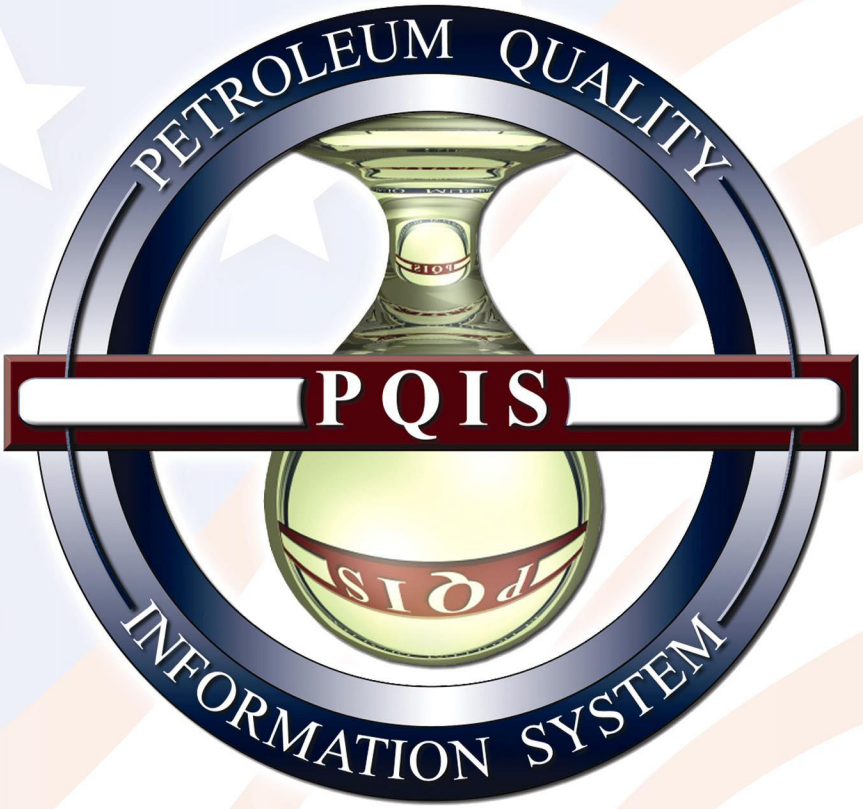
Petroleum Quality Information System



2002

Notes

DESC wishes to extend thanks to the US Department of Defense (DefensLINK), and their contributing photographers; PH1 Novia Harrington, Sgt. Major Larry Stevens, Sgt Jack Morse, and Senior Airman Karolina Gmyrek for their contribution of photographs of servicemen and servicewomen serving in Operation Enduring Freedom, used in this publication.

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

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IN REPLY
REFER TO

November 3, 2003

PETROLEUM QUALITY INFORMATION SYSTEM FUELS DATA (2002)

This is the Defense Energy Support Center's (DESC's) seventh 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 specification developers (Government/commercial), contracting agencies (Government), manufacturers, and general interest parties (i.e., OEMs, fuel handling equipment manufacturers, etc.). This report includes statistical summaries of information for Aviation Fuels, Fuel Naval Distillate (F-76) and Gasoline.

In our continuing efforts to realize the full potential of the PQIS Program, test result information for Jet A-1 is included for the first time. Almost all the data for the continental United States in this report was collected electronically using the Paperless Ordering and Receiving Transaction Screens (PORTS). PORTS is an Internet-based program that collects quality data from refineries for shipments of bulk refined products under DESC contracts. Test data, associated within PORTS to individual shipments, was collected by the PORTS server. The data was then sent to a temporary PQIS data file, screened, and imported directly into PQIS.

Special thanks 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 4.4 billion gallons of product representing over 8960 batches received in calendar year 2002.

As always, any comments and questions pertaining to this report and recommendations for future reports are welcome. Please contact Ms Patricia Wilkins at Commercial (703) 767-8360 or DSN 427-8360, e-mail patricia.wilkins@dla.mil for these issues and to obtain additional copies of this report or the CD-ROM.

MARK K. IDEN
Deputy Director
Bulk Fuels Commodity Business Unit

Executive Summary

This seventh annual edition of the Petroleum Quality Information System (PQIS) report continues the convention of providing statistical assessment of fuel properties compiled in the PQIS database. Fuel is procured every year under contracts let by the Bulk Commodity Business Unit (CBU) of the Defense Energy Support Center (DESC). Evaluation of properties is based on test data submitted in a standard test report format with fuel shipments. This report follows in review of overall and regional trends for selected fuel properties, comparing totals documented for the period 1997 through 2002, and like values from 2000 through 2002. 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 and introduced data for Naval Distillate fuel, F-76, and motor gasoline. The 2000 edition had the same coverage but with a drop in JP-4 data, reflecting a downturn in its use. The 2001 edition revealed a reversal of the trend with JP-4; and no data on AN-8, since there were no procurements. This edition follows that trend; and although PQIS now collects data on JA1 and missile fuels, records were insufficient to warrant inclusion in this analysis.

Though required reporting in test data, the naphthalene and olefin contents of JP-5 jet fuel are not driven by DoD specification limits. Although the olefin limit was deleted from U.S. JP-4, JP-5, and JP-8 fuel specifications in 1999, test results for both aromatics and olefins are determined by the same method and some refineries report both. This report still compares against the old standard. It should be noted that military specifications were used to procure these fuels for the U.S. government. As such, trends noted herein may not necessarily reflect those in industry; since military fuels are, in some cases, specially blended to meet U.S. government requirements.

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 the dissemination of standardized quality control data, as well as tracking trends in product quality. It expedites data interchange through electronic access, its analysis, and promotes a comprehensive approach in addressing quality issues.

As in previous reports, histograms chart the distribution of 2002 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.

Even with extensive efforts to ensure a complete volumetric representation, in the test data on which reports are based, some reporting falls slightly short of that goal. In this report, the effort resulted in a 100% representation of fuels procured by DESC, except for JA1. This is due, in part, to merging this new data into existing database constructs, and problems with extrapolating data garnered by the PORTS software utilized, for automated data entry.

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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). General agreement 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.

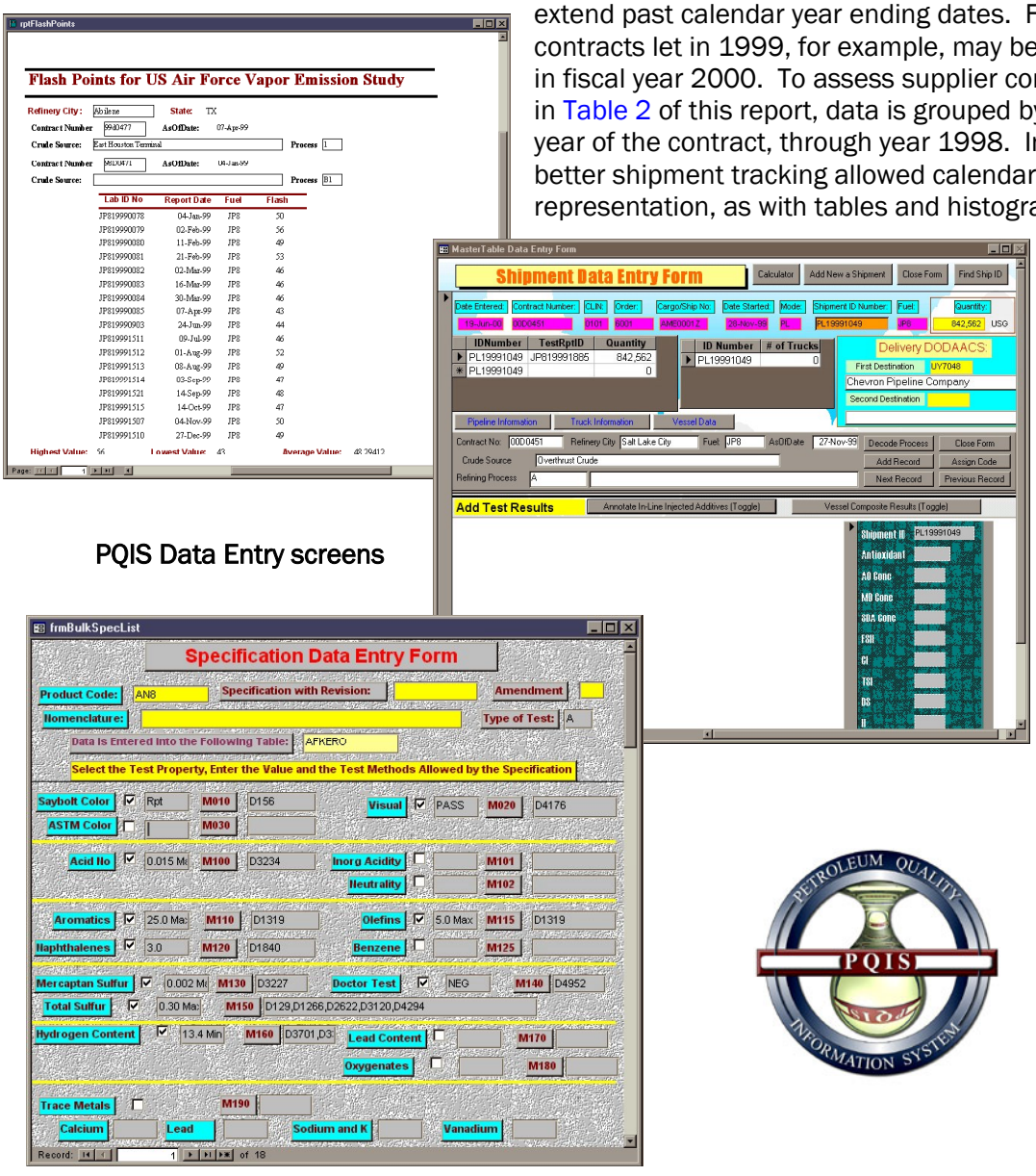
The DEPPM 89-1 authorized LMI to develop a prototype to be tested and evaluated by the DESC. Review and acceptance of the archetype was attained by March 1989. However, the initial PQIS database system only processed data on procurements of aviation fuels (JP-4, JP-5 and JP-8), due to funding constraints 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 iterations, but remains on a PC platform. Plans to locate this database on an Internet application, for worldwide use, are still being developed. There still needs to be resolved what Structured Query Language (SQL) engine is to be utilized, to be tied to a Web Portal capable of Pivot-Table driven, HTML Data Access and Whiteboard Pages, that will be compatible with the many systems it is to serve. Traditionally, test reports received from refiners worldwide had been manually entered into PQIS. In 2000, the Paperless Ordering and Receipt Transaction Screens (PORTS) software was utilized, for automated data entry. Anticipated improvements in efficiency, and 'real-time' datasets, are expected to assist in implementation of standardized data reporting criteria established in 1999. Due to problems with data submission via PORTS, and amplified verification process it necessitated, it has fallen somewhat short of expectations.

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. The 2000 Report was emended, though, to eliminate reporting of test data no longer solicited, due to improvements in product testing or processing. The 2000 report ensued, utilizing the same formats for its Histograms and Tables, to facilitate comparison of information in previous reports. In last year's report and this, t is reformatted slightly to accommodate the transmutation above, and to provide more accurate representations of interpreted data.

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 calendar year ending dates. Fuel from contracts let in 1999, for example, may be delivered in fiscal year 2000. To assess supplier compliance, in Table 2 of this report, 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.



PQIS Data Entry screens

Fuel shipments recorded in PQIS total 4.3 billion USG for 2002, categorized by mode as follows:

Mode:	Tanker	Barge	Pipeline	Tank Truck
2002 Volume (Million USG):	1,459	352.4	2,256.4	386.2
2002 Issue/Shipments:	165	206	1,343	7,246

Terminology

For the purposes of this report, the following 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, in this example, is 0.42 °API. Each method uses a different basis to calculate the average. Both averages are provided in this report. Depending on the amount of fuel entailed, the difference can be quite significant (see Table 14).

We salute you…

The Defense Energy Support Center extends a salute to the men and women of our nation's armed forces supporting Operation Enduring Freedom. Today's Soldier, Sailor, Airman and Marine – and their families – undergo hardships the rest of us escape – we should pause from time-to-time to thank those who so nobly serve.

Those now in and out of uniform will remember wars of the not so distant past -- like Vietnam and Desert Shield/Storm -- and compare their experiences with those now fighting the ongoing war on terror. They will find differences and similarities, but in the end will know a kinship – one difficult to explain and hard to quantify; however keenly felt. Few know that bus ride to ship or plane; the hurry-up-and-wait; transport to "theater" and the anguish of pending battle coupled with being homesick, austere living conditions and facing deaths. From those within DESC with those memories, and from those who can only imagine what you and yours feel are and going through, we salute you, our men and women in uniform.

"Our men and women in uniform are performing brilliantly and have sacrificed much in the global war against terrorism. They have earned the thanks of all Americans."

Donald Rumsfeld,
Secretary of Defense

Of 1.4 million military personnel serving worldwide, 953,000 are in CONUS, leaving 461,000 in various OCONUS assignments. Of those assigned OCONUS: 117,000 are in Europe; 98,000 in Asia and the Pacific; 17,000 in Africa, the Near East and South Asia; and 1,700 elsewhere in North and South America. Within the total, worldwide, are 158,000 National Guard and Reserve personnel -- called to extended active duty in support of the war on terror. By 31 March 2003, 269,000 personnel were assigned to Operation Iraqi Freedom -- away from family, friends, and home. A little over a decade earlier, 360,000 served in the Arabian Gulf during Operations Desert Shield/Storm. And, lest we forget, for every one assigned overseas without family, there is a mother, father, and siblings (and often spouse and children) anguishing their safe return.

"I know that the families of our military are praying that all those who serve will return safely and soon. Millions of Americans are praying with you for the safety of your loved ones and for the protection of the innocent. For your sacrifice, you have the gratitude and respect of the American people. And you can know that our forces will be coming home as soon as their work is done. Our nation enters this conflict reluctantly -- yet, our purpose is sure. The people of the United States and our friends and allies will not live at the mercy of an outlaw regime that threatens the peace with weapons of mass murder.
We will meet that threat now, with our Army, Air Force, Navy, Coast Guard, and Marines, so that we do not have to meet it later with armies of fire fighters and police and doctors on the streets of our cities. Now that conflict has come, the only way to limit its duration is to apply decisive force. And I assure you, this will not be a campaign of half measures, and we will accept no outcome but victory.
My fellow citizens, the dangers to our country and world will be overcome. We will pass through this time of peril and carry on the work of peace. We will defend our freedom, bring freedom to others and we will prevail.
May God bless our country and all who defend her. "

President George W. Bush

Supporting our troops in harms way includes provision of many commodities, but of special interest to us at DESC is the planning for, contracting for, and the provision of bulk petroleum; millions of gallons provided so far, that on its way and that to come. We stand prepared to do our part to serve our nation…
but most of all, you.

Product Distribution

Data in the PQIS database for 2002 represents nearly 4.5 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	1998		1999		2000		2001		2002		Total	
	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries	Volume	Entries
AN8	3.39	1	3.92	1	5.38	1	—	—	1.93	1	14.62	4
F76	—	—	580.58	119	645.85	121	673.53	175	645.64	156	2,545.60	571
JA1	—	—	—	—	—	—	—	—	51.49	6	51.49	6
JP4	1.71	10	1.22	80	1.13	84	1.55	121	1.50	122	7.11	417
JP5	615.81	230	664.68	307	687.94	475	836.34	437	812.18	397	3,616.95	1846
JP8	2228.68	1952	2,569.64	7157	2,535.49	7142	2,743.22	8624	2,914.40	8263	12,991.43	33138
MU	—	—	15.00	16	28.43	16	16.52	13	15.02	13	74.97	58
RME	—	—	10.34	2	10.85	2	15.33	2	11.77	2	48.29	8

[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.

There is no analysis on aviation fuel for use in the Antarctic, product code “AN8”, since there are no new procurements. The AN8 shown, procured in 2001 and delivered in 2002, is the only in two years. Still also included in Table 1, for this report, is continued reporting on Naval Distillate Fuels (DFM/F76); Marine Residual Fuel, Grade RME-25 (IFO 180); and Unleaded, Automotive Gasoline. Since these product procurements are comparatively small, they are also 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. Study of JP4 and MOGAS is also omitted from Section II. For some select test properties, however, the minimum, average, volumetrically weighted average, and maximum values are included for JP4.

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 has resulted in some overlap in volume totals, in the past, since delivery period groupings to extend across calendar years. The DFAMS printout for each Contract Line Item was compared, order by order, to quantities in the PQIS database, however, so that any possible discrepancy was only marginally significant. Due to improvements in the efficiency of reporting in 2001, however, PQIS reflects DFAMS records exactly, for all fuels. The fuel volumes in the table represent information on fuels on a worldwide basis, for the last five years.

Table 2. Volumes Purchased vs. Volumes Reported.

