PQIS - 2000

Petroleum Quality Information System

Notes

Cross-references and the Document Map feature of Word are implemented for navigating this electronic version of the Report. References in the text are hyperlinked, as an expedient to accessing that data, via OLE, with convenient return to the point of origin.

The Print Preview feature of Word may be used to simulate the layout of the printed report.

The video (PQIS.avi) on page 2 may be activated from the (right-click) context menu, if your system is not configured with a default association to automatically start .AVIs.

Some photographs used in this Report are courtesy of the US Army, Fort Lee, VA.

Defense Energy Support Center
Product Technology and
Standardization Division
DESC-BP

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IN REPLY
REFER TO

6 July 2001

PETROLEUM QUALITY INFORMATION SYSTEM FUELS DATA (2000)

This is the Defense Energy Support Center's (DESC's) fifth installment of what is recognized by the petroleum industry as a very beneficial annual report used to monitor fuel quality trends and to research quality issues around the globe. Users of these annual reports include the product users (Government/commercial), manufacturers, and general interest parties (i.e., OEMs, fuel handling equipment manufacturers, etc.). As part of our goal to offer quality statistical information for all products purchased by DESC and supplied to our customers, the Petroleum Quality Information System (PQIS) was expanded in 1999 to include quality data for all products purchased by the Bulk Commodity Business Unit of DESC. This report is the second to include statistical summaries of information for Fuel Naval Distillate (F76) and gasoline. Continuing our commitment to improve what PQIS has to offer, both the 1999 report and this report were professionally published in order to provide the utmost in quality and added features. One such feature available is an interactive CD-ROM, which displays a web screen that allows navigation to this publication, the 1998 and 1999 publications, and raw data tables (in Microsoft Access 2000) used to produce the charts and graphs.

Special thanks go to the Fuels Quality Assurance Representatives (QARs) of the Defense Contract Management Agency (DCMA) and representatives from the refineries under DESC Contracts who have worked with the DESC PQIS Team to insure complete representation of purchased fuel. The result is the only worldwide comprehensive data repository of test results for refined fuel properties. This report contains statistical summaries for over 15.6 billion gallons of product representing over 20,000 data points. We have achieved for the years 1999 and 2000 a 100% representation for all fuels except JP8, which is at 95% for both years.

As always, any comments and questions pertaining to this report and recommendations for future reports are welcome. Please contact Mr Kenneth Henz at Commercial (703) 767-8356 or DSN 427-8356, e-mail khenz@desc.dla.mil, for these issues and to obtain additional copies of this report or the CD-ROM.

MARK K. IDEN
Director
Bulk Fuels Commodity Business Unit

Executive Summary

This report provides a statistical assessment of fuel properties compiled from the Petroleum Quality Information System (PQIS) database. Fuel was procured in 2000 under contracts let by the Bulk Commodity Business Unit (CBU) of the Defense Energy Support Center (DESC). Evaluation of test properties is based on test data submitted in a standard test report format with fuel shipments. This fifth annual report continues review of overall and regional trends for selected fuel properties, comparing totals documented for the period 1995 through 2000, and like values 1997 through 2000. The first three annual PQIS Reports chronicled aviation turbine fuel grades JP-5 and JP-8, NATO codes F-44 and F-34, respectively; with minimal reporting on JP-4, corresponding to F-40. The 1999 edition added expanded data on JP-4, to reporting on the aviation fuels, and introduced data for Naval Distillate fuel, F-76, and motor gasoline. This edition continues the same coverage but sees a drop in JP-4 data, reflecting downturns in use.

The Office of the Secretary of Defense, Energy Policy Directorate, authorized the establishment of the PQIS database in 1989. The intent, with automated data processing, is to facilitate garnering and dissemination of standardized quality control data, as well as tracking trends in product quality. It expedites data interchange through electronic access and, further, promotes a comprehensive approach in addressing quality issues.

Within this report, histograms chart the distribution of the year 2000 test results to the volume of fuel represented. Tables show statistical summaries of minimum, average, volumetrically weighted average, and maximum values for selected test properties; segregated on the geographic source of the fuels. Regions 1 through 5 correspond to U.S. Petroleum Administration for Defense Districts (PADDs), denoting areas of the United States supplying the fuel. Properties of fuels procured from outside the U.S. are reported under Region 6, the Middle East; Region 7, Europe; Region 8, the Pacific; and Region 9, the Caribbean.

Extensive effort was made to ensure the complete volumetric representation of test information on which this report is based. With the assistance of the Defense Contract Management District (DCMD) field offices, this effort for the year 2000 resulted in a 96% representation of JP-8 procured for the military services and 100% representations of all other fuels, to include JP-5 fuel procured for the U.S. Navy. The representation of 1999 data in this report is supplemented, to comparable levels, augmenting that published in the 1999 PQIS report.

Again, based on required reporting of test data, the naphthalene and olefin contents of JP-5 jet fuel are not driven by DoD specification limits for these properties. The olefin limit was in fact deleted from the U.S. JP-4, JP-5, and JP-8 fuel specifications in 1999; though this report still compares the old standard. It should be noted that military specifications were used to procure these fuels for the U.S. government. As such, the trends noted in this report may not necessarily reflect those seen in industry, since the military fuels are in some cases specially blended to meet U.S. government requirements.

POC for this report and for requests for information from the PQIS database is Mr. Kenneth Henz, at the following:

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The Source for Fuel Data

Section I – Introduction

Background

The Petroleum Quality Information System came into being out of a clearly established need for a comprehensive system to track fuel quality trends; conceptualized as the authoritative, single-source, data base, readily accessible to DoD Defense Energy Program members and affiliates. Consensus was formulated on evaluation of data collected from March – May 1988 in response to a request from the Office of the Assistant Secretary of Defense, Energy Policy Directorate, for review and comment on a focus report to the Services in February 1988. The 1987 report "Petroleum Quality Information System (PQIS): Architecture and Design Alternatives", published by the Logistics Management Institute (LMI), outlined requirements and alternatives for a system to store and process information on the quality of petroleum products procured and used by the Department of Defense (DoD). Committee consonance resulted in the Defense Energy Program Policy Memorandum (DEPPM) 89-1, issued 25 April 1989, establishing the requirement for PQIS and designating responsibility for its design and maintenance to the Defense Fuel Supply Center, now the Defense Energy Support Center (DESC). PQIS was planned as an automated, mainframe, information management system that would standardize the disparate government and industry quality control and surveillance data reporting formats. Information in the database would be available to DoD personnel for use in identifying, investigating, or resolving fuel related problems.

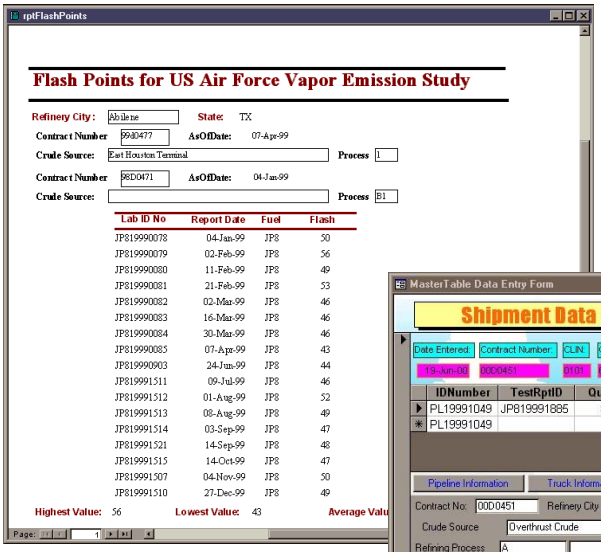
The DEPPM 89-1 authorized LMI to develop a prototype to be tested and evaluated by the DESC. Review and acceptance of the archetype was attained by March 1989. However, the initial PQIS database system only processed data on procurements of aviation fuels (JP-4, JP-5 and JP-8), due to funding constraints and the complexity of designing an "all-encompassing" system. This prototype was put into operation in October 1990, operating on a desktop-PC platform, utilizing a DOS-based program, dBase IV®. The database has since been converted to MS-Access® format, through several iteration, but remains on a PC platform. Plans to locate this database on an Internet application, for worldwide use, are currently coming to fruition. The current format is fully SQL compatible, and research into development of a Web Portal, utilizing Pivot-Table driven, HTML Data Access Pages and Whiteboard Pages for online collaboration, is currently being done. Traditionally, test reports received from refiners worldwide were manually entered into PQIS. Implemented this year, however, is utilization of the Paperless Ordering and Receipt Transaction Screens (PORTS) software, for automated data entry. In addition to anticipated improvements in efficiency, and 'real-time' datasets, it is expected to assist in the implementation of standardized data reporting criteria established last year.

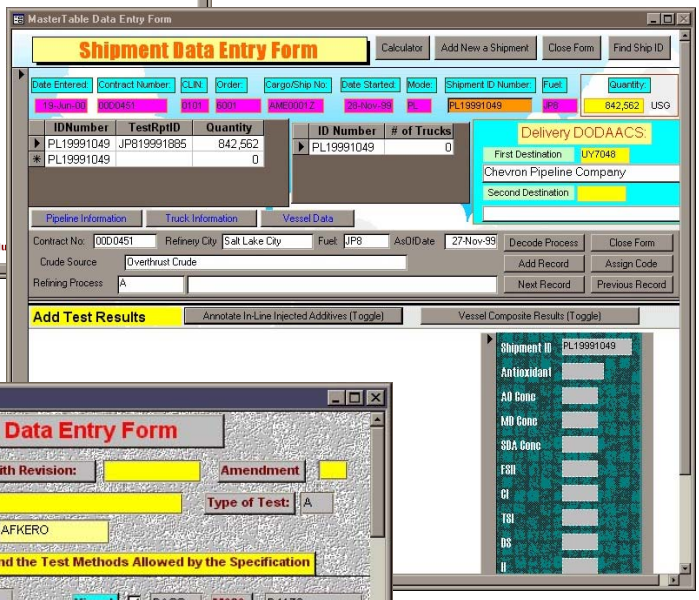
The first PQIS Report was published in June 1998, providing statistical information on data from calendar years 1990 to 1996, on aviation fuels only. The second and third were successively published, in 1997 and 1998, each covering supplementary information for the preceding year. The 1999 Report expanded on product coverage, to include reporting on Naval Distillate Fuels, or MOGAS; Marine Residual Fuel, Grade RME-25; and on Unleaded, Automotive Gasoline. This report succeeds those; utilizing the same formats for its Histograms and Tables, to facilitate comparison of information in the previous reports. It has been emended, though, to eliminate reporting of test data no longer solicited, due to improvements in product testing or processing.

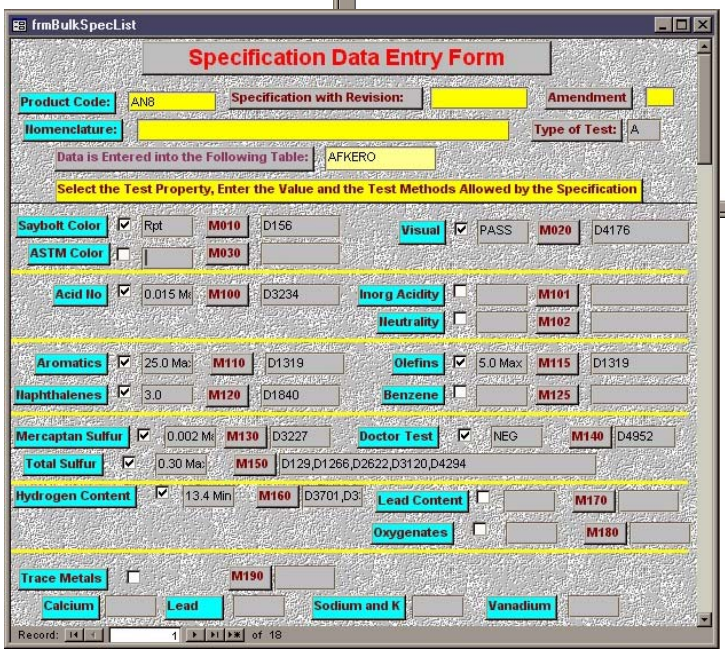
The PQIS database has evolved correspondingly over the years. Test results for calendar years 1990 to 1994 were archived, on issue of the initial report, and those starting from January 1995 were kept in the then active database. This database was eventually archived, too, at the end of complete data input of records through 1998; but remains online for referral, internally. Records starting with test data for 1999 procurements are entered into the currently active database for processing and analysis. The system permits querying the preceding database, however, so that historical data remains accessible. Requests for this type of information or analysis, however,

should be submitted with a sufficient allowance of time to develop adequate queries and/or the linking of database tables.

In review of the data presented herein, it needs to be noted that contract delivery periods often extend past the calendar year ending date. For example, in fiscal year 2000, deliveries may be made of fuel bought on contracts let in 1999. To assess contractor compliance, in Table 2 of this report, the data is grouped by fiscal year of the contract, through year 1998. In 1999, better shipment tracking allowed calendar year representation, as with tables and histograms.







In the current PQIS database:

- Contracts increased to 228
- F-76 data is now expanded
- MOGAS data is supplemented

F-76 information represents 228 batches of Marine diesel; and the MOGAS, 33 batches (Midrange and Regular).

Fuel shipments represented in PQIS total 7.71 billion USG, categorized by mode as follows:

Mode:	Tanker	Barge	Pipeline	Tank Truck
1999 Volume (Million USG) / Count:	1,318.0 / 196	269.9 / 215	1,924.2 / 1250	316.8 / 6021
2000 Volume (Million USG) / Count:	1,420.7 / 175	350.4 / 268	1,800.0 / 1127	313.6 / 6272

Terminology

For the purposes of this report, these subordinate definitions apply:

Spectender: A complete specification analysis report of product being offered for acceptance by the US Government. For fuels, it is the written report of results for full specification testing, in the refinery or terminal shipping tank, of product offered for acceptance.

Report: Represents one spectender tank test result (Complete Specification Test Results), regardless of how many shipments were made from the tank or if more than one tank is involved in a total loading or product movement.

Volume: Total volume, expressed in millions of gallons, delivered to the US Government or other designee, from the shipping tank referenced in the report.

Region: The grouping of states or countries into defined geographical areas affording a more specific or focused data analysis for a particular area of interest. It is based on the US Department of Energy designated Petroleum Administration for Defense Districts (PADDs), cited here to provide a standard industry reference for comparative study. These do not correlate with the Defense Fuel Regions or Offices. Since shipments can originate and terminate in different Regions, the determination of the Region is based on the refinery location rather than the receipt location.

Region	Title	PADDs	States or Countries
1	East Coast	I	ME, VT, NH, MA, RI, CT, NY, PA, NJ, DE, MD, VA, WV, NC, SC, GA, FL
2	East Central	II	ND, SD, MN, IA, NE, WI, MI, OH, KY, TN, IN, IL, MO, KS, OK
3	Gulf Coast	III	AL, MS, AR, LA, TX, NM
4	West Central	IV	MT, ID, WY, UT, CO
5	West Coast	V	WA, OR, CA, NV, AZ
6	Middle East		Kuwait, Bahrain
7	European		Europe, Israel, Turkey
8	Pacific		Korea, Japan, HI, AK, Australia
9	Caribbean		Coastal Aruba

Average: The average calculated on volume of fuel purchased or each instance of purchase. For example, if one batch of product had an API Gravity of 46.0 with 1,000,000 gallons delivered and another batch had an API Gravity of 43.5 with 500,000 delivered, the average, based on occurrences of test values, would be:

(46.0+ 43.5)/2 = 44.75.

The volumetrically weighted average, based on volumes of product represented by the test values, would be:

(46.0 x 1,000,000) + (43.5 x 500,000) / 1,500,000 = (67,750,000 / 1,500,000) = 45.17

The difference between the two averaging methods is 0.42 °API. Each method uses a different basis to calculate the average. Both averages are provided in this report.

PQIS
team members
track fuel shipments

PQIS
team members
plan publication

DESC-BP

PQIS chemist
Ken Henz verifies
fuel characteristics

PETROLEUM QUALITY
PQIS
INFORMATION SYSTEM

PQIS analyst
Courtney Long
resolves discrepancies

PQIS analyst
Kristine Crum
posts determined data

Product Distribution

Data in the PQIS database for 2000 represents over 3.9 billion gallons of fuel. Table 1 shows the volumes and number of shipping tank reports, presented by product, for the past five years.

Table 1. Total Fuel Database Entries.

Fuel	1996		1997		1998		1999		2000		Total	
	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries
AN8	9.11	6	3.20	3	3.39	1	3.92	1	5.38	1	25.00	12
F76	—	—	—	—	—	—	580.58	119	645.85	121	1,226.43	240
JP4	0.89	6	1.64	9	1.71	10	1.22	80	1.13	84	6.59	189
JP5	494.45	160	707.32	252	615.81	230	664.68	307	687.94	475	3,170.20	1,424
JP8	1831.80	1231	2142.56	1695	2228.68	1952	2,569.64	7157	2,535.49	7142	11,308.17	19,177
MU	—	—	—	—	—	—	15.00	16	28.43	16	43.43	32
RME	—	—	—	—	—	—	10.34	2	10.85	2	21.19	4

[Volume in Millions of Gallons]

The report data in Table 1 indicates the number of database entries for each, individual shipping tank used to sell product to the DESC, irrespective of the contractor. A single product movement may involve more than one shipping tank/vessel; just as many product movements (e.g. truck shipments) could have the same source tank. The quantities cited represent the actual quantity shipped to the US Government from a particular shipping tank at a refinery or terminal, not total quantity in the tank at the time of sampling. The quantity reported on a test report from each shipping tank is the basis for calculating volumetrically weighted averages (see Terminology) for a specification property.

Included in Table 1, for this report, is continued reporting on Naval Distillate Fuels (DFM/F76); Marine Residual Fuel, Grade RME-25 (IFO 180); Unleaded, Automotive Gasoline; and the special aviation fuel procured for use in the Antarctic with a product code of "AN8". Since these product procurements are comparatively small, they are omitted from the analysis and the Histograms in Section II; and from those tables where there is yet insufficient information in the database to warrant their inclusion. The former is also true of JP4. For some select test properties, however, minimum, average, volumetrically weighted average, and maximum values are included for JP4, MOGAS, and AN8. The table also includes corrections and adjustments of 1999 data based on year-end tallies.

Table 2 shows the representative volume of product recorded in PQIS versus the amount actually purchased per the Defense Fuel Automated Management System (DFAMS). In DFAMS, contracts are grouped according to the fiscal year in which awarded, with each contract number containing a segment that indicates that fiscal year. This dictates this fiscal grouping, in lieu of calendar, as the basis for comparison. Modifications to the PQIS database in 1999, in tracking shipments, effected volume reporting being based on a calendar year instead of fiscal, conversely. This may result in some overlap in volume totals, since orders can be made in December and delivered in January, causing delivery period groupings to extend across calendar years. The DFAMS printout for each Contract Line Item was compared, order by order, to the quantity represented in the PQIS database, however, so that any possible discrepancy is only marginally significant. The fuel volumes in the table represent information on fuels on a worldwide basis, focusing on what was shipped to DESC customers, for the last five years.

Table 2. Volumes Purchased vs. Volumes Reported.

AN8	1996	1997	1998	1999	2000
Purchased	—	—	—	3.9	5.4
Reported	—	—	—	3.9	5.4
Difference	—	—	—	0.0	0.0
Percentage	—	—	—	100%	100%
F76	1996	1997	1998	1999	2000
Purchased	—	—	—	570.2	648.5
Reported	—	—	—	570.2	648.5
Difference	—	—	—	0.0	0.0
Percentage	—	—	—	100%	100%
JP4	1996	1997	1998	1999	2000
Purchased	1.6	1.5	0.8	1.2	1.1
Reported	1.6	1.5	0.8	1.2	1.1
Difference	0.0	0.0	0.0	0.0	0.0
Percentage	100%	100%	100%	100%	100%
JP5	1996	1997	1998	1999	2000
Purchased	771.0	702.7	393.1	664.3	676.6
Reported	670.2	696.3	338.0	664.3	676.6
Difference	100.8	6.4	55.1	0.0	0.0
Percentage	87%	99%	86%	100%	100%
JP8	1996	1997	1998	1999	2000
Purchased	2343.8	2577.0	1277.5	2690.5	2,631.6
Reported	1896.8	2309.6	1155.9	2564.0	2,513.9
Difference	477.0	267.4	121.6	126.5	117.7
Percentage	81%	90%	90%	95%	96%
MU	1996	1997	1998	1999	2000
Purchased	—	—	—	15.0	28.4
Reported	—	—	—	15.0	28.4
Difference	—	—	—	0.0	0.0
Percentage	—	—	—	100%	100%
RME	1996	1997	1998	1999	2000
Purchased	—	—	—	10.34	10.9
Reported	—	—	—	10.34	10.9
Difference	—	—	—	0.0	0.0
Percentage	—	—	—	100%	100%

[Volume in Millions of Gallons]

Summary by Region

The next three Tables provide a breakdown of the total number of reports received per Region, and a breakdown of both the volume and number of reports received for each product category. Table 3 indicates the total number of fuel test reports received, by year, from each region, as an aid to the reader in evaluating data presented in this report. Clause E40.05, Material Inspection and Receiving Report, cited in DESC contracts, requires fuel contractors to submit a copy of the complete laboratory test report from each shipping tank used for shipments to DESC Customers.

Table 3. Total Reports Received by Year and Region.

Year	PQIS Region									Totals
	1	2	3	4	5	6	7	8	9	
1996	60	148	544	96	241	10	132	166	—	1397
1997	97	306	787	86	360	10	111	202	—	1959
1998	150	272	997	112	350	6	76	229	—	2192
1999	138	314	1124	198	279	12	212	309	13	2599
2000	143	400	1023	225	337	25	127	258	22	2560

The values above represent the number of possible data points available for each Region, for all fuel received for the specific year that was entered into the PQIS database. Again, note that the number of occurrences does not necessarily relate directly to the number of shipments made, since one batch from a particular refinery tank may have been used in multiple shipments, on different orders. The information may be considered an overview of responses received from each Region, inferably representing the number of contracts in each. Again, this year Regions 2 through 5 and 8 submitted the largest number of reports. Reporting has increased for all areas, except Regions 3, 7, and 8 compared to last year. The downturn for the Gulf Coast, Europe, and the Pacific is more reflective of a decrease in procurements than remissive in submitting reports. Region 3, which includes Texas, still leads in the submission of reports, which is commensurate with total procurements. Data from Region 9 (Caribbean) is maintained in this report; although still lagging in volume, supply has nearly doubled. Note that Tables 4 and 5 include corrections and adjustments of 1999 data, based on year-end tallies, which are reflected in this table.

Table 4 provides information on the number of reports received per calendar year, by Region, for each type of fuel reported, representing a more detailed breakdown of Table 3. It can be used in conjunction with the data in Table 5 for an indication of the average parcel size, which might be indicative of the modes of transportation used. For example, for JP8 in 1996, Region 6 reported seven tenders that represent 37.28 million gallons; which means that each tender corresponds to over 5.3 million gallons, or the parcel size of a tanker. Reported for Region 4 in 1997 were 86 tenders for 53.28 million gallons of JP8, or an average parcel size of 0.62 million gallons or 619,000 USG. This would suggest mainly truck shipments, probably mixed with some pipeline transport, during this period, for Region 4.

Table 5 represents the volumes of fuels, in millions of gallons, refined each calendar year in the individual Regions, and sold to DoD customers. The data reflects the trend of a decrease in the volume of JP4 delivered, and corresponding increase in the total volume of JP8, as customers convert from JP4 to JP8. Although outside the scope of this report, it is possible to further break down volumes received; categorized by the state in which the refinery is located, by company name, by refinery location, or by contract, for example. Organizations with a particular interest may contact DESC-BP, to submit a request for such custom reports and charting.

Table 4. Annual Reports Received – By Region

Year	Fuel	PQIS Region									Total
		1	2	3	4	5	6	7	8	9	
1996	JP4	—	—	—	—	—	—	—	6	—	6
	JP5	—	—	111	—	17	3	21	8	—	160
	JP8	60	148	433	96	224	7	111	152	—	1231
1997	JP4	—	—	—	—	—	—	—	9	—	9
	JP5	—	—	129	—	74	10	19	20	—	252
	JP8	97	306	658	86	286	—	92	170	—	1695
1998	JP4	—	—	—	—	—	—	—	10	—	10
	JP5	—	—	125	—	66	5	19	15	—	230
	JP8	150	272	872	112	284	1	57	204	—	1952
1999	AN8	—	—	—	—	—	—	1	—	—	1
	F76	—	—	47	—	25	—	13	44	1	130
	JP4	—	—	—	—	—	—	—	8	—	8
	JP5	—	35	117	—	53	12	14	10	2	243
	JP8	138	279	959	198	201	—	183	232	10	2200
	MU	—	—	1	—	—	—	1	13	—	15
	RME	—	—	—	—	—	—	—	2	—	2
2000	AN8	—	—	—	—	—	—	1	—	—	1
	F76	6	—	36	—	31	14	26	29	6	148
	JP4	—	—	—	—	—	—	—	12	—	12
	JP5	—	46	116	—	103	11	18	12	—	306
	JP8	137	354	868	225	203	—	81	191	16	2075
	MU	—	—	3	—	—	—	1	12	—	16
	RME	—	—	—	—	—	—	—	2	—	2

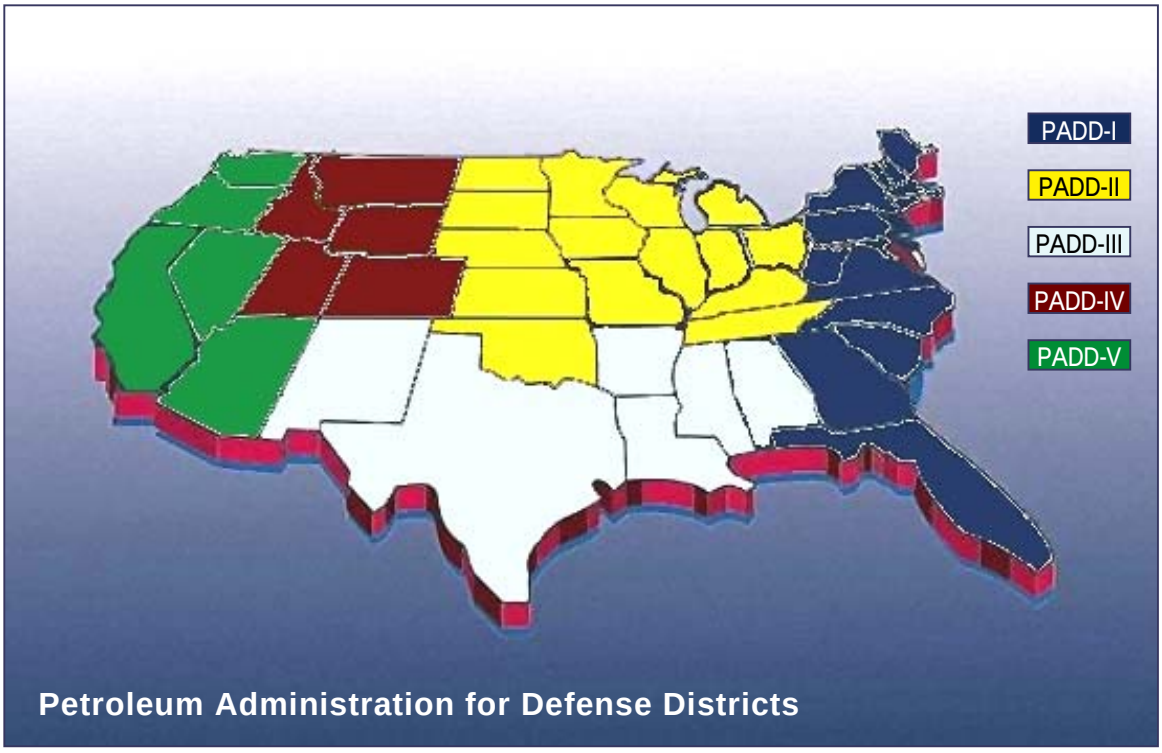
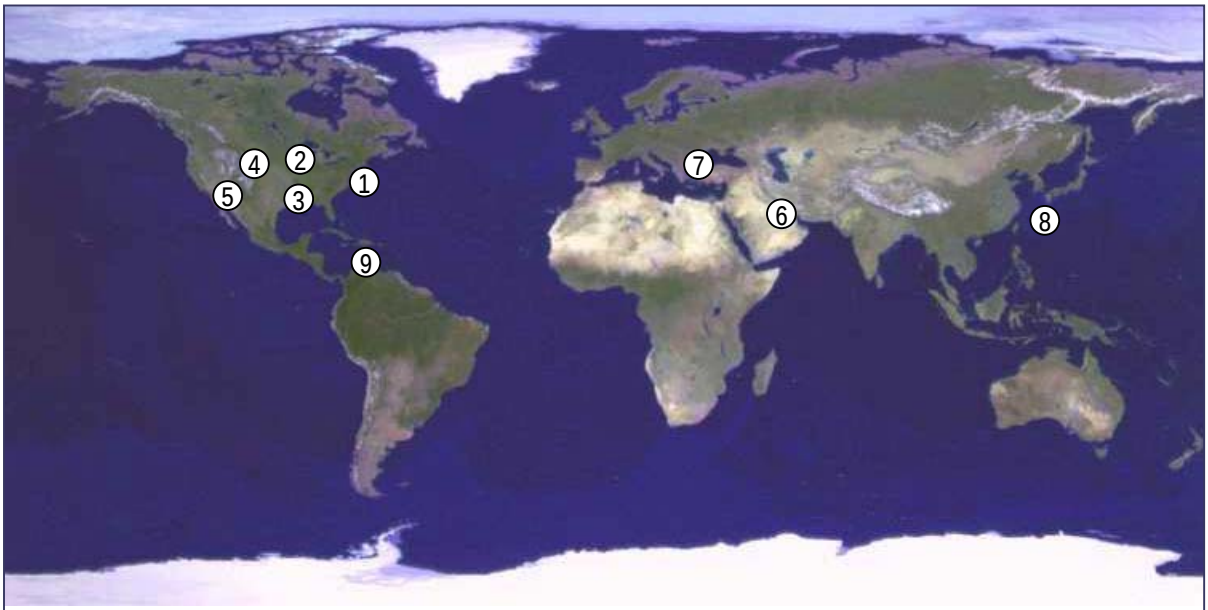


Table 5. Annual Volume of Fuel Received – By Region.

