0.000E+00
7.99090E+03 -1.05500E+02  0.000E+00
```

| | | |
|---|---|---|
| 7.99090E+03 | -1.67100E+02 | 0.000E+00 |
| 7.99090E+03 | -2.35490E+02 | 0.000E+00 |
| 7.99090E+03 | -3.11390E+02 | 0.000E+00 |
| 7.99090E+03 | -3.95640E+02 | 0.000E+00 |
| 7.99090E+03 | -4.89160E+02 | 0.000E+00 |
| 7.99090E+03 | -5.92970E+02 | 0.000E+00 |
| 7.99090E+03 | -7.08200E+02 | 0.000E+00 |
| 7.99090E+03 | -8.36100E+02 | 0.000E+00 |
| 7.99090E+03 | -9.78070E+02 | 0.000E+00 |
| 7.99090E+03 | -1.13570E+03 | 0.000E+00 |
| 7.99090E+03 | -1.31060E+03 | 0.000E+00 |
| 7.99090E+03 | -1.50470E+03 | 0.000E+00 |
| 7.99090E+03 | -1.72030E+03 | 0.000E+00 |
| 7.99090E+03 | -1.95950E+03 | 0.000E+00 |
| 8.91990E+03 | -5.00000E+01 | 0.000E+00 |
| 8.91990E+03 | -1.05500E+02 | 0.000E+00 |
| 8.91990E+03 | -1.67100E+02 | 0.000E+00 |
| 8.91990E+03 | -2.35490E+02 | 0.000E+00 |
| 8.91990E+03 | -3.11390E+02 | 0.000E+00 |
| 8.91990E+03 | -3.95640E+02 | 0.000E+00 |
| 8.91990E+03 | -4.89160E+02 | 0.000E+00 |
| 8.91990E+03 | -5.92970E+02 | 0.000E+00 |
| 8.91990E+03 | -7.08200E+02 | 0.000E+00 |
| 8.91990E+03 | -8.36100E+02 | 0.000E+00 |
| 8.91990E+03 | -9.78070E+02 | 0.000E+00 |
| 8.91990E+03 | -1.13570E+03 | 0.000E+00 |
| 8.91990E+03 | -1.31060E+03 | 0.000E+00 |
| 8.91990E+03 | -1.50470E+03 | 0.000E+00 |
| 8.91990E+03 | -1.72030E+03 | 0.000E+00 |
| 8.91990E+03 | -1.95950E+03 | 0.000E+00 |
| 0.00000E+00 | 0.00000E+00 | 1.837E+04 |
| 5.00000E+01 | 0.00000E+00 | 1.986E+04 |
| 1.05500E+02 | 0.00000E+00 | 2.034E+04 |
| 1.67100E+02 | 0.00000E+00 | 1.688E+04 |
| 2.35490E+02 | 0.00000E+00 | 7.034E+03 |
| 3.11390E+02 | 0.00000E+00 | 1.920E+03 |
| 3.95640E+02 | 0.00000E+00 | 2.813E+02 |
| 4.89160E+02 | 0.00000E+00 | 1.336E+01 |
| 5.92970E+02 | 0.00000E+00 | 1.794E-01 |
| 7.08200E+02 | 0.00000E+00 | 5.425E-04 |
| 8.36100E+02 | 0.00000E+00 | 2.824E-07 |
| 9.78070E+02 | 0.00000E+00 | 1.831E-11 |
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| 1.50470E+03 | 0.00000E+00 | 0.000E+00 |
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| 1.95950E+03 | 0.00000E+00 | 0.000E+00 |
| 2.22500E+03 | 0.00000E+00 | 0.000E+00 |
| 2.51980E+03 | 0.00000E+00 | 0.000E+00 |
| 2.84700E+03 | 0.00000E+00 | 0.000E+00 |
| 3.21010E+03 | 0.00000E+00 | 0.000E+00 |
| 3.61330E+03 | 0.00000E+00 | 0.000E+00 |
| 4.06070E+03 | 0.00000E+00 | 0.000E+00 |
| 4.55740E+03 | 0.00000E+00 | 0.000E+00 |
| 5.10870E+03 | 0.00000E+00 | 0.000E+00 |
| 5.72070E+03 | 0.00000E+00 | 0.000E+00 |
| 6.39990E+03 | 0.00000E+00 | 0.000E+00 |
| 7.15390E+03 | 0.00000E+00 | 0.000E+00 |
| 7.99090E+03 | 0.00000E+00 | 0.000E+00 |
| 8.91990E+03 | 0.00000E+00 | 0.000E+00 |
| 0.00000E+00 | 5.00000E+01 | 2.723E+03 |
| 0.00000E+00 | 1.05500E+02 | 1.424E+01 |
| 0.00000E+00 | 1.67100E+02 | 4.486E-03 |
| 0.00000E+00 | 2.35490E+02 | 6.301E-08 |
| 0.00000E+00 | 3.11390E+02 | 2.376E-14 |
| 0.00000E+00 | 3.95640E+02 | 2.863E-27 |
| 0.00000E+00 | 4.89160E+02 | 0.000E+00 |
| 0.00000E+00 | 5.92970E+02 | 0.000E+00 |
| 0.00000E+00 | 7.08200E+02 | 0.000E+00 |
| 0.00000E+00 | 8.36100E+02 | 0.000E+00 |
| 0.00000E+00 | 9.78070E+02 | 0.000E+00 |

```
 0.00000E+00  1.13570E+03  0.000E+00
 0.00000E+00  1.31060E+03  0.000E+00
 0.00000E+00  1.50470E+03  0.000E+00
 0.00000E+00  1.72030E+03  0.000E+00
 0.00000E+00  1.95950E+03  0.000E+00
 0.00000E+00 -5.00000E+01  2.723E+03
 0.00000E+00 -1.05500E+02  1.424E+01
 0.00000E+00 -1.67100E+02  4.486E-03
 0.00000E+00 -2.35490E+02  6.301E-08
 0.00000E+00 -3.11390E+02  2.376E-14
 0.00000E+00 -3.95640E+02  2.863E-27
 0.00000E+00 -4.89160E+02  0.000E+00
 0.00000E+00 -5.92970E+02  0.000E+00
 0.00000E+00 -7.08200E+02  0.000E+00
 0.00000E+00 -8.36100E+02  0.000E+00
 0.00000E+00 -9.78070E+02  0.000E+00
 0.00000E+00 -1.13570E+03  0.000E+00
 0.00000E+00 -1.31060E+03  0.000E+00
 0.00000E+00 -1.50470E+03  0.000E+00
 0.00000E+00 -1.72030E+03  0.000E+00
 0.00000E+00 -1.95950E+03  0.000E+00
-5.00000E+01 -2.00000E+03  0.000E+00
-5.00000E+01  2.00000E+03  0.000E+00
 9.00000E+03 -2.00000E+03  0.000E+00
 9.00000E+03  2.00000E+03  0.000E+00
Execution Time (Seconds):   29
```