Fuel	1998	1999	2000	2001	2002
AN8 Purchased	—	3.9	5.4	—	1.9
AN8 Reported	—	3.9	5.4	—	1.9
Difference	—	0.0	0.0	—	0.0
Percentage	—	100%	100%	—	100%
F76 Purchased	—	570.2	648.5	673.5	645.6
F76 Reported	—	570.2	648.5	673.5	645.6
Difference	—	0.0	0.0	0.0	0.0
Percentage	—	100%	100%	100%	100%
JA1 Purchased	—	—	—	—	71.1
JA1 Reported	—	—	—	—	51.5
Difference	—	—	—	—	19.5
Percentage	—	—	—	—	72.5%
JP4 Purchased	0.8	1.2	1.1	1.6	1.5
JP4 Reported	0.8	1.2	1.1	1.6	1.5
Difference	0.0	0.0	0.0	0.0	0.0
Percentage	100%	100%	100%	100%	100%
JP5 Purchased	393.1	664.3	676.6	836.3	812.2
JP5 Reported	338.0	664.3	676.6	836.3	812.2
Difference	55.1	0.0	0.0	0.0	0.0
Percentage	86%	100%	100%	100%	100%
JP8 Purchased	1277.5	2690.5	2,631.6	2,743.2	2,914.4
JP8 Reported	1155.9	2564.0	2,513.9	2,743.2	2,914.4
Difference	121.6	126.5	117.7	0.0	0.0
Percentage	90%	95%	96%	100%	100%
MU Purchased	—	15.0	28.4	16.5	15.0
MU Reported	—	15.0	28.4	16.5	15.0
Difference	—	0.0	0.0	0.0	0.0
Percentage	—	100%	100%	100%	100%
RME Purchased	—	10.34	10.9	15.3	11.8
RME Reported	—	10.34	10.9	15.3	11.8
Difference	—	0.0	0.0	0.0	0.0
Percentage	—	100%	100%	100%	100%
Fuel	1998	1999	2000	2001	2002

[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 number of reports and volume 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	
2000	143	400	1023	225	337	25	127	258	22	2560
2001	73	504	1050	225	439	36	184	362	20	2893
2002	113	411	1025	193	464	95	193	290	18	2802

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. Again, this year Regions 2 through 5 and 8 submitted the largest number of reports. Reporting has increased for all areas, except Regions 1 and 9, compared to last year, with Region 4 holding constant. The downturn for the East Coast and the Caribbean is more indicative of a decrease in procurements than of production. Procurement from the East Coast Region are significantly down, and the Caribbean, customarily lagging in volume, has decreased by two million gallons. Region 3, which includes Texas, still leads in the submission of reports, which is commensurate with total procurements.

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 JP5 in 1999, Region 6 reported twelve tenders that represent 62.01 million gallons; which means that each tender corresponds to over 5.1 million gallons, or the parcel size of a tanker. The single shipment of 0.53 million gallons of motor gasoline from Region 7 in 2000 would suggest mainly truck shipments, probably mixed with some pipeline transport, during this period.

Table 5 represents the volumes of fuels, in millions of gallons, received each calendar year in the individual Regions, that was sold to DoD customers. The increase in JP4 does not, necessarily, reflect a reversal of the previous trend of a decrease in the volume of JP4 delivered. It is more likely an increase in overall consumption rather than a shift from customers converting 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	
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
2001	AN8	—	—	—	—	—	—	—	1	—	1
	F76	2	—	37	—	39	22	20	43	6	169
	JP4	—	—	—	—	—	—	—	7	—	7
	JP5	—	44	125	—	118	12	23	35	1	358
	JP8	71	460	887	225	282	—	140	264	13	2342
	MU	—	—	1	—	—	—	1	11	—	13
	RME	—	—	—	—	—	2	—	2	—	4
2002	AN8	—	—	—	—	—	—	—	—	—	0
	F76	—	—	38	—	49	28	18	24	5	162
	JA1	—	—	—	—	—	10	1	—	—	11
	JP4	—	—	—	—	—	—	—	17	—	17
	JP5	—	38	108	—	118	13	14	45	—	336
	JP8	113	373	878	193	297	43	159	192	13	2261
	MU	—	—	1	—	—	—	1	11	—	13
	RME	—	—	—	—	—	1	—	1	—	2

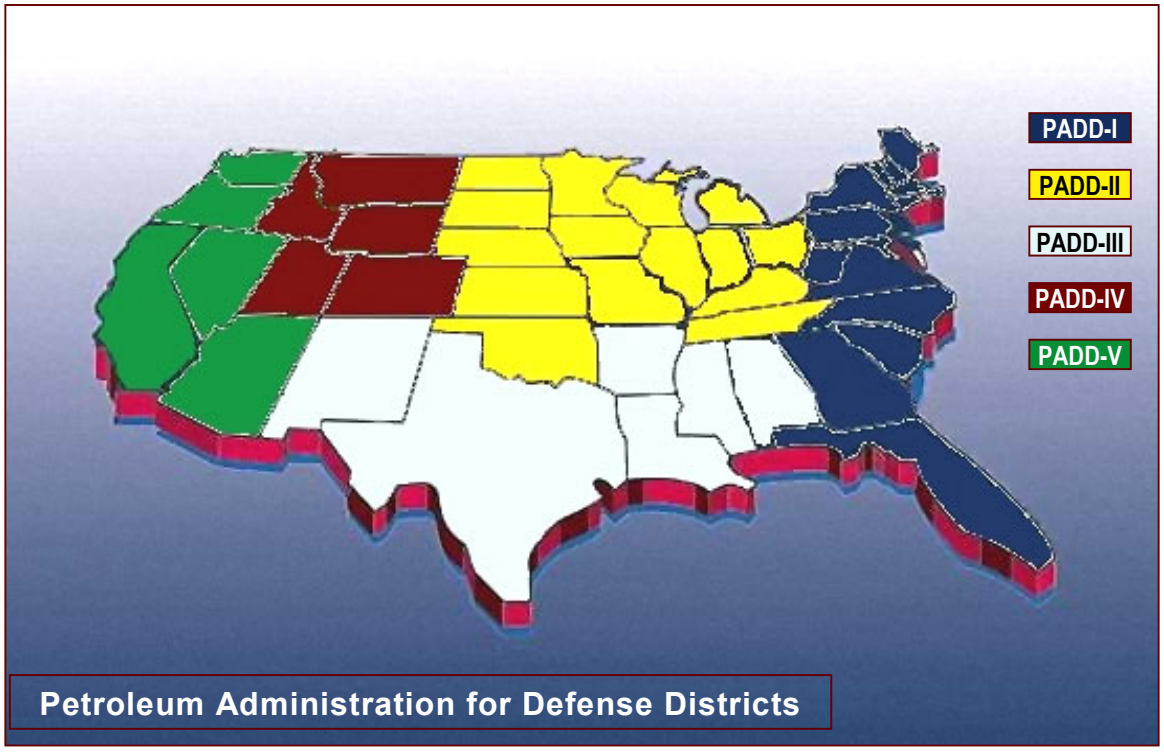
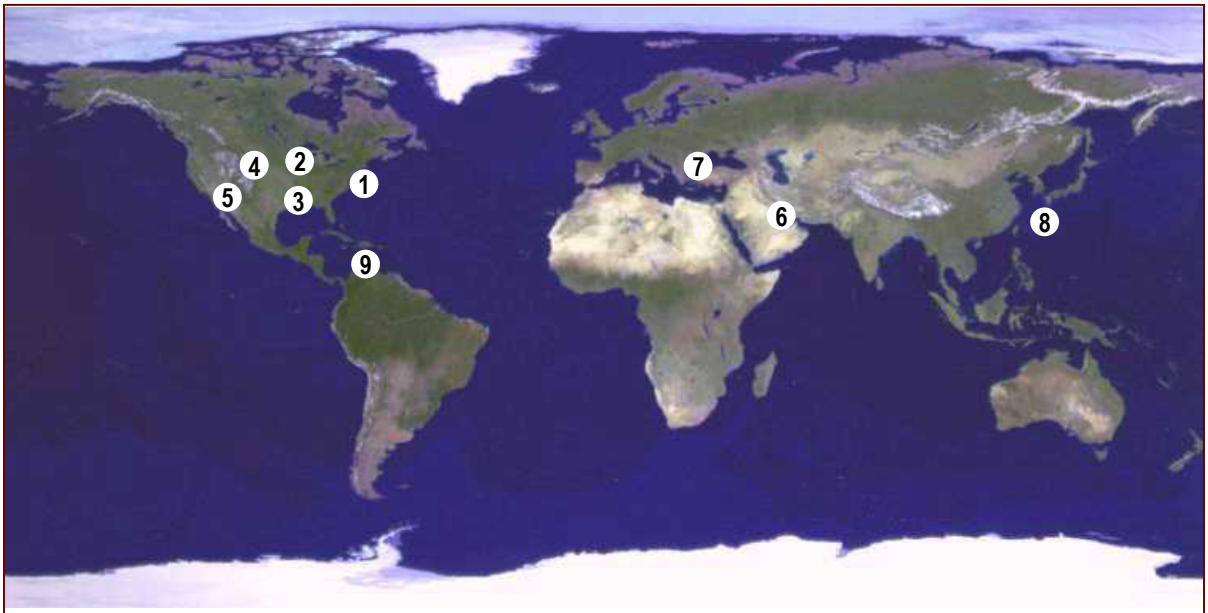


Table 5. Annual Volume of Fuel Received – By Region.

Year	Fuel	PQIS Region									Totals
		1	2	3	4	5	6	7	8	9	
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
2001	AN8	—	—	—	—	—	—	—	1.93	—	1.93
	F76	4.12	—	114.69	—	109.17	147.49	92.83	157.47	43.75	669.52
	JP4	—	—	—	—	—	—	—	1.55	—	1.55
	JP5	—	7.52	327.42	—	196.44	59.29	86.91	160.94	9.83	848.35
	JP8	38.36	313.10	1,074.10	105.52	443.25	—	366.65	331.57	83.58	2,756.13
	MU	—	—	0.42	—	—	—	0.87	15.22	—	16.51
	RME	—	—	—	—	—	9.87	—	5.46	—	15.33
2002	AN8	—	—	—	—	—	—	—	—	—	0
	F76	—	—	99.76	—	141.06	127.68	109.66	122.64	45.69	646.49
	JA1	—	—	—	—	—	48.85	2.64	—	—	51.49
	JP4	—	—	—	—	—	—	—	1.50	—	1.5
	JP5	—	7.07	310.51	—	177.39	75.69	51.75	168.62	—	791.03
	JP8	6.62	251.89	1,178.33	95.48	422.53	44.02	417.56	384.16	117.91	2,918.5
	MU	—	—	0.60	—	—	—	0.10	14.33	—	15.03
	RME	—	—	—	—	—	5.88	—	5.90	—	11.78

[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. Logistic and data collecting problems too, affect the process. For instance, in the case of the newly adopted JA1 fuel reporting, difficulties in implementing collectors and conduits for this product data resulted in shortages in its accounting. A single unattainable report, for pipeline delivery of fuel, resulted in the 28% deficiency in reporting. Whereas every effort has been made to garner product data, to present coherent analyses, this has not always been achievable. 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. Since it was readily identifiable, in the case of the AN8, in this instance the 2001 tables are corrected in this issue. All charts and tables, however, specify the volume of fuel and number of reports on which the fuel characteristic was assayed. These may be contrasted against totals reported in Table 4 and Table 5, to establish any possible deviation. For analyses predicated on 'occurrence averages', where volumetric totals are not commensurate, proportionating adjustments may be applied, based on that comparison.

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 on 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

As it has been since its introduction to this Report in 1999, 2002 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 previous reporting, there are still insufficient data points to provide proper statistical analysis. As such, histograms are not used; rather the data is presented in a single table. Noting the volume of fuel and number of shipments in Table 6, be cognizant that cited information is representative only. The same is true for JA1, added this year both may improve sufficiently to warrant inclusion in future issues of this report.

Marine Lance Cpl. Mike Anderson

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. Even with the reversal of last year's indication of declining use, the usefulness, and consequently retention, of this data is questionable, though. 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 2002, for all Regions combined, providing an overview of the condition of fuel delivered to DESC customers. These provide an overview of the detailed data, presented by region, in the Tables.

Table 6. Motor Gasoline (Midrange & Regular) Characteristics – 2002.

Characteristic	PQIS Reporting							
	Fuel	Region	Volume	Min	Avg	Wt Avg	Max	Count
Anti-Oxidants (mg/L)	MUM	3	0.6	9.5	9.500	9.500	9.5	1
	MUM	7	0.1	9.0	9.000	9.000	9.0	1
	MUM	8	14.3	9.5	15.318	15.8111	15.9	11
API Gravity (@ 60°F)	MUM	3	0.6	55.2	55.200	55.200	55.2	1
	MUM	7	0.1	54.9	54.900	54.900	54.9	1
	MUM	8	14.3	54.70	56.400	56.160	59.60	11
Distillation 10% Recovered (°C)	MUM	3	0.6	54.10	54.100	54.100	54.10	1
	MUM	7	0.1	53.00	53.000	53.000	53.00	1
	MUM	8	14.3	39.80	53.991	55.140	58.80	11
Final Boiling Point (°C)	MUM	3	0.6	205.0	205.000	205.000	205.0	1
	MUM	7	0.1	207.0	207.000	207.000	207.0	1
	MUM	8	14.3	192.0	196.482	196.521	204.0	11
Lead (g/L)	MUM	3	0.6	0.009	0.0090	0.0090	0.009	1
	MUM	7	0.1	0.002	0.0020	0.0020	0.002	1
	MUM	8	14.3	0.000	0.0004	0.0002	0.003	11
AKI (Octane)	MUM	3	0.6	90.55	90.550	90.550	90.55	1
	MUM	7	0.1	90.25	90.250	90.250	90.25	1
	MUM	8	14.3	89.05	89.800	89.796	90.45	11
Total Sulfur (% mass)	MUM	3	0.6	0.01	0.010	0.010	0.01	1
	MUM	7	0.1	0.01	0.015	0.015	0.01	1
	MUM	8	14.3	0.01	0.007	0.007	0.01	11
Vapor Liquid Ratio (@ 0.1°C)	MUM	3	0.6	64.7	64.700	64.700	64.7	1
	MUM	7	0.1	61.1	61.100	61.100	61.1	1
	MUM	8	14.3	8.7	57.154	61.224	63.6	11

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

Histograms show, for each product and fuel characteristic, the percent by volume of product refined, for delivery to DESC customers worldwide in 2002. The grades of fuel and specification values are indicated in the text box within the chart with the mean and standard deviation values calculated for the 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 limits. 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], per specifications.

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. This is a limitation in software available to plot the histograms; and it is impractical to do it manually due to the amount of data to be processed. 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.

The data indicates the overall distribution of test results on a worldwide basis for 2002. 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). The quantities represented may be contrasted against totals in Table 5, to determine any possible deviation.

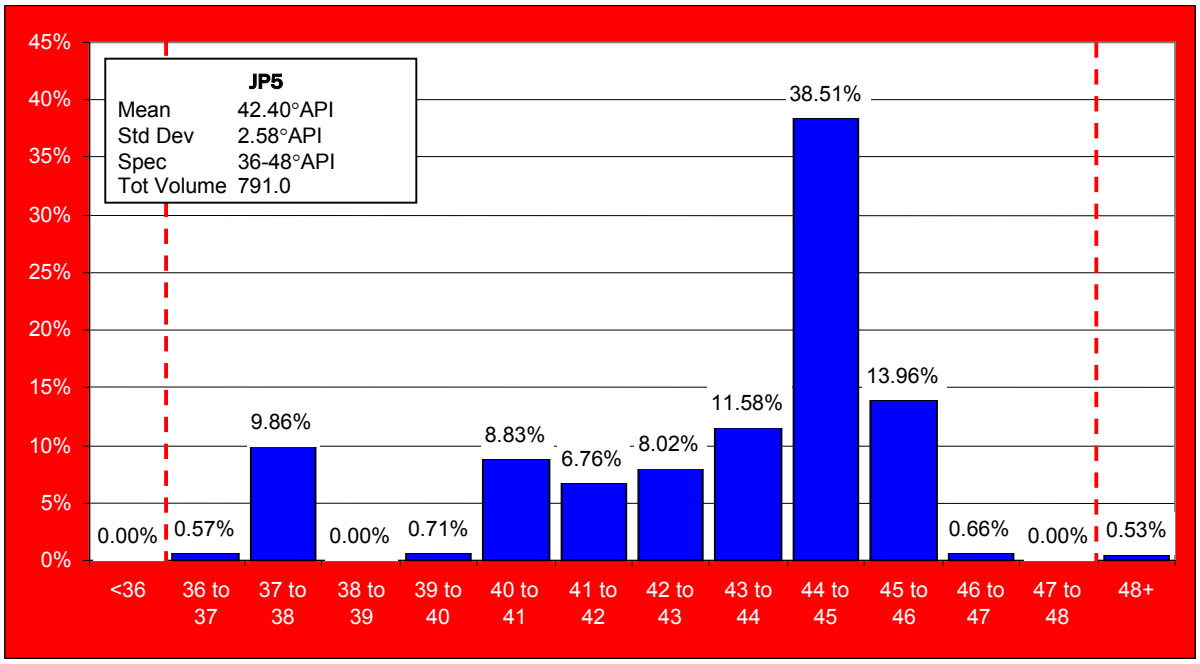
Army Sgt. Julia Fadell

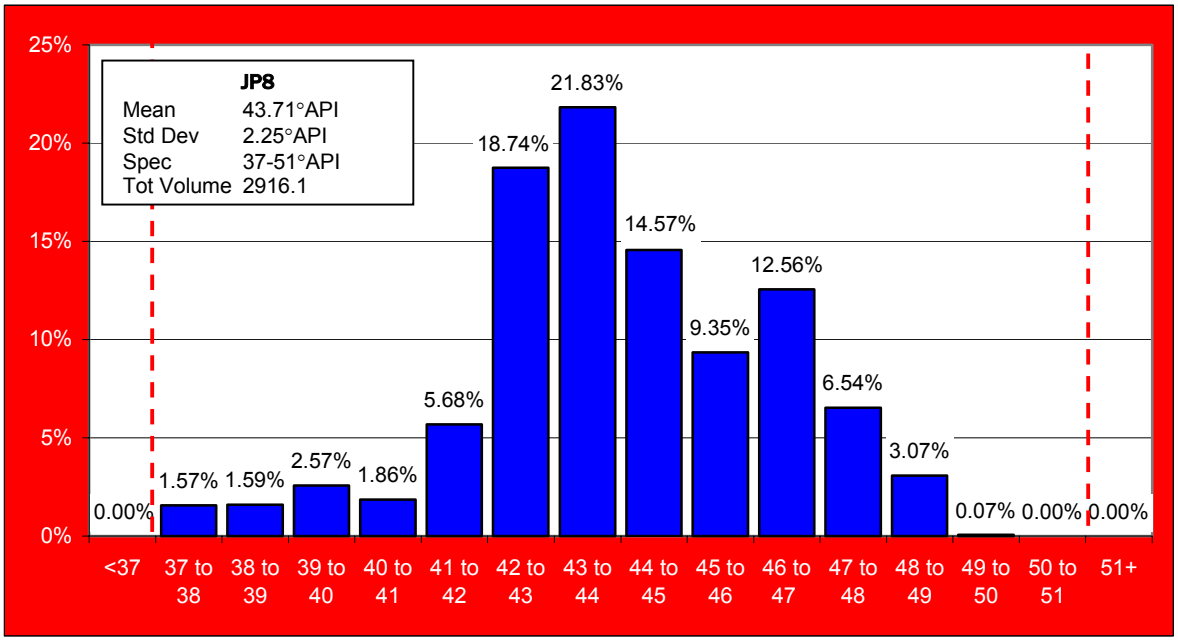
This year's Report continues the charting, initiated in 2001, for Marine sulfur content in Histogram 5. It was added to provide an overview of this currently topical statistic, as the world looks at controlling emissions.