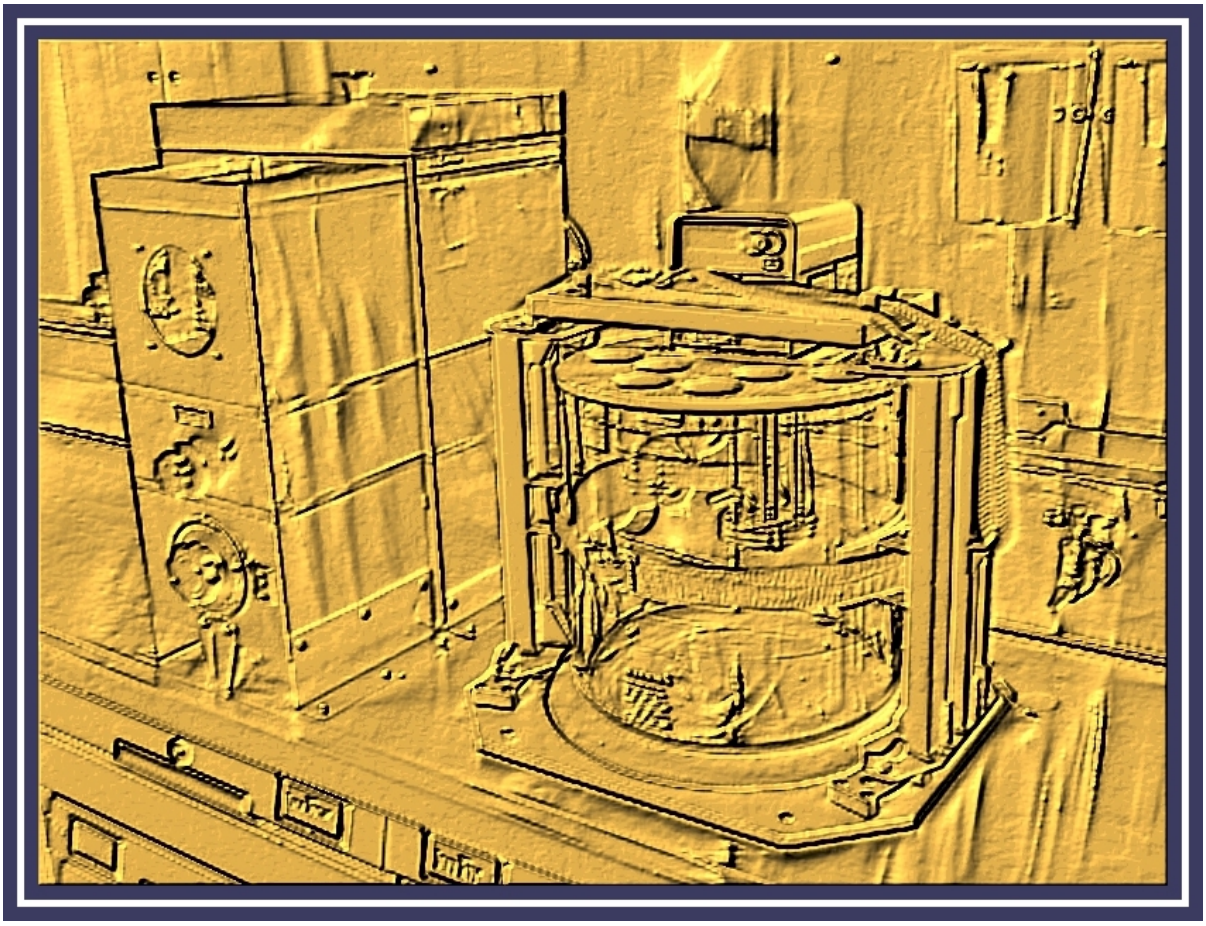
Year	Fuel	PQIS Region									Totals
		1	2	3	4	5	6	7	8	9	
1996	JP4	—	—	—	—	—	—	—	0.89	—	0.89
	JP5	—	—	308.86	—	51.36	22.72	71.87	39.65	—	494.46
	JP8	18.81	191.35	633.67	84.94	426.64	37.28	263.07	176.03	—	1831.79
1997	JP4	—	—	—	—	—	—	—	1.64	—	1.64
	JP5	—	—	322.88	—	210.78	59.19	55.84	58.63	—	707.32
	JP8	91.36	213.98	799.86	53.28	421.54	—	261.00	301.48	—	2142.50
1998	JP4	—	—	—	—	—	—	—	1.71	—	1.71
	JP5	—	—	310.80	—	168.26	24.10	54.74	57.90	—	615.80
	JP8	123.59	215.78	976.11	60.22	434.64	6.68	149.36	262.30	—	2228.68
1999	AN8	—	—	—	—	—	—	3.92	—	—	3.92
	F76	—	—	173.9	—	96.29	—	50.03	250.53	9.80	580.55
	JP4	—	—	—	—	—	—	—	1.22	—	1.22
	JP5	—	6.27	307.56	—	168.06	62.01	54.28	46.87	19.63	664.68
	JP8	104.17	207.91	1,024.91	92.40	308.38	—	463.48	302.42	65.97	2,569.64
	MU	—	—	0.38	—	—	—	0.29	14.33	—	15.00
	RME	—	—	—	—	—	—	—	10.34	—	10.34
2000	AN8	—	—	—	—	—	—	5.38	—	—	5.38
	F76	12.29	—	146.62	—	138.98	88.46	115.09	120.31	33.10	654.85
	JP4	—	—	—	—	—	—	—	1.13	—	1.13
	JP5	—	8.00	308.81	—	191.57	60.88	57.27	61.41	—	687.94
	JP8	108.86	249.55	1,041.35	101.82	371.57	—	177.46	362.74	122.11	2,535.46
	MU	—	—	11.81	—	—	—	0.53	16.09	—	28.43
	RME	—	—	—	—	—	—	—	10.85	—	10.85

[Volume in Millions of Gallons]



Region 1 – East Coast (PADDs-I)
Region 2 – East Central (PADDs-II)
Region 3 – Gulf Coast (PADDs-III)
Region 4 – West Central (PADDs-IV)
Region 5 – West Coast (PADDs-V)
Region 6 – Middle East
Region 7 – European
Region 8 – Pacific
Region 9 – Caribbean

The Data presented in this report has been carefully evaluated for accuracy and completeness, exploiting the entire resources of PQIS. As an adjunctive tool to this report, a CD with additional data is available to users of this report. Included are abridged copies of PQIS databases that have been stripped of sensitive material. It should be noted that results in our analyses may have been affected by that data, and that yours could produce slightly different results, as such.



Although every effort at complete accountability has been made in collecting, analyzing, and presenting the data in this report, it should be noted there are instances where laboratories or suppliers failed to report individual test results or characteristics on (particular consignments of) fuels. Reasons may range from inapplicability, because of processing or test methods employed, to the requirement being exempted, in particular contracts or purchase orders. Whereas every effort has been made to garner this data, to present coherent analyses, this has not always been attainable. Consequently, certain statistics presented herein are weighted, adjusted to representative values.

So too for “shortages” from an overlap in volume totals, when allotment delivery periods extend across calendar years; as discussed in the Table 2 paragraph under Product Distribution. All charts and tables, however, specify the volume of fuel and the number of reports on which the fuel characteristic was assayed. Theses may be contrasted against totals reported in Table 4 and Table 5, to establish possible deviation. For analyses predicated on ‘occurrence averages’, where volumetric totals are not commensurate, proportionating adjustments may be applied.

Section II – Product Specifications

The DoD Specification for procurement of JP4 and JP5 is currently MIL-DTL-5624T, Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST, dated 18 September 1998. The specification for JP8 is MIL-DTL-83133E, Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8), NATO F-35, and JP-8+100, dated 1 April 1999. MIL-F-16884J, Fuel, Naval Distillate, is used for marine fuel. These specifications govern the compositions of these fuels, procured for the DoD.

For the purposes of this report, only those specification properties that have measurable and definitive requirements in the specification are summarized, with the exception of the "reported" cetane index and the naphthalene content (not required for JP5). Specification properties that involve an assigned rating (e.g., water reaction, and copper corrosion) are not summarized; but data for those specification properties not reported is available by request, from DESC-BP.

Not all tests need to be performed on all batches. For the Net Heat of Combustion requirement, contractors have a choice of two or three different methods/units of measurement for reporting, depending on the product. Contractors also have the option of not performing Mercaptan Sulfur testing, when opting for the Doctor Test. If the Doctor Test is negative, Mercaptan Sulfur testing need not be performed; but some contractors elect to report both the Doctor Test and Mercaptan Sulfur results. Further, if the Smoke Point is below 25 mm, the product is acceptable as long as the Naphthalenes Content is below 3.0% and the Smoke Point above the minimum of 19 mm. Therefore, the number of reports represented by the data may be different for individual test parameters. Specification limits are provided on all Histograms and with Tables.

Fuel Characteristics - Global

Like with its introduction to this report in 1999, 2000 shipments of motor gasoline (MUM/MUR) remain comparatively low. For this reason, and the fact that its characteristics and specification differ from those for turbine fuels, it is reported separately here; and in less detail. Although improved over last years reporting, there are still insufficient data points for a proper statistical analysis. As such, histograms are not used; rather the data is presented in a table. Noting the volume of fuel and the number of shipment reports in Table 6, be cognizant that the information is representative only. With an improved reporting, however, it will probably usurp JP-4 reporting in future issues of this report.

As with gasoline, there is insufficient JP-4 data recorded in PQIS to provide useful histograms; but there is enough specific data to have warranted inclusion in the Tables for most, in last years report. With declining use, though, usefulness of this data is questionable. While the formulation of JP-4 is closer to that of gasoline, it is combined with the turbine fuels since testing, additives, and end use are more akin to them. However, note that there are instances where there is no analogous table, where that characteristic is inapplicable or not reported for JP-4. The same is true of Naval Distillate Fuel.

Histograms depicting diesel fuel product characteristic variances follow. Histograms show the measure of each test property result reported for 2000, for all Regions combined, providing an overview of the condition of fuel delivered to DESC customers. These are augmented by detailed data, presented by region, in the Tables.

Table 6. Motor Gasoline (Midrange & Regular) Characteristics – 1999.

Characteristic	PQIS Reporting							
	Fuel	Region	Volume	Min	Avg	Wt Avg	Max	Count
Anti-Oxidants (mg/L)	MUM	3	11.81	13.63	13.97	1.49	14.30	2
	MUM	7	0.53	(NR)	(NR)	(NR)	(NR)	0
	MUM	8	16.09	5.54	16.40	16.40	20.00	12
API Gravity (@ 60°F)	MUM	3	11.81	55.80	58.17	60.51	61.00	3
	MUM	7	0.53	(NR)	(NR)	(NR)	(NR)	0
	MUM	8	16.09	55.20	58.05	53.43	61.40	11
Aromatics (% volume)	MUM	3	11.81	31.50	31.50	28.11	31.50	1
	MUM	8	16.09	33.74	34.60	13.09	35.50	4
Distillation 10% Recovered (°C)	MUM	3	11.81	48.00	51.50	48.66	55.90	3
	MUM	7	0.53	50.00	50.00	50.00	50.00	1
	MUM	8	16.09	55.50	58.11	57.91	61.90	12
Final Boiling Point (°C)	MUM	3	11.81	206.00	215.53	207.57	221.10	3
	MUM	7	0.53	198.00	198.00	198.00	198.00	1
	MUM	8	16.09	179.50	196.03	196.82	211.00	12
Lead (g/L)	MUM	3	11.81	0.00	0.01	0.00	0.01	3
	MUM	7	0.53	0.00	0.00	0.00	0.00	1
	MUM	8	16.09	0.00	0.00	0.00	0.00	12
AKI (Octane) [1]	MUM	3	11.81	89.10	90.02	91.21	91.45	3
	MUM	8	16.09	89.70	90.36	41.23	92.65	5
Total Sulfur (% mass)	MUM	3	11.81	0.01	0.02	0.01	0.03	3
	MUM	7	0.53	(NR)	(NR)	(NR)	(NR)	0
	MUM	8	16.09	0.01	0.01	0.01	0.01	12
Vapor Liquid Ratio (@ 0.1°C)	MUM	3	11.81	57.80	61.10	58.35	63.30	3
	MUM	7	0.53	(NR)	(NR)	(NR)	(NR)	0
	MUM	8	16.09	1.00	22.27	24.92	62.60	12

[(NR) = Not Recorded] ¤ [Volume in Millions of Gallons]

[1] The Anti-Knock Index (AKI) is not reported for Region 7 since it cannot be calculated. The Research Octane Number and the Motor Octane Number (MON) are required, but the European specification governing gasoline does not require reporting the MON.

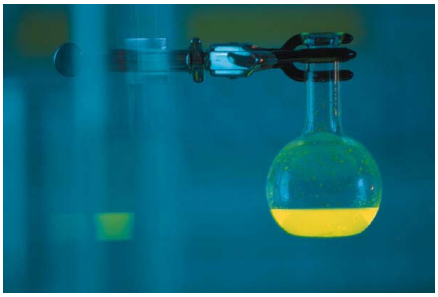
Histograms show, for each product and fuel characteristic, the percent by volume of product refined for delivery to DESC customers worldwide, for 2000. The grades of fuel and specification values are indicated in the text within the chart with the mean and standard deviation values; which are automatically calculated for each Histogram. Percentages above the bars represent the percent of total volume of product falling within the data ranges indicated on the x-axis. Heavy dashed lines in the graph depict specification values. To ensure that all data is included, the first and last bars have an allowance for data outside of the ranges upon which the histogram is based, where appropriate. A "<[low value]" indicates all occurrences of volumes less than lower range [low value] and a "[high value]+" indicates all occurrences of volumes greater than the upper range [high value].

Values are grouped into data ranges indicated in the x-axis. The range includes data at the lower limit and up to, but not including, the upper limit. Consequently, values in the next data grouping above the specification limit, indicated by the dashed line, might include data that matches the upper specification limit. Consult the pertinent table, following the Histograms, to ascertain the maximum value for the property, to determine whether any volume purchased exceeded the specification limits.

Because the mean indicates the average value and modes to the bars on Histograms displaying volume percentages, the mean may not always occur where visual inspection of the Histogram indicates. The differences in two values are similar to the differences between the average and the volumetrically weighted average.

The data indicates the overall distribution of test results on a worldwide basis for 2000. No attempt was made to separate results by the test method used, where more than one method was possibly utilized, although this also can be provided on specific request. Whereas the histograms are exemplificative, in that they may not represent 100 percent of the given fuel characteristic (see The Data), they illustrate sufficient data points to provide a quite accurate picture. It should be noted, however, that they are based on "occurrence averages"(i.e. plotting on submitted data for the characteristic). Quantities represented may be contrasted against totals in Table 5, to determine any possible deviation.

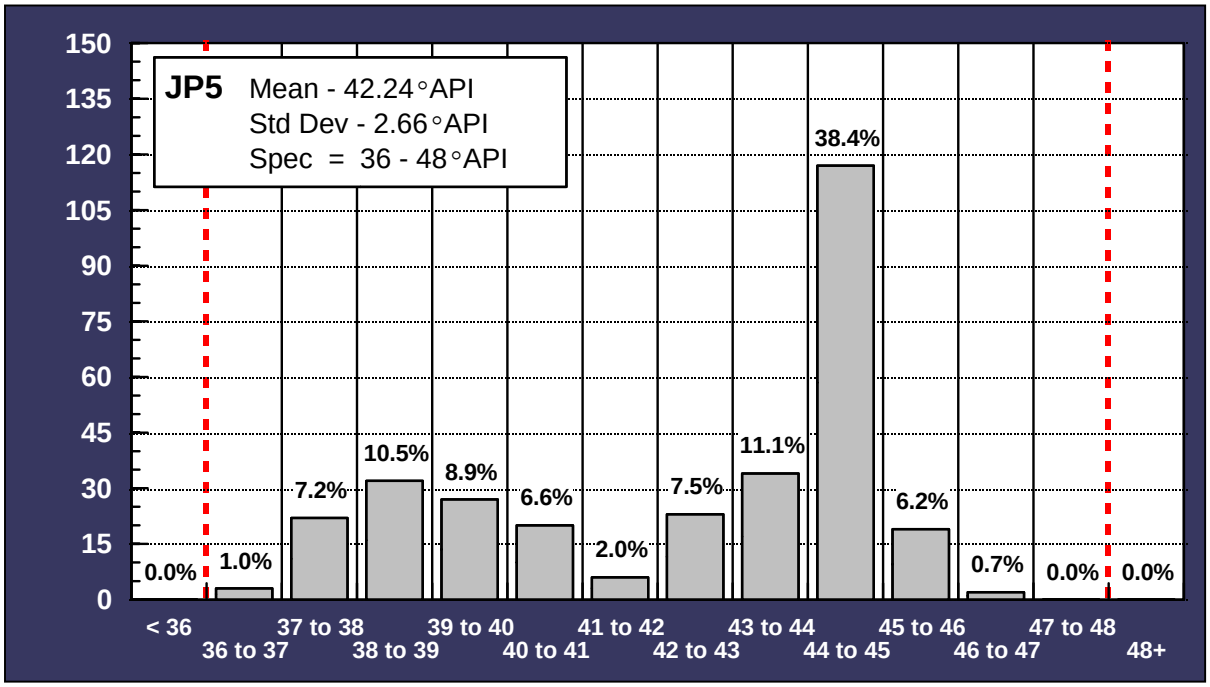
Comparing Histograms for 2000 with those for 1999, only changes in distributions, the volumes of fuel processed, are observed. No significant changes are observed in either the mean value or the shape of the curve, for either JP5 or JP8 for API Gravity, Aromatics, Olefins, Total Sulfur, Mercaptan Sulfur, Particulate Contamination, Smoke Point, Hydrogen Content, Flash Point, Cetane, Freezing Point or Viscosity.

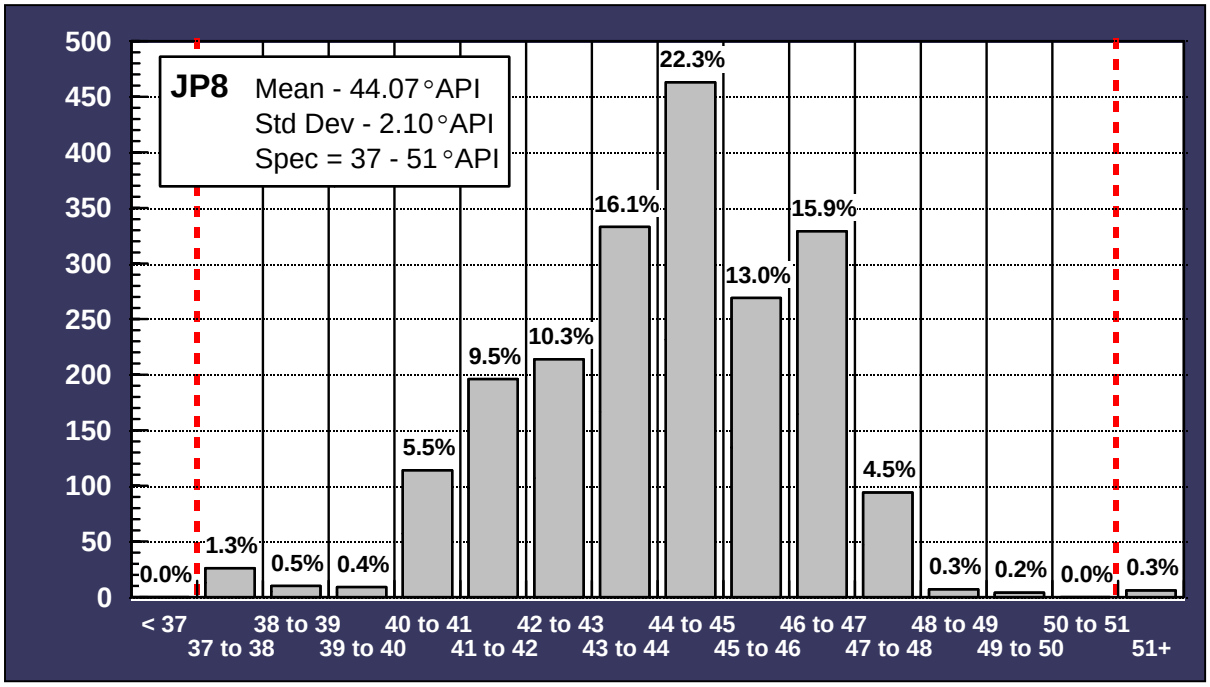


The JP8 API Gravity overage constitutes only one shipment. For Filtration Time, the Mean is up by almost a minute; and is slightly down for the Total Acid Number and Naphthalene. Smoke Point has a marked increase in the 26 to 27 range, but this is obviated to a 0.3 mm change in the Mean, for JP5. There is a slight increase in the underage for the JP8 limit that, particularly on a smaller volume of fuel, may warrant monitoring.

Apportionments, the divisions used for Histograms, have been revised in this report, to permit a more detailed examination of test results. They reveal no significant changes in plotted curves but do show distributions better. Histograms show that greater than 99% of the volume of fuel received in 2000 met the graphed specification properties. The most notable exception is the Total Acid Number, continuing what seems to be a trend. This office will continue to monitor the Total Acid Number, and add Smoke Point, for JP8 shipments in 2001.

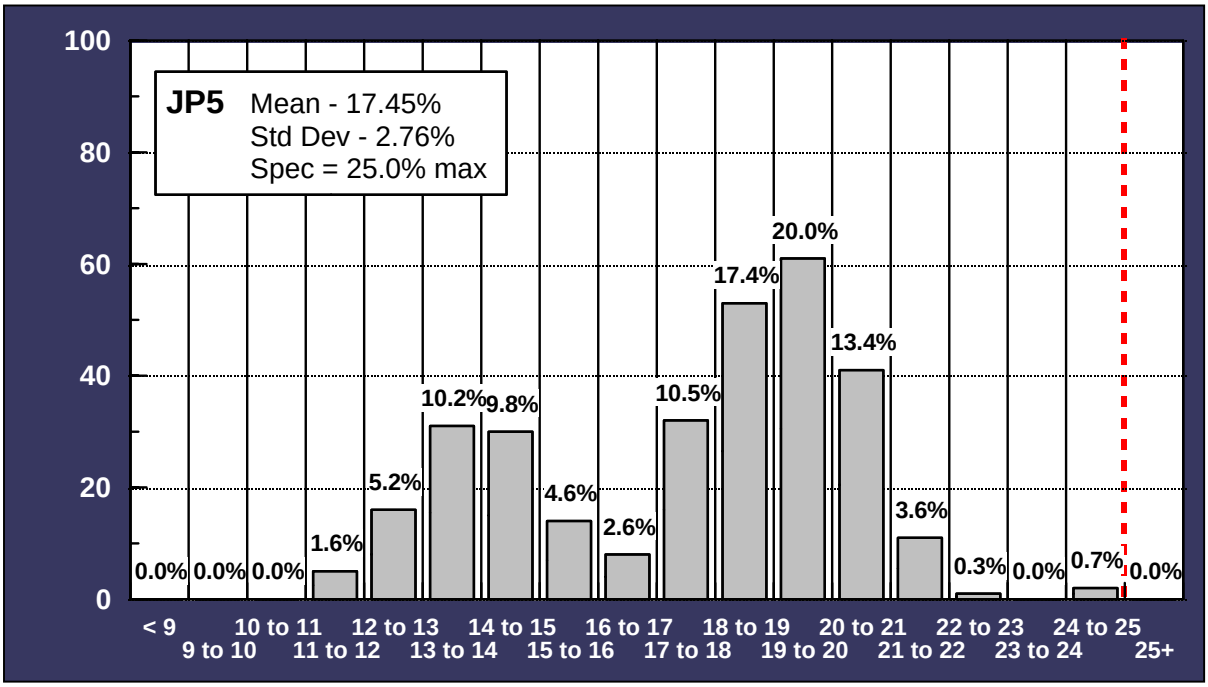
Histogram 1. API Gravity in Volume Received – 2000.