Again, as in the 2001 Report, comparing Histograms to those of the prior year, only changes in distributions, the volumes of fuel processed, and values of the peaks reported are observed. No significant changes are observed in either the mean or the shape of the curve, for either JP5 or JP8 for each of the characteristics depicted.

Histograms show that greater than 99% of the volume of fuel received in 2002 met specification properties. The most notable exceptions are Olefins in JP-5 and, again, the Total Acid Number in JP-8. Note that the Olefin maximum was removed from the governing specification in 1999. For the latter, the trend noted last year continues. DESC will continue to monitor these properties in JP8 shipments through 2003.

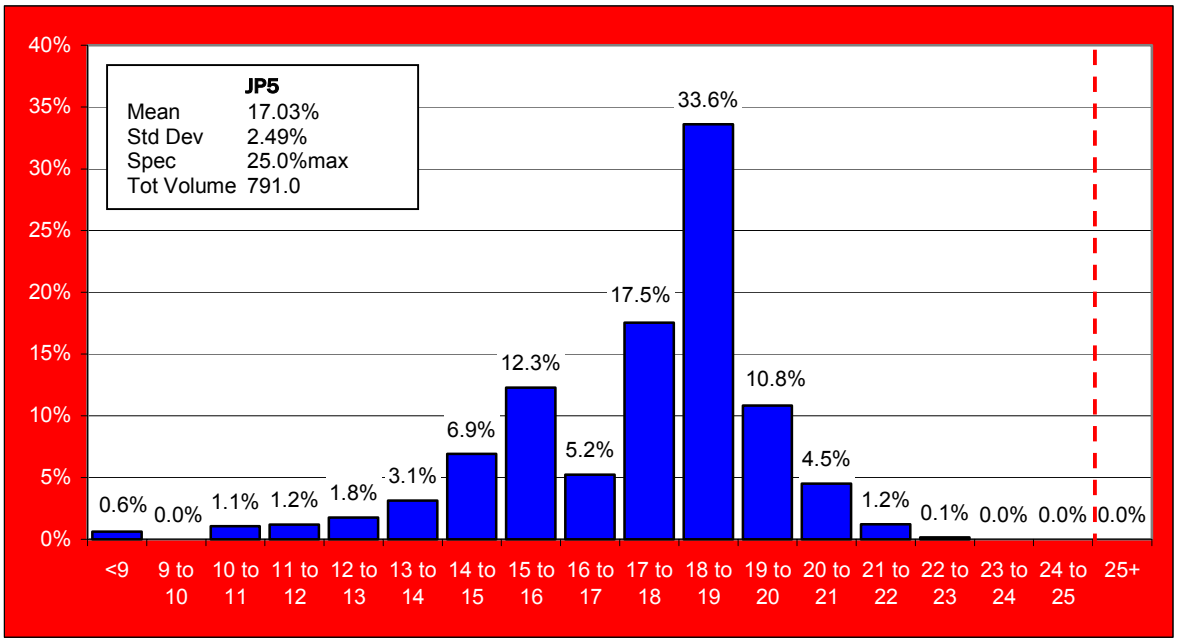
Histogram 1. API Gravity in Volume Received – 2002.

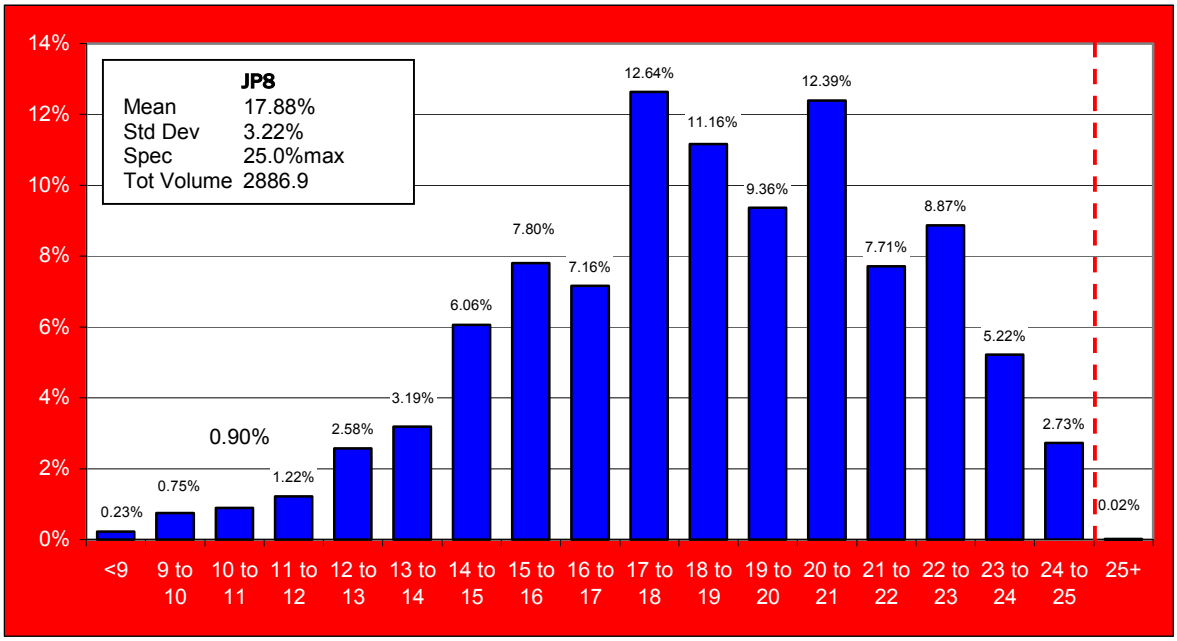




[Volume in Millions of Gallons]

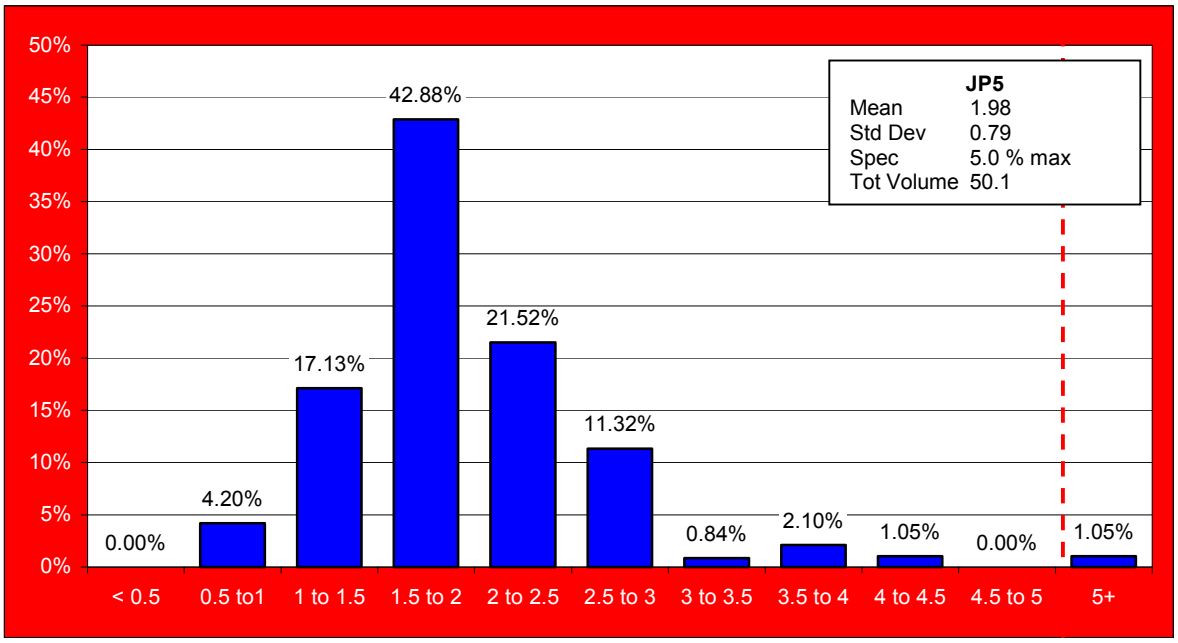
Histogram 2. Aromatics in Volume Received – 2002.

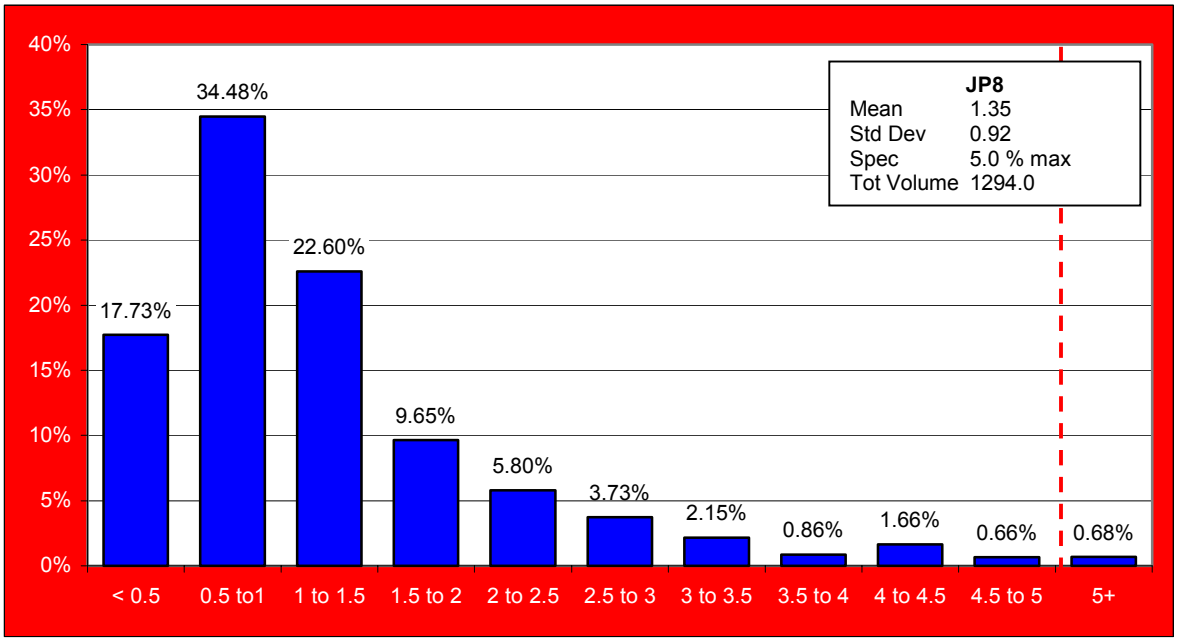




[Volume in Millions of Gallons]

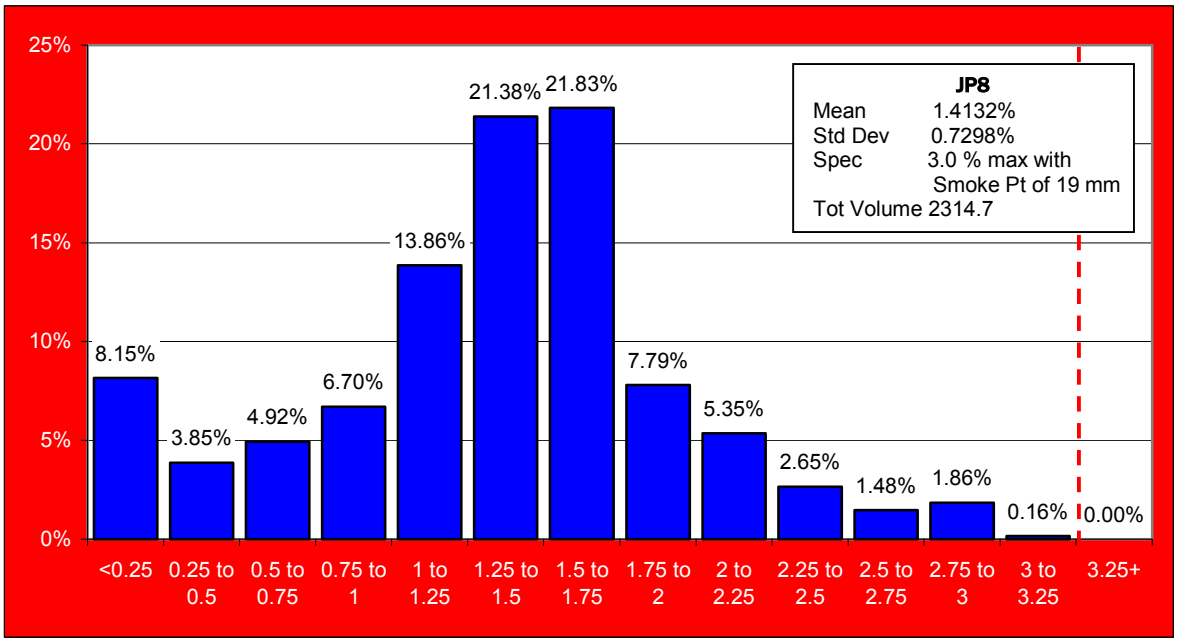
Histogram 3. Olefins in Volume Received – 2002.



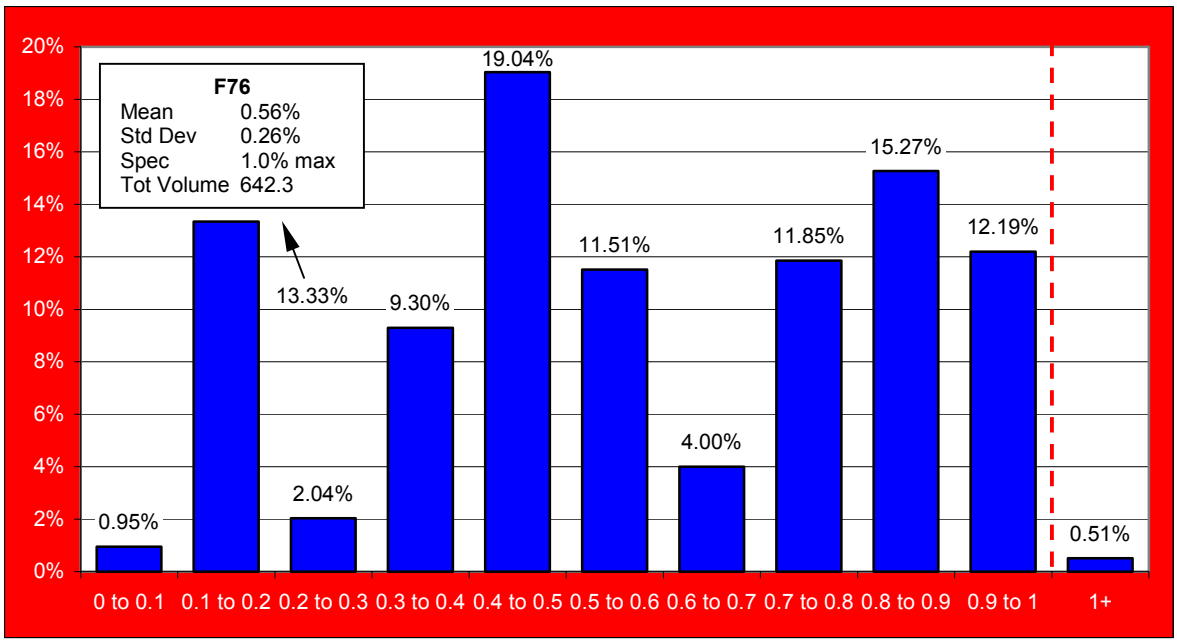


[Volume in Millions of Gallons]

Histogram 4. Naphthalene in Volume Received – 2002.

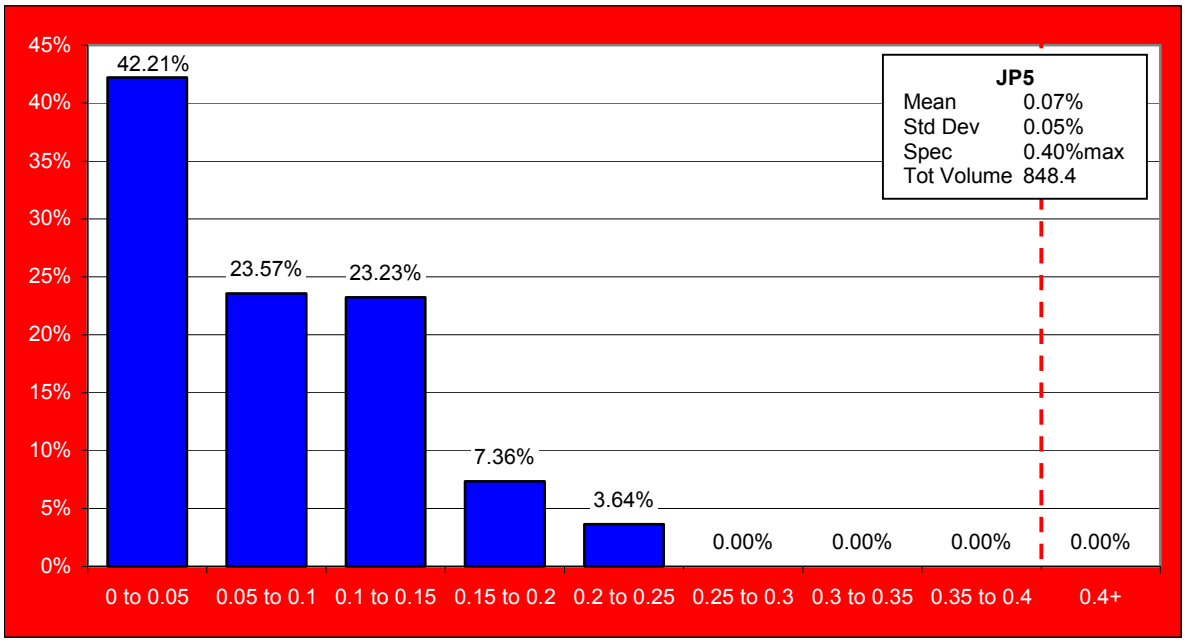


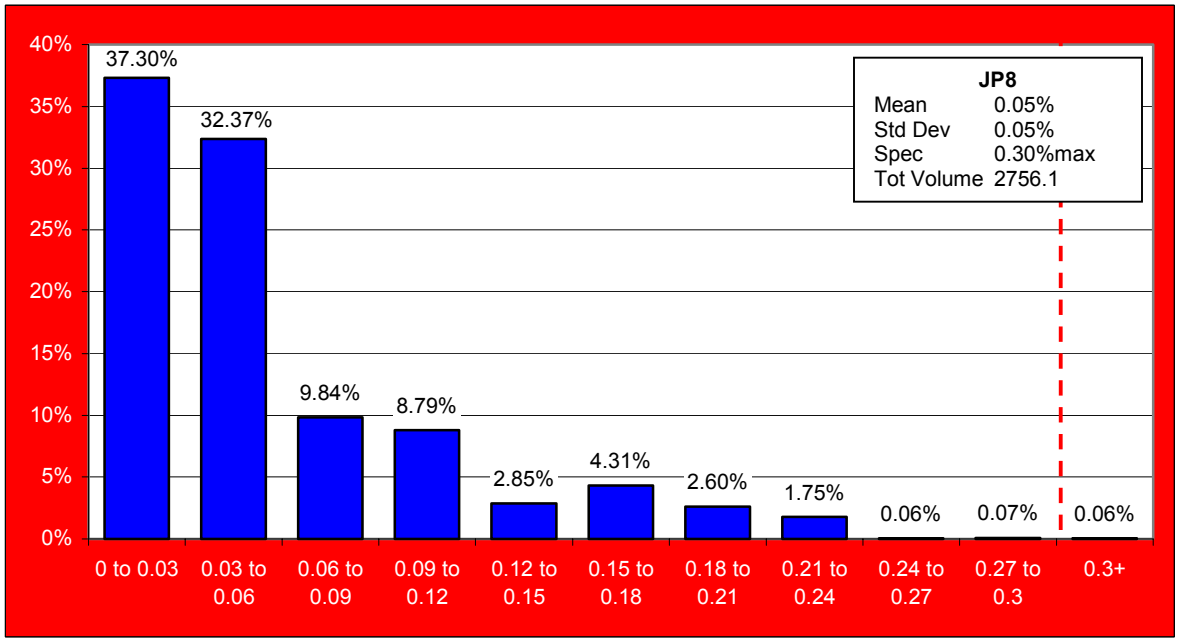
Histogram 5a. Total Sulfur in Volume Received – 2002.



[Volume in Millions of Gallons]

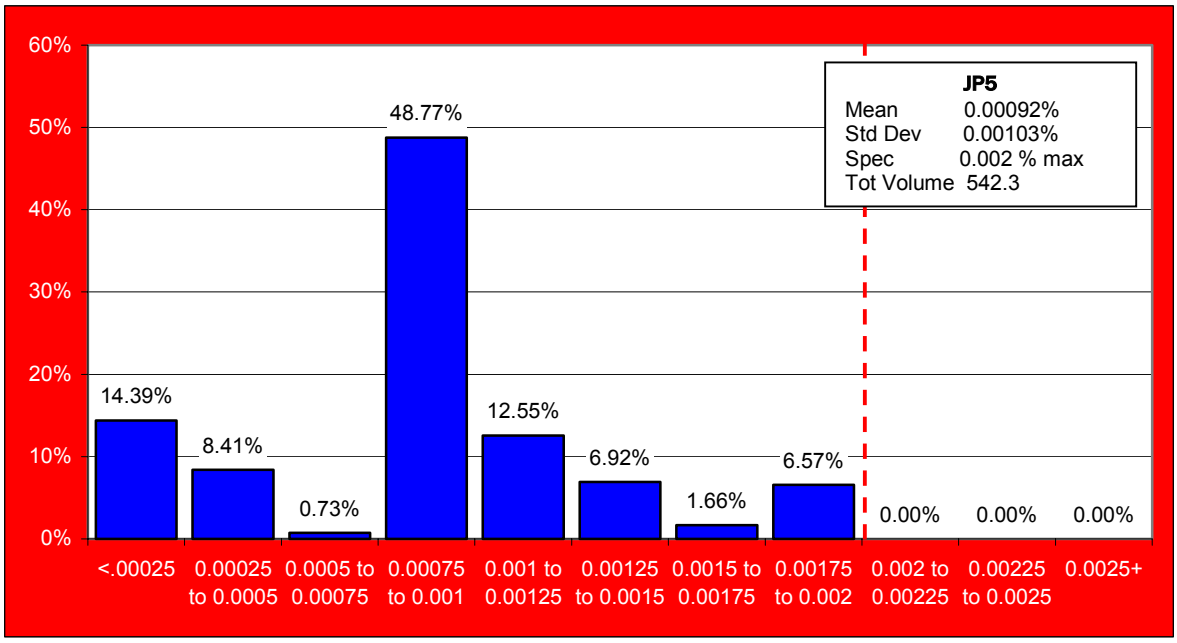
Histogram 5. Total Sulfur in Volume Received – 2002.

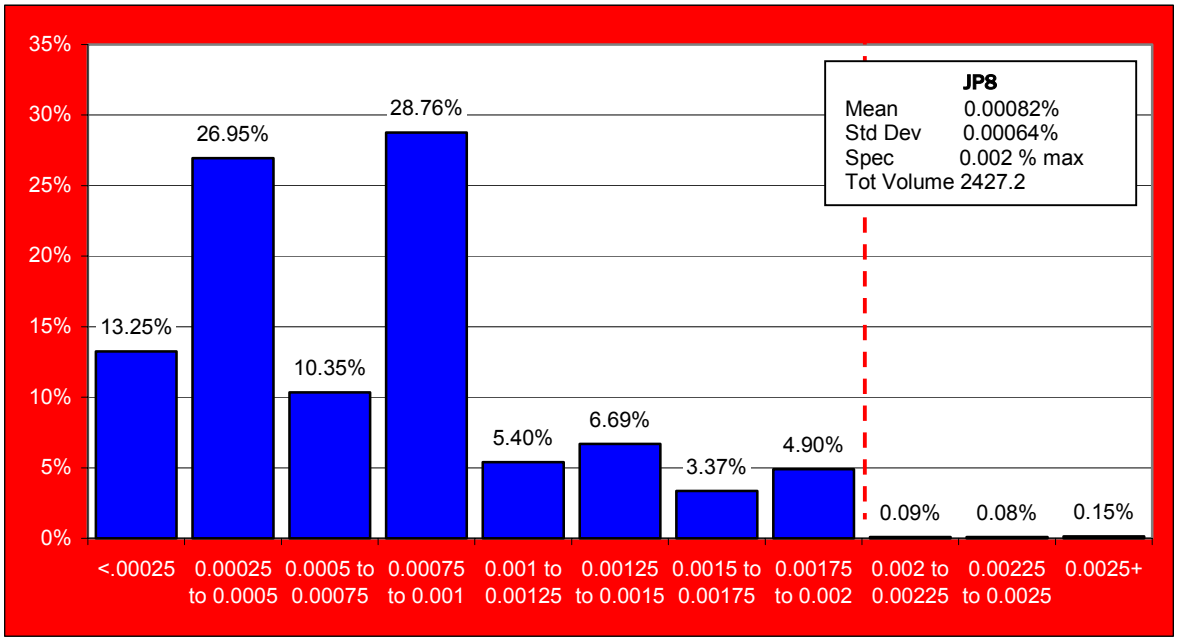




[Volume in Millions of Gallons]

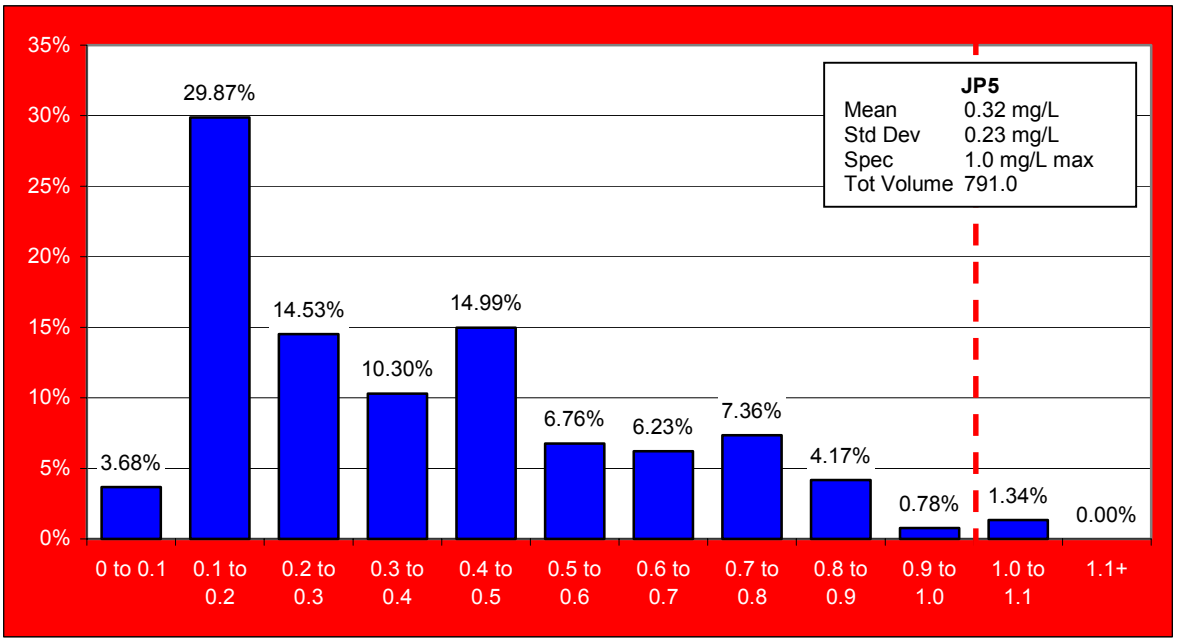
Histogram 6. Mercaptan Sulfur in Volume Received – 2002.

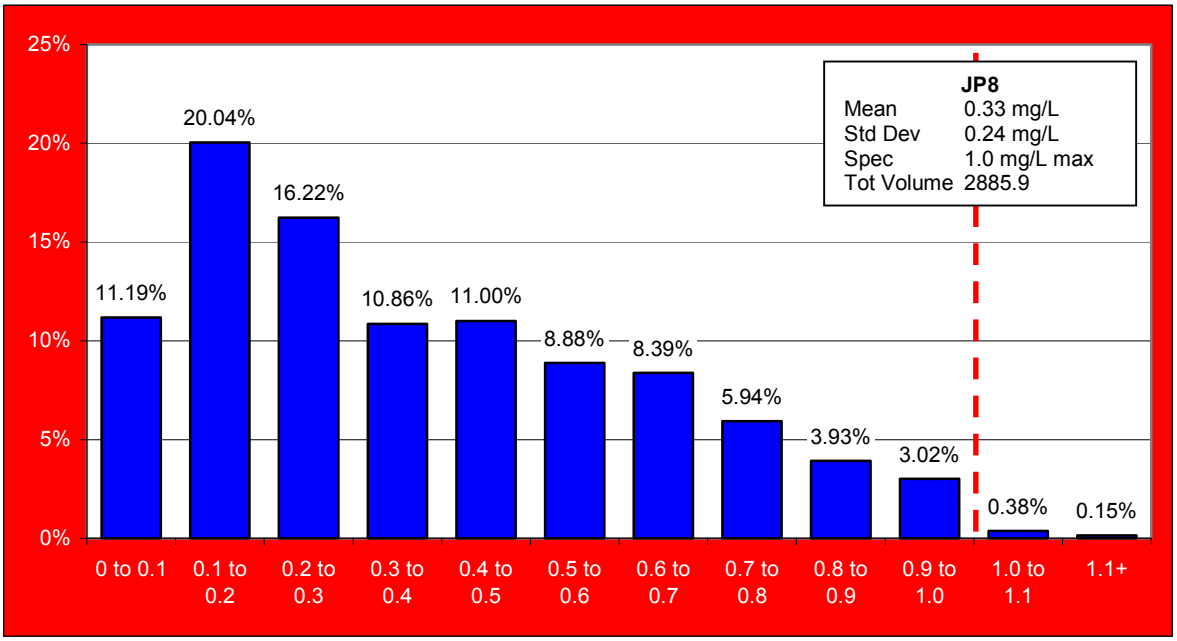




[Volume in Millions of Gallons]

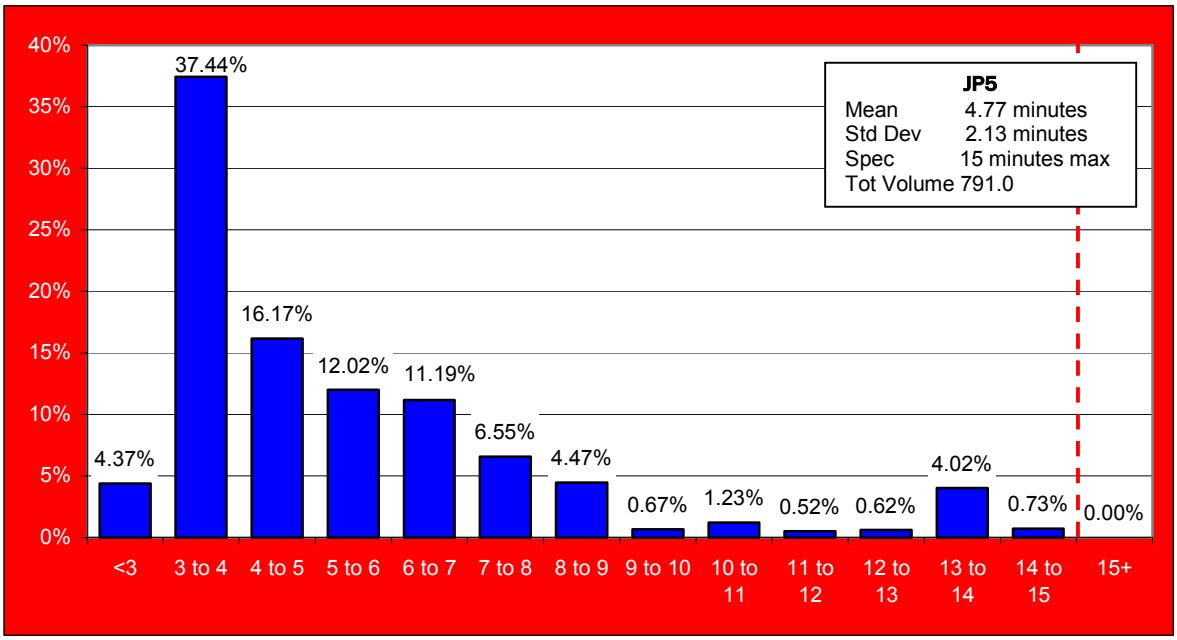
Histogram 7. Particulate Contamination in Volume Received – 2002.