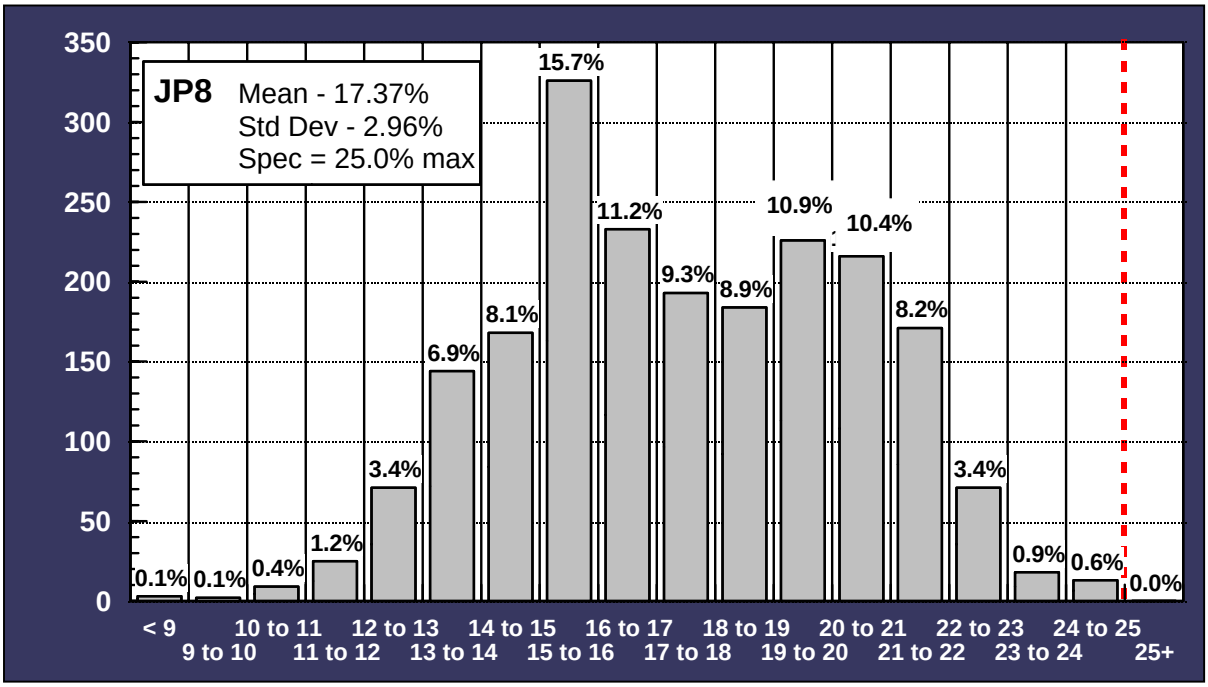




[Volume in Millions of Gallons]

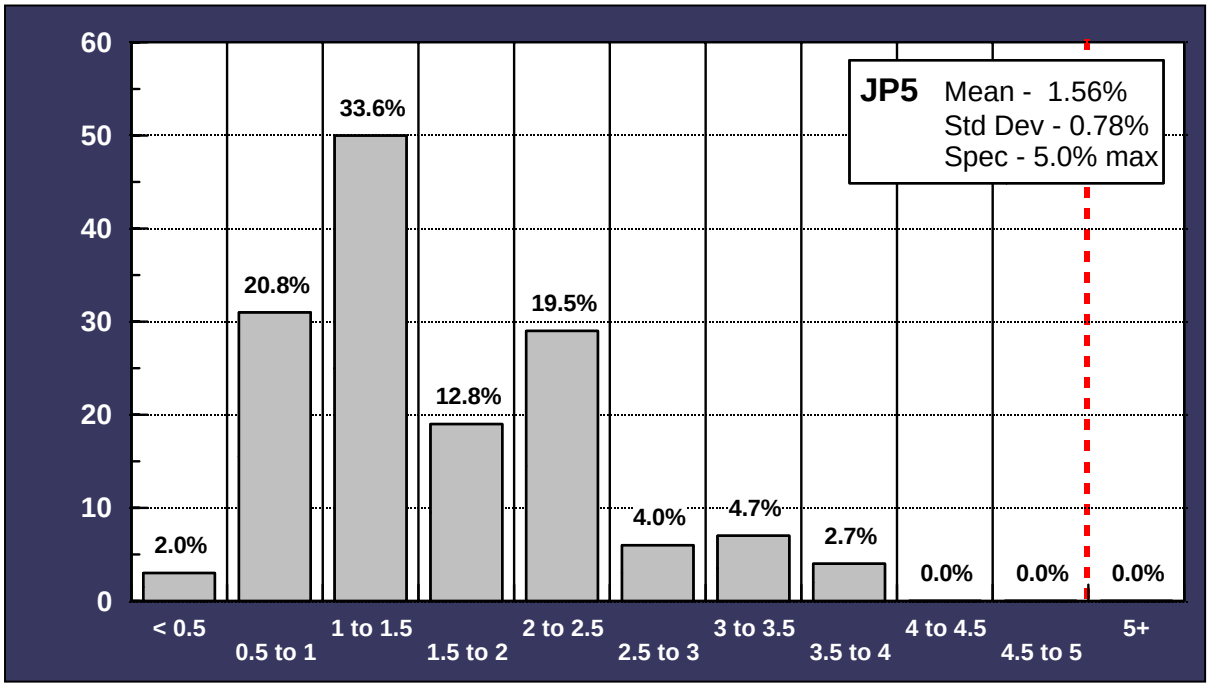
Histogram 2. Aromatics in Volume Received – 2000.

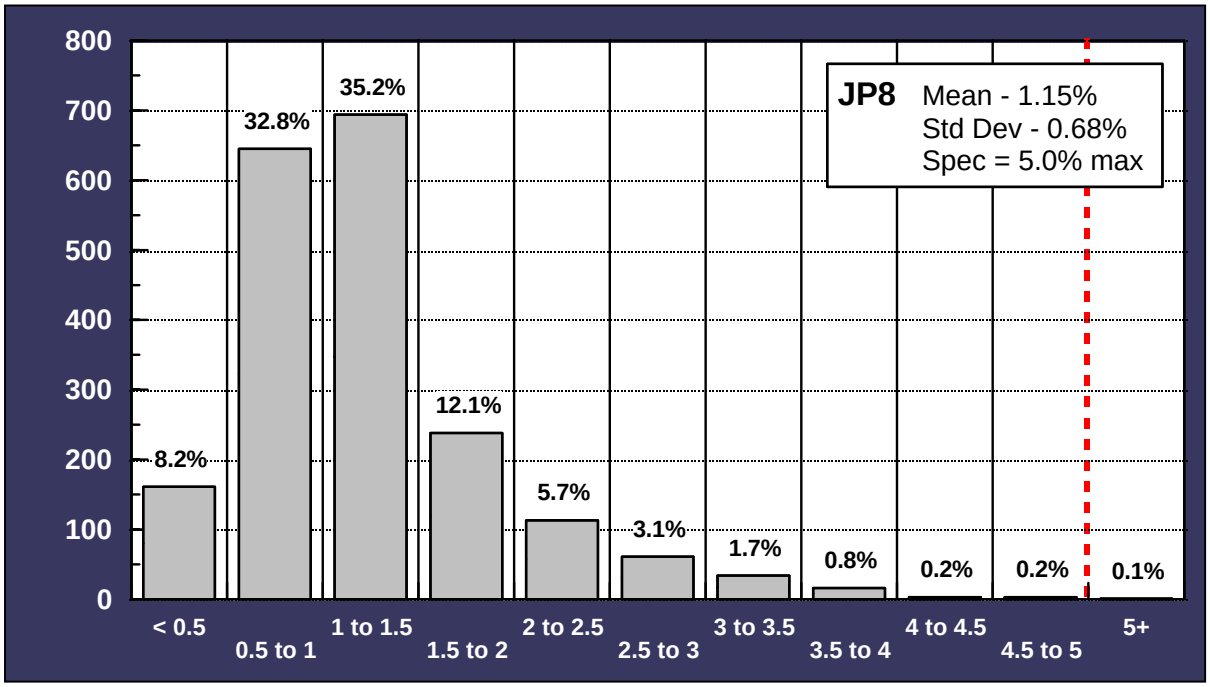




[Volume in Millions of Gallons]

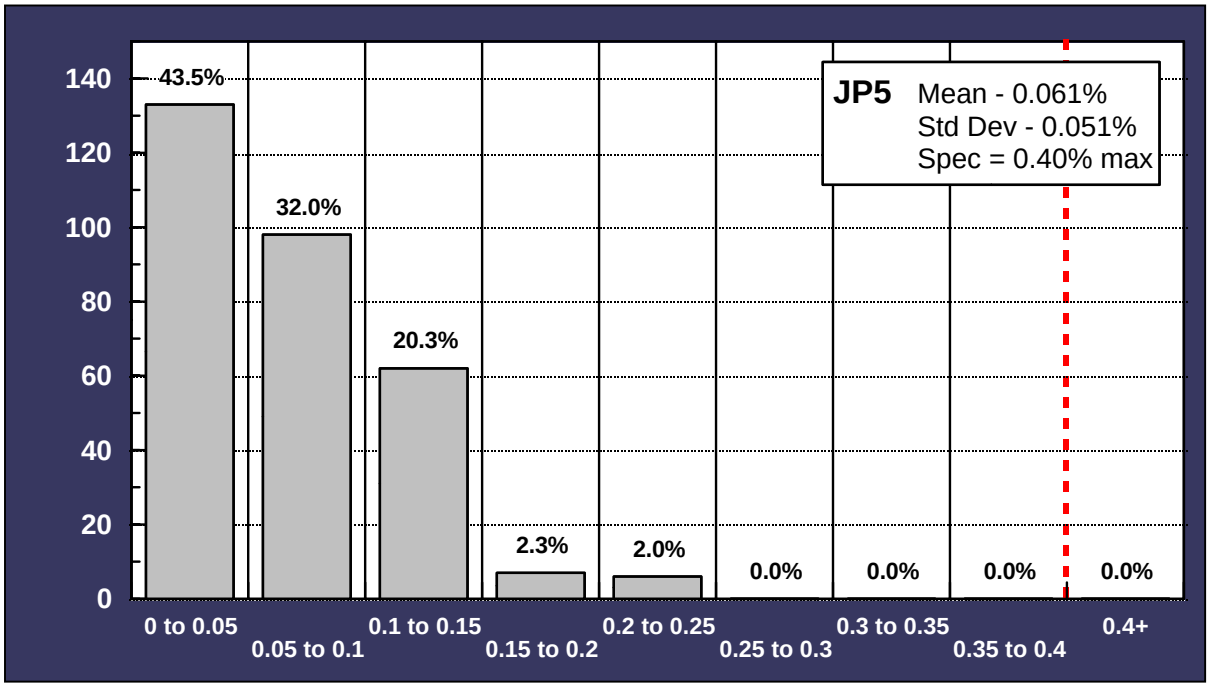
Histogram 3. Olefins in Volume Received – 2000.

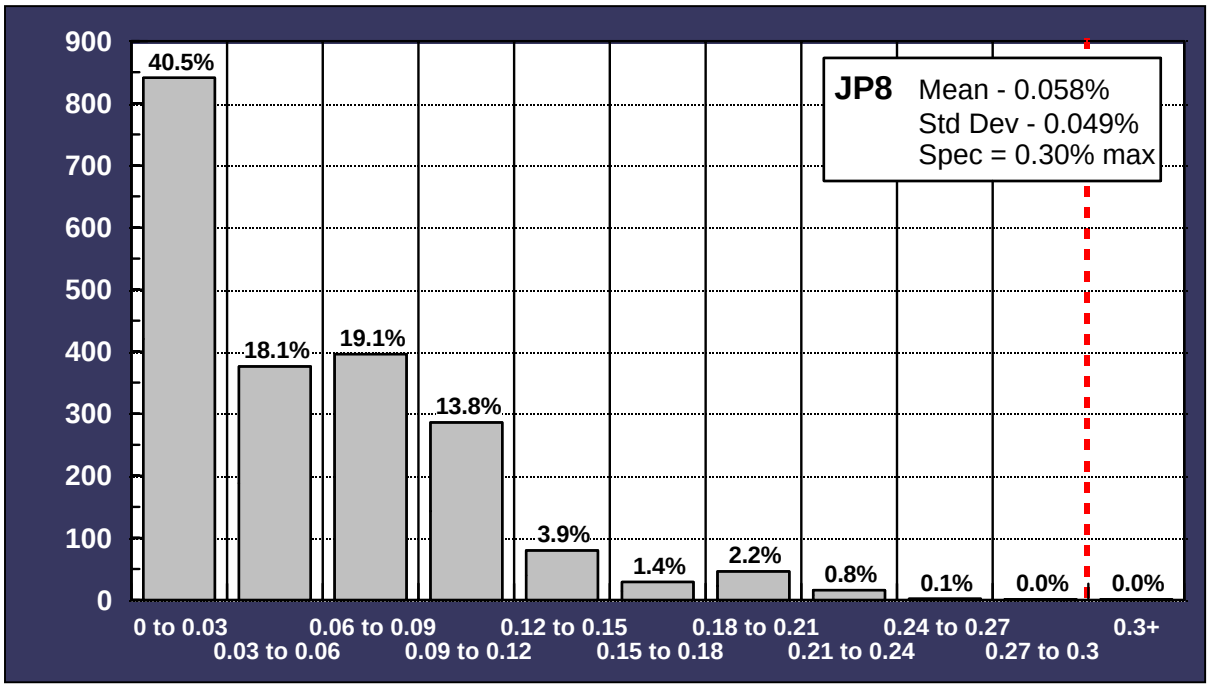




[Volume in Millions of Gallons]

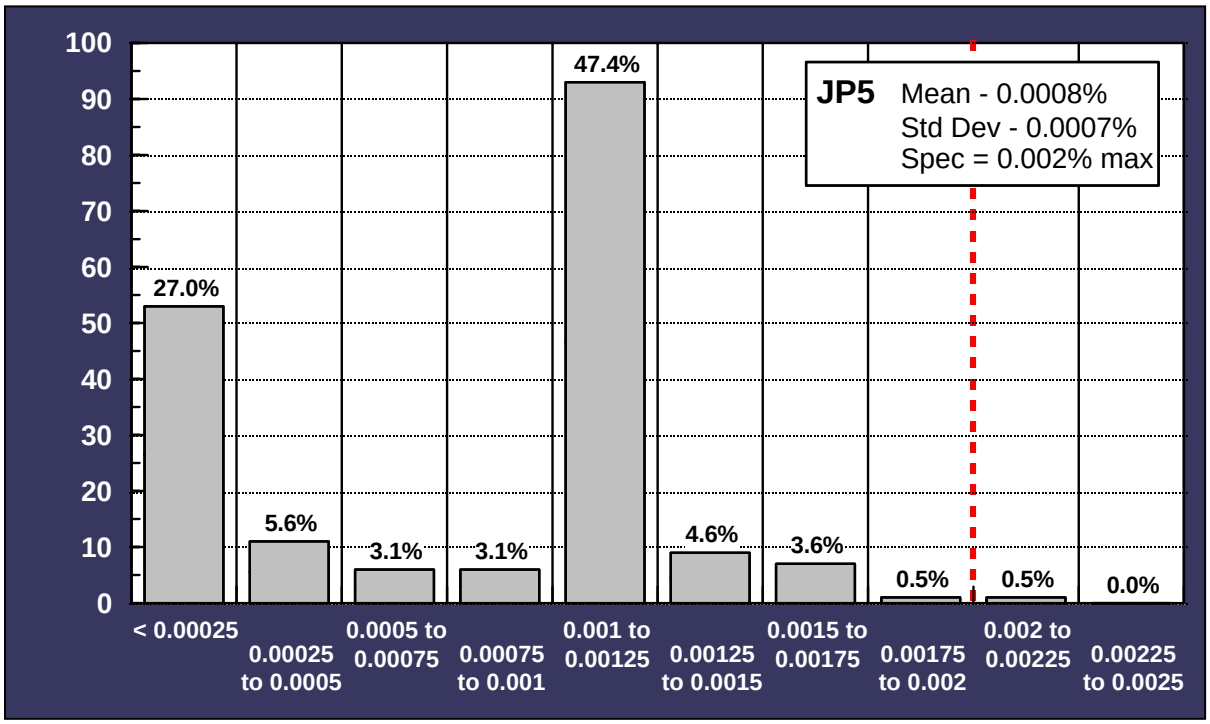
Histogram 4. Total Sulfur in Volume Received – 2000.

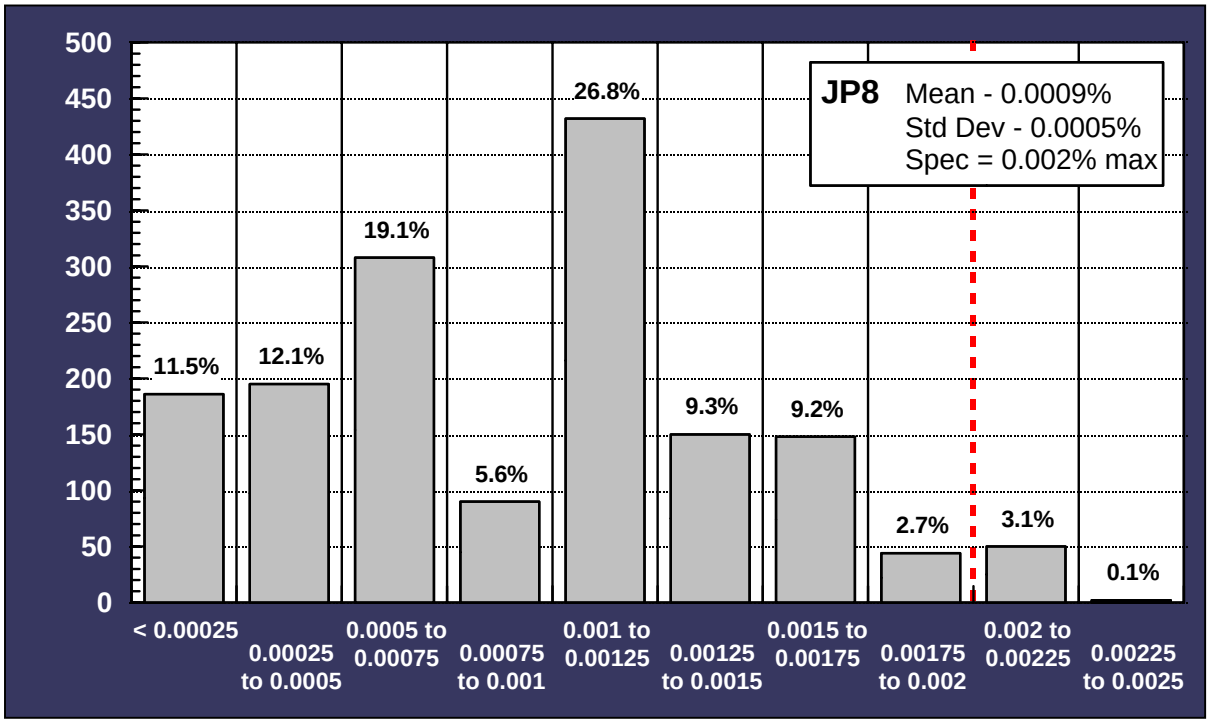




[Volume in Millions of Gallons]

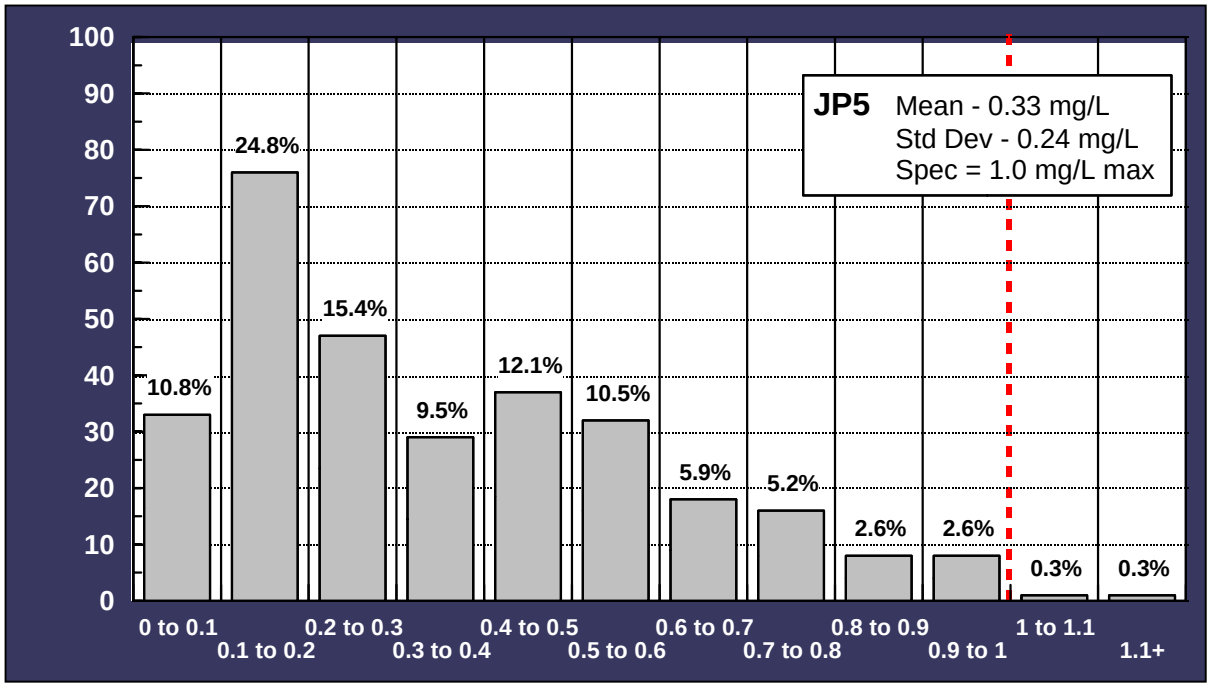
Histogram 5. Mercaptan Sulfur in Volume Received – 2000.

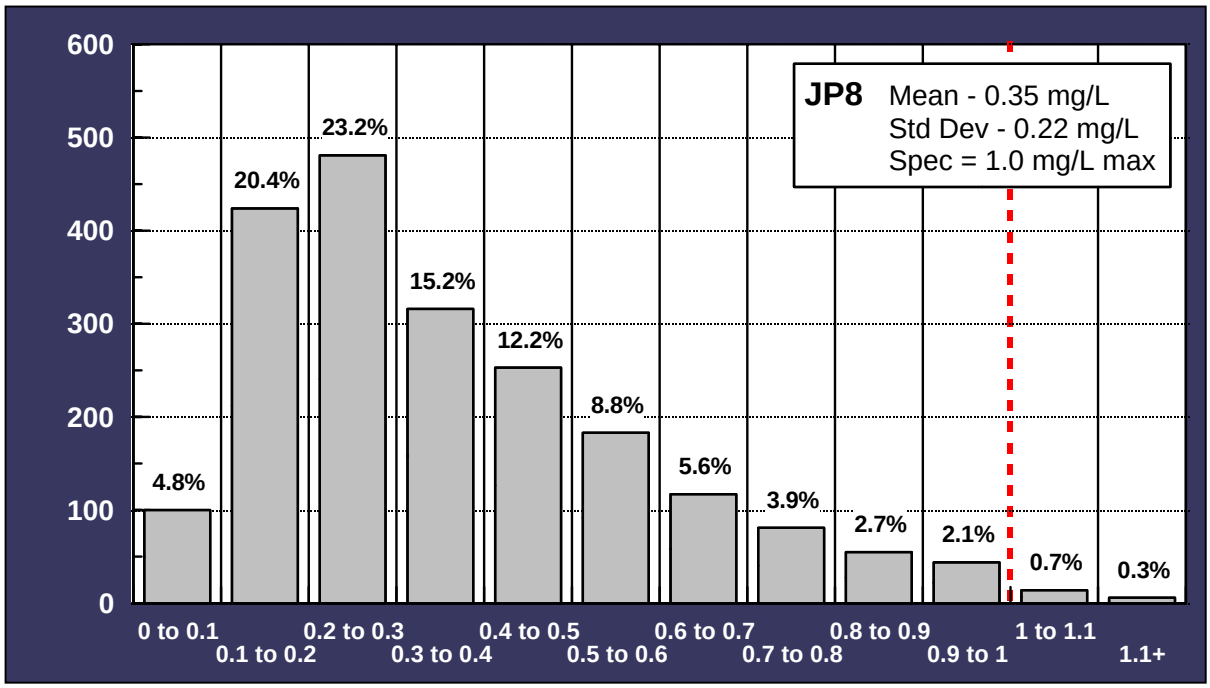




[Volume in Millions of Gallons]

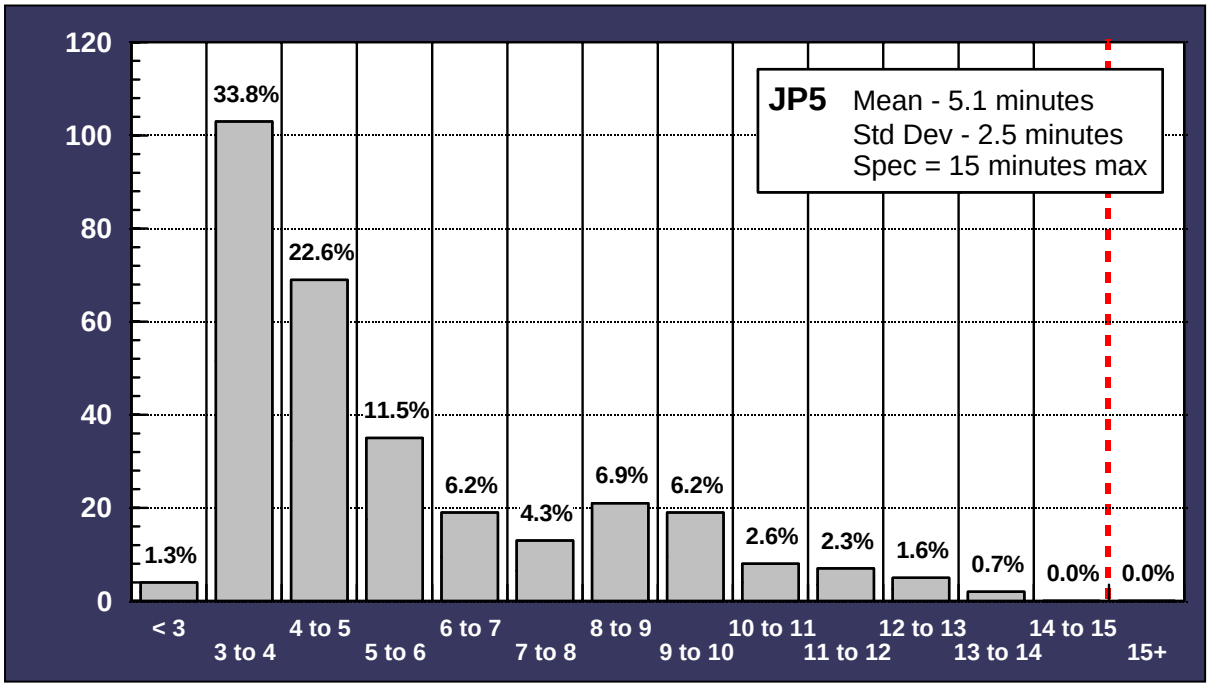
Histogram 6. Particulate Contamination in Volume Received – 2000.

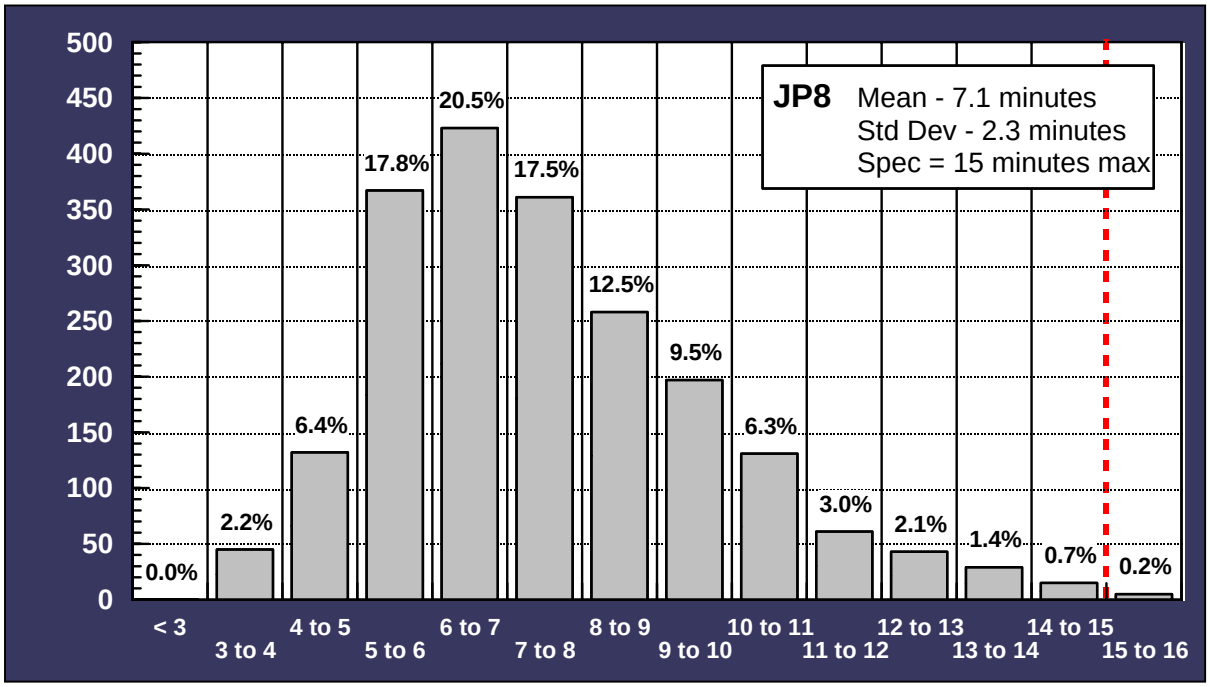




[Volume in Millions of Gallons]

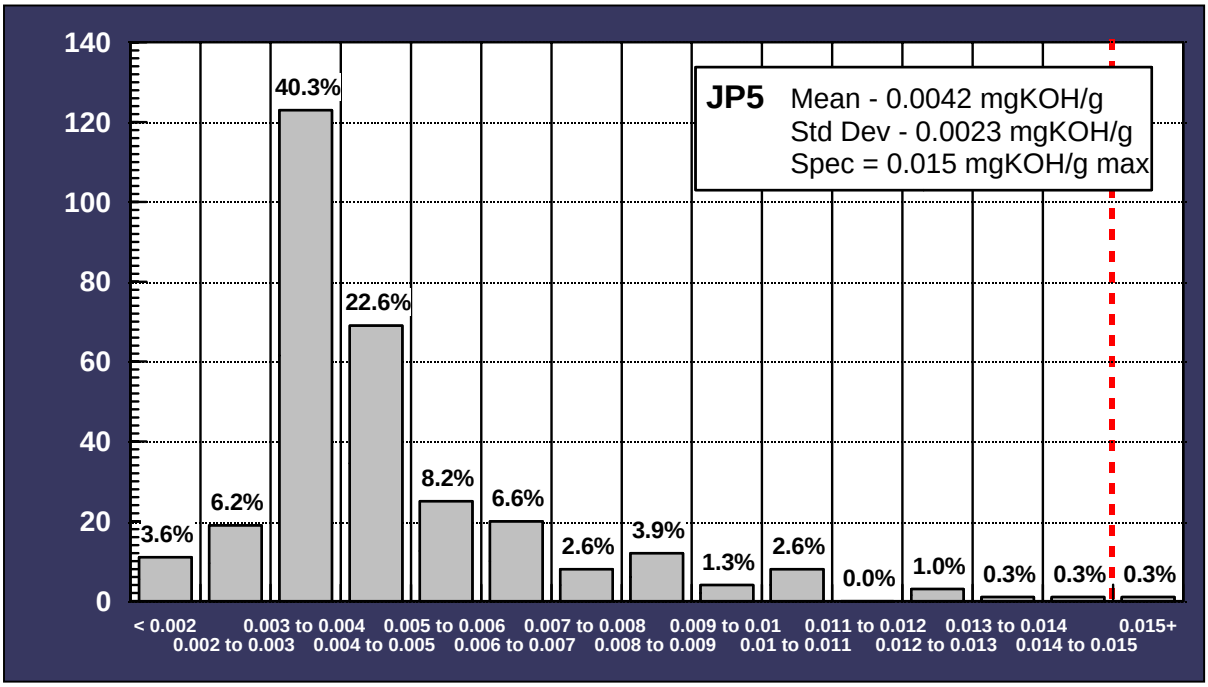
Histogram 7. Filtration Time for Volume Received – 2000.