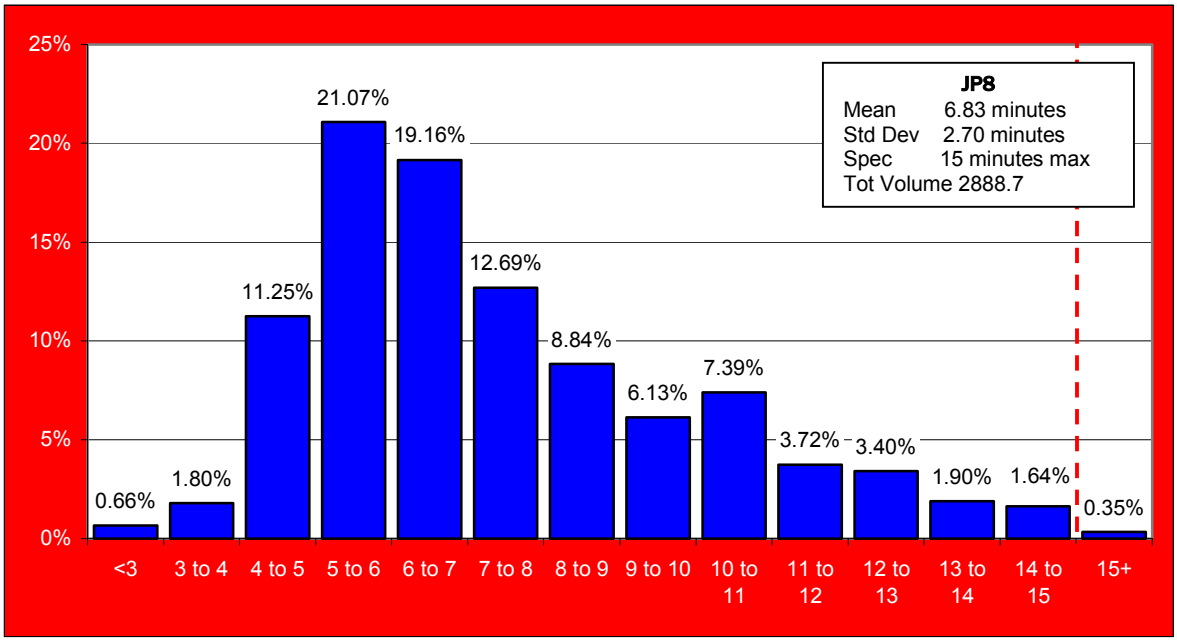




[Volume in Millions of Gallons]

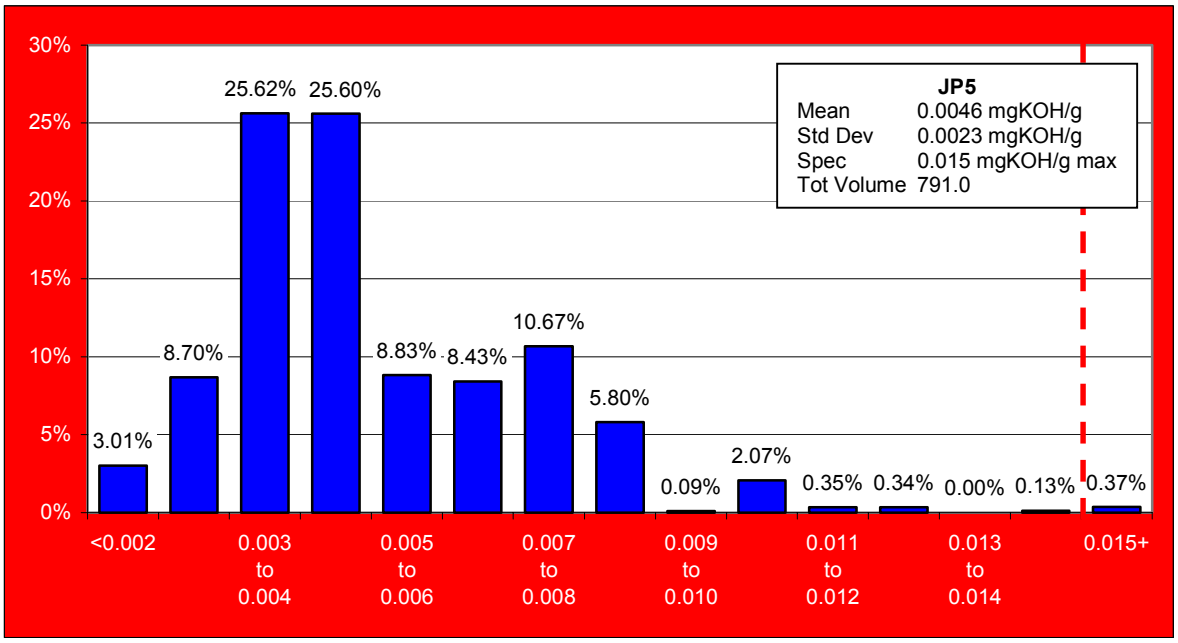
Histogram 8. Filtration Time for Volume Received – 2002.

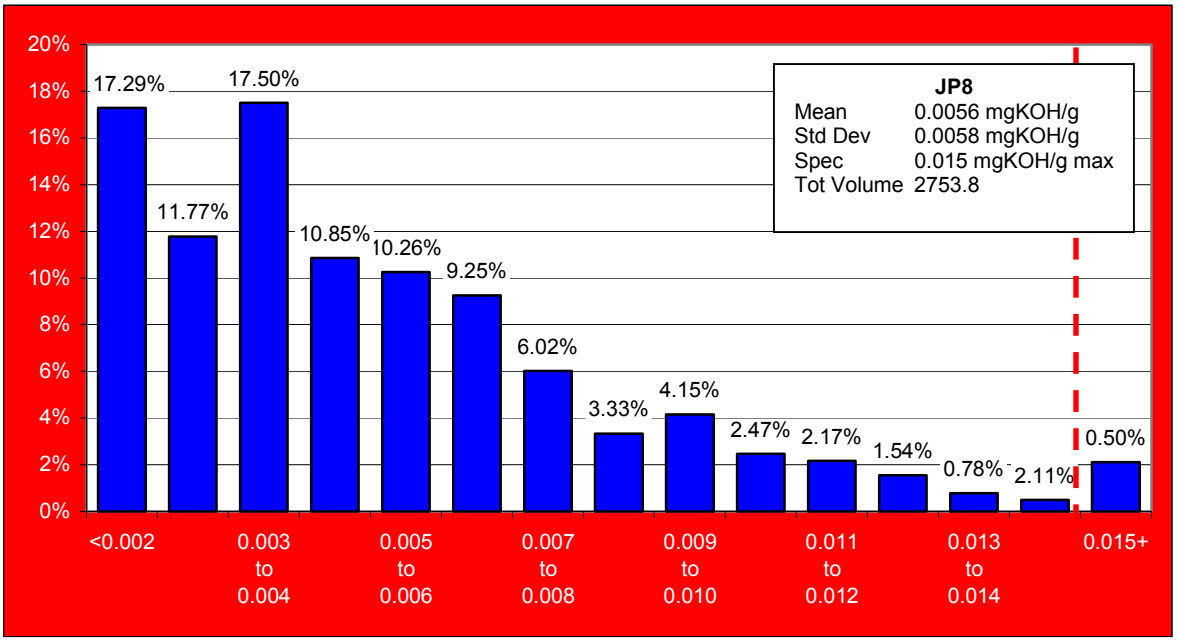




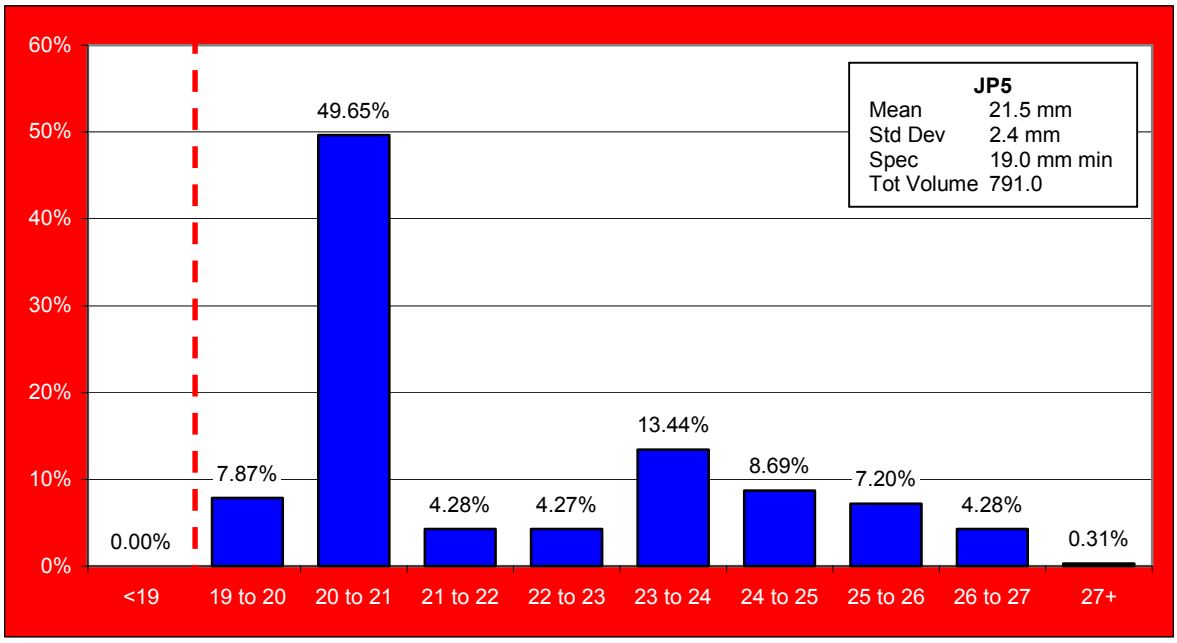
[Volume in Millions of Gallons]

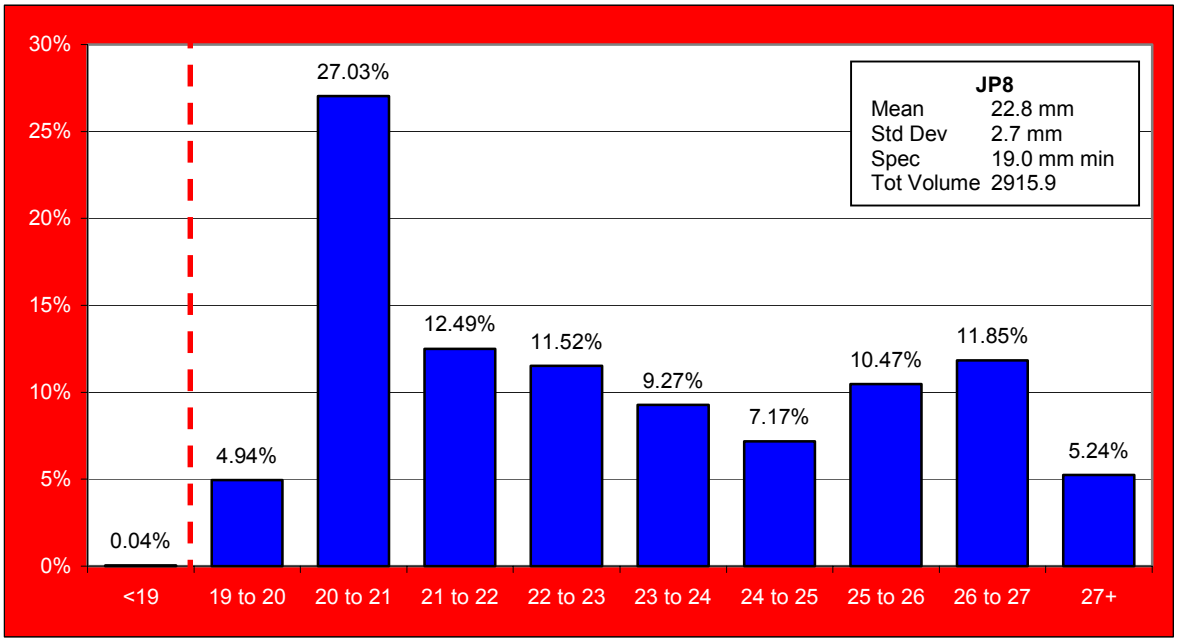
Histogram 9. Total Acid Number in Volume Received – 2002.





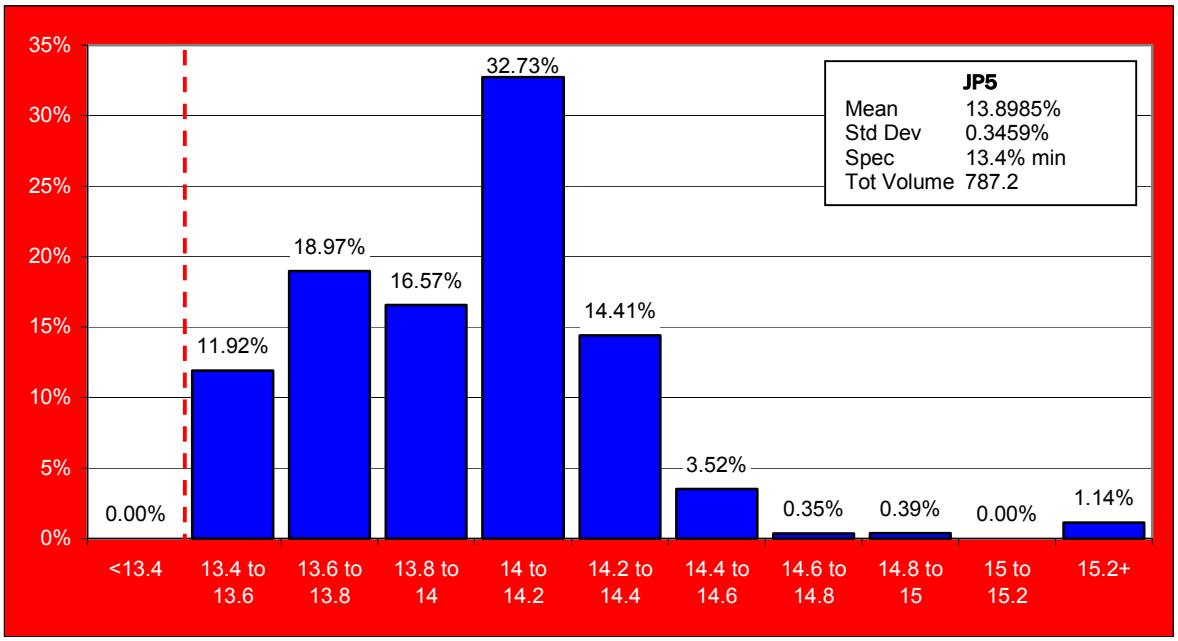
Histogram 10. Smoke Point in Volume Received – 2002.

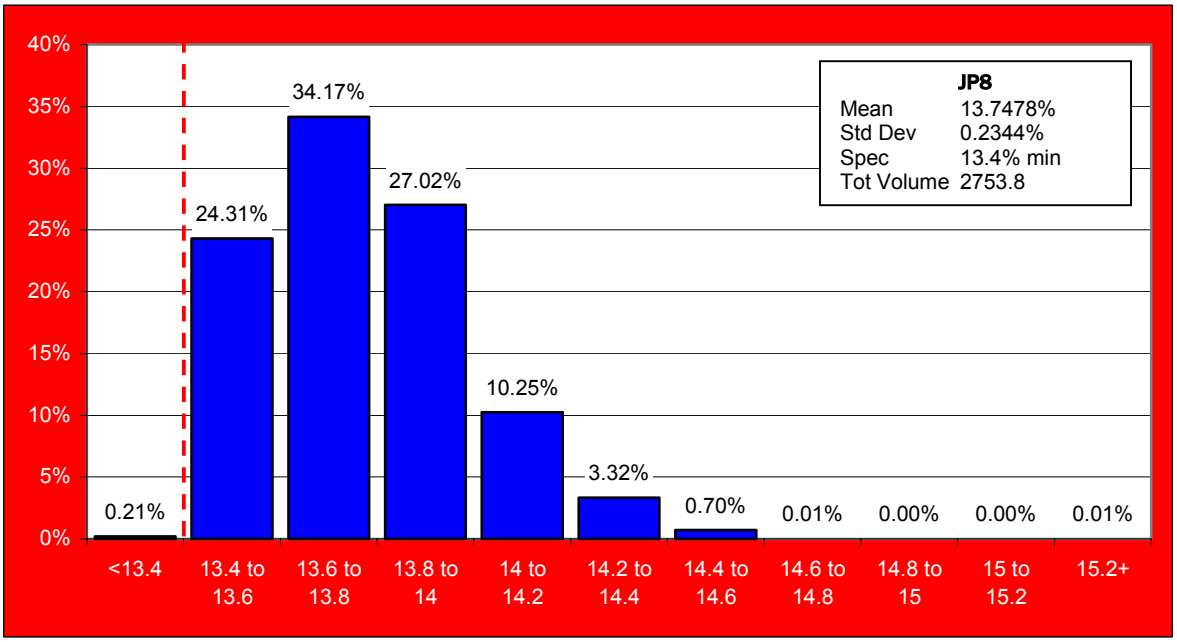




[Volume in Millions of Gallons]

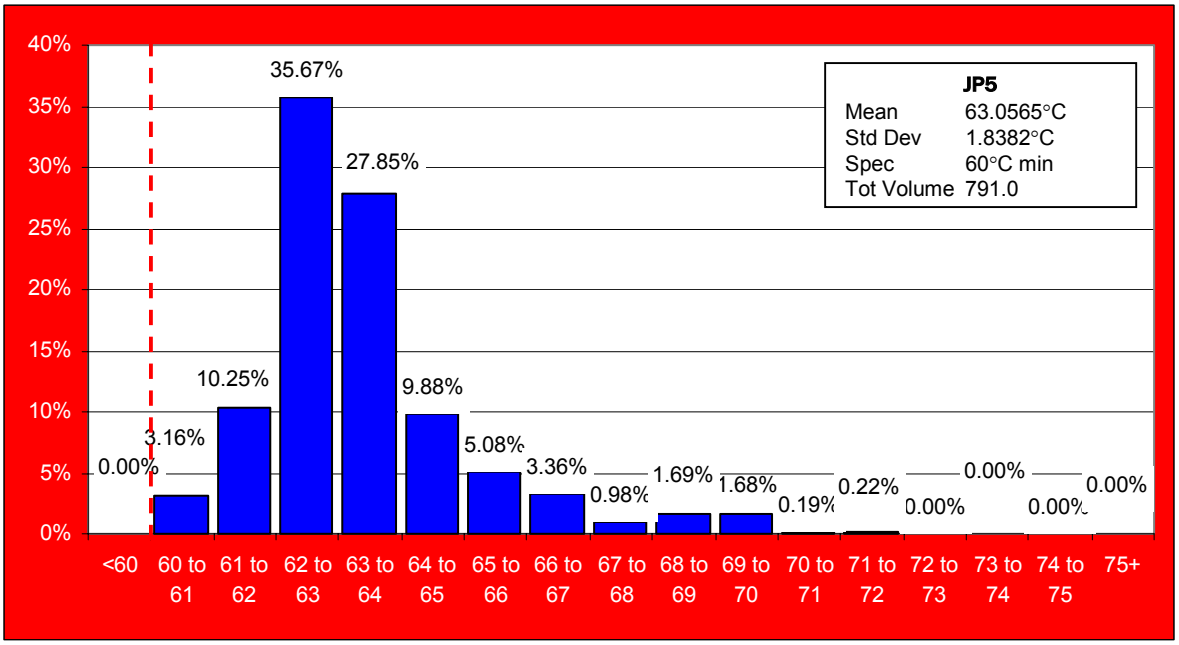
Histogram 11. Hydrogen Content in Volume Received – 2002.

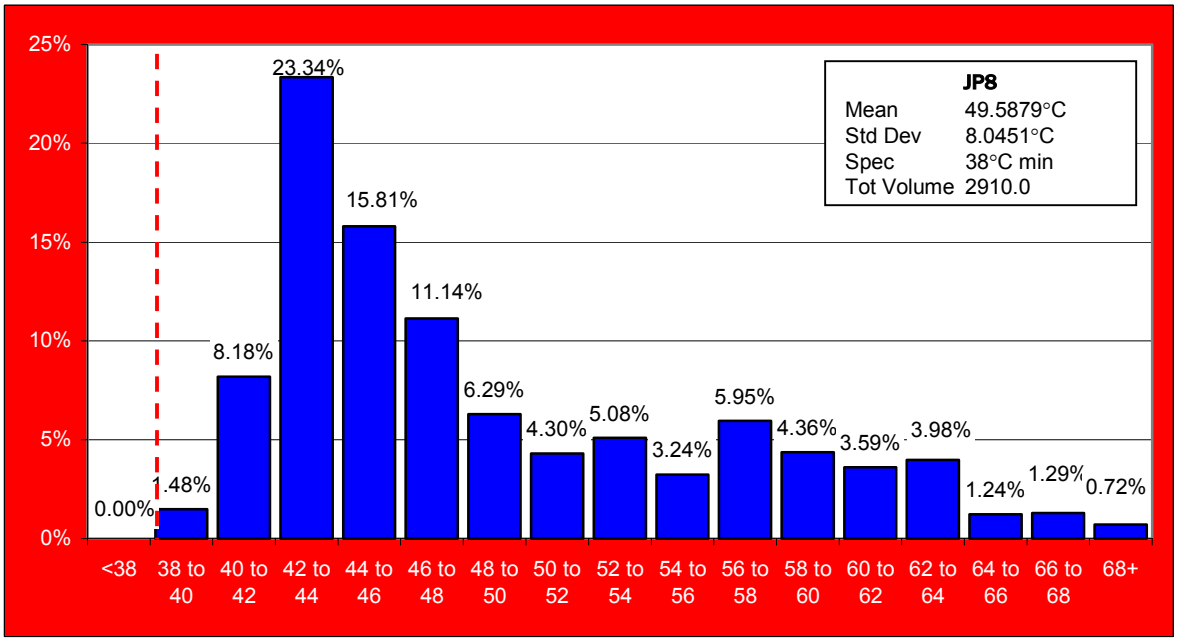




[Volume in Millions of Gallons]

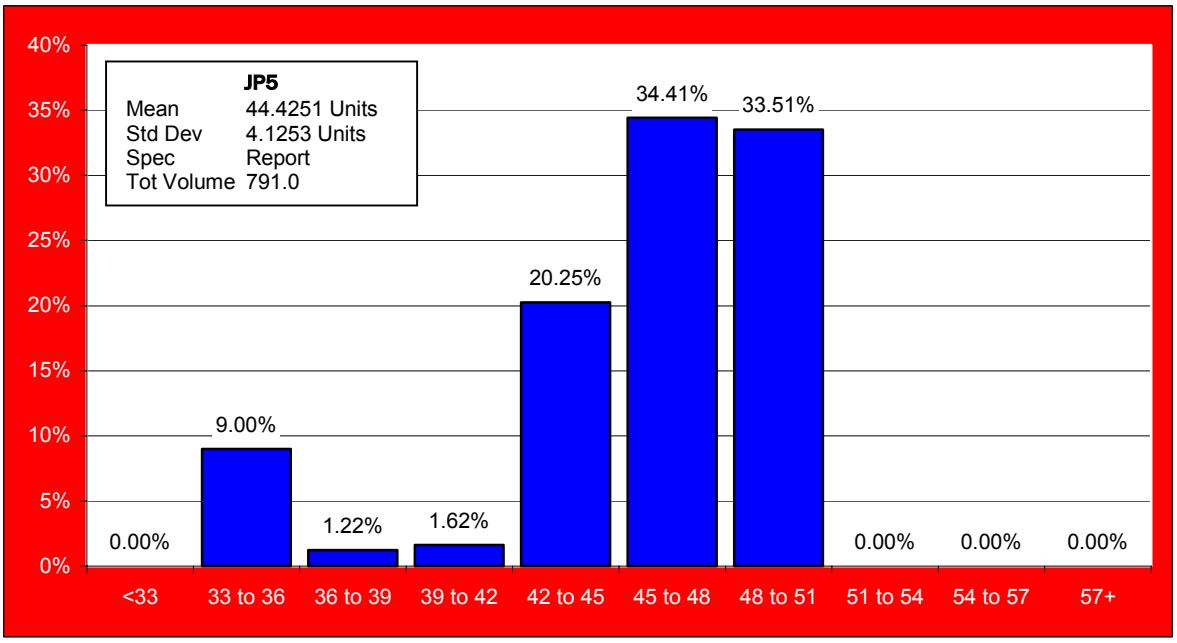
Histogram 12. Flash Point in Volume Received – 2002.

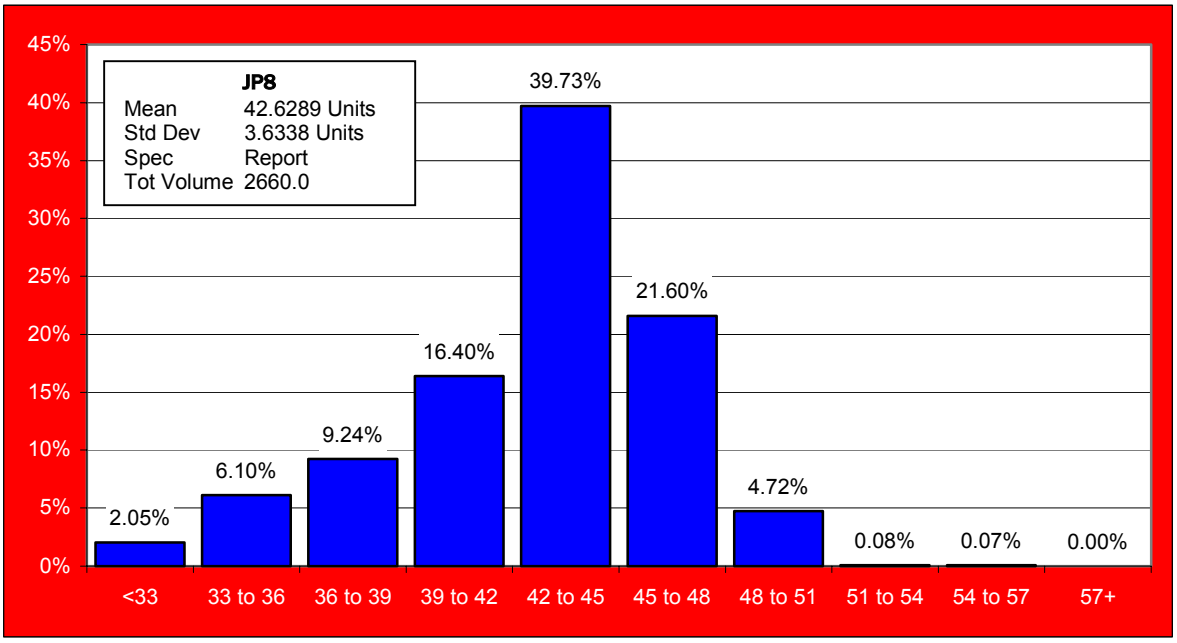




[Volume in Millions of Gallons]

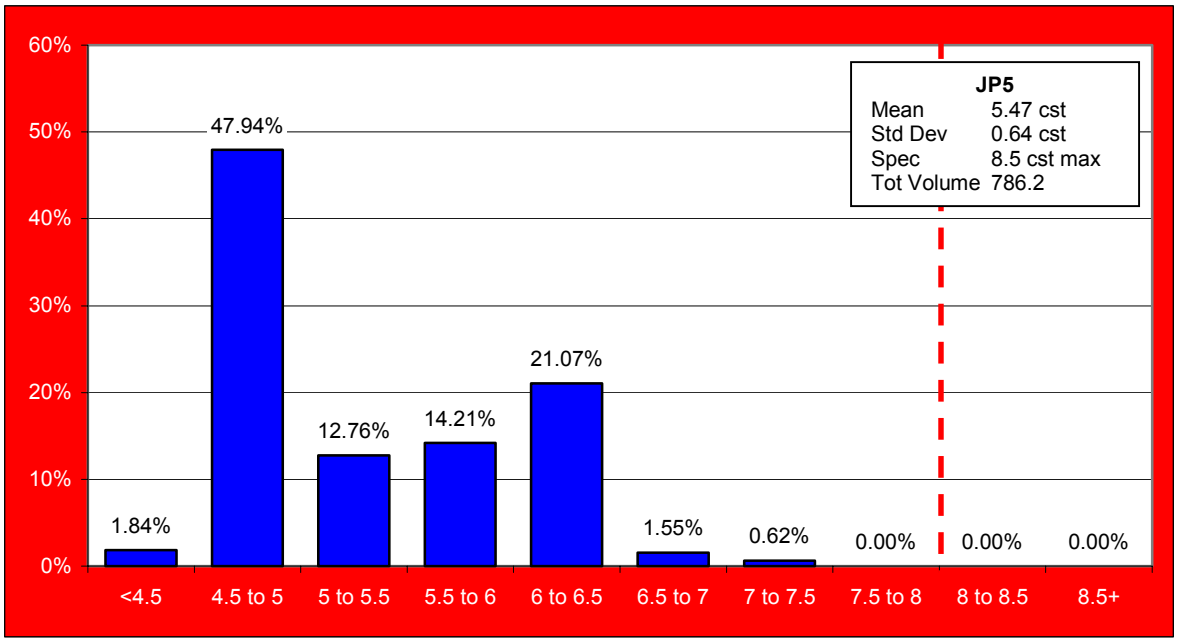
Histogram 13. Cetane Index in Volume Received – 2002.

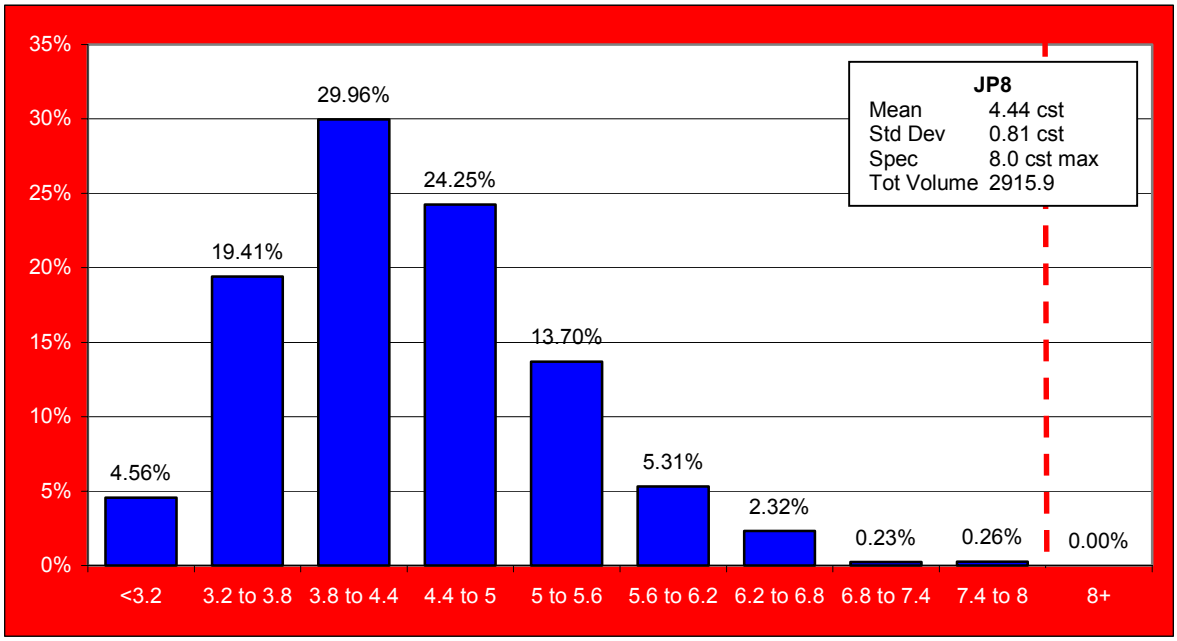




[Volume in Millions of Gallons]

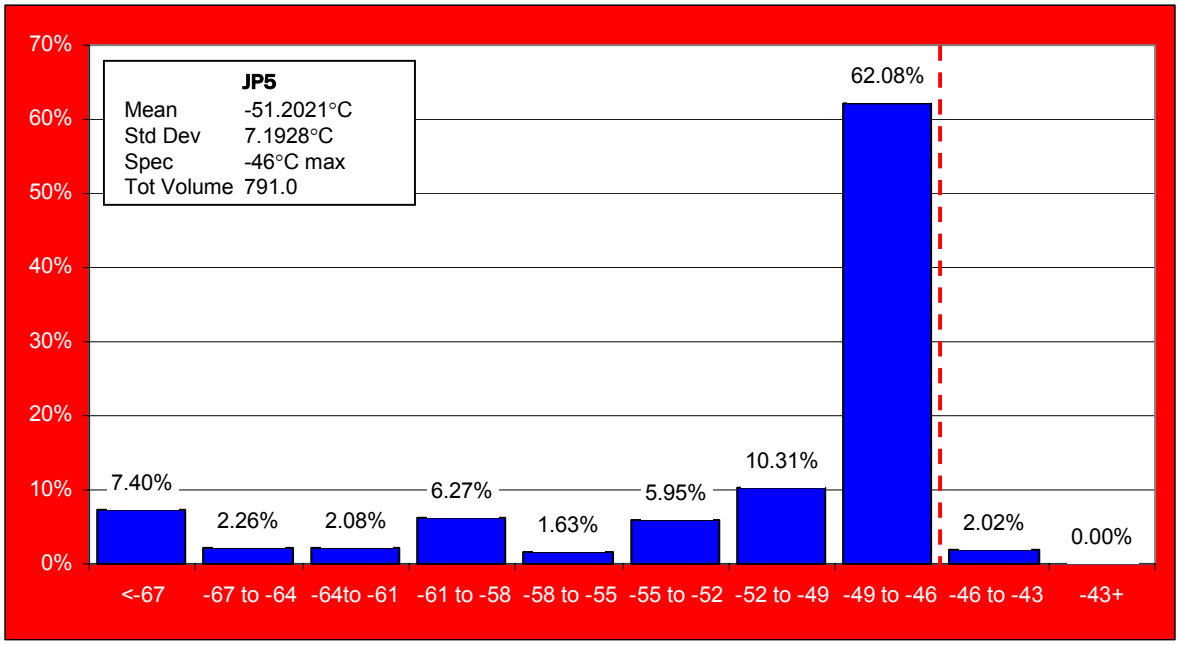
Histogram 14. Viscosity in Volume Received – 2002.