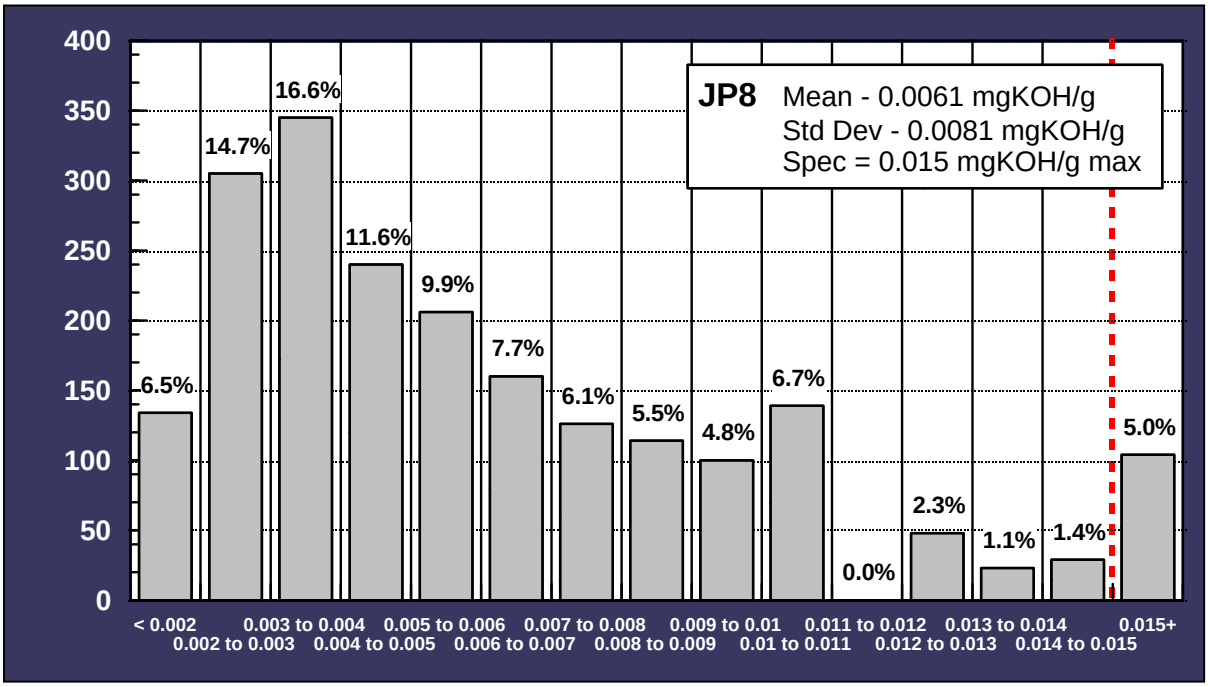




[Volume in Millions of Gallons]

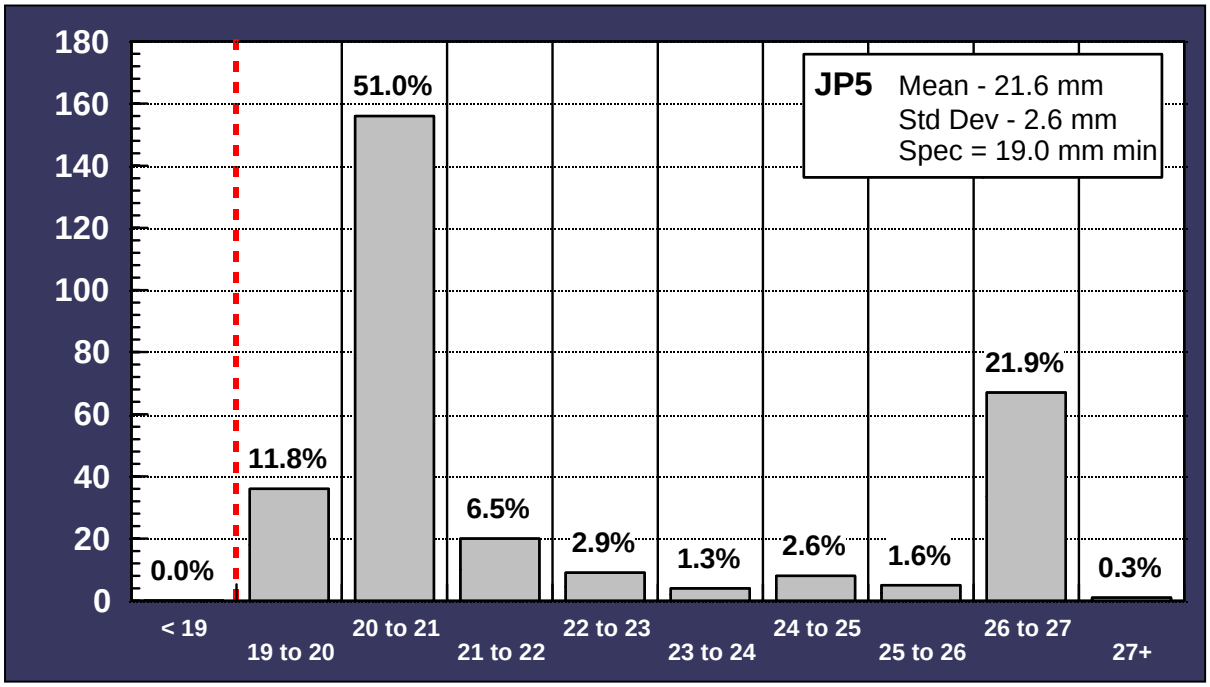
Histogram 8. Total Acid Number in Volume Received – 2000.

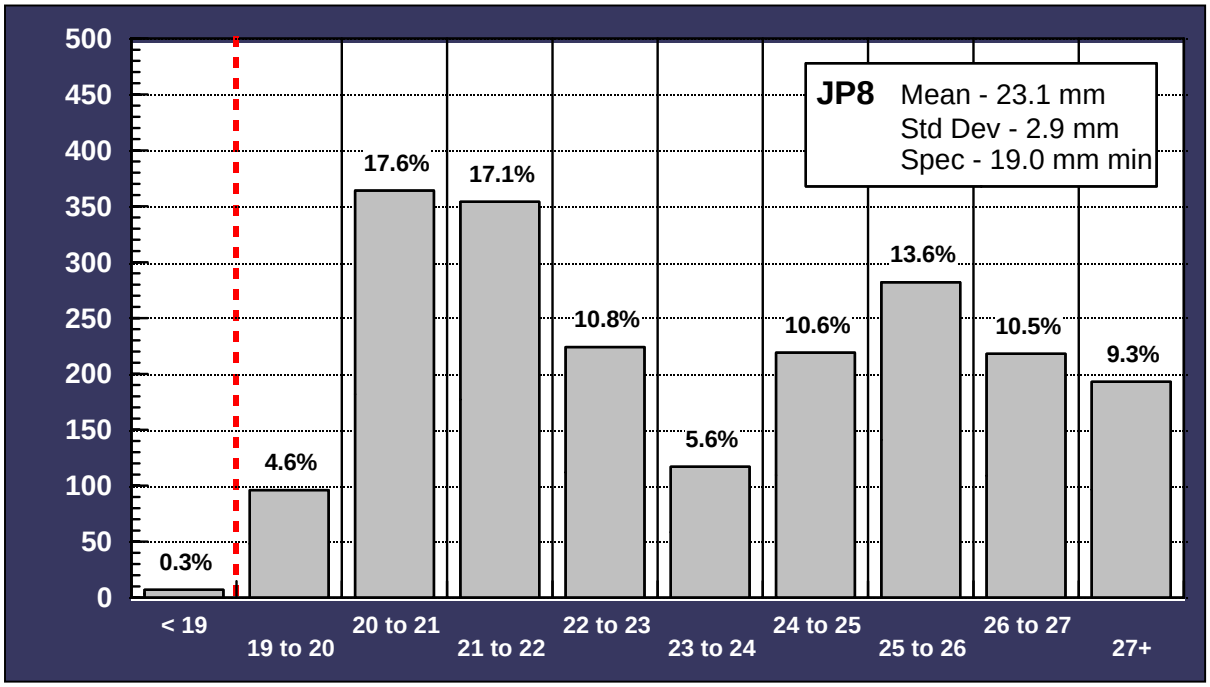




[Volume in Millions of Gallons]

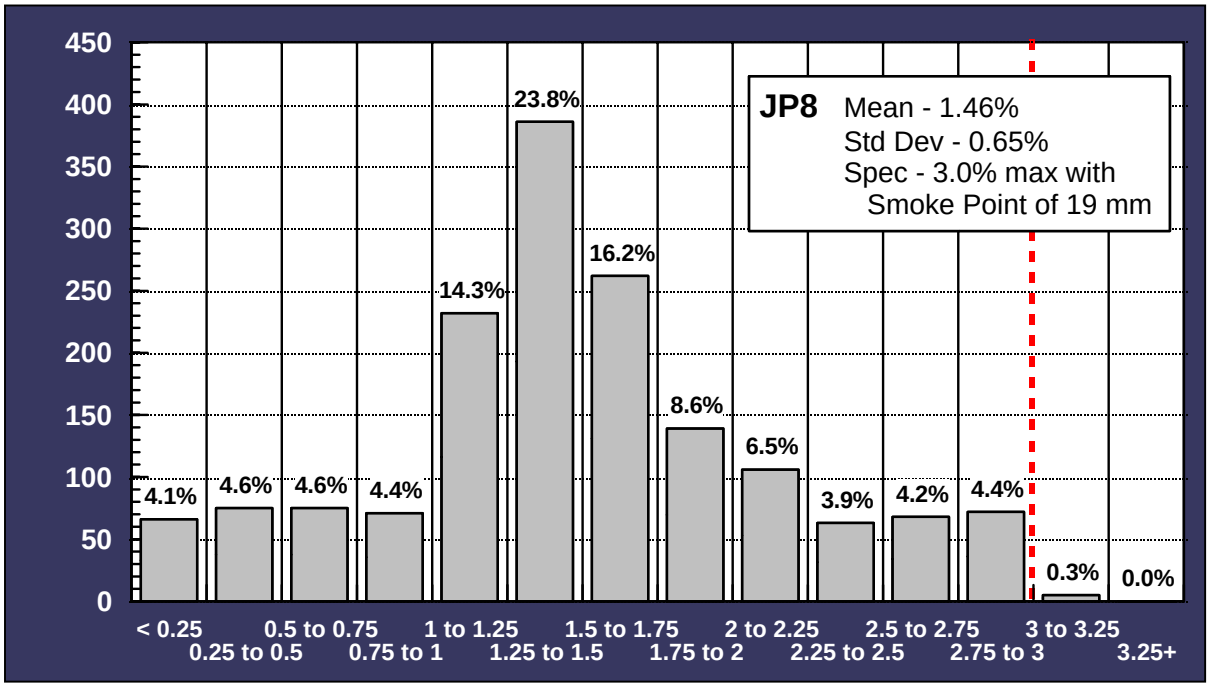
Histogram 9. Smoke Point in Volume Received – 2000.





[Volume in Millions of Gallons]

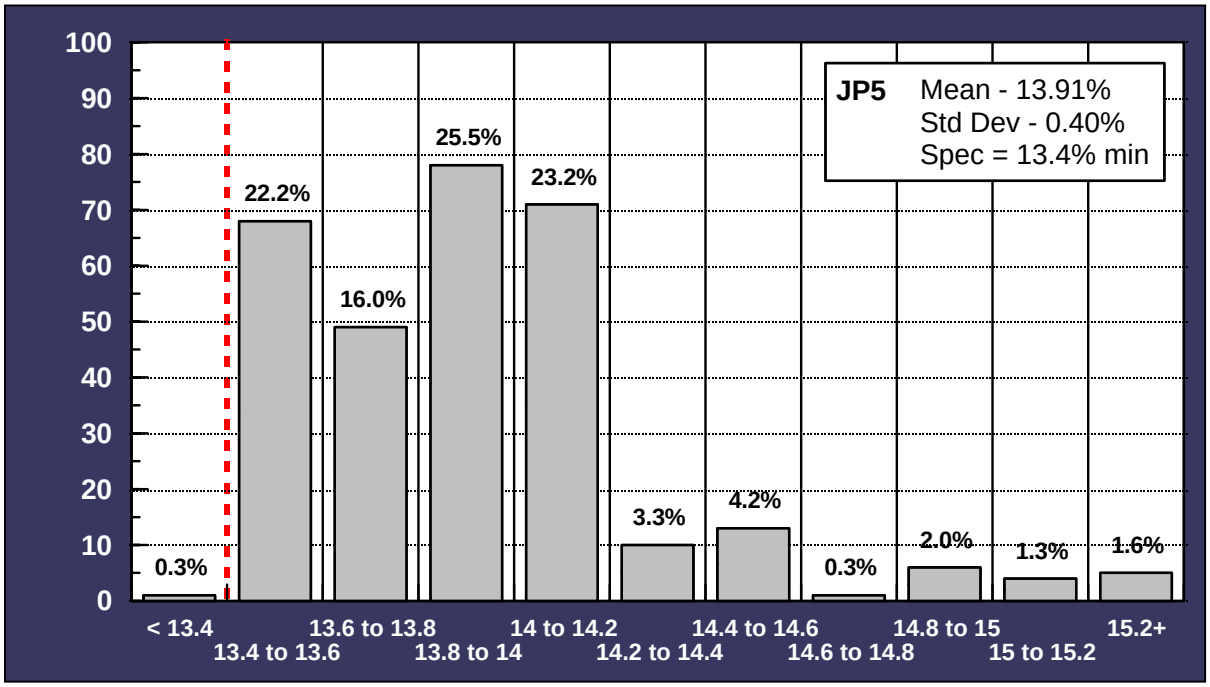
Histogram 10. Naphthalene in Volume Received – 2000.

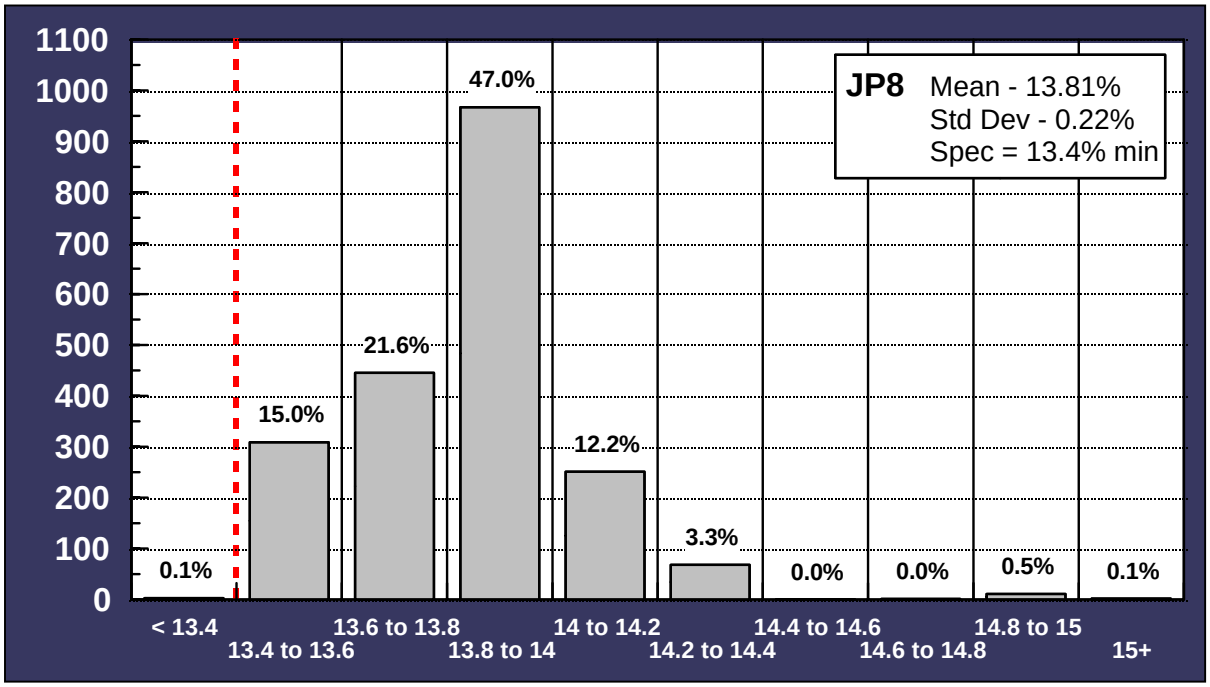


Fuel Samples

[Volume in Millions of Gallons]

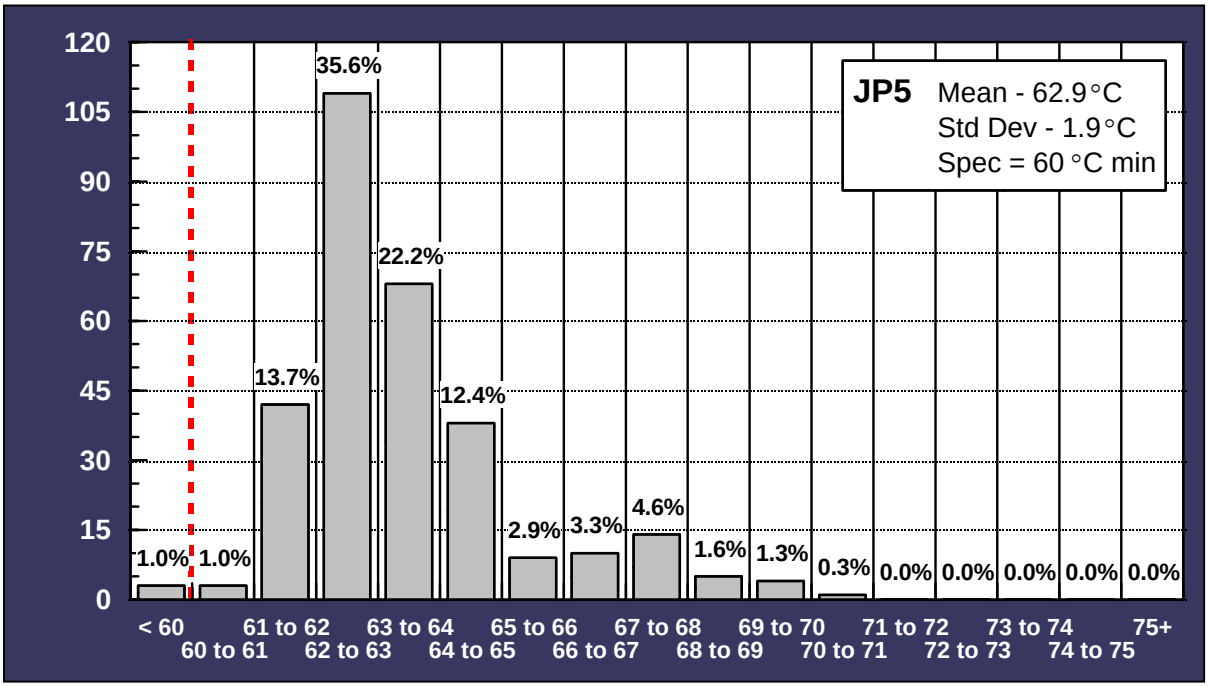
Histogram 11. Hydrogen Content in Volume Received – 2000.

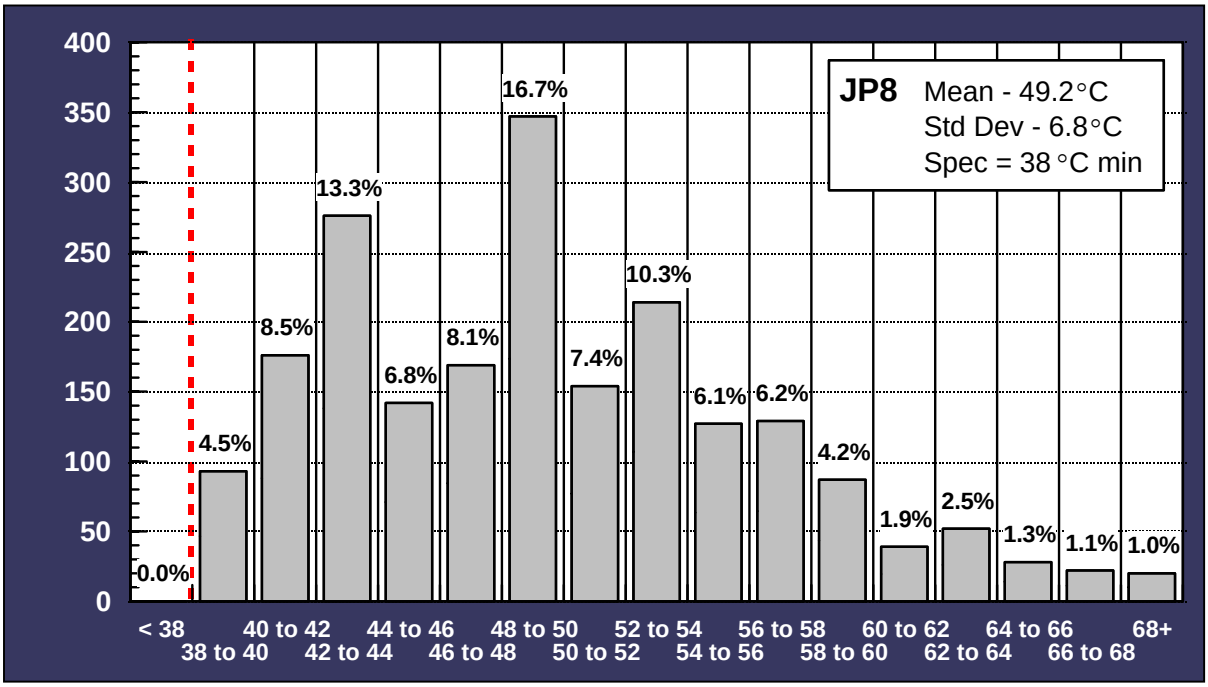




[Volume in Millions of Gallons]

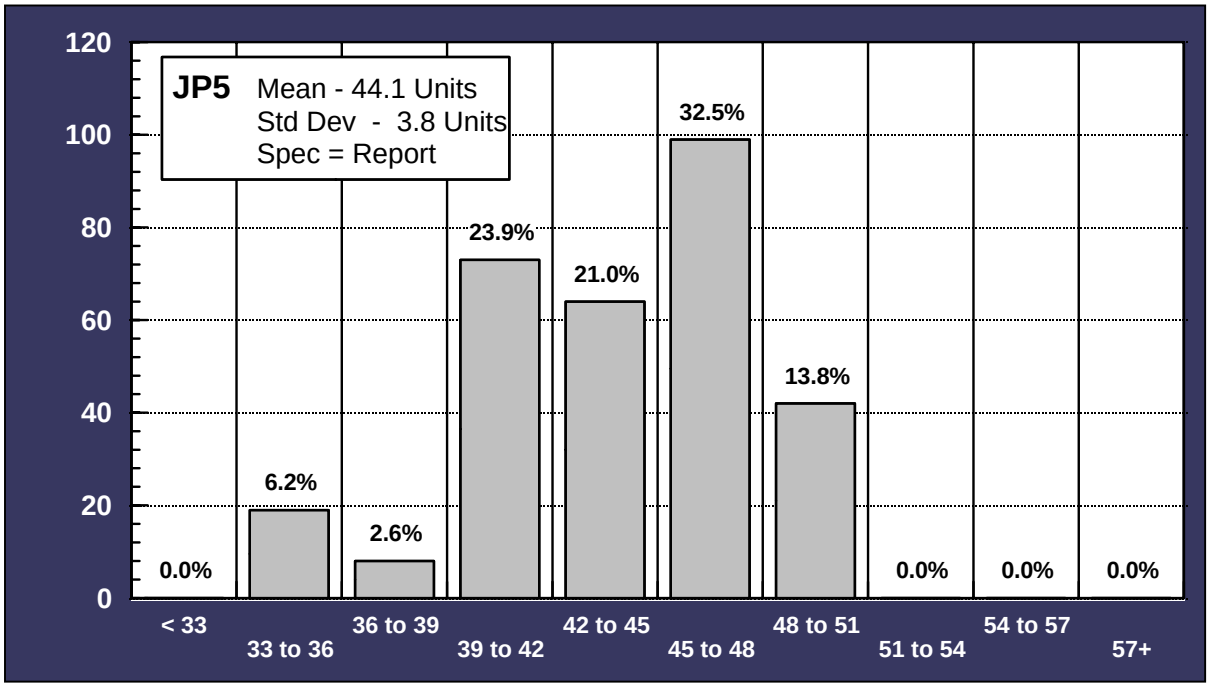
Histogram 12. Flash Point in Volume Received – 2000.