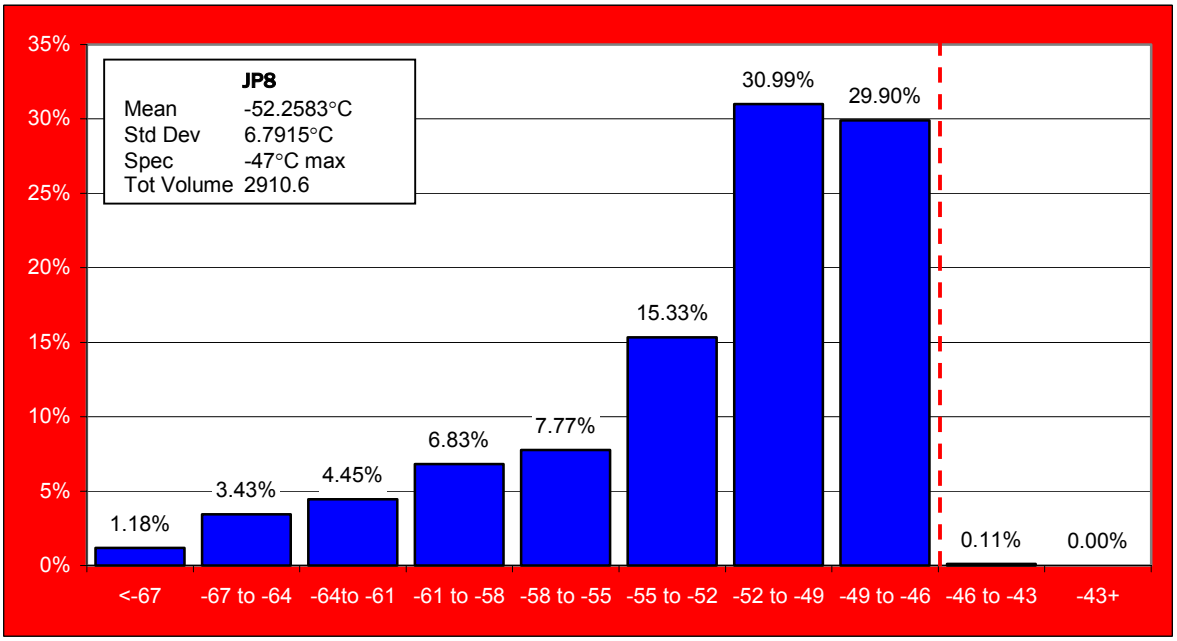




[Volume in Millions of Gallons]

Histogram 15. Freezing Point in Volume Received – 2002.





[Volume in Millions of Gallons]

Fuel Characteristics - Regional

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. These are supplemented by the histograms that present global characteristics distributions. The region-specific reporting of the tables facilitates comparison of characteristics, one to the other. Note that in each scope of reporting, summarization is based on a different focus, which may produce slightly different results.

Senior Airman John Mejia

Like the histograms, the conformance tables too are illustrative, in that they may not represent 100 percent of the particular fuel characteristic (see The Data), but delineate 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 the submitted data for the characteristic). Supplied for each year and region combination is number of reports from the field comprising the data set and the volume, in millions of gallons, of fuel 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 the data in Table 7, Table 9, or Table 8. For specificity, "actuals" may be compared to; and weighted against the amount of data recorded, as cited in the last column. Tables also afford year-to-year comparisons of the condition or attributes of fuels. Such an evaluation may be accomplished for any characteristic, governed in the specification, in consulting the appropriate table(s).

Dr. (Maj.) Joel Tanaka

In utilizing this data to draw conclusions on the condition or composition of fuels, however, It is important to note that this data reflects "Level A procurement Quality test data"; that is to say, the results compiled from testing or 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 recorded 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
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
2001	1	F76	4.1	37.2	37.35	37.35	37.5	2
2001	3	F76	114.7	35.8	36.99	36.99	38.0	37
2001	5	F76	109.2	31.5	32.51	32.47	33.8	39
2001	6	F76	147.5	34.8	37.39	37.84	39.7	22
2001	7	F76	92.8	35.2	37.20	37.14	39.3	20
2001	8	F76	157.5	31.6	35.95	35.70	41.7	43
2001	9	F76	43.8	33.7	35.16	34.90	37.3	6
2002	3	F76	99.8	34.7	36.40	36.35	37.7	38
2002	5	F76	141.1	31.9	32.60	32.57	34.1	49
2002	6	F76	127.7	35.3	36.38	36.64	39.1	28
2002	7	F76	109.7	35.4	36.47	36.65	37.3	18
2002	8	F76	122.6	30.0	36.80	36.30	39.2	24
2002	9	F76	45.7	35.7	36.39	36.40	37.6	5

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

Table 8. API Gravity Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	43.1	43.90	43.11	44.8	43
2001	3	JP5	327.4	41.8	44.17	44.23	52.7	125
2001	5	JP5	196.4	36.6	39.11	38.70	41.3	118
2001	6	JP5	59.2	44.2	45.41	45.41	46.2	12
2001	7	JP5	86.9	40.4	42.62	42.67	45.1	23
2001	8	JP5	160.9	40.5	43.38	43.64	45.4	35
2001	9	JP5	9.8	42.2	42.20	42.20	42.2	1
2002	2	JP5	7.1	42.3	43.43	43.42	44.1	38
2002	3	JP5	310.5	42.3	44.63	44.69	48.3	108
2002	5	JP5	177.4	36.9	39.32	38.91	41.2	118
2002	6	JP5	75.7	42.4	43.62	44.06	45.3	13
2002	7	JP5	51.8	41.8	42.98	43.15	45.3	14
2002	8	JP5	168.6	40.8	43.70	43.79	46.0	45

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

Table 9. API Gravity Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
2000	8	JP4	1.1	54.6	55.85	55.99	56.3	12
2001	8	JP4	1.6	54.4	55.98	56.00	56.6	7
2002	8	JP4	1.5	55.2	56.38	56.40	57.1	17

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

Table 10. API Gravity Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	40.0	42.47	43.89	45.8	71
2001	2	JP8	313.1	39.5	44.25	43.91	48.0	460
2001	3	JP8	1,074.1	30.9	44.41	44.23	49.9	886
2001	4	JP8	105.5	39.7	44.61	44.58	46.6	224
2001	5	JP8	443.2	37.0	40.68	40.91	43.4	282
2001	7	JP8	366.6	40.0	45.61	45.12	49.5	137
2001	8	JP8	331.6	41.6	44.12	45.25	48.6	264
2001	9	JP8	83.6	45.2	45.82	45.87	46.5	13
2002	1	JP8	6.6	35.6	41.60	41.79	47.3	113
2002	2	JP8	251.9	40.7	44.18	43.74	47.6	372
2002	3	JP8	1178.3	39.0	44.23	43.70	49.3	878
2002	4	JP8	95.5	38.9	43.82	44.00	47.7	193
2002	5	JP8	422.5	37.2	40.73	40.99	44.2	297
2002	6	JP8	44.0	47.2	47.27	47.23	47.4	43
2002	7	JP8	417.6	41.9	44.92	45.09	48.3	158
2002	8	JP8	384.2	42.0	44.19	45.52	48.1	192
2002	9	JP8	117.9	45.5	45.98	45.94	46.9	13

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

Table 11. Aromatics Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	10.6	13.64	13.38	15.6	43
2001	3	JP5	327.4	13.3	17.68	17.81	20.8	125
2001	5	JP5	196.4	10.5	17.94	17.28	21.9	118
2001	6	JP5	59.3	12.0	15.83	15.84	18.6	12
2001	7	JP5	86.9	13.7	18.87	18.64	24.1	23
2001	8	JP5	160.9	10.5	17.29	17.05	20.6	35
2001	9	JP5	9.8	14.5	14.50	14.50	14.5	1
2002	2	JP5	7.1	12.8	13.95	13.97	15.7	38
2002	3	JP5	310.5	10.0	17.64	17.78	19.2	108
2002	5	JP5	177.4	11.5	17.74	17.07	22.2	118
2002	6	JP5	75.7	14.0	15.24	15.20	15.9	13
2002	7	JP5	51.8	15.6	17.56	17.37	19.1	14
2002	8	JP5	168.6	7.1	16.66	17.52	21.8	45

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

Table 12. Aromatics Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
2000	8	JP4	1.1	6.7	7.76	7.81	8.9	12
2001	8	JP4	1.6	7.0	7.90	8.20	9.2	7
2002	8	JP4	1.5	5.2	6.91	7.36	10.1	17

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

Table 13. Aromatics Conformance - JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	13.4	19.81	16.74	23.3	71
2001	2	JP8	313.1	9.6	14.92	15.56	23.3	460
2001	3	JP8	1,074.1	0.2	18.57	19.45	25.0	886
2001	4	JP8	105.5	7.3	15.80	16.06	24.0	224
2001	5	JP8	443.2	5.5	17.27	16.66	22.8	281
2001	7	JP8	366.6	10.7	17.32	16.83	24.3	140
2001	8	JP8	331.6	6.7	17.84	17.22	22.7	254
2001	9	JP8	83.6	19.2	20.03	19.98	20.4	13
2002	1	JP8	6.6	16.5	20.53	20.84	23.4	113
2002	2	JP8	251.9	8.2	14.91	15.31	22.2	372
2002	3	JP8	1178.3	11.3	18.74	20.14	25.0	878
2002	4	JP8	95.5	9.1	17.79	17.70	24.7	191
2002	5	JP8	422.5	8.4	17.29	16.07	25.6	293
2002	6	JP8	44.0	19.6	19.94	13.76	20.4	38
2002	7	JP8	417.6	12.3	18.39	17.81	24.9	158
2002	8	JP8	384.2	10.3	18.16	17.45	24.1	192
2002	9	JP8	117.9	20.1	20.56	20.58	21.0	13

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

Table 14. Olefins Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	4.4	0.6	1.48	1.49	2.6	25
2001	3	JP5	38.1	0.8	1.48	1.49	2.2	19
2001	5	JP5	37.8	1.4	3.69	3.82	7.8	28
2001	7	JP5	8.0	0.9	0.90	0.90	0.9	2
2002	2	JP5	7.1	NR	NR	NR	NR	0
2002	3	JP5	310.5	0.9	1.23	0.03	1.6	4
2002	5	JP5	177.4	1.1	2.06	0.48	5.0	38
2002	6	JP5	75.7	NR	NR	NR	NR	0
2002	7	JP5	51.8	NR	NR	NR	NR	0
2002	8	JP5	168.6	NR	NR	NR	NR	0

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

Note:

The impact of a region (or supplier) not reporting a given characteristic is vividly illustrated here in the significant difference in the Average v Weighted Average. Users are reminded of the relevance of results, to total volume.

Table 15. Olefins Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
2000	8	JP4	1.1	0.0	0.08	0.05	1.0	12
2001	8	JP4	1.6	0.0	0.00	0.00	0.0	2
2002	8	JP4	1.5	0.0	0.55	0.33	0.9	6

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

Table 16. Olefins Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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	1.08	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
2001	1	JP8	38.4	0.7	1.37	1.72	4.3	71
2001	2	JP8	289.4	0.4	2.01	2.31	7.0	436
2001	3	JP8	462.1	0.0	1.18	1.32	5.0	535
2001	4	JP8	71.1	0.6	1.67	1.58	4.2	175
2001	5	JP8	113.8	0.5	1.84	1.64	4.3	42
2001	7	JP8	253.2	0.3	0.64	0.60	1.9	81
2001	8	JP8	105.5	0.0	0.92	0.80	2.7	102
2001	9	JP8	83.6	0.5	0.60	0.61	0.7	13
2002	1	JP8	6.6	0.2	1.35	0.90	3.3	103
2002	2	JP8	251.9	0.4	2.06	2.00	9.2	320
2002	3	JP8	1178.3	0.1	1.12	0.33	5.0	444
2002	4	JP8	95.5	0.2	1.53	1.23	4.5	157
2002	5	JP8	422.5	0.7	1.40	0.40	5.0	60
2002	6	JP8	44.0	NR	NR	NR	NR	0
2002	7	JP8	417.6	0.1	0.55	0.21	1.4	78
2002	8	JP8	384.2	0.0	0.76	0.55	4.0	120
2002	9	JP8	117.9	0.5	0.59	0.59	0.7	13

[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
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
2001	1	F76	4.1	0.034	0.0356	0.0356	0.038	2
2001	3	F76	114.7	0.023	0.5516	0.5330	0.880	37
2001	5	F76	109.2	0.156	0.4652	0.4829	0.589	39
2001	6	F76	147.5	0.290	0.6705	0.6245	1.020	22
2001	7	F76	92.8	0.042	0.3345	0.2975	0.910	20
2001	8	F76	157.5	0.028	0.5034	0.5888	0.800	43
2001	9	F76	43.7	0.042	0.0777	0.0826	0.119	6
2002	3	F76	99.8	0.020	0.5417	0.5552	0.910	38
2002	5	F76	141.1	0.244	0.4294	0.4356	0.530	49
2002	6	F76	127.7	0.300	0.8711	0.8593	1.020	28
2002	7	F76	109.7	0.120	0.5451	0.3634	0.950	17
2002	8	F76	122.6	0.092	0.4847	0.6844	1.000	24
2002	9	F76	45.7	0.348	0.6352	0.6441	0.952	5

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

Table 18. Total Sulfur Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	0.058	0.0806	0.0806	0.140	44
2001	3	JP5	327.4	0.040	0.1245	0.1263	0.170	125
2001	5	JP5	196.4	0.000	0.0215	0.0189	0.080	118
2001	6	JP5	59.3	0.001	0.0092	0.0093	0.010	12
2001	7	JP5	86.9	0.001	0.0283	0.0264	0.400	23
2001	8	JP5	160.9	0.020	0.1230	0.1277	0.230	35
2001	9	JP5	9.8	0.010	0.0100	0.0100	0.010	1
2002	2	JP5	7.1	0.069	0.0849	0.0850	0.100	38
2002	3	JP5	310.5	0.030	0.1051	0.1055	0.170	108
2002	5	JP5	177.4	0.000	0.0366	0.0322	0.090	118
2002	6	JP5	75.7	0.010	0.0108	0.0106	0.020	13
2002	7	JP5	51.8	0.001	0.0337	0.0432	0.200	14
2002	8	JP5	168.6	0.002	0.0725	0.0931	0.220	45

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

Table 19. Total Sulfur Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	0.030	0.0392	0.0410	0.050	12
2001	8	JP4	1.6	0.030	0.0314	0.0312	0.040	7
2002	8	JP4	1.5	0.028	0.0448	0.0598	0.280	17

[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
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
2001	1	JP8	38.4	0.000	0.0204	0.0304	0.048	71
2001	2	JP8	313.1	0.000	0.0810	0.0931	0.300	460
2001	3	JP8	1,074.1	0.000	0.0418	0.0451	0.360	887
2001	4	JP8	105.5	0.000	0.0130	0.0174	0.050	225
2001	5	JP8	443.2	0.003	0.0841	0.0600	0.266	282
2001	7	JP8	366.6	0.000	0.0785	0.1110	0.290	140
2001	8	JP8	331.6	0.001	0.0841	0.0664	0.300	264
2001	9	JP8	83.6	0.030	0.0636	0.0778	0.380	13
2002	1	JP8	6.6	0.005	0.0244	0.0182	0.070	113
2002	2	JP8	251.9	0.000	0.0895	0.0995	0.448	372
2002	3	JP8	1178.3	0.000	0.0417	0.0447	0.330	877
2002	4	JP8	95.5	0.001	0.0177	0.0208	0.060	191
2002	5	JP8	422.5	0.000	0.0737	0.0550	0.281	297
2002	6	JP8	44.0	0.070	0.0971	0.0825	0.150	38
2002	7	JP8	417.6	0.000	0.0569	0.0729	0.230	157
2002	8	JP8	384.2	0.001	0.0654	0.0469	0.176	192
2002	9	JP8	117.9	0.022	0.0331	0.0326	0.042	13

[Spec = 0.3% max] ¤ [Volume in Millions of Gallons]

Table 21. Mercaptan Sulfur Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	0.9	0.0000	0.00060	0.00060	0.0010	5
2001	3	JP5	327.4	0.0000	0.00147	0.00152	0.0020	125
2001	5	JP5	61.2	0.0001	0.00024	0.00024	0.0004	28
2001	7	JP5	86.9	0.0001	0.00034	0.00032	0.0020	23
2001	8	JP5	160.9	0.0001	0.00097	0.00100	0.0018	35
2002	2	JP5	7.1	0.0009	0.00110	0.00010	0.0014	4
2002	3	JP5	310.5	0.0000	0.00119	0.00111	0.0128	107
2002	5	JP5	177.4	0.0000	0.00007	0.00001	0.0003	20
2002	6	JP5	75.7	NR	NR	NR	NR	0
2002	7	JP5	51.8	0.0001	0.00045	0.00054	0.0020	14
2002	8	JP5	168.6	0.0001	0.00075	0.00081	0.0017	37

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

Table 22. Mercaptan Sulfur Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	0.0002	0.00084	0.00078	0.0015	12
2001	8	JP4	1.6	0.0002	0.00087	0.00097	0.0015	7
2002	8	JP4	1.5	0.0010	0.00129	0.00139	0.0020	17