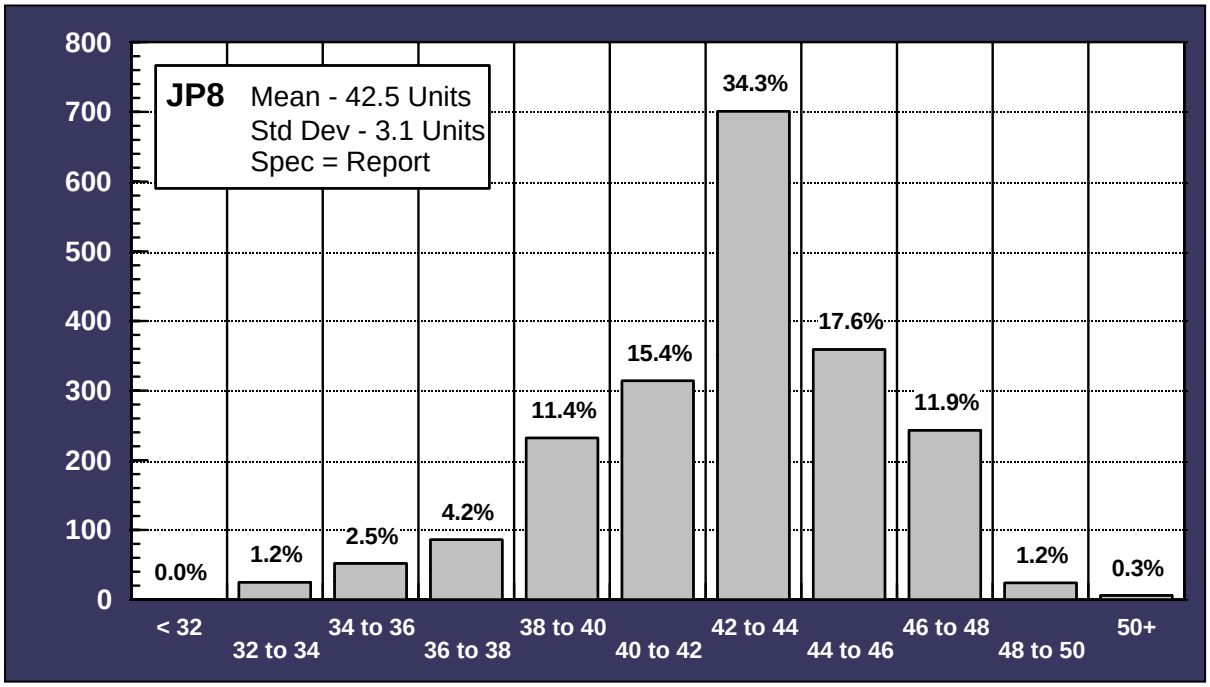




[Volume in Millions of Gallons]

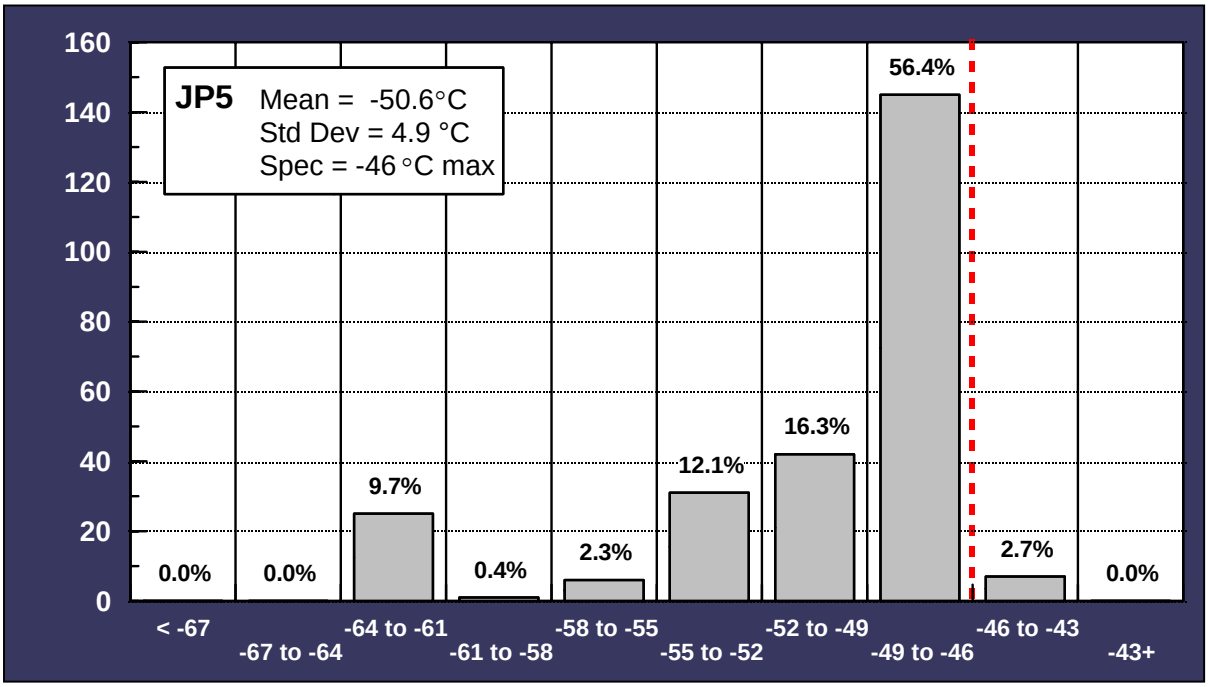
Histogram 13. Cetane Index in Volume Received – 2000.

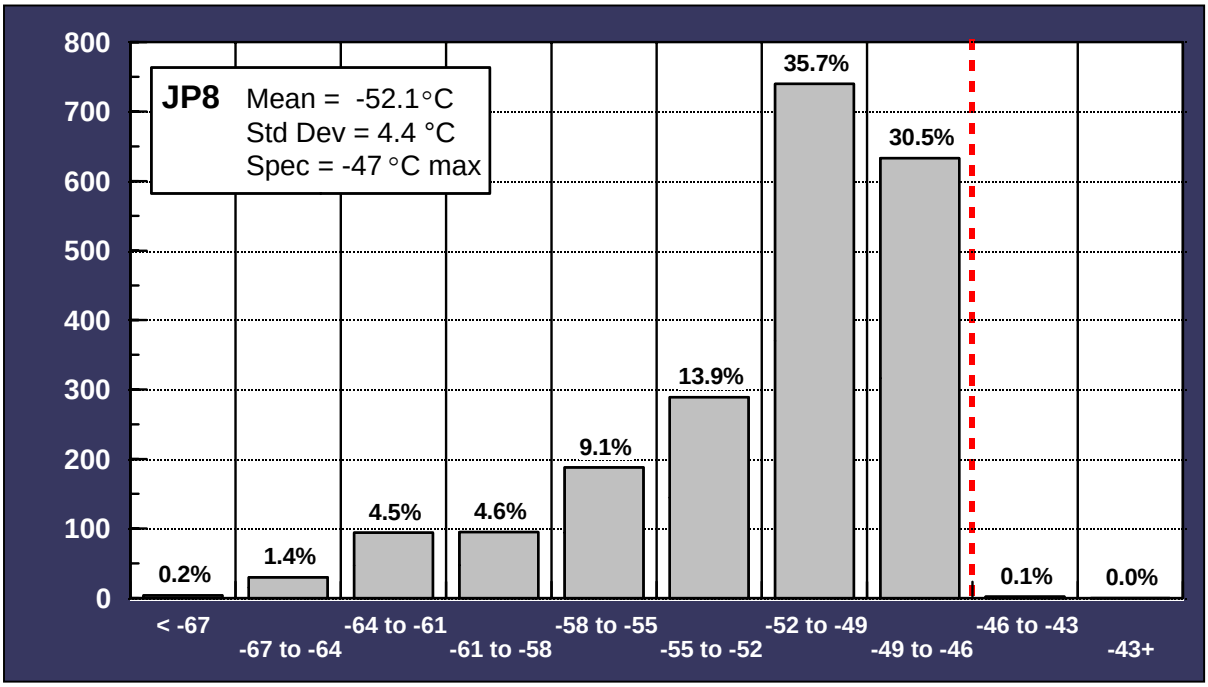




[Volume in Millions of Gallons]

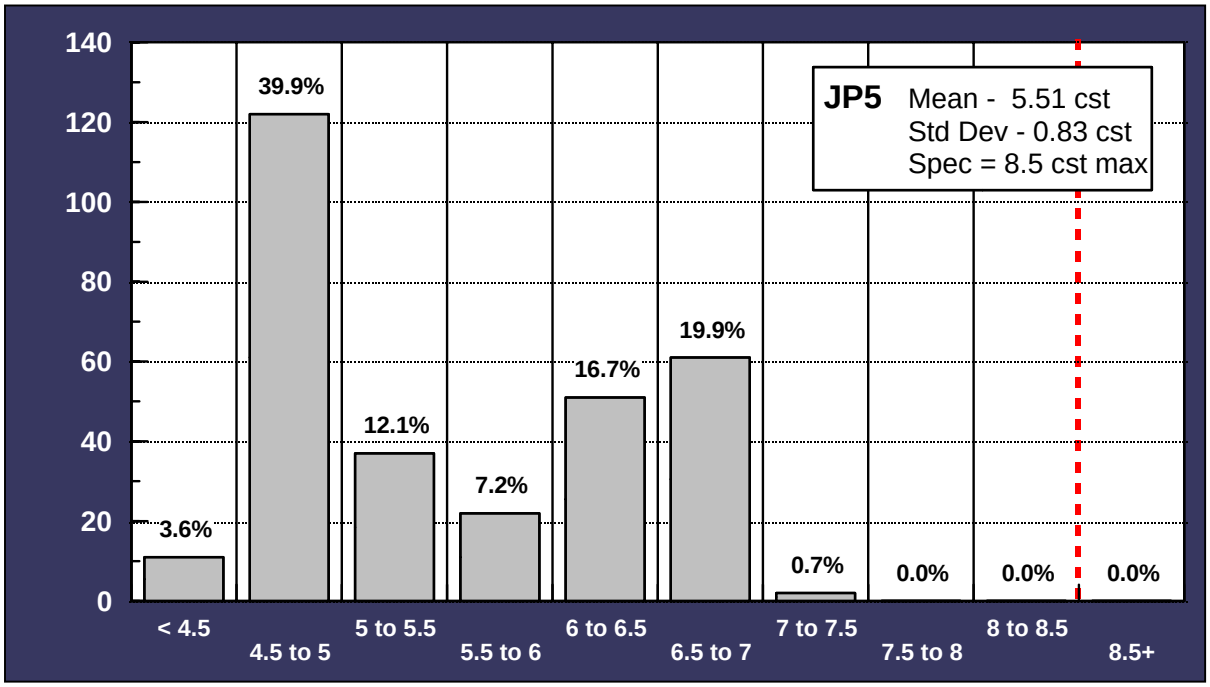
Histogram 14. Freezing Point in Volume Received – 2000.

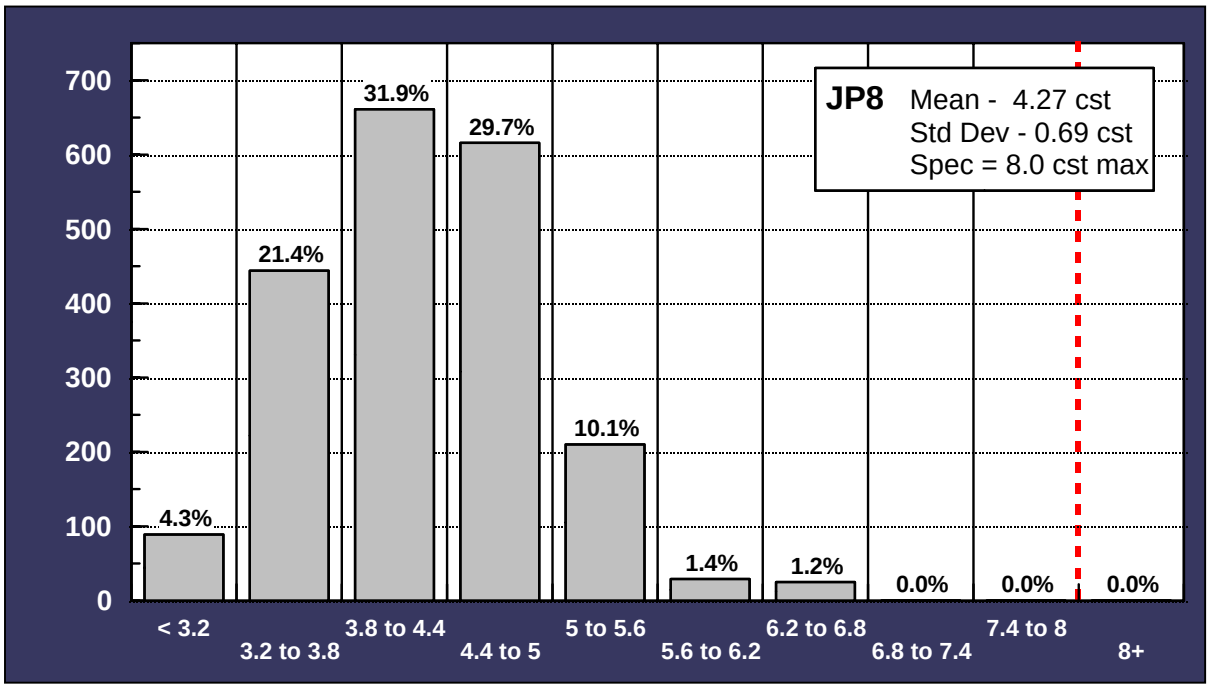




[Volume in Millions of Gallons]

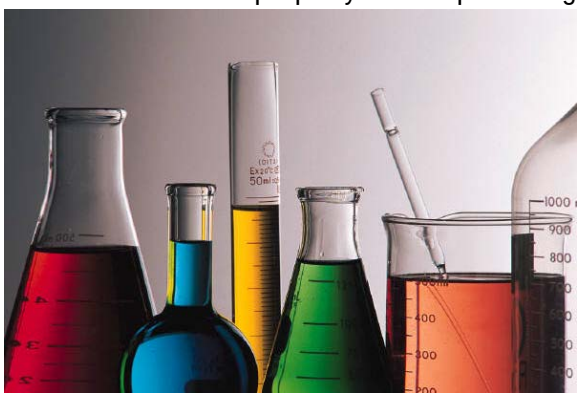
Histogram 15. Viscosity in Volume Received – 2000.





[Volume in Millions of Gallons]

Tables (7— 65) provide the minimum, average, volumetrically weighted average, and maximum values for each fuel property of the specified grade, categorized by calendar year and by region.

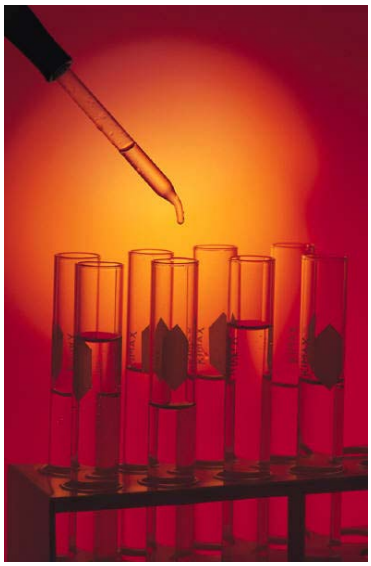


This supplements the preceding histograms, and facilitates the comparison of characteristics from different regions. Note that in each scope of reporting, summarization is based on a different focus, producing slightly different results.

Like histograms, the conformance tables too are exemplificative, in that they may not represent 100 percent of the given fuel characteristic (see The Data), but do illustrate sufficient data points to provide a quite accurate picture. It should be noted, however, that arithmetic means are based on "occurrence averages"(i.e. averaging on submitted data for the characteristic). Supplied for each year and region combination is the number of reports from the field comprising the data set and the volume, in millions of gallons, that the data represents. Quantities represented may be contrasted against totals in Table 4 and Table 5, to determine any possible deviation.

Comments noting observed trends in product or test values are included in Conclusions, where appropriate. Since Histograms and Tables are designed to be self-contained, to allow each to be useable removed from the main body of the report; these observations will need to be captured separately, if desired.

In perusing tables, it is possible to compare individual fuel characteristics from different regions. A researcher, attempting to determine what differences there may be in a comparison of regional averages for the API Gravity of JP8, for example, would consult Table 10. The researcher could also contrast API Gravity, one fuel to another, comparing this data to that in Table 7, Table 8, or Table 9. For specificity, "actuals" may be compared too; and weighted against the amount of data recorded, as cited in the last column. The tables also afford year-to-year comparisons of the condition or attributes of fuels. The same evaluations could be accomplished for any characteristic, that is governed in the specification, in consulting the appropriate table(s).



It is important to note in utilizing this data to draw conclusions of the condition or composition of fuels, however, that this data reflects "Level A procurement Quality test data"; that is to say, the results compiled from testing/evaluation at the point of origin. It must be recognized that the various transport mediums (pipeline, tankers, tank-truck, etc.) all have the potential to "contaminate" fuel, and that there is also the probability of mixing product from different sources/batches for allotment. This could result in different values, in product finally delivered to the end user, to those obtained in spectender terminal shipping tank or refinery test results. DESC-BP can provide transportation data for first, second, and third tier bulk deliveries, but not information on (re)distribution or on what constitutes an individual allotment.

Table 7. API Gravity Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1999	3	F76	176.3	30.0	36.52	36.26	38.3	47
1999	5	F76	93.2	31.5	32.64	32.53	34.6	24
1999	7	F76	38.6	35.4	36.43	36.55	37.7	11
1999	8	F76	250.5	31.6	35.50	36.07	38.2	44
1999	9	F76	9.8	33.2	33.25	33.25	33.3	1
2000	1	F76	12.3	32.8	36.77	36.75	37.9	6
2000	3	F76	146.6	33.9	35.41	35.31	38.4	36
2000	5	F76	139.0	31.5	32.27	32.25	34.6	31
2000	6	F76	88.5	35.6	36.78	37.11	38.4	14
2000	7	F76	115.1	35.4	37.28	37.25	39.9	26
2000	8	F76	120.3	32.5	36.01	36.12	37.5	29
2000	9	F76	33.1	32.0	34.75	34.31	36.1	6

[Spec = 30.0°API min] ¤ [Volume in Millions of Gallons]

Table 8. API Gravity Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1999	8	JP4	1.4	55.1	55.54	55.40	56.2	8
2000	8	JP4	1.1	54.6	55.85	55.99	56.3	12

[Spec = 45.0 - 57.0°API] ¤ [Volume in Millions of Gallons]

Table 9. API Gravity Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	42.1	43.94	44.04	44.8	129
1997	5	JP5	210.8	36.6	39.86	40.56	43.1	74
1997	6	JP5	59.2	40.8	43.05	42.92	44.2	10
1997	7	JP5	55.8	41.1	43.44	43.52	45.9	19
1997	8	JP5	58.6	40.7	43.58	43.61	45.9	20
1998	3	JP5	310.8	42.3	44.14	44.21	45.1	125
1998	5	JP5	168.3	36.4	38.82	39.17	41.9	66
1998	6	JP5	24.1	40.6	40.76	40.74	41.1	5
1998	7	JP5	54.7	40.6	44.38	44.33	46.4	19
1998	8	JP5	57.9	40.4	44.12	45.05	46.2	15
1999	2	JP5	15.9	43.7	44.07	44.09	44.6	32
1999	3	JP5	307.6	34.0	43.79	43.90	44.9	117
1999	5	JP5	168.1	28.8	38.36	39.08	42.5	53
1999	6	JP5	62.0	40.6	44.31	44.37	46.2	12
1999	7	JP5	52.6	41.3	42.94	43.54	45.6	13
1999	8	JP5	46.9	44.7	45.23	45.23	45.6	10
1999	9	JP5	19.6	42.3	42.50	42.50	42.7	2
2000	2	JP5	8.0	42.7	43.95	43.95	44.9	46
2000	3	JP5	308.8	42.1	44.07	44.14	45.5	116
2000	5	JP5	191.6	36.0	38.72	38.56	40.4	103
2000	6	JP5	60.9	40.7	43.63	43.60	46.1	11
2000	7	JP5	57.3	41.6	43.59	43.34	45.7	18
2000	8	JP5	61.4	40.6	44.51	44.80	45.7	12

[Spec = 36.0 - 48.0°API] ¤ [Volume in Millions of Gallons]

Table 10. API Gravity Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	41.0	44.12	44.83	46.4	97
1997	2	JP8	214.0	39.0	44.32	44.15	47.3	306
1997	3	JP8	799.9	40.3	44.67	44.27	49.4	658
1997	4	JP8	53.3	42.2	45.68	45.92	46.9	86
1997	5	JP8	421.5	38.5	41.36	41.63	44.9	286
1997	7	JP8	261.0	39.5	45.67	45.90	48.0	92
1997	8	JP8	301.5	41.7	44.07	45.44	48.6	170
1998	1	JP8	123.6	41.1	43.70	44.71	46.1	150
1998	2	JP8	215.8	38.0	44.13	43.62	48.1	272
1998	3	JP8	976.1	40.8	44.63	43.93	47.5	872
1998	4	JP8	60.2	43.5	45.26	45.54	46.6	112
1998	5	JP8	434.6	37.2	41.82	41.57	44.1	284
1998	6	JP8	6.7	46.0	46.00	46.00	46.0	1
1998	7	JP8	149.4	40.5	45.54	45.64	47.5	57
1998	8	JP8	262.3	41.7	44.34	45.54	48.4	204
1999	1	JP8	104.2	39.9	43.40	44.86	47.4	137
1999	2	JP8	204.0	37.8	43.80	43.63	46.2	270
1999	3	JP8	1037.7	38.8	44.49	44.78	48.1	951
1999	4	JP8	92.4	42.3	45.17	45.28	49.9	198
1999	5	JP8	306.5	34.4	40.98	40.42	43.6	199
1999	7	JP8	316.7	40.9	45.04	45.40	48.8	118
1999	8	JP8	293.9	40.0	43.92	44.71	49.4	225
1999	9	JP8	47.0	45.1	46.24	46.07	47.5	7
1999	7	AN8	3.9	46.2	46.20	46.20	46.2	1
2000	1	JP8	108.9	40.0	43.19	44.38	46.3	137
2000	2	JP8	249.6	41.3	44.30	44.13	47.6	354
2000	3	JP8	1041.4	39.7	44.30	44.42	54.0	868
2000	4	JP8	101.8	41.2	45.60	45.42	47.4	225
2000	5	JP8	371.6	37.0	41.07	41.21	44.4	203
2000	7	JP8	177.5	41.3	45.61	46.29	48.9	81
2000	8	JP8	362.7	40.0	43.80	45.27	47.9	191
2000	9	JP8	122.1	44.2	45.29	45.29	46.7	16
2000	7	AN8	5.4	48.3	48.30	48.30	48.3	1

[Spec = 37.0 - 51.0 °API] ¤ [Volume in Millions of Gallons]

Table 11. Aromatics Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1999	8	JP4	1.4	7.1	8.94	9.06	10.5	8
2000	8	JP4	1.1	6.7	7.76	7.81	8.9	12

[Spec = 25% max] ¤ [Volume in Millions of Gallons]

Table 12. Aromatics Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	11.8	18.41	18.74	20.6	129
1997	5	JP5	210.8	13.0	19.80	20.08	22.6	74
1997	6	JP5	59.2	18.0	19.46	19.40	20.7	10
1997	7	JP5	55.8	18.6	19.98	20.07	22.6	19
1997	8	JP5	58.6	14.0	16.85	16.80	19.6	20
1998	3	JP5	310.8	11.5	18.39	18.57	20.8	125
1998	5	JP5	168.3	10.0	18.04	18.08	24.1	66
1998	6	JP5	24.1	20.0	21.66	21.59	22.8	5
1998	7	JP5	54.7	15.3	18.75	18.59	20.4	19
1998	8	JP5	57.9	14.0	16.99	16.35	20.3	15
1999	2	JP5	15.9	12.6	14.01	14.20	15.4	32
1999	3	JP5	307.6	13.4	18.34	18.61	20.8	117
1999	5	JP5	168.1	11.2	15.97	15.71	21.0	53
1999	6	JP5	62.0	16.1	20.00	19.95	24.1	12
1999	7	JP5	52.6	14.7	18.99	18.17	21.0	13
1999	8	JP5	46.9	12.0	16.22	15.94	18.2	10
1999	9	JP5	19.6	16.1	16.35	16.35	16.6	2
2000	2	JP5	8.0	11.9	13.67	13.67	17.0	46
2000	3	JP5	308.8	12.9	17.86	18.09	24.3	116
2000	5	JP5	191.6	10.0	18.31	17.78	21.7	103
2000	6	JP5	60.9	16.0	18.58	18.66	22.0	11
2000	7	JP5	57.3	15.2	18.15	18.23	20.4	18
2000	8	JP5	61.4	15.3	17.82	17.60	20.0	12

[Spec = 25% max] ¤ [Volume in Millions of Gallons]

Table 13. Aromatics Conformance - JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	12.9	17.70	16.43	21.8	97
1997	2	JP8	214.0	6.1	14.33	14.43	21.0	306
1997	3	JP8	799.9	6.0	17.60	18.90	24.6	658
1997	4	JP8	53.3	13.1	16.52	15.92	22.0	86
1997	5	JP8	421.5	10.7	19.83	17.75	23.7	286
1997	7	JP8	261.0	13.5	17.17	16.60	23.0	92
1997	8	JP8	301.5	10.8	18.58	17.81	20.9	170
1998	1	JP8	123.6	14.3	18.05	16.59	21.8	150
1998	2	JP8	215.8	5.2	13.94	14.75	22.6	272
1998	3	JP8	976.1	10.4	17.60	18.75	24.8	872
1998	4	JP8	60.2	12.2	16.31	15.80	21.5	112
1998	5	JP8	434.6	9.4	19.63	17.71	22.9	284
1998	6	JP8	6.7	16.2	16.20	16.20	16.2	1
1998	7	JP8	149.4	12.3	16.85	16.70	20.3	57
1998	8	JP8	262.3	6.8	18.25	17.57	24.9	204
1999	1	JP8	104.2	11.0	19.18	17.34	23.6	137
1999	2	JP8	204.0	9.5	15.23	15.27	22.0	270
1999	3	JP8	1037.7	7.9	17.77	17.97	24.7	951
1999	4	JP8	92.4	11.4	15.98	16.16	22.4	198
1999	5	JP8	306.5	10.1	19.05	18.18	25.0	199
1999	7	JP8	316.7	9.8	16.60	16.59	21.4	118
1999	8	JP8	293.9	7.9	18.43	17.74	21.6	225
1999	9	JP8	47.0	19.4	20.00	20.11	21.8	7
1999	7	AN8	3.9	17.7	17.70	17.70	17.7	1
2000	1	JP8	108.9	12.6	18.54	16.76	23.0	137
2000	2	JP8	249.6	11.0	14.77	14.87	22.2	353
2000	3	JP8	1041.4	12.3	18.43	19.26	24.9	868
2000	4	JP8	101.8	6.2	14.57	15.26	22.5	225
2000	5	JP8	371.6	10.8	18.44	17.60	22.5	203
2000	7	JP8	177.5	10.1	16.90	15.85	24.8	81
2000	8	JP8	362.7	10.3	18.52	17.49	22.1	191
2000	9	JP8	122.1	18.4	20.90	20.86	21.9	16
2000	7	AN8	5.4	15.3	15.30	15.30	15.3	1

[Spec = 25% max] ¤ [Volume in Millions of Gallons]

Table 14. Olefins Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1999	8	JP4	1.4	0.0	0.22	0.05	1.8	8
2000	8	JP4	1.1	0.0	0.08	0.05	1.0	12

[Spec = 5% max] ¤ [Volume in Millions of Gallons]

Table 15. Olefins Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	0.4	0.87	0.82	2.7	129
1997	5	JP5	210.8	0.6	1.72	1.66	4.8	74
1997	6	JP5	59.2	0.4	0.65	0.70	1.2	10
1997	7	JP5	55.8	0.5	1.17	1.13	2.2	19
1997	8	JP5	56.6	0.4	0.88	1.06	1.4	18
1998	3	JP5	303.2	0.6	0.89	0.88	2.6	120
1998	5	JP5	148.6	0.6	1.62	1.37	3.6	57
1998	6	JP5	14.2	0.0	0.0	0.00	0.0	3
1998	7	JP5	49.3	0.6	1.06	1.01	1.9	17
1998	8	JP5	50.2	0.3	0.61	0.74	1.2	14
1999	2	JP5	15.6	0.8	1.62	1.41	3.4	32
1999	3	JP5	307.6	0.1	0.96	0.20	1.7	29
1999	5	JP5	168.1	0.5	1.17	0.62	2.3	24
1999	6	JP5	62.0	0.0	0.0	0.00	0.0	0
1999	7	JP5	52.6	1.2	1.20	1.20	1.2	1
1999	8	JP5	46.9	0.0	0.0	0.00	0.0	0
1999	9	JP5	19.6	1.2	1.20	1.20	1.2	1
2000	2	JP5	8.0	0.6	1.93	1.91	3.7	46
2000	3	JP5	38.0	0.1	0.90	0.89	1.7	19
2000	5	JP5	128.4	0.6	1.58	1.58	3.9	77
2000	7	JP5	17.0	0.5	0.73	0.67	0.9	7

[Spec = 5% max] ¤ [Volume in Millions of Gallons]

Table 16. Olefins Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	0.6	1.88	2.30	4.6	97
1997	2	JP8	214.0	0.0	1.22	1.35	4.8	306
1997	3	JP8	799.9	0.0	1.15	1.17	4.6	658
1997	4	JP8	53.3	0.3	0.85	0.89	2.4	86
1997	5	JP8	421.5	0.3	1.49	2.00	4.7	286
1997	7	JP8	261.0	0.1	0.46	0.40	1.4	78
1997	8	JP8	301.5	0.0	0.38	0.20	3.5	170
1998	1	JP8	123.6	0.5	1.62	2.00	3.9	150
1998	2	JP8	215.8	0.0	1.23	1.33	4.8	272
1998	3	JP8	976.1	0.3	1.10	1.10	4.0	872
1998	4	JP8	60.2	0.4	1.21	1.13	4.2	112
1998	5	JP8	434.6	0.1	1.25	1.73	4.3	284
1998	6	JP8	6.7	0.3	0.30	0.30	0.3	1
1998	7	JP8	149.4	0.1	0.61	0.60	2.7	57
1998	8	JP8	262.3	0.0	0.62	0.36	4.5	204
1999	1	JP8	104.2	0.1	1.31	1.68	3.9	137
1999	2	JP8	204.0	0.5	1.36	1.32	5.0	269
1999	3	JP8	1037.7	0.0	1.01	1.01	4.0	947
1999	4	JP8	92.4	0.0	1.44	1.31	4.9	198
1999	5	JP8	306.5	0.2	1.17	1.35	5.0	199
1999	7	JP8	316.7	0.0	0.84	0.93	4.6	118
1999	8	JP8	293.9	0.0	1.02	0.92	4.9	225
1999	9	JP8	47.0	0.5	0.59	0.60	0.7	7
1999	7	AN8	3.9	0.4	0.40	0.40	0.4	1
2000	1	JP8	108.9	0.6	1.52	1.93	3.8	137
2000	2	JP8	245.7	0.8	1.28	1.37	5.0	349
2000	3	JP8	872.3	0.1	1.081	1.07	4.0	788
2000	4	JP8	101.8	0.3	1.45	1.43	4.6	225
2000	5	JP8	332.4	0.3	1.22	1.42	4.0	183
2000	7	JP8	174.8	0.1	0.42	0.36	0.9	80
2000	8	JP8	362.7	0.0	0.85	0.79	3.2	191
2000	9	JP8	122.1	0.4	0.63	0.61	0.8	16
2000	7	AN8	5.4	0.3	0.30	0.30	0.3	1

[Spec = 5% max] ¤ [Volume in Millions of Gallons]

Table 17. Total Sulfur Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	0.030	0.4633	0.4871	0.850	47
1999	5	F76	93.2	0.146	0.3915	0.3880	0.526	24
1999	7	F76	38.6	0.160	0.6882	0.6787	0.980	11
1999	8	F76	250.5	0.220	0.5461	0.5048	0.950	44
1999	9	F76	9.8	0.146	0.1460	0.1460	0.146	1
2000	1	F76	12.3	0.013	0.0181	0.0181	0.026	6
2000	3	F76	146.6	0.044	0.6060	0.6346	0.990	36
2000	5	F76	139.0	0.450	0.5103	0.5105	0.580	31
2000	6	F76	88.5	0.470	0.7857	0.7351	0.990	14
2000	7	F76	115.1	0.102	0.4185	0.3763	0.950	26
2000	8	F76	120.3	0.060	0.5883	0.6436	0.960	29
2000	9	F76	33.1	0.025	0.1055	0.1386	0.246	6

[Spec = 1.0% max] ¤ [Volume in Millions of Gallons]

Table 18. Total Sulfur Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	0.030	0.0412	0.0426	0.050	8
2000	8	JP4	1.1	0.030	0.0392	0.0410	0.050	12

[Spec = 0.4% max] ¤ [Volume in Millions of Gallons]

Table 19. Total Sulfur Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	0.004	0.0915	0.0935	0.130	129
1997	5	JP5	210.8	0.000	0.0115	0.0126	0.150	74
1997	6	JP5	59.2	0.010	0.0100	0.0100	0.010	10
1997	7	JP5	55.8	0.004	0.0327	0.0253	0.150	19
1997	8	JP5	58.6	0.010	0.0330	0.0252	0.090	20
1998	3	JP5	310.8	0.030	0.0981	0.0993	0.140	125
1998	5	JP5	168.3	0.000	0.0255	0.0235	0.060	66
1998	6	JP5	24.1	0.010	0.0100	0.0100	0.010	5
1998	7	JP5	54.7	0.006	0.0454	0.0407	0.200	19
1998	8	JP5	57.9	0.001	0.0527	0.0364	0.120	15
1999	2	JP5	15.6	0.070	0.1177	0.1230	0.142	32
1999	3	JP5	307.6	0.060	0.1017	0.1034	0.140	117
1999	5	JP5	168.1	0.000	0.0161	0.0165	0.080	53
1999	6	JP5	62.0	0.010	0.0100	0.0100	0.010	12
1999	7	JP5	52.6	0.001	0.0559	0.0949	0.240	13
1999	8	JP5	46.9	0.010	0.1650	0.1544	0.280	10
1999	9	JP5	19.6	0.000	0.0015	0.0015	0.003	2
2000	2	JP5	8.0	0.054	0.0935	0.0928	0.156	46
2000	3	JP5	308.8	0.000	0.0893	0.0897	0.120	116
2000	5	JP5	191.6	0.000	0.0118	0.0125	0.057	103
2000	6	JP5	60.9	0.010	0.0100	0.0100	0.010	11
2000	7	JP5	57.3	0.001	0.0236	0.0262	0.230	18
2000	8	JP5	61.4	0.099	0.1866	0.1937	0.230	12

[Spec = 0.4% max] ¤ [Volume in Millions of Gallons]

Table 20. Total Sulfur Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	0.006	0.0353	0.0422	0.074	97
1997	2	JP8	214.0	0.000	0.0885	0.0845	0.260	306
1997	3	JP8	799.9	0.000	0.0309	0.0347	0.160	658
1997	4	JP8	53.3	0.004	0.0281	0.0287	0.050	86
1997	5	JP8	421.5	0.000	0.0604	0.0322	0.200	286
1997	7	JP8	261.0	0.009	0.1001	0.1199	0.210	92
1997	8	JP8	301.5	0.001	0.0566	0.0495	0.120	170
1998	1	JP8	123.6	0.001	0.0227	0.0255	0.190	150
1998	2	JP8	215.8	0.000	0.0734	0.0659	0.145	272
1998	3	JP8	976.1	0.000	0.0375	0.0342	0.300	741
1998	4	JP8	60.2	0.000	0.0236	0.0255	0.101	112
1998	5	JP8	434.6	0.000	0.0808	0.0498	0.300	284
1998	6	JP8	6.7	0.010	0.0100	0.0100	0.010	1
1998	7	JP8	149.4	0.009	0.0743	0.0945	0.215	57
1998	8	JP8	262.3	0.001	0.0652	0.0463	0.130	204
1999	1	JP8	104.17	0.000	0.0317	0.0301	0.289	137
1999	2	JP8	204.00	0.000	0.1021	0.0976	0.280	270
1999	3	JP8	1037.72	0.000	0.0446	0.0537	0.295	951
1999	4	JP8	92.41	0.000	0.0184	0.0208	0.052	198
1999	5	JP8	306.48	0.000	0.0696	0.0611	0.328	199
1999	7	JP8	316.74	0.002	0.0540	0.0660	0.300	118
1999	8	JP8	293.85	0.000	0.0740	0.0587	0.140	225
1999	9	JP8	47.03	0.012	0.0451	0.0406	0.190	7
1999	7	AN8	3.92	0.030	0.0300	0.0300	0.030	1
2000	1	JP8	108.9	0.000	0.0264	0.0343	0.054	137
2000	2	JP8	249.6	0.000	0.0855	0.0866	0.300	353
2000	3	JP8	1041.4	0.000	0.0425	0.0526	0.214	868
2000	4	JP8	101.8	0.000	0.0251	0.0279	0.130	225
2000	5	JP8	371.6	0.002	0.0939	0.0674	0.230	203
2000	7	JP8	177.5	0.003	0.1017	0.1475	0.350	81
2000	8	JP8	362.7	0.003	0.0819	0.0603	0.230	191
2000	9	JP8	122.1	0.001	0.0289	0.0284	0.046	16
2000	7	AN8	5.4	0.110	0.1100	0.1100	0.110	1

[Spec = 0.4% max] ¤ [Volume in Millions of Gallons]

Table 21. Mercaptan Sulfur Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	0.0000	0.00061	0.00063	0.0010	8
2000	8	JP4	1.1	0.0002	0.00084	0.00078	0.0015	12

[Spec = 0.002% max] ¤ [Volume in Millions of Gallons]

Table 22. Mercaptan Sulfur Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	0.0001	0.00072	0.00073	0.0013	129
1997	5	JP5	146.9	0.0001	0.00064	0.00073	0.0020	29
1997	7	JP5	34.0	0.0001	0.00019	0.00016	0.0006	13
1997	8	JP5	55.0	0.0001	0.00077	0.00086	0.0009	15
1998	3	JP5	310.8	0.0001	0.00099	0.00100	0.0020	125
1998	5	JP5	96.8	0.0001	0.00039	0.00051	0.0020	32
1998	7	JP5	32.1	0.0001	0.00039	0.00039	0.0014	14
1998	8	JP5	57.9	0.0006	0.00079	0.00086	0.0009	14
1999	2	JP5	15.6	0.0000	0.00062	0.00085	0.0015	32
1999	3	JP5	307.6	0.0001	0.00096	0.00099	0.0040	117
1999	5	JP5	168.1	0.0001	0.00026	0.00024	0.0012	38
1999	7	JP5	52.6	0.0001	0.00052	0.00065	0.0015	12
1999	8	JP5	46.9	0.0003	0.00083	0.00078	0.0014	10
2000	2	JP5	4.1	0.0000	0.00029	0.00030	0.0012	24
2000	3	JP5	308.8	0.0000	0.00114	0.00116	0.0040	116
2000	5	JP5	65.3	0.0001	0.00020	0.00020	0.0005	27
2000	7	JP5	55.6	0.0001	0.00039	0.00036	0.0014	17
2000	8	JP5	61.4	0.0006	0.00125	0.00131	0.0017	12

[Spec = 0.002% max] ¤ [Volume in Millions of Gallons]

Table 23. Mercaptan Sulfur Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	86.6	0.0001	0.00018	0.00017	0.0014	57
1997	2	JP8	197.2	0.0001	0.00123	0.00126	0.0040	295
1997	3	JP8	799.9	0.0001	0.00097	0.00095	0.0071	381
1997	4	JP8	52.9	0.0002	0.00171	0.00178	0.0030	85
1997	5	JP8	333.9	0.0001	0.00065	0.00079	0.0021	136
1997	7	JP8	260.5	0.0000	0.00101	0.00109	0.0025	91
1997	8	JP8	51.1	0.0004	0.00059	0.00059	0.0010	86
1998	1	JP8	119.0	0.0001	0.00032	0.00029	0.0017	83
1998	2	JP8	186.4	0.0001	0.00085	0.00079	0.0020	252
1998	3	JP8	684.3	0.0000	0.00078	0.00054	0.0023	568
1998	4	JP8	60.2	0.0002	0.00146	0.00150	0.0030	112
1998	5	JP8	377.4	0.0002	0.00087	0.00076	0.0020	121
1998	6	JP8	6.7	0.0004	0.00040	0.00040	0.0004	1
1998	7	JP8	149.4	0.0000	0.00083	0.00091	0.0020	57
1998	8	JP8	262.3	0.0002	0.00058	0.00024	0.0018	158
1999	1	JP8	104.2	0.0003	0.00033	0.00030	0.0019	64
1999	2	JP8	204.0	0.0000	0.00120	0.00095	0.0020	232
1999	3	JP8	1037.7	0.0000	0.00086	0.00082	0.0029	683
1999	4	JP8	92.4	0.0000	0.00103	0.00102	0.0020	166
1999	5	JP8	306.5	0.0001	0.00106	0.00058	0.0021	67
1999	7	JP8	316.7	0.0001	0.00078	0.00077	0.0040	97
1999	8	JP8	293.8	0.0002	0.00063	0.00046	0.0016	183
1999	9	JP8	47.0	0.0001	0.00027	0.00025	0.0005	7
1999	7	AN8	3.9	0.0012	0.00120	0.00120	0.0012	1
2000	1	JP8	104.0	0.0001	0.00037	0.00037	0.0030	78
2000	2	JP8	210.8	0.0000	0.00119	0.00114	0.0020	308
2000	3	JP8	1000.1	0.0000	0.00085	0.00090	0.0020	721
2000	4	JP8	75.7	0.0000	0.00075	0.00067	0.0020	146
2000	5	JP8	341.9	0.0001	0.00098	0.00092	0.0020	126
2000	7	JP8	166.5	0.0001	0.00121	0.00131	0.0030	70
2000	8	JP8	182.4	0.0002	0.00078	0.00085	0.0070	147
2000	9	JP8	122.1	0.0001	0.00020	0.00019	0.0003	16
2000	7	AN8	5.4	0.0007	0.00070	0.00070	0.0007	1

[Spec = 0.002% max] ¤ [Volume in Millions of Gallons]

Table 24. Particulate Contamination Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	0.10	2.147	2.480	10.0	47
1999	5	F76	93.2	0.70	2.808	2.951	9.10	24
1999	7	F76	38.6	1.50	4.021	4.079	7.10	11
1999	8	F76	250.5	0.00	1.742	1.801	4.00	44
1999	9	F76	9.8	1.20	1.200	1.200	1.20	1
2000	1	F76	12.3	0.15	1.242	1.249	3.30	6
2000	3	F76	146.6	0.10	2.467	2.605	7.70	36
2000	5	F76	139.0	0.30	2.484	2.256	8.20	31
2000	6	F76	88.5	1.00	3.607	3.468	6.80	14
2000	7	F76	115.1	0.80	2.323	2.193	5.80	26
2000	8	F76	120.3	0.00	0.928	0.876	2.00	29
2000	9	F76	33.1	0.20	3.417	3.637	10.00	6

[Spec = 10 mg/L max] ¤ [Volume in Millions of Gallons]

Table 25. Particulate Contamination Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	0.05	0.556	0.540	0.8	8
2000	8	JP4	1.1	0.16	0.409	0.623	0.95	12

[Spec = 1.0 mg/L max] ¤ [Volume in Millions of Gallons]

Table 26. Particulate Contamination Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	0.03	0.196	0.194	0.7	129
1997	5	JP5	210.8	0	0.171	0.137	0.6	74
1997	6	JP5	59.2	0.18	0.293	0.278	0.5	10
1997	7	JP5	55.8	0.13	0.436	0.405	0.8	19
1997	8	JP5	58.6	0.1	0.386	0.441	0.7	20
1998	3	JP5	310.8	0.05	0.234	0.186	2.0	125
1998	5	JP5	168.3	0	0.286	0.264	1.0	66
1998	6	JP5	24.1	0.2	0.217	0.212	0.3	5
1998	7	JP5	54.7	0.15	0.520	0.510	1.0	19
1998	8	JP5	57.9	0.1	0.485	0.497	0.9	15
1999	2	JP5	15.6	0.20	0.577	0.718	1.00	32
1999	3	JP5	307.6	0.01	0.223	0.217	1.00	117
1999	5	JP5	168.1	0.00	0.298	0.272	1.00	53
1999	6	JP5	62.0	0.10	0.393	0.396	0.68	12
1999	7	JP5	52.6	0.20	0.430	0.466	0.78	13
1999	8	JP5	46.9	0.40	0.572	0.586	0.80	10
1999	9	JP5	19.6	0.32	0.475	0.476	0.63	2
2000	2	JP5	8.0	0.10	0.442	0.441	0.90	46
2000	3	JP5	308.8	0.03	0.162	0.157	1.60	116
2000	5	JP5	191.6	0.00	0.386	0.394	1.00	103
2000	6	JP5	60.9	0.39	0.557	0.565	0.75	11
2000	7	JP5	57.3	0.08	0.438	0.387	0.90	18
2000	8	JP5	61.4	0.21	0.617	0.629	0.90	12

[Spec = 1.0 mg/L max] ¤ [Volume in Millions of Gallons]

Table 27. Particulate Contamination Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	0.00	0.184	0.186	1.00	97
1997	2	JP8	214.0	0.03	0.446	0.401	1.00	306
1997	3	JP8	799.9	0.00	0.340	0.316	1.00	658
1997	4	JP8	53.3	0.01	0.316	0.327	1.00	86
1997	5	JP8	421.5	0.00	0.286	0.346	1.00	286
1997	7	JP8	261.00	0.03	0.353	0.393	0.90	83
1997	8	JP8	301.5	0.05	0.434	0.580	1.10	170
1998	1	JP8	123.6	0.00	0.225	0.366	0.80	150
1998	2	JP8	215.8	0.02	0.436	0.420	1.00	272
1998	3	JP8	976.1	0.00	0.300	0.316	0.90	741
1998	4	JP8	60.2	0.10	0.316	0.332	0.90	112
1998	5	JP8	434.6	0.03	0.314	0.350	1.00	284
1998	6	JP8	6.7	0.79	0.790	0.790	0.80	1
1998	7	JP8	149.4	0.05	0.374	0.416	1.00	57
1998	8	JP8	262.3	0.09	0.425	0.500	2.10	204
1999	1	JP8	104.2	0.00	0.239	0.320	1.00	137
1999	2	JP8	204.0	0.08	0.465	0.476	1.00	270
1999	3	JP8	1037.7	0.00	0.323	0.357	1.20	951
1999	4	JP8	92.4	0.01	0.315	0.306	0.98	198
1999	5	JP8	306.5	0.00	0.328	0.328	1.00	199
1999	7	JP8	316.7	0.01	0.403	0.414	1.00	118
1999	8	JP8	293.8	0.00	0.340	0.494	0.90	225
1999	9	JP8	47.0	0.20	0.343	0.333	0.60	7
1999	7	AN8	3.9	0.97	0.970	0.970	0.97	1
2000	1	JP8	108.9	0.00	0.200	0.236	1.00	137
2000	2	JP8	249.6	0.03	0.348	0.360	1.29	354
2000	3	JP8	1041.4	0.00	0.366	0.384	1.30	868
2000	4	JP8	101.8	0.03	0.335	0.322	1.00	225
2000	5	JP8	371.6	0.06	0.365	0.296	1.80	203
2000	7	JP8	177.5	0.02	0.341	0.417	0.95	80
2000	8	JP8	362.7	0.00	0.336	0.509	1.00	191
2000	9	JP8	122.1	0.10	0.388	0.398	0.60	16
2000	7	AN8	5.4	0.40	0.400	0.400	0.40	1

[Spec = 1.0 mg/L max] ¤ [Volume in Millions of Gallons]

Table 28. Filtration Time Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.42	4	4.75	4.78	7	8
2000	8	JP4	1.1	4	5.6	6.5	9	12

[Spec = 15 minutes max] ¤ [Volume in Millions of Gallons]

Table 29. Filtration Time Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	2	3.3	3.1	8	129
1997	5	JP5	210.8	3	4.4	4.2	12	74
1997	6	JP5	59.2	7	8.7	8.6	10	10
1997	7	JP5	55.8	4	6.5	6.7	11	19
1997	8	JP5	58.6	3	6.2	5.9	15	20
1998	3	JP5	310.8	2	3.2	3.1	9	125
1998	5	JP5	168.3	3	5.8	5.6	15	66
1998	6	JP5	24.1	10	11.4	11.6	13	5
1998	7	JP5	54.7	4	6.7	6.7	12	19
1998	8	JP5	57.9	3	5.2	5.1	7	15
1999	2	JP5	15.6	4	5.9	7.8	9	32
1999	3	JP5	307.6	2	3.2	3.1	6	117
1999	5	JP5	168.1	3	7.1	6.7	14	52
1999	6	JP5	62.0	8	10.8	10.8	13	12
1999	7	JP5	52.6	4	6.0	5.8	8	13
1999	8	JP5	46.9	4	4.9	4.9	7	10
1999	9	JP5	19.6	2	4.5	4.5	7	2
2000	2	JP5	8.0	4	7.2	7.2	11	46
2000	3	JP5	308.8	2	3.4	3.3	8	116
2000	5	JP5	191.6	3	5.4	5.8	12	103
2000	6	JP5	60.9	8	10.0	10.2	13	11
2000	7	JP5	57.3	3	6.1	5.7	12	18
2000	8	JP5	61.4	4	5.0	4.7	8	12

[Spec = 15 minutes max] ¤ [Volume in Millions of Gallons]

Table 30. Filtration Time Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	4	7.4	6.8	11	97
1997	2	JP8	214.0	3	7.4	7.2	14	306
1997	3	JP8	799.9	4	6.4	6.7	14	658
1997	4	JP8	53.3	5	7.5	7.3	14	86
1997	5	JP8	421.5	3	5.2	6.3	15	286
1997	7	JP8	261.0	4	7.6	7.1	14	83
1997	8	JP8	301.5	4	6.7	7.3	11	170
1998	1	JP8	123.6	4	7.5	7.0	12	150
1998	2	JP8	216.0	3	7.6	7.6	15	272
1998	3	JP8	927.6	3	6.9	7.6	15	872
1998	4	JP8	60.2	4	8.4	8.4	14	112
1998	5	JP8	434.6	2	5.4	6.7	15	284
1998	6	JP8	6.7	10	10	10	10	1
1998	7	JP8	149.4	5	7.5	7.3	12	57
1998	8	JP8	262.3	4	6.6	6.4	13	204
1999	1	JP8	104.2	3	7.5	7.2	11	137
1999	2	JP8	204.0	3	8.3	8.5	15	270
1999	3	JP8	1037.7	1	6.4	6.2	15	950
1999	4	JP8	92.4	4	7.0	7.2	13	198
1999	5	JP8	306.5	3	5.6	5.6	13	191
1999	7	JP8	316.7	4	9.1	9.0	31	118
1999	8	JP8	293.8	4	7.3	6.7	14	225
1999	9	JP8	47.0	5	6.0	6.0	7	7
1999	7	AN8	3.9	7	7.0	7.0	7	1
2000	1	JP8	108.9	3	7.8	7.3	12	137
2000	2	JP8	249.6	3	8.0	8.1	17	354
2000	3	JP8	1041.4	3	6.6	6.2	24	868
2000	4	JP8	101.8	3	7.8	7.8	15	225
2000	5	JP8	371.6	3	5.2	5.9	11	203
2000	7	JP8	177.5	5	9.1	7.9	15	80
2000	8	JP8	362.7	4	7.0	6.8	13	190
2000	9	JP8	122.1	4	8.5	8.8	24	16
2000	7	AN8	5.4	6	6.0	6.0	6	1

[Spec = 15 minutes max] ¤ [Volume in Millions of Gallons]

Table 31. Total Acid Number Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	0.002	0.0449	0.0522	0.262	47
1999	5	F76	93.2	0.000	0.1449	0.1339	0.300	24
1999	7	F76	38.6	0.002	0.0538	0.0560	0.100	11
1999	8	F76	250.5	0.010	0.0869	0.0734	0.241	44
1999	9	F76	9.8	0.030	0.0300	0.0300	0.030	1
2000	1	F76	12.3	0.030	0.0383	0.0385	0.070	6
2000	3	F76	146.6	0.008	0.1146	0.1280	0.300	36
2000	5	F76	139.0	0.000	0.0683	0.0582	0.290	31
2000	6	F76	88.5	0.003	0.0259	0.0270	0.040	14
2000	7	F76	115.1	0.010	0.0688	0.0597	0.300	26
2000	8	F76	120.3	0.010	0.0870	0.0857	0.296	29
2000	9	F76	33.1	0.005	0.0342	0.0405	0.100	6

[Spec = 0.30 mg KOH/100mL max] ¤ [Volume in Millions of Gallons]

Table 32. Total Acid Number Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	0.006	0.0080	0.0084	0.011	8
2000	8	JP4	1.1	0.007	0.0085	0.0085	0.011	12

[Spec = 0.015 mg KOH/g max] ¤ [Volume in Millions of Gallons]

Table 33. Total Acid Number Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	0.001	0.0031	0.0030	0.009	129
1997	5	JP5	210.8	0.001	0.0050	0.0060	0.015	73
1997	6	JP5	59.2	0.003	0.0044	0.0047	0.008	10
1997	7	JP5	55.8	0.001	0.0051	0.0054	0.008	19
1997	8	JP5	58.6	0.001	0.0071	0.0061	0.020	20
1998	3	JP5	310.8	0.001	0.0029	0.0029	0.012	125
1998	5	JP5	168.3	0.001	0.0055	0.0054	0.014	66
1998	6	JP5	24.1	0.003	0.0046	0.0049	0.008	5
1998	7	JP5	54.7	0.003	0.0049	0.0053	0.007	19
1998	8	JP5	57.9	0.003	0.0089	0.0060	0.019	15
1999	2	JP5	15.6	0.002	0.0067	0.0057	0.014	32
1999	3	JP5	307.6	0.001	0.0035	0.0034	0.008	117
1999	5	JP5	168.1	0.000	0.0051	0.0052	0.015	52
1999	6	JP5	62.0	0.003	0.0032	0.0032	0.005	12
1999	7	JP5	52.6	0.002	0.0041	0.0045	0.009	13
1999	8	JP5	46.9	0.005	0.0077	0.0077	0.011	10
1999	9	JP5	19.6	0.001	0.0030	0.0030	0.005	2
2000	2	JP5	8.0	0.002	0.0061	0.0062	0.011	46
2000	3	JP5	308.8	0.001	0.0036	0.0035	0.011	116
2000	5	JP5	191.6	0.000	0.0040	0.0043	0.014	103
2000	6	JP5	60.9	0.002	0.0034	0.0033	0.006	11
2000	7	JP5	57.3	0.001	0.0046	0.0048	0.007	18
2000	8	JP5	61.4	0.001	0.0046	0.0036	0.018	12

[Spec = 0.015 mg KOH/g max] ¤ [Volume in Millions of Gallons]

Table 34. Total Acid Number Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	0.001	0.0063	0.0077	0.015	97
1997	2	JP8	214.0	0.0002	0.0043	0.0047	0.014	306
1997	3	JP8	799.9	0.0006	0.0076	0.0038	0.14	658
1997	4	JP8	53.3	0.001	0.0060	0.0062	0.014	86
1997	5	JP8	421.5	0.001	0.0045	0.0040	0.013	285
1997	7	JP8	261.0	0.001	0.0035	0.0039	0.0095	92
1997	8	JP8	301.5	0.001	0.0125	0.0093	0.020	170
1998	1	JP8	123.6	0.001	0.0079	0.0112	0.015	150
1998	2	JP8	215.8	0.001	0.0045	0.0041	0.014	272
1998	3	JP8	976.1	0.000	0.0057	0.0041	0.015	872
1998	4	JP8	60.2	0.001	0.0065	0.0066	0.014	112
1998	5	JP8	434.6	0.001	0.0044	0.0037	0.014	284
1998	6	JP8	6.7	0.006	0.006	0.006	0.006	1
1998	7	JP8	149.4	0.001	0.0034	0.0036	0.009	57
1998	8	JP8	262.3	0.001	0.0125	0.0092	0.020	204
1999	1	JP8	104.2	0.002	0.0064	0.0096	0.018	137
1999	2	JP8	204.0	0.000	0.0041	0.0043	0.030	270
1999	3	JP8	1037.7	0.000	0.0067	0.0057	0.018	951
1999	4	JP8	92.4	0.000	0.0051	0.0053	0.013	198
1999	5	JP8	306.5	0.000	0.0045	0.0045	0.015	191
1999	7	JP8	316.7	0.000	0.0050	0.0059	0.014	118
1999	8	JP8	293.8	0.000	0.0123	0.0088	0.020	225
1999	9	JP8	47.0	0.001	0.0051	0.0047	0.009	7
1999	7	AN8	3.9	0.008	0.0080	0.0080	0.008	1
2000	1	JP8	108.9	0.001	0.0075	0.0087	0.159	137
2000	2	JP8	249.6	0.000	0.0035	0.0038	0.013	353
2000	3	JP8	1041.4	0.000	0.0056	0.0045	0.100	868
2000	4	JP8	101.8	0.000	0.0051	0.0046	0.015	225
2000	5	JP8	371.6	0.000	0.0058	0.0067	0.015	203
2000	7	JP8	177.5	0.000	0.0038	0.0046	0.010	81
2000	8	JP8	362.7	0.003	0.0144	0.0093	0.180	191
2000	9	JP8	122.1	0.001	0.0108	0.0109	0.090	16
2000	7	AN8	5.4	0.008	0.0080	0.0080	0.008	1

[Spec = 0.015 mg KOH/g max] ¤ [Volume in Millions of Gallons]

Table 35. Smoke Point Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	23.0	26.38	26.97	30.0	8
2000	8	JP4	1.1	26.0	29.50	27.38	34.0	12

[Spec = 20.0 mm max] ¤ [Volume in Millions of Gallons]

Table 36. Smoke Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	19.0	20.68	20.31	26.0	129
1997	5	JP5	210.8	19.0	19.95	20.21	22.5	74
1997	6	JP5	59.2	21.0	22.40	22.19	24.0	10
1997	7	JP5	55.8	21.0	22.26	21.92	25.0	19
1997	8	JP5	58.6	19.7	23.28	23.30	25.0	20
1998	3	JP5	310.8	19.0	20.55	20.32	26.0	125
1998	5	JP5	168.3	19.0	19.49	19.56	20.5	66
1998	6	JP5	24.1	21.0	21.60	21.49	23.0	5
1998	7	JP5	54.7	21.0	22.68	22.06	25.0	19
1998	8	JP5	57.9	19.2	22.43	23.25	25.0	15
1999	2	JP5	15.6	26.0	26.00	26.00	26.0	32
1999	3	JP5	307.6	19.0	20.73	20.37	26.0	117
1999	5	JP5	168.1	18.0	19.94	20.23	30.0	53
1999	6	JP5	62.0	21.0	22.83	22.85	26.0	12
1999	7	JP5	52.6	20.0	22.00	22.41	25.0	13
1999	8	JP5	46.9	22.0	23.60	23.60	25.0	10
1999	9	JP5	19.6	20.0	20.00	20.00	20.0	2
2000	2	JP5	8.0	26.0	26.00	26.00	26.0	46
2000	3	JP5	308.8	19.0	21.16	20.86	27.0	116
2000	5	JP5	191.6	19.0	19.74	19.71	22.0	103
2000	6	JP5	60.9	20.0	22.36	22.33	25.0	11
2000	7	JP5	57.3	21.0	21.78	22.03	25.0	18
2000	8	JP5	61.4	20.0	23.17	23.44	25.0	12

[Spec = 19.0 mm max] ¤ [Volume in Millions of Gallons]

Table 37. Smoke Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	20.0	21.39	21.29	25.0	97
1997	2	JP8	214.0	19.0	25.29	24.93	29.0	306
1997	3	JP8	799.9	19.0	23.41	22.15	29.0	658
1997	4	JP8	53.3	21.0	26.11	26.84	29.0	86
1997	5	JP8	421.5	19.0	20.09	20.56	25.0	286
1997	7	JP8	261.0	19.0	24.49	24.76	27.0	92
1997	8	JP8	301.5	19.4	21.76	23.15	26.2	170
1998	1	JP8	123.6	19.2	21.43	21.88	25.0	150
1998	2	JP8	215.8	19.0	24.78	24.06	29.0	272
1998	3	JP8	976.1	19.0	23.24	22.18	34.0	872
1998	4	JP8	60.2	21.0	26.13	26.81	29.7	112
1998	5	JP8	434.6	19.0	20.09	20.42	24.0	284
1998	6	JP8	6.7	27.0	27.00	27.00	27.0	1
1998	7	JP8	149.4	22.0	24.61	24.63	26.0	57
1998	8	JP8	262.3	19.2	22.15	23.60	28.0	204
1999	1	JP8	104.2	17.0	21.15	21.67	31.0	137
1999	2	JP8	204.0	19.0	24.37	24.28	43.0	270
1999	3	JP8	1037.7	19.0	23.19	22.60	44.0	951
1999	4	JP8	92.4	21.0	26.58	26.47	35.0	196
1999	5	JP8	306.5	18.0	19.94	20.04	24.0	199
1999	7	JP8	316.7	21.0	24.71	24.57	27.0	118
1999	8	JP8	293.8	19.0	21.55	22.61	35.0	225
1999	9	JP8	47.0	23.0	23.00	23.00	23.0	7
1999	7	AN8	3.9	25.0	25.00	25.00	25.0	1
2000	1	JP8	108.9	18.0	20.55	20.87	24.0	137
2000	2	JP8	249.6	19.0	24.69	24.77	45.0	353
2000	3	JP8	1041.4	19.0	22.55	21.87	32.0	868
2000	4	JP8	101.8	18.0	27.38	26.84	32.0	225
2000	5	JP8	371.6	18.0	20.14	20.43	24.0	203
2000	7	JP8	177.5	21.0	25.22	25.39	27.0	81
2000	8	JP8	362.7	19.0	21.53	22.88	27.0	191
2000	9	JP8	122.1	20.0	22.81	22.95	24.0	16
2000	7	AN8	5.4	26.0	26.00	26.00	26.0	1

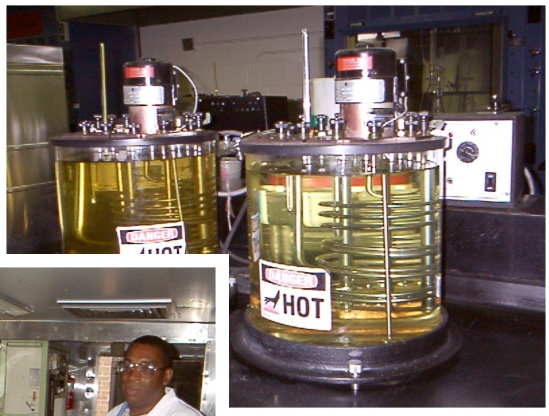
[Spec = 25 mm min **or** 19 mm min w/ 3.0% Naphthalenes] ¤ [Volume in Millions of Gallons]

Table 38. Naphthalenes Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	0.9	1.38	1.57	3.0	97
1997	2	JP8	161.5	0.1	1.31	1.28	1.7	180
1997	3	JP8	695.6	0.1	1.06	1.08	3.5	423
1997	4	JP8	2.4	0.0	0.28	0.05	1.3	14
1997	5	JP8	410.5	0.1	1.79	1.04	3.0	282
1997	7	JP8	129.9	0.1	1.54	1.56	2.9	60
1997	8	JP8	301.5	0.1	1.67	1.16	2.9	170
1998	1	JP8	121.9	0.0	1.38	1.56	2.2	122
1998	2	JP8	135.0	0.1	1.26	1.23	2.1	122
1998	3	JP8	845.8	0.0	1.17	1.13	2.3	579
1998	4	JP8	2.8	0.1	0.51	0.51	1.0	18
1998	5	JP8	434.6	0.2	1.99	1.27	2.8	284
1998	6	JP8	6.7	0.5	0.53	0.53	0.5	1
1998	7	JP8	102.3	0.1	1.23	1.18	3.0	46
1998	8	JP8	194.7	0.1	2.18	1.63	2.9	146
1999	1	JP8	104.2	0.2	1.42	1.62	3.0	137
1999	2	JP8	204.0	0.2	1.36	0.91	2.8	210
1999	3	JP8	1037.7	0.0	1.38	1.12	3.0	634
1999	4	JP8	92.4	0.0	0.39	0.04	1.0	44
1999	5	JP8	306.5	0.0	1.45	1.16	3.0	197
1999	7	JP8	316.7	0.1	1.55	0.67	2.8	66
1999	8	JP8	293.8	0.2	2.02	1.53	3.0	214
1999	9	JP8	47.0	0.9	1.09	1.11	1.4	7
2000	1	JP8	108.8	0.9	1.33	1.42	3.0	136
2000	2	JP8	174.9	0.1	1.31	1.32	2.3	281
2000	3	JP8	943.1	0.0	1.43	1.40	2.9	668
2000	4	JP8	40.9	0.0	0.52	0.61	2.7	111
2000	5	JP8	371.6	0.1	1.79	1.42	3.0	203
2000	7	JP8	14.7	1.4	2.45	2.53	3.0	15
2000	8	JP8	352.9	0.5	2.03	1.42	3.0	190
2000	9	JP8	122.1	0.7	1.08	1.08	1.3	16

[Spec = 3.0% max] ¤ [Volume in Millions of Gallons]

EC



Viscosity

JFTOT

Separometer

API

Distillation

Flash Point

Table 39. Hydrogen Content Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	12.8	13.32	13.30	15.3	47
1999	5	F76	93.2	12.5	12.86	12.84	13.1	24
1999	7	F76	38.6	13.1	13.69	13.64	15.8	11
1999	8	F76	250.5	12.6	13.14	13.13	13.7	44
1999	9	F76	9.8	13.3	13.30	13.30	13.3	1
2000	1	F76	12.3	12.9	13.35	13.35	13.6	6
2000	3	F76	146.6	12.5	13.27	13.24	14.8	36
2000	5	F76	139.0	12.6	12.76	12.75	13.0	31
2000	6	F76	88.5	13.0	13.54	13.49	14.0	14
2000	7	F76	115.1	13.2	13.63	13.71	15.5	26
2000	8	F76	120.3	12.8	13.18	13.21	13.6	29
2000	9	F76	33.1	13.3	13.31	13.31	13.4	6

[Spec = 12.5% min] ¤ [Volume in Millions of Gallons]

Table 40. Hydrogen Content Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	14.5	14.58	14.55	14.7	8
2000	8	JP4	1.1	14.5	14.64	14.18	14.7	11

[Spec = 13.5% min] ¤ [Volume in Millions of Gallons]

Table 41. Hydrogen Content Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	13.4	13.97	13.97	14.4	129
1997	5	JP5	210.8	13.4	13.58	13.65	14.1	74
1997	6	JP5	59.2	13.6	13.78	13.75	14.0	10
1997	7	JP5	55.8	13.6	13.81	13.82	14.1	19
1997	8	JP5	58.6	13.6	13.84	13.78	14.1	20
1998	3	JP5	310.8	13.4	13.95	13.96	14.7	125
1998	5	JP5	168.3	13.4	13.59	13.57	15.3	66
1998	6	JP5	24.1	13.6	13.62	13.62	13.7	5
1998	7	JP5	54.7	13.4	13.89	13.86	14.1	19
1998	8	JP5	57.9	13.8	13.93	13.93	14.2	15
1999	2	JP5	15.6	13.9	14.42	15.24	15.7	32
1999	3	JP5	307.6	13.4	13.92	13.93	14.4	117
1999	5	JP5	168.1	13.4	13.60	13.64	14.2	53
1999	6	JP5	62.0	13.6	13.90	13.90	14.2	12
1999	7	JP5	52.6	13.7	14.07	14.04	15.0	13
1999	8	JP5	46.9	13.8	13.99	14.01	14.4	10
1999	9	JP5	19.6	13.7	13.78	13.77	13.9	2
2000	2	JP5	8.0	13.4	14.46	14.47	15.5	46
2000	3	JP5	308.8	13.2	14.00	14.01	14.8	116
2000	5	JP5	191.6	13.4	13.58	13.58	15.8	103
2000	6	JP5	60.9	13.6	13.85	13.84	14.1	11
2000	7	JP5	57.3	13.6	13.80	13.77	14.1	18
2000	8	JP5	61.4	13.8	13.87	13.88	14.0	12

[Spec = 13.4% min] ¤ [Volume in Millions of Gallons]

Table 42. Hydrogen Content Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	13.5	13.86	13.83	14.0	97
1997	2	JP8	214.0	13.4	13.89	13.88	14.4	306
1997	3	JP8	799.9	12.9	15.87	14.16	13.9	658
1997	4	JP8	53.3	13.6	13.85	13.89	14.0	86
1997	5	JP8	421.5	13.4	13.54	13.63	13.9	286
1997	7	JP8	261.0	13.5	14.02	14.01	15.2	92
1997	8	JP8	301.5	13.4	13.92	13.90	14.1	170
1998	1	JP8	123.6	13.4	13.69	13.78	14.0	150
1998	2	JP8	215.8	13.4	13.94	13.86	15.0	272
1998	3	JP8	976.1	13.4	16.98	14.37	13.9	871
1998	4	JP8	60.2	13.6	13.85	13.88	14.1	112
1998	5	JP8	434.6	13.4	13.57	13.65	14.6	284
1998	6	JP8	6.7	14.0	14.00	14.00	14.0	1
1998	7	JP8	149.4	13.1	13.90	13.92	14.2	57
1998	8	JP8	262.3	13.6	13.92	13.94	14.4	204
1999	1	JP8	104.2	13.3	13.63	13.76	14.0	137
1999	2	JP8	204.0	13.4	13.85	13.85	14.2	257
1999	3	JP8	1037.7	13.2	13.85	13.85	15.5	951
1999	4	JP8	92.4	13.4	13.85	13.79	14.2	196
1999	5	JP8	306.5	13.4	13.57	13.59	15.5	199
1999	7	JP8	316.7	13.6	13.93	13.94	15.5	118
1999	8	JP8	293.8	13.5	13.88	13.85	14.5	216
1999	9	JP8	47.0	13.7	13.81	13.80	13.9	7
1999	7	AN8	3.9	13.8	13.80	13.80	13.8	1
2000	1	JP8	108.9	13.3	13.64	13.76	14.4	137
2000	2	JP8	249.6	13.4	13.89	13.87	14.4	353
2000	3	JP8	1041.4	13.4	13.81	13.78	16.0	868
2000	4	JP8	101.8	13.3	13.95	13.85	14.6	223
2000	5	JP8	371.6	13.4	13.56	13.61	14.1	203
2000	7	JP8	177.5	13.4	13.95	13.92	15.2	80
2000	8	JP8	362.7	13.4	13.87	10.09	14.3	177
2000	9	JP8	122.1	13.4	13.67	13.66	13.8	16
2000	7	AN8	5.4	14.0	14.03	14.03	14.0	1

[Spec = 13.4% min] ¤ [Volume in Millions of Gallons]

Table 43. Distillation (10% Recovered) Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	196	232.89	179.77	246	39
1999	5	F76	93.2	212	233.18	233.87	248	24
1999	7	F76	38.6	201	217.73	215.83	240	11
1999	8	F76	250.5	203	236.62	236.46	261	44
1999	9	F76	9.8	365	365.00	365.00	365	1
2000	1	F76	12.3	211	214.35	214.40	221	6
2000	3	F76	146.6	228	237.29	237.03	246	36
2000	5	F76	139.0	212	232.11	231.84	250	31
2000	6	F76	88.5	212	231.12	229.83	249	14
2000	7	F76	115.1	201	216.85	216.52	238	26
2000	8	F76	120.3	203	223.78	221.20	262	29
2000	9	F76	33.1	231	238.67	238.58	254	6

[Spec = (Report)] ¤ [Volume in Millions of Gallons]

Table 44. Distillation (10% Recovered) Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	88	91.00	90.54	94	8
2000	8	JP4	1.1	87	88.77	88.33	91	12

[Spec = (Report)] ¤ [Volume in Millions of Gallons]

Table 45. Distillation (10% Recovered) Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	156	174.06	172.63	201	129
1997	5	JP5	210.8	170	191.49	183.99	202	74
1997	6	JP5	59.2	189	191.30	191.48	193	10
1997	7	JP5	55.8	180	193.36	192.69	202	19
1997	8	JP5	58.6	189	192.81	193.40	198	20
1998	3	JP5	310.8	150	174.34	173.57	201	125
1998	5	JP5	168.3	176	195.09	192.60	205	66
1998	6	JP5	24.1	194	195.00	197.07	197	5
1998	7	JP5	54.7	186	193.93	191.42	201	19
1998	8	JP5	57.9	191	194.10	194.15	195	15
1999	2	JP5	15.6	186	189.21	186.91	192	32
1999	3	JP5	307.6	171	175.73	174.40	197	117
1999	5	JP5	168.1	172	192.71	179.87	201	52
1999	6	JP5	62.0	180	188.92	188.96	191	12
1999	7	JP5	52.6	187	192.78	192.37	196	13
1999	8	JP5	46.9	191	192.95	193.16	200	10
1999	9	JP5	19.6	197	197.50	197.50	198	2
2000	2	JP5	8.0	186	189.82	189.90	198	46
2000	3	JP5	308.8	149	177.15	175.93	200	116
2000	5	JP5	191.6	185	198.31	197.95	202	103
2000	6	JP5	60.9	188	190.36	190.38	193	11
2000	7	JP5	57.3	183	191.16	191.92	198	18
2000	8	JP5	61.4	191	192.39	192.13	196	12

[Spec = 205/206 °C max] ¤ [Volume in Millions of Gallons]

Table 46. Distillation (10% Recovered) Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	168	178.92	176.73	191	97
1997	2	JP8	214.0	172	181.48	181.42	197	306
1997	3	JP8	799.9	126	174.86	177.05	200	658
1997	4	JP8	53.3	156	167.06	165.02	193	86
1997	5	JP8	421.5	148	171.53	167.34	201	286
1997	7	JP8	261.0	152	171.74	171.83	193	92
1997	8	JP8	301.5	157	167.37	170.52	195	170
1998	1	JP8	123.6	166	178.67	172.78	195	150
1998	2	JP8	215.8	167	183.37	182.85	197	272
1998	3	JP8	976.1	183	180.11	181.13	201	741
1998	4	JP8	60.2	158	172.39	169.06	186	112
1998	5	JP8	434.6	148	168.32	165.96	199	284
1998	6	JP8	6.7	170	170.00	170.00	170	1
1998	7	JP8	149.4	157	174.35	174.22	190	57
1998	8	JP8	262.3	154	166.93	169.92	182	204
1999	1	JP8	104.2	164	179.00	173.61	194	137
1999	2	JP8	204.0	158	183.07	183.71	198	270
1999	3	JP8	1037.7	122	177.12	179.12	202	951
1999	4	JP8	92.4	156	172.67	170.05	189	198
1999	5	JP8	306.5	148	178.42	161.94	201	191
1999	7	JP8	316.7	163	175.04	173.86	190	118
1999	8	JP8	293.8	158	166.88	168.09	177	225
1999	9	JP8	47.0	168	172.43	172.69	176	7
1999	7	AN8	3.9	162	162.00	162.00	162	1
2000	1	JP8	108.9	169	179.98	176.41	194	137
2000	2	JP8	249.6	161	180.12	180.93	198	354
2000	3	JP8	1041.4	156	177.62	178.23	198	868
2000	4	JP8	101.8	155	170.98	170.41	187	225
2000	5	JP8	371.6	146	173.24	167.55	202	203
2000	7	JP8	177.5	158	174.01	174.73	194	81
2000	8	JP8	362.7	153	167.81	168.14	195	191
2000	9	JP8	122.1	167	172.69	172.82	178	16
2000	7	AN8	5.4	168	168.00	168.00	168	1

[Spec = 205/206 °C max] ¤ [Volume in Millions of Gallons]

Table 47. Final Boiling Point Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	256	348.46	350.07	367	47
1999	5	F76	93.2	343	355.16	353.75	365	24
1999	7	F76	38.6	359	368.55	368.94	371	11
1999	8	F76	250.5	348	365.33	366.03	383	44
1999	9	F76	9.8	366	366.00	366.00	366	1
2000	1	F76	12.3	336	347.87	348.02	359	6
2000	3	F76	146.6	338	355.42	356.79	369	36
2000	5	F76	139.0	351	359.56	359.58	369	31
2000	6	F76	88.5	370	378.21	379.10	385	14
2000	7	F76	115.1	341	366.14	366.80	385	26
2000	8	F76	120.3	346	362.11	363.50	377	29
2000	9	F76	33.1	346	354.17	352.78	362	6

[Spec = 385 °C max] ¤ [Volume in Millions of Gallons]

Table 48. Final Boiling Point Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.4	257	262.25	262.14	266	8
2000	8	JP4	1.1	252	256.93	257.42	261	12

[Spec = 270 °C max] ¤ [Volume in Millions of Gallons]

Table 49. Final Boiling Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	263	279.34	279.73	289	129
1997	5	JP5	210.8	250	275.24	290.15	309	74
1997	6	JP5	59.2	259	266.40	266.74	278	10
1997	7	JP5	55.8	234	255.76	255.67	273	19
1997	8	JP5	58.6	238	252.52	247.00	280	20
1998	3	JP5	310.8	262	279.46	279.61	289	128
1998	5	JP5	168.3	244	263.20	269.05	314	66
1998	6	JP5	24.1	281	281.60	281.71	283	5
1998	7	JP5	54.7	232	248.08	249.31	266	19
1998	8	JP5	57.9	236	252.43	245.35	281	15
1999	2	JP5	15.6	244	250.55	248.79	256	32
1999	3	JP5	307.6	269	283.29	283.69	297	117
1999	5	JP5	168.1	249	266.52	260.75	314	52
1999	6	JP5	62.0	250	262.58	262.25	280	12
1999	7	JP5	52.6	241	257.22	254.44	264	13
1999	8	JP5	46.9	246	247.65	247.72	252	10
1999	9	JP5	19.6	267	268.00	268.01	269	2
2000	2	JP5	8.0	244	250.98	251.04	258	46
2000	3	JP5	308.8	252	283.42	283.97	321	116
2000	5	JP5	191.6	243	260.33	260.33	283	103
2000	6	JP5	60.9	253	274.27	274.89	298	11
2000	7	JP5	57.3	233	256.03	257.79	271	18
2000	8	JP5	61.4	249	252.08	251.25	264	12

[Spec = 300 °C max] ¤ [Volume in Millions of Gallons]

Table 50. Final Boiling Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	234	254.80	251.13	278	97
1997	2	JP8	214.0	232	254.89	254.73	285	306
1997	3	JP8	799.9	220	259.44	263.62	300	658
1997	4	JP8	53.3	237	262.81	263.70	295	86
1997	5	JP8	421.5	242	280.19	284.85	313	286
1997	7	JP8	261.0	236	256.83	256.84	276	92
1997	8	JP8	301.5	257	275.54	274.03	293	170
1998	1	JP8	123.6	242	257.29	251.21	292	150
1998	2	JP8	215.8	234	254.79	256.85	288	272
1998	3	JP8	976.1	220	260.98	265.10	290	872
1998	4	JP8	60.2	235	257.68	260.25	273	112
1998	5	JP8	434.6	238	275.40	287.62	316	284
1998	6	JP8	6.7	258	258.00	258.00	258	1
1998	7	JP8	149.4	230	254.44	254.67	273	57
1998	8	JP8	262.3	251	271.53	269.01	291	204
1999	1	JP8	104.2	231	253.70	246.88	286	137
1999	2	JP8	204.0	201	256.85	258.08	365	270
1999	3	JP8	1037.7	217	257.44	259.72	355	951
1999	4	JP8	92.4	232	258.29	261.49	287	198
1999	5	JP8	306.5	236	260.66	253.60	310	191
1999	7	JP8	316.7	229	257.49	256.69	370	118
1999	8	JP8	293.8	178	271.02	268.02	294	225
1999	9	JP8	47.0	258	263.43	263.95	269	7
1999	7	AN8	3.9	243	243.00	243.00	243	1
2000	1	JP8	108.9	223	253.40	248.26	272	137
2000	2	JP8	249.6	239	256.01	256.12	279	354
2000	3	JP8	1041.4	217	255.86	259.07	325	868
2000	4	JP8	101.8	225	257.55	258.76	291	225
2000	5	JP8	371.6	239	272.98	286.67	350	203
2000	7	JP8	177.5	227	256.24	253.35	274	81
2000	8	JP8	362.7	244	272.09	269.84	292	191
2000	9	JP8	122.1	258	269.88	269.82	287	16
2000	7	AN8	5.4	229	229.00	229.00	229	1

[Spec = 300 °C max] ¤ [Volume in Millions of Gallons]

Table 51. Flash Point Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1999	3	F76	176.3	66	81.09	80.27	90	47
1999	5	F76	93.2	64	72.92	73.96	91	24
1999	7	F76	38.6	63	71.09	70.08	84	11
1999	8	F76	250.5	61	75.64	76.35	89	44
1999	9	F76	9.8	110	110.00	110.00	110	1
2000	1	F76	12.3	68	71.00	70.92	77	6
2000	3	F76	146.6	71	78.78	78.46	84	36
2000	5	F76	139.0	62	75.32	74.74	87	31
2000	6	F76	88.5	68	80.57	77.72	92	14
2000	7	F76	115.1	64	69.15	69.20	76	26
2000	8	F76	120.3	61	69.90	67.68	100	29
2000	9	F76	33.1	80	88.00	89.27	94	6

[Spec = 60 °C min] ¤ [Volume in Millions of Gallons]

Table 52. Flash Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	60	62.44	62.06	72	129
1997	5	JP5	210.8	60	62.63	62.76	69	74
1997	6	JP5	59.2	61	63.40	63.56	65	10
1997	7	JP5	55.8	61	65.42	65.42	73	19
1997	8	JP5	58.6	61	63.85	63.87	67	20
1998	3	JP5	310.8	60	62.48	62.33	71	125
1998	5	JP5	168.3	61	64.52	64.44	72	66
1998	6	JP5	24.1	64	64.40	64.42	65	5
1998	7	JP5	54.7	61	64.42	64.49	72	19
1998	8	JP5	57.9	43	62.73	63.30	66	15
1999	2	JP5	15.6	60	62.25	60.79	66	32
1999	3	JP5	307.6	61	62.70	62.58	67	117
1999	5	JP5	168.1	57	64.25	64.09	69	53
1999	6	JP5	62.0	62	62.67	62.68	65	12
1999	7	JP5	52.6	60	62.92	62.22	67	13
1999	8	JP5	46.9	62	63.60	63.62	67	10
1999	9	JP5	19.6	63	64.00	64.01	65	2
2000	2	JP5	8.0	61	63.39	63.39	69	46
2000	3	JP5	308.8	60	62.55	62.43	67	116
2000	5	JP5	191.6	54	63.26	63.26	70	103
2000	6	JP5	60.9	60	62.45	62.52	65	11
2000	7	JP5	57.3	61	62.72	62.72	65	18
2000	8	JP5	61.4	61	62.50	62.44	64	12

[Spec = 60 °C min] ¤ [Volume in Millions of Gallons]

Table 53. Flash Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	42	53.19	55.17	74	97
1997	2	JP8	214.0	41	53.39	53.05	66	306
1997	3	JP8	799.9	38	48.75	50.10	77	658
1997	4	JP8	53.3	38	44.53	43.11	63	86
1997	5	JP8	421.5	40	48.38	48.96	64	286
1997	7	JP8	261.0	39	46.57	46.86	63	92
1997	8	JP8	301.5	39	44.41	47.03	59	170
1998	1	JP8	123.6	46	53.13	52.11	67	150
1998	2	JP8	215.8	40	54.49	53.46	69	272
1998	3	JP8	976.1	38	49.77	51.04	72	871
1998	4	JP8	60.2	38	45.37	43.97	58	112
1998	5	JP8	434.6	40	45.56	47.88	66	284
1998	6	JP8	6.7	52	52.00	52.00	52	1
1998	7	JP8	149.4	40	47.69	47.52	60	57
1998	8	JP8	262.3	39	42.93	44.74	53	204
1999	1	JP8	104.2	42	51.58	51.70	64	137
1999	2	JP8	204.0	43	52.66	53.49	64	270
1999	3	JP8	1037.7	37	49.64	50.55	71	951
1999	4	JP8	92.4	38	45.14	43.84	57	198
1999	5	JP8	306.5	39	49.31	52.13	69	199
1999	7	JP8	316.7	38	47.59	46.79	61	118
1999	8	JP8	293.8	38	42.27	42.14	50	225
1999	9	JP8	47.0	42	42.29	42.39	43	7
1999	7	AN8	3.9	39	39.00	39.00	39	1
2000	1	JP8	108.9	38	53.78	54.72	73	137
2000	2	JP8	249.6	41	51.21	51.85	67	354
2000	3	JP8	1041.4	38	50.18	49.89	72	868
2000	4	JP8	101.8	38	47.19	46.45	65	225
2000	5	JP8	371.6	39	47.72	49.33	71	203
2000	7	JP8	177.5	38	46.94	47.50	59	81
2000	8	JP8	362.7	39	42.94	44.39	62	191
2000	9	JP8	122.1	40	43.06	43.22	47	16
2000	7	AN8	5.4	44	44.00	44.00	44	1

[Spec = 38 °C min] ¤ [Volume in Millions of Gallons]

Table 54. Cetane Index Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.3	43.0	51.51	51.42	55.0	47
1999	5	F76	93.2	43.0	46.06	46.12	47.8	24
1999	7	F76	38.6	50.3	52.66	52.70	53.9	11
1999	8	F76	250.5	43.0	52.46	53.68	56.4	44
1999	9	F76	9.8	49.5	49.50	49.50	49.5	1
2000	1	F76	12.3	48.8	49.83	49.85	50.9	6
2000	3	F76	146.6	49.0	50.77	50.67	53.0	36
2000	5	F76	139.0	44.8	47.44	47.46	51.0	31
2000	6	F76	88.5	52.0	53.74	41.94	55.7	9
2000	7	F76	115.1	50.6	53.03	52.63	57.1	26
2000	8	F76	120.3	48.0	52.62	52.72	56.0	29
2000	9	F76	33.1	47.5	50.20	49.78	51.8	5

[Spec = 42 min] ¤ [Volume in Millions of Gallons]

Table 55. Cetane Index Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	3	JP5	322.9	44.3	47.43	47.58	49.1	129
1997	5	JP5	210.8	33.7	41.75	42.67	46.0	74
1997	6	JP5	59.2	42.4	44.21	44.14	45.2	10
1997	7	JP5	55.8	42.4	45.35	45.02	56.5	19
1997	8	JP5	56.6	39.5	44.08	43.73	49.0	18
1998	3	JP5	310.8	40.8	47.42	47.50	49.2	125
1998	5	JP5	168.3	32.3	38.93	39.45	44.0	66
1998	6	JP5	24.1	43.0	43.26	43.27	44.1	5
1998	7	JP5	54.7	41.4	45.70	45.43	48.0	19
1998	8	JP5	57.9	37.5	45.40	46.99	49.0	15
1999	2	JP5	15.6	41.7	43.58	42.38	44.9	32
1999	3	JP5	307.6	43.1	47.31	47.47	49.0	117
1999	5	JP5	168.1	20.0	37.97	39.26	45.0	53
1999	6	JP5	62.0	42.9	46.12	46.16	49.0	12
1999	7	JP5	52.6	42.1	44.18	44.90	48.2	13
1999	8	JP5	46.9	46.0	47.20	47.23	49.0	10
1999	9	JP5	19.6	44.9	45.20	45.20	45.5	2
2000	2	JP5	8.0	40.6	43.64	43.65	45.6	46
2000	3	JP5	308.8	44.8	47.71	47.76	49.6	116
2000	5	JP5	191.6	33.0	39.90	39.37	43.7	103
2000	6	JP5	60.9	44.0	45.98	45.94	48.6	11
2000	7	JP5	57.3	15.0	42.58	43.23	49.0	18
2000	8	JP5	61.4	42.5	46.29	46.57	48.0	12

[Spec = (Report)] ¤ [Volume in Millions of Gallons]

Table 56. Cetane Index Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
1997	1	JP8	91.4	37.7	40.88	41.48	45.0	97
1997	2	JP8	214.0	38.9	43.76	43.80	46.9	306
1997	3	JP8	799.9	32.8	42.02	41.54	49.9	658
1997	4	JP8	53.3	38.0	40.95	41.00	45.4	86
1997	5	JP8	411.7	35.0	40.65	40.42	49.5	284
1997	7	JP8	258.4	38.0	44.27	44.61	48.1	90
1997	8	JP8	301.5	35.3	42.22	45.07	59.3	170
1998	1	JP8	123.6	36.3	40.11	40.30	49.0	150
1998	2	JP8	215.8	38.0	43.81	43.42	46.9	272
1998	3	JP8	975.5	33.4	43.65	43.39	50.6	871
1998	4	JP8	60.2	36.1	42.96	42.52	47.0	112
1998	5	JP8	434.6	33.9	39.76	40.58	51.0	284
1998	6	JP8	6.7	42.5	42.5	42.5	42.5	1
1998	7	JP8	149.4	40.3	44.61	44.85	48.0	57
1998	8	JP8	247.4	33.5	41.82	45.02	51.6	199
1999	1	JP8	104.2	34.8	39.52	40.05	50.0	137
1999	2	JP8	204.0	39.0	43.63	43.50	48.5	270
1999	3	JP8	1037.7	11.0	43.47	44.16	50.5	950
1999	4	JP8	92.4	37.3	43.20	42.43	49.0	198
1999	5	JP8	306.5	32.5	38.98	39.37	43.8	199
1999	7	JP8	316.7	37.3	44.07	44.17	48.9	118
1999	8	JP8	293.8	37.1	41.30	39.23	48.2	216
1999	9	JP8	47.0	43.2	45.76	45.61	47.8	7
1999	7	AN8	3.9	37.6	37.60	37.60	37.6	1
2000	1	JP8	108.9	35.0	39.49	39.76	43.3	137
2000	2	JP8	249.6	39.2	43.79	43.65	51.2	353
2000	3	JP8	1041.4	32.3	42.56	42.45	52.1	860
2000	4	JP8	101.8	37.3	44.01	43.54	50.5	225
2000	5	JP8	371.6	33.4	39.39	40.11	44.1	203
2000	7	JP8	177.5	37.5	45.15	45.27	49.0	80
2000	8	JP8	362.7	37.0	41.74	32.25	48.8	171
2000	9	JP8	122.1	43.5	45.41	38.36	47.1	14
2000	7	AN8	5.4	45.5	45.50	45.50	45.5	1

[Spec = (Report)] ¤ [Volume in Millions of Gallons]

Table 57. Combustion Net Heat Conformance – JP-4.

Year	Region	Fuel	Volume	AG			BTU			MJ		
				Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
1999	8	JP4	1.2	—	—	—	—	—	—	43.8	43.84	43.9
2000	8	JP4	1.1	—	—	—	18,753	18,857	18,882	43.6	43.84	43.9

[Spec: Aniline-G. = 4500 min, Net Heat = 18385 BTU or 42.8 MJ/kg min] ¤ [Volume in Millions of Gallons]

Table 58. Combustion Net Heat Conformance – JP-5.

Year	Region	Fuel	Volume	AG			BTU			MJ		
				Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
1997	3	JP5	(NR)	5,711	6,217.0	6,442	18,431	18,573.6	18,615	—	—	—
1997	5	JP5	(NR)	4,924	5,397.0	6,249	—	—	—	43.0	43.02	43.1
1997	6	JP5	(NR)	5,569	6,066.3	6,254	—	—	—	—	—	—
1997	7	JP5	(NR)	5,710	6,136.2	6,600	—	—	—	43.2	43.22	43.2
1997	8	JP5	(NR)	6,480	6,578.0	6,650	—	—	—	43.0	43.20	43.3
1998	3	JP5	(NR)	5,577	6,258.5	6,575	18,577	18,583.2	18,591	—	—	—
1998	5	JP5	(NR)	4,784	5,242.6	5,755	18,442	18,465.3	18,490	43.0	43.00	43.0
1998	6	JP5	(NR)	—	—	—	—	—	—	43.1	43.11	43.1
1998	7	JP5	(NR)	5,575	6,224.6	6,728	—	—	—	43.2	43.28	43.3
1998	8	JP5	(NR)	6,810	6,810.0	6,810	—	—	—	43.0	43.27	43.5
1999	2	JP5	6.3	—	—	—	18,579	18,594.5	18,611	—	—	—
1999	3	JP5	307.6	5,427	6,144.9	6,403	18,567	18,584.9	18,599	43.1	43.22	43.5
1999	5	JP5	168.1	5,136	5,226.1	5,393	18,374	18,463.6	18,495	43.0	43.00	43.0
1999	6	JP5	62.0	—	—	—	—	—	—	43.0	43.22	43.4
1999	7	JP5	54.3	—	—	—	—	—	—	42.5	43.15	43.4
1999	8	JP5	46.9	—	—	—	—	—	—	43.3	43.68	46.4
1999	9	JP5	19.6	6,135	6,135	6,135	—	—	—	43.1	43.11	43.1
2000	2	JP5	8.0	—	—	—	18,575	18,601.3	18,635	—	—	—
2000	3	JP5	308.8	—	—	—	18,563	18,583.0	18,594	43.2	43.23	43.9
2000	5	JP5	191.6	4,500	5,231.9	5,491	18,413	18,457.2	18,485	42.6	42.98	43.1
2000	6	JP5	60.9	—	—	—	—	—	—	43.1	43.29	43.9
2000	7	JP5	57.3	—	—	—	—	—	—	43.1	43.20	43.3
2000	8	JP5	61.4	—	—	—	—	—	—	43.2	43.28	43.3

[Spec: Aniline-G. = 4500 min, Net Heat = 18300 BTU or 42.6 MJ/kg min] ¤ [Volume in Millions of Gallons]

Table 59. Combustion Net Heat Conformance – JP-8.

Year	Region	Fuel	Volume	AG			BTU			MJ		
				Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
1997	1	JP8	(NR)	—	—	—	—	—	—	43.1	43.20	43.4
1997	2	JP8	(NR)	—	—	—	18,504	18,605.7	18,725	42.8	43.49	44.0
1997	3	JP8	(NR)	—	—	—	18,503	18,602.3	19,605	43.0	43.23	43.7
1997	4	JP8	(NR)	—	—	—	18,539	18,602.0	18,646	43.2	43.29	43.4
1997	5	JP8	(NR)	5,819	6,060.3	6,258	18,487	18,547.4	18,857	43.0	43.04	43.1
1997	7	JP8	(NR)	5,749	6,148.0	6,488	18,601	18,615.6	18,648	43.1	43.32	45.5
1997	8	JP8	(NR)	—	—	—	18,505	18,615.1	19,646	43.2	43.49	45.0
1998	1	JP8	(NR)	—	—	—	—	—	—	42.8	43.18	43.5
1998	2	JP8	(NR)	—	—	—	18,460	18,591.6	18,631	43.0	43.83	44.0
1998	3	JP8	(NR)	—	—	—	18,400	18,598.0	18,851	43.0	43.23	43.5
1998	4	JP8	(NR)	—	—	—	18,557	18,600.7	18,638	43.3	43.33	43.4
1998	5	JP8	(NR)	5,567	5,954.3	6,342	18,451	18,549.2	18,634	43.0	43.05	43.1
1998	6	JP8	(NR)	—	—	—	—	—	—	43.3	43.30	43.3
1998	7	JP8	(NR)	6,231	6,399.8	6,516	18,596	18,618.7	18,634	43.0	43.27	43.4
1998	8	JP8	(NR)	—	—	—	13,750	18,425.6	18,674	43.2	43.35	43.8
1999	1	JP8	104.2	—	—	—	—	—	—	43.0	43.15	43.5
1999	2	JP8	207.9	—	—	—	18,400	18,594.3	18,650	43.1	43.37	43.5
1999	3	JP8	1024.9	—	—	—	18,400	18,586.9	18,727	42.2	43.27	44.0
1999	4	JP8	92.4	—	—	—	18,265	18,598.9	18,860	43.0	43.33	45.0
1999	5	JP8	308.4	—	—	—	18,448	18,506.3	18,612	42.1	43.04	43.1
1999	7	JP8	463.5	—	—	—	18,610	18,658.1	18,864	43.0	43.25	43.9
1999	8	JP8	302.4	—	—	—	18,508	18,553.5	18,754	43.2	43.34	44.3
1999	9	JP8	66.0	—	—	—	—	—	—	43.2	43.27	43.3
2000	1	JP8	108.9	—	—	—	—	—	—	43.0	43.14	43.3
2000	2	JP8	249.6	—	—	—	18,400	18,610.1	18,643	43.0	43.23	43.4
2000	3	JP8	1041.4	18,628	18,628	18,628	18,197	18,573.4	18,692	13.1	43.17	43.6
2000	4	JP8	101.8	—	—	—	18,464	18,631.9	18,717	43.1	43.33	43.6
2000	5	JP8	371.6	—	—	—	18,419	18,538.8	18,595	42.8	43.04	43.8
2000	7	JP8	177.5	—	—	—	—	—	—	43.0	43.31	46.4
2000	8	JP8	362.7	—	—	—	18,499	18,561.2	18,704	43.2	43.32	43.5
2000	9	JP8	122.1	—	—	—	—	—	—	43.1	43.22	43.3
2000	7	AN8	5.4	—	—	—	—	—	—	43.3	43.34	43.3

[Spec: Aniline-G. = 4500 min, Net Heat = 18300 BTU or 42.6 MJ/kg min] ¤ [Volume in Millions of Gallons]

Table 60. Viscosity Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	3	F76	176.34	2.70	3.057	3.122	3.60	47
1999	5	F76	93.17	2.80	3.413	3.481	4.20	24
1999	7	F76	38.57	2.00	2.888	2.866	3.80	11
1999	8	F76	250.53	2.78	3.646	3.631	4.30	44
1999	9	F76	9.79	4.18	4.180	4.180	4.18	1
2000	1	F76	12.3	2.31	2.605	2.609	2.90	6
2000	3	F76	146.6	2.60	3.315	3.331	3.85	36
2000	5	F76	139.0	3.00	3.800	3.814	4.30	31
2000	6	F76	88.5	2.91	3.524	3.515	4.30	14
2000	7	F76	115.1	2.53	2.910	2.889	3.37	26
2000	8	F76	120.3	2.70	3.264	3.207	4.30	29
2000	9	F76	33.1	3.11	3.440	3.549	4.16	6

[Spec = 1.7 – 4.3 cst @ 40 °C] ¤ [Volume in Millions of Gallons]

Table 61. Viscosity Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	2	JP5	15.58	4.60	4.98	4.931	6.80	32
1999	3	JP5	307.56	4.60	5.04	4.961	6.48	117
1999	5	JP5	168.06	4.40	6.19	6.006	7.70	53
1999	6	JP5	62.01	4.36	5.10	5.089	5.61	12
1999	7	JP5	52.63	3.63	4.60	4.606	5.69	13
1999	8	JP5	46.87	4.50	4.77	4.837	5.50	10
1999	9	JP5	19.63	5.62	5.72	5.726	5.83	2
2000	2	JP5	8.0	4.50	5.048	5.041	6.80	46
2000	3	JP5	308.8	4.60	5.074	5.008	6.95	116
2000	5	JP5	191.6	5.20	6.419	6.379	7.20	103
2000	6	JP5	60.9	3.42	5.336	5.376	6.70	11
2000	7	JP5	57.3	3.70	4.662	4.763	5.40	18
2000	8	JP5	61.4	4.60	5.107	5.089	5.75	12

[Spec = 8.5 mm^2/s @ -20 °C] ¤ [Volume in Millions of Gallons]

Table 62. Viscosity Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	1	JP8	104.17	2.78	4.11	3.608	7.70	137
1999	2	JP8	204.00	3.79	4.76	4.795	7.40	268
1999	3	JP8	1037.72	2.26	4.36	4.319	8.00	948
1999	4	JP8	92.41	2.20	4.03	4.048	6.50	198
1999	5	JP8	306.48	3.40	4.83	5.187	6.90	199
1999	7	JP8	316.74	2.83	4.14	4.028	6.62	118
1999	8	JP8	293.85	2.70	4.02	4.005	5.30	225
1999	9	JP8	47.03	3.83	4.11	4.146	4.30	7
1999	7	AN8	3.92	3.78	3.78	3.780	3.78	1
2000	1	JP8	108.9	2.78	4.424	4.075	6.48	137
2000	2	JP8	249.6	3.28	4.557	4.605	6.20	353
2000	3	JP8	1041.4	2.00	4.161	4.191	6.60	868
2000	4	JP8	101.8	2.10	3.867	3.888	6.80	225
2000	5	JP8	371.6	3.10	4.888	4.883	6.80	203
2000	7	JP8	177.5	3.01	4.052	4.021	5.23	81
2000	8	JP8	362.7	2.47	4.063	3.904	5.44	191
2000	9	JP8	122.1	2.92	4.109	4.140	4.90	16
2000	7	AN8	5.4	3.59	3.590	3.590	3.59	1

[Spec = 8.0 mm^2/s @ -20 °C] ¤ [Volume in Millions of Gallons]

Table 63. Freezing Point Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	8	JP4	1.42	-65.00	-61.375	-61.157	-58.00	8
2000	8	JP4	1.1	-82.00	-66.750	-68.733	-61.00	12

[Spec = -58 °C max] ¤ [Volume in Millions of Gallons]

Table 64. Freezing Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	2	JP5	15.6	-56.00	-52.844	-54.839	-46.00	32
1999	3	JP5	307.6	-51.10	-47.637	-47.580	-42.00	117
1999	5	JP5	168.1	-71.00	-60.436	-48.067	-47.00	39
1999	6	JP5	62.0	-54.00	-51.417	-51.401	-49.00	12
1999	7	JP5	52.6	-75.00	-54.262	-52.464	-46.00	13
1999	8	JP5	46.9	-55.00	-49.500	-49.606	-47.00	10
1999	9	JP5	19.6	-49.00	-48.505	-48.497	-48.00	2
2000	2	JP5	8.0	-54.00	-52.804	-52.797	-51.00	46
2000	3	JP5	308.8	-50.00	-47.478	-47.463	-44.00	116
2000	5	JP5	191.6	-63.00	-54.439	-30.563	-46.00	54
2000	6	JP5	60.9	-53.00	-50.546	-50.548	-48.00	11
2000	7	JP5	57.3	-62.78	-54.827	-54.480	-46.50	18
2000	8	JP5	61.4	-51.00	-48.042	-47.832	-47.00	12

[Spec = -46 °C max] ¤ [Volume in Millions of Gallons]

Table 65. Freezing Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
1999	1	JP8	104.17	-66.00	-57.334	-56.863	-52.00	137
1999	2	JP8	204.00	-61.00	-50.256	-50.492	-47.00	269
1999	3	JP8	1037.72	-63.54	-50.333	-50.579	-2.00	951
1999	4	JP8	92.41	-63.00	-50.533	-49.978	-47.00	198
1999	5	JP8	306.48	-70.60	-54.119	-54.200	-47.00	199
1999	7	JP8	316.74	-60.00	-51.657	-51.655	-47.00	118
1999	8	JP8	293.85	-60.00	-50.643	-50.333	-47.00	225
1999	9	JP8	47.03	-67.00	-54.857	-55.043	-48.00	7
1999	7	AN8	3.92	-62.80	-62.800	-62.800	-62.80	1
2000	1	JP8	108.9	-68.00	-59.818	-57.485	-50.00	137
2000	2	JP8	249.6	-62.00	-50.162	-50.471	-46.20	354
2000	3	JP8	1041.4	-66.00	-52.079	-52.271	-46.00	868
2000	4	JP8	101.8	-63.00	-50.500	-50.359	-47.00	225
2000	5	JP8	371.6	-68.00	-55.069	-54.486	-47.00	203
2000	7	JP8	177.5	-62.00	-50.419	-49.678	-47.00	81
2000	8	JP8	362.7	-60.00	-49.789	-49.985	-47.00	191
2000	9	JP8	122.1	-60.00	-50.806	-50.204	-46.00	16
2000	7	AN8	5.4	-58.90	-58.900	-58.900	-58.90	1

[Spec = -47 °C max] ¤ [Volume in Millions of Gallons]

Conclusions

All fuel procured in 2000 met specifications for API Gravity, except for one shipment of JP8 from Region 3; which was slightly over limit but falls in line with volumetrically weighted averaging.

All fuel procured in 2000 met specifications for Aromatics, with peak at 15—16 moderating last years distribution about 19—20.

All fuel procured in 2000 met specifications for Olefins, though slightly higher than last years.

All fuel procured in 2000 met specifications for Total Sulfur. For Mercaptan content, .005 of the total volume exceeded limit. This overage, from three Regions, is nullified by averaging.

All fuel procured in 2000 met specifications for Particulate Contamination, except 7, of 5531, shipments from Regions 2, 3, and 5; mitigated again by volumetrically weighted averaging.

Except for 8 shipments, constituting .001 of total shipments, all fuel procured in 2000 met specifications for Filtration Time. Again, the overage was waived, diminished by averaging.

There were 231 shipments, predominantly from Region 8, that exceeded specifications for Total Acid number. Although a few shipments met specifications for Smoke Point, on the average, all fuel procured in 2000 slightly exceeded limits. JP8 fell in line with averaging and allowances for Naphthalene. These are the only significant deviations from specification limits in fuel procured in 2000.

All JP8 fuel procured in 2000 met specifications for Naphthalene Content.

The F76, JP4, JP5, and all but 8.8 of 688 million gallons of JP8, procured met specifications for Hydrogen Content.

All fuel procured in 2000 met specifications for Distillation temperatures (10% Recovered) and was within limits at Final Boiling Point. Note, only reporting is required for JP4 10% Recovered.

Other than in 5 shipments of JP5, constituting less than .01% of fuel procured in 2000, all met specifications for Flash Point.

The Cetane index, still only a "report only requirement", continues its trend in improvement over previous years, though not as marked as last. Region 7 emerges as having the highest average cetane content.

All fuel procured in 2000 met specifications for Net Heat of Combustion. This disregards the one reporting of 13.1 MJ/kg, on one shipment of JP8 from Region 3; since the associated reporting in BTUs is 18,197. Net Heat can be reported in three different ways: the Aniline-API Gravity product or net heat, reported in either British Thermal Units (BTUs) or in MegaJoules per kg (MJ/kg).

Data on the Freezing Point and Viscosity of fuels were added to last year's Report as a point of reference in discussions on survivability of aircraft subject to adverse high altitude and arctic conditions. Although claiming trends for these properties is probably premature, it should be noted that Viscosity is up, generally, for all fuels; and that reported Freezing Point indexes are, on the whole, lower than last year's reportings.

Appendix – Jet Fuel Thermal Oxidation Stability Tester (JFTOT)

JFTOT Test Results at test temperatures of 260 °C vs. 275 °C.

This Appendix follows on reporting of the 1999 report, illustrating JFTOT results for JP5 and JP8 reported at test temperatures of 260 °C and 275 °C. This data is extracted and presented to more readily track trends in reporting at the two test result temperatures, since contractors are not required to report results at both, providing data for equating JFTOT results in support of the efforts of the December 1998 ASTM conference on the issue.

Whereas military jet fuel specifications stipulate the temperature of the JFTOT test to be 260 °C, most DESC contracts require a JFTOT test temperature of 275 °C. Specified limits on the tube deposit rating (less than 3 max) and on the pressure differential (25 mm Hg max) are the same however. If the test fails at 275 °C, the refiner has the option of performing the test at 260 °C. JFTOT test results are entered into the PQIS database with unique Test Method codes to differentiate the test temperature employed.

Although most of the jet fuel we procure can pass the JFTOT at 275 °C, some contractors still do not provide results at the higher temperature. The following table contrasts the number of JFTOT test results reported at 275 °C with that still only reported at 260 °C, each with the volume of product represented. Of the 268 million gallons reported at 260 °C, in 2000, only about 25% had questionable results at 275 °C, requiring retesting at the lower temperature.

Table 66. JFTOT Test Temperatures.

Year	Fuel	Test Temperature	Count	Volume
1998	JP5	260 °C	80	190.0
1998	JP5	275 °C	150	425.8
1998	JP8	260 °C	346	577.5
1998	JP8	275 °C	1592	1559.4
1999	JP5	260 °C	58	178.06
1999	JP5	275 °C	185	486.62
1999	JP8	260 °C	206	330.06
1999	JP8	275 °C	1994	2239.57
1999	AN8	260 °C	1	3.92
2000	JP5	260 °C	26	67.38
2000	JP5	275 °C	280	620.55
2000	JP8	260 °C	241	345.00
2000	JP8	275 °C	1834	2190.48
2000	AN8	260 °C	1	5.38

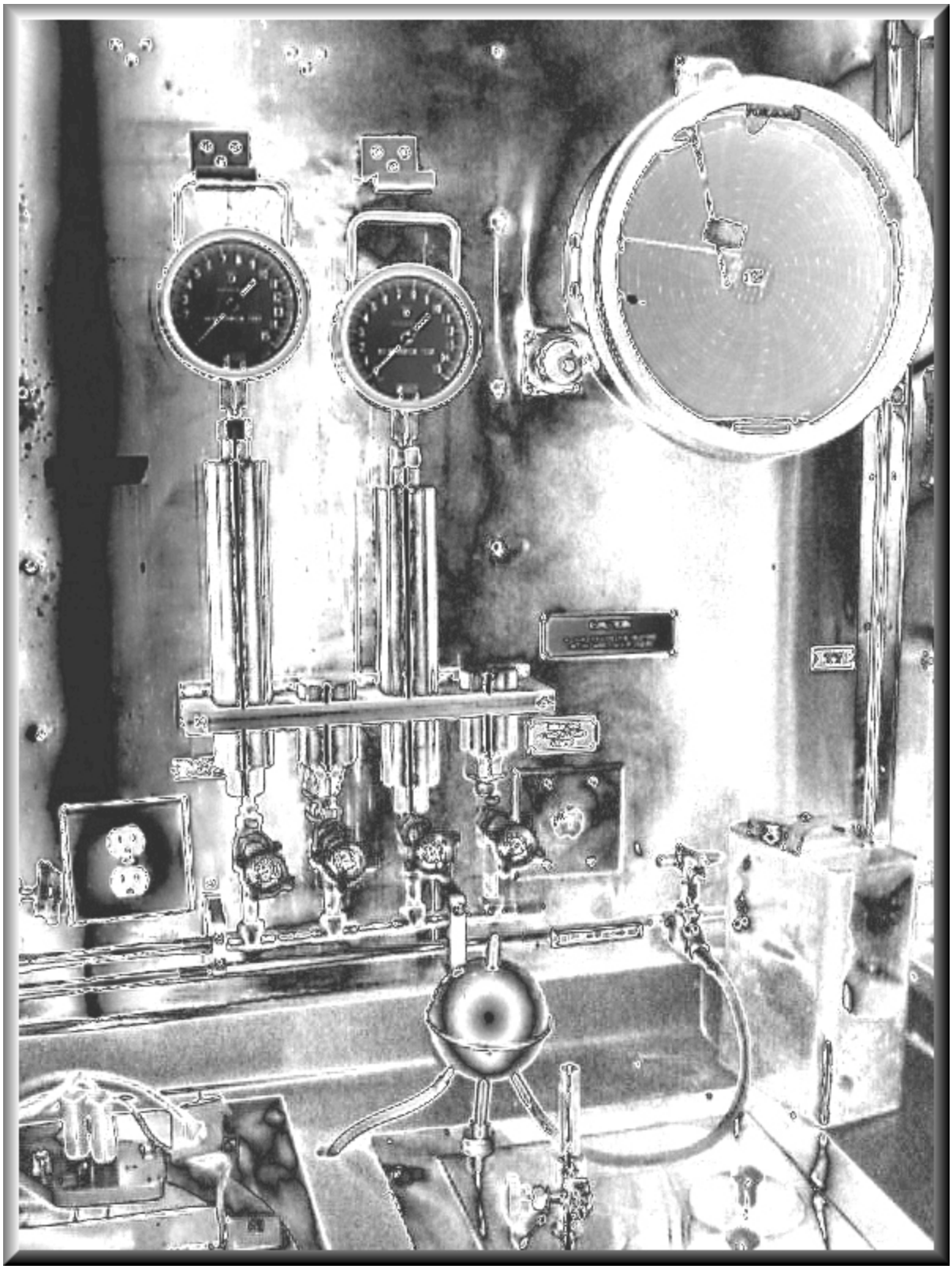
[Volume in Millions of Gallons]

Note that 1999 counts, some of which were inadvertently reversed in last year's publication, are corrected; and updated, based on year-end tallies reflecting procrastinated compliance.

Table 67. JFTOT Test Temperatures – Per Region.

Fuel	Region	Temp	1998		1999		2000	
			Count	Volume	Count	Volume	Count	Volume
JP5	2	275°C	—	—	35	6.27	46	8.00
	3	260°C	46	(NR)	22	51.44	1	4.20
	3	275°C	79	(NR)	95	256.12	115	304.61
	5	260°C	32	(NR)	29	79.70	24	59.06
	5	275°C	34	(NR)	24	88.36	79	132.50
	6	275°C	5	(NR)	12	62.01	11	60.88
	7	260°C	—	—	5	27.29	1	4.11
	7	275°C	19	(NR)	9	26.99	17	53.16
	8	260°C	2	(NR)	—	—	—	—
	8	275°C	13	(NR)	10	46.87	12	61.41
	9	260°C	—	—	2	19.63	—	—
JP8	1	275°C	150	(NR)	137	104.17	137	108.86
	2	260°C	86	(NR)	26	12.8	15	16.34
	2	275°C	186	(NR)	253	195.09	339	233.21
	3	260°C	140	(NR)	57	103.71	62	87.49
	3	275°C	732	(NR)	902	921.20	806	953.86
	4	260°C	—	—	4	0.96	1	0.35
	4	275°C	112	(NR)	194	91.44	224	101.47
	5	260°C	46	(NR)	32	57.18	52	61.68
	5	275°C	238	(NR)	169	251.21	151	309.89
	6	275°C	1	(NR)	—	—	—	—
	7	260°C	—	—	39	111.41	29	116.06
	7	275°C	57	(NR)	144	352.07	52	61.40
	8	260°C	74	(NR)	48	43.98	82	63.07
	8	275°C	116	(NR)	184	258.44	109	299.67
	9	275°C	—	—	10	65.97	16	122.11
AN8	7	260°C	—	—	1	3.92	1	5.38

[(NR) = Not Recorded] ¤ [Volume in Millions of Gallons]



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