[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
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
2001	1	JP8	31.9	0.0000	0.00027	0.00027	0.0005	21
2001	2	JP8	215.4	0.0001	0.00107	0.00119	0.0033	346
2001	3	JP8	723.9	0.0000	0.00094	0.00098	0.0030	633
2001	4	JP8	87.8	0.0000	0.00080	0.00072	0.0020	163
2001	5	JP8	332.8	0.0000	0.00082	0.00071	0.0020	152
2001	7	JP8	297.5	0.0003	0.00116	0.00127	0.0035	96
2001	8	JP8	286.1	0.0000	0.00085	0.00084	0.0026	247
2001	9	JP8	83.6	0.0001	0.00039	0.00044	0.0020	13
2002	1	JP8	6.6	0.0001	0.00040	0.00016	0.0040	80
2002	2	JP8	251.9	0.0000	0.00121	0.00091	0.0022	293
2002	3	JP8	1178.3	0.0000	0.00074	0.00063	0.0128	696
2002	4	JP8	95.5	0.0000	0.00084	0.00069	0.0020	144
2002	5	JP8	422.5	0.0000	0.00065	0.00047	0.0060	175
2002	6	JP8	44.0	0.0006	0.00089	0.00068	0.0015	38
2002	7	JP8	417.6	0.0000	0.00093	0.00082	0.0025	113
2002	8	JP8	384.2	0.0003	0.00080	0.00064	0.0020	154
2002	9	JP8	117.9	0.0001	0.00020	0.00020	0.0003	13

[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
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
2001	1	F76	4.1	1.20	1.650	1.643	2.10	2
2001	3	F76	114.7	0.00	1.445	1.506	5.70	37
2001	5	F76	109.2	0.10	3.111	2.678	7.00	39
2001	6	F76	147.5	1.00	2.868	2.681	6.00	22
2001	7	F76	92.8	1.40	2.615	2.620	6.80	20
2001	8	F76	157.5	0.30	1.028	1.052	2.00	43
2001	9	F76	43.7	1.00	2.367	2.626	7.40	6
2002	3	F76	99.8	0.00	0.905	0.860	3.50	38
2002	5	F76	141.1	0.10	4.560	4.334	10.00	49
2002	6	F76	127.7	0.40	1.932	1.714	8.00	25
2002	7	F76	109.7	0.50	2.388	2.183	4.90	17
2002	8	F76	122.6	0.30	0.883	1.038	2.00	24
2002	9	F76	45.7	1.00	3.100	3.170	7.80	5

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

Table 25. Particulate Contamination Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	0.20	0.560	0.563	1.00	43
2001	3	JP5	327.4	0.02	0.146	0.142	0.84	125
2001	5	JP5	196.4	0.00	0.412	0.417	1.00	118
2001	6	JP5	59.3	0.21	0.467	0.464	0.79	12
2001	7	JP5	86.9	0.10	0.433	0.430	0.90	23
2001	8	JP5	160.9	0.11	0.373	0.389	0.80	35
2001	9	JP5	9.8	0.48	0.480	0.480	0.48	1
2002	2	JP5	7.1	0.10	0.484	0.468	0.95	38
2002	3	JP5	310.5	0.00	0.156	0.153	0.50	108
2002	5	JP5	177.4	0.00	0.347	0.369	1.00	118
2002	6	JP5	75.7	0.20	0.522	0.581	0.85	13
2002	7	JP5	51.8	0.16	0.540	0.528	0.80	14
2002	8	JP5	168.6	0.05	0.390	0.468	1.00	45

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

Table 26. Particulate Contamination Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	0.16	0.409	0.623	0.95	12
2001	8	JP4	1.6	0.16	0.347	0.328	0.63	7
2002	8	JP4	1.5	0.26	0.389	0.343	0.45	17

[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
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
2001	1	JP8	38.4	0.00	0.157	0.319	0.98	71
2001	2	JP8	313.1	0.02	0.362	0.394	7.00	460
2001	3	JP8	1,074.1	0.00	0.356	0.331	1.00	886
2001	4	JP8	105.5	0.00	0.322	0.305	0.98	224
2001	5	JP8	443.2	0.00	0.331	0.307	1.00	282
2001	7	JP8	366.6	0.01	0.386	0.409	0.98	115
2001	8	JP8	331.6	0.02	0.300	0.331	0.98	264
2001	9	JP8	83.6	0.30	0.385	0.391	0.60	13
2002	1	JP8	6.6	0.00	0.119	0.116	0.75	113
2002	2	JP8	251.9	0.00	0.343	0.380	1.00	372
2002	3	JP8	1178.3	0.00	0.326	0.310	0.95	877
2002	4	JP8	95.5	0.06	0.490	0.457	1.00	192
2002	5	JP8	422.5	0.00	0.328	0.292	1.40	296
2002	6	JP8	44.0	0.10	0.420	0.474	0.90	42
2002	7	JP8	417.6	0.05	0.351	0.382	1.00	155
2002	8	JP8	384.2	0.03	0.272	0.417	0.93	192
2002	9	JP8	117.9	0.20	0.300	0.306	0.60	13

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

Table 28. Filtration Time Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	4	6.2	6.10	10	43
2001	3	JP5	327.4	2	3.5	3.45	11	125
2001	5	JP5	196.4	3	5.5	6.00	11	118
2001	6	JP5	59.3	8	10.2	10.11	13	12
2001	7	JP5	86.9	3	5.4	5.49	8	23
2001	8	JP5	160.9	3	5.3	5.06	8	35
2001	9	JP5	9.8	5	5.0	5.00	5	1
2002	2	JP5	7.1	5	7.1	7.14	14	38
2002	3	JP5	310.5	2	3.1	3.02	7	108
2002	5	JP5	177.4	3	4.7	5.01	13	118
2002	6	JP5	75.7	6	9.1	10.30	13	13
2002	7	JP5	51.8	4	6.4	6.51	8	14
2002	8	JP5	168.6	3	5.2	5.18	14	45

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

Table 29. Filtration Time Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	4	5.6	6.5	9	12
2001	8	JP4	1.6	5	5.4	5.4	6	7
2002	8	JP4	1.5	3	4.35	4.78	6	17

[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
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
2001	1	JP8	38.4	4	7.6	7.0	13	71
2001	2	JP8	313.1	4	8.0	8.1	18	460
2001	3	JP8	1,074.1	4	6.5	6.5	22	885
2001	4	JP8	105.5	2	7.4	7.4	12	224
2001	5	JP8	443.2	1	5.1	5.7	13	282
2001	7	JP8	366.6	0	8.2	6.9	15	115
2001	8	JP8	331.6	4	7.2	6.8	14	264
2001	9	JP8	83.6	5	6.4	6.4	10	13
2002	1	JP8	6.6	1	3.6	5.84	12	112
2002	2	JP8	251.9	3	8.2	8.73	15	372
2002	3	JP8	1178.3	0	6.5	6.59	15	878
2002	4	JP8	95.5	5	8.4	8.26	15	192
2002	5	JP8	422.5	3	5.4	5.79	14	297
2002	6	JP8	44.0	10	10.0	9.84	10	42
2002	7	JP8	417.6	1	8.3	7.95	14	154
2002	8	JP8	384.2	4	6.4	6.32	12	192
2002	9	JP8	117.9	2	5.7	5.62	10	13

[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
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
2001	1	F76	4.1	0.060	0.0650	0.0649	0.070	2
2001	3	F76	114.7	0.001	0.0268	0.0254	0.094	37
2001	5	F76	109.2	0.000	0.1239	0.0917	0.300	39
2001	6	F76	147.5	0.020	0.0291	0.0268	0.100	22
2001	7	F76	92.8	0.009	0.0413	0.0398	0.150	20
2001	8	F76	157.5	0.010	0.1187	0.1107	0.300	43
2001	9	F76	43.7	0.020	0.0217	0.0221	0.030	6
2002	3	F76	99.8	0.001	0.0393	0.0387	0.250	38
2002	5	F76	141.1	0.002	0.1438	0.1194	0.300	49
2002	6	F76	127.7	0.004	0.0201	0.0205	0.030	28
2002	7	F76	109.7	0.009	0.0495	0.0343	0.130	17
2002	8	F76	122.6	0.020	0.1323	0.0787	0.300	24
2002	9	F76	45.7	0.010	0.1004	0.1034	0.200	5

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

Table 32. Total Acid Number Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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	9
2001	2	JP5	7.5	0.001	0.0044	0.0044	0.009	43
2001	3	JP5	327.4	0.000	0.0041	0.0041	0.009	125
2001	5	JP5	196.4	0.000	0.0041	0.0040	0.013	118
2001	6	JP5	59.3	0.002	0.0028	0.0028	0.003	12
2001	7	JP5	86.9	0.003	0.0054	0.0055	0.010	23
2001	8	JP5	160.9	0.002	0.0057	0.0047	0.019	35
2001	9	JP5	9.8	0.002	0.0020	0.0020	0.002	1
2002	2	JP5	7.1	0.002	0.0029	0.0029	0.006	38
2002	3	JP5	310.5	0.001	0.0045	0.0045	0.012	108
2002	5	JP5	177.4	0.001	0.0053	0.0050	0.010	118
2002	6	JP5	75.7	0.003	0.0031	0.0031	0.004	13
2002	7	JP5	51.8	0.003	0.0051	0.0053	0.007	14
2002	8	JP5	168.6	0.001	0.0045	0.0046	0.016	45

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

Table 33. Total Acid Number Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	0.007	0.0085	0.0085	0.011	12
2001	8	JP4	1.6	0.001	0.0064	0.0054	0.009	7
2002	8	JP4	1.5	0.006	0.0079	0.0079	0.010	17

[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
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
2001	1	JP8	38.4	0.001	0.0073	0.0101	0.015	71
2001	2	JP8	313.1	0.000	0.0044	0.0040	0.030	460
2001	3	JP8	1,074.1	0.000	0.0054	0.0040	0.020	886
2001	4	JP8	105.5	0.000	0.0039	0.0039	0.012	224
2001	5	JP8	443.2	0.001	0.0045	0.0046	0.030	282
2001	7	JP8	366.6	0.001	0.0042	0.0046	0.021	140
2001	8	JP8	331.6	0.001	0.0115	0.0075	0.190	264
2001	9	JP8	83.6	0.002	0.0045	0.0045	0.007	13
2002	1	JP8	6.6	0.001	0.0040	0.0058	0.014	113
2002	2	JP8	251.9	0.000	0.0039	0.0036	0.015	372
2002	3	JP8	1178.3	0.000	0.0050	0.0034	0.015	877
2002	4	JP8	95.5	0.000	0.0040	0.0043	0.014	192
2002	5	JP8	422.5	0.001	0.0049	0.0055	0.015	297
2002	6	JP8	44.0	0.004	0.0051	0.0051	0.007	43
2002	7	JP8	417.6	0.000	0.0040	0.0049	0.012	158
2002	8	JP8	384.2	0.000	0.0121	0.0079	0.020	192
2002	9	JP8	117.9	0.002	0.0055	0.0054	0.009	13

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

Table 35. Smoke Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
2000	2	JP5	8.0	26	26.00	26.00	26	46
2000	3	JP5	308.8	19	21.16	20.86	27	116
2000	5	JP5	191.6	19	19.74	19.71	22	103
2000	6	JP5	60.9	20	22.36	22.33	25	11
2000	7	JP5	57.3	21	21.78	22.03	25	18
2000	8	JP5	61.4	20	23.17	23.44	25	12
2001	2	JP5	7.5	26	26.00	26.00	26	44
2001	3	JP5	327.4	19	21.14	20.90	26	125
2001	5	JP5	196.4	19	19.57	19.49	23	118
2001	6	JP5	59.3	23	24.25	24.26	26	12
2001	7	JP5	86.9	19	21.26	21.24	22	23
2001	8	JP5	160.9	19	22.94	23.28	25	35
2001	9	JP5	9.8	28	28.00	28.00	28	1
2002	2	JP5	7.1	26	26.00	26.00	26	38
2002	3	JP5	310.5	19	20.43	20.28	26	108
2002	5	JP5	177.4	19	19.81	19.77	22	118
2002	6	JP5	75.7	24	24.38	24.56	25	13
2002	7	JP5	51.8	21	22.50	22.65	26	14
2002	8	JP5	168.6	20	23.56	23.36	27	45

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

Table 36. Smoke Point Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	26	29.50	27.38	34	12
2001	8	JP4	1.6	32	32.86	32.89	34	7
2002	8	JP4	1.5	32	32.35	32.57	35	17

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

Table 37. Smoke Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
2000	1	JP8	108.9	18	20.55	20.87	24	137
2000	2	JP8	249.6	19	24.69	24.77	45	353
2000	3	JP8	1041.4	19	22.55	21.87	32	868
2000	4	JP8	101.8	18	27.38	26.84	32	225
2000	5	JP8	371.6	18	20.14	20.43	24	203
2000	7	JP8	177.5	21	25.22	25.39	27	81
2000	8	JP8	362.7	19	21.53	22.88	27	191
2000	9	JP8	122.1	20	22.81	22.95	24	16
2000	7	AN8	5.4	26	26.00	26.00	26	1
2001	1	JP8	38.4	19	20.69	21.81	26	71
2001	2	JP8	313.1	19	24.15	23.94	27	460
2001	3	JP8	1,074.1	19	22.32	21.65	30	884
2001	4	JP8	105.5	20	26.95	26.44	32	223
2001	5	JP8	443.2	19	20.31	20.47	27	282
2001	7	JP8	366.6	21	24.85	24.98	28	139
2001	8	JP8	331.6	19	22.22	23.41	29	264
2001	9	JP8	83.6	23	23.00	23.00	23	13
2002	1	JP8	6.6	19	20.14	20.23	23	113
2002	2	JP8	251.9	19	24.15	24.01	27	372
2002	3	JP8	1178.3	19	22.39	21.40	43	878
2002	4	JP8	95.5	20	26.52	26.29	32	192
2002	5	JP8	422.5	19	20.27	20.42	22	296
2002	6	JP8	44.0	25	25.91	25.97	26	43
2002	7	JP8	417.6	20	24.01	24.23	28	158
2002	8	JP8	384.2	19	22.01	23.83	27	192
2002	9	JP8	117.9	23	23.00	23.00	23	13

[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
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
2001	1	JP8	38.4	0.7	1.27	1.52	2.5	71
2001	2	JP8	249.6	0.2	1.49	1.50	2.5	393
2001	3	JP8	952.2	0.1	1.41	1.30	3.0	687
2001	4	JP8	62.2	0.0	0.80	0.97	2.9	119
2001	5	JP8	403.9	0.0	1.63	1.28	2.9	262
2001	7	JP8	99.4	0.4	1.33	1.30	2.9	56
2001	8	JP8	218.5	0.4	2.13	1.90	2.9	225
2001	9	JP8	83.6	1.2	1.44	1.43	1.6	13
2002	1	JP8	6.6	0.5	1.84	1.39	3.9	113
2002	2	JP8	197.7	0.0	1.46	1.42	2.9	320
2002	3	JP8	1072.2	0.0	1.20	1.30	3.0	738
2002	4	JP8	40.2	0.0	0.68	0.74	1.5	74
2002	5	JP8	417.4	0.0	1.54	1.22	3.0	294
2002	7	JP8	198.4	0.2	1.38	1.35	2.9	97
2002	8	JP8	264.4	0.0	2.13	1.57	3.0	166
2002	9	JP8	117.9	0.7	1.27	1.24	1.7	13

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


The nation's greatest weapon runs on water...
Everything else uses fuel.

Table 39. Hydrogen Content Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
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
2001	1	F76	4.1	13.1	13.60	13.59	14.1	2
2001	3	F76	114.7	12.5	13.47	13.51	15.7	37
2001	5	F76	109.2	12.6	12.88	12.90	13.3	39
2001	6	F76	147.5	13.1	13.66	13.61	16.6	22
2001	7	F76	92.8	12.8	13.31	13.30	13.7	20
2001	8	F76	157.5	12.7	13.46	13.39	14.8	43
2001	9	F76	43.7	13.1	13.22	13.20	13.3	6
2002	3	F76	99.8	12.8	13.42	13.40	15.7	38
2002	5	F76	141.1	12.5	12.91	12.91	13.2	49
2002	6	F76	127.7	13.0	13.33	13.38	14.1	28
2002	7	F76	109.7	12.8	13.28	12.78	13.7	17
2002	8	F76	122.6	12.5	13.52	13.47	13.9	24
2002	9	F76	45.7	13.3	13.32	13.32	13.4	5

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

Table 40. Hydrogen Content Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	13.7	13.96	13.70	14.6	43
2001	3	JP5	327.4	13.4	13.96	13.97	15.0	125
2001	5	JP5	196.4	13.4	13.57	13.55	14.3	118
2001	6	JP5	59.3	13.9	14.07	14.07	14.2	12
2001	7	JP5	86.9	13.5	13.76	13.76	14.0	23
2001	8	JP5	160.9	13.6	13.84	13.83	14.9	35
2001	9	JP5	9.8	14.4	14.40	14.40	14.4	1
2002	2	JP5	7.1	13.8	14.11	14.10	14.8	38
2002	3	JP5	310.5	13.5	14.10	14.00	14.9	106
2002	5	JP5	177.4	13.4	13.58	13.55	14.3	118
2002	6	JP5	75.7	13.8	13.98	13.98	14.2	13
2002	7	JP5	51.8	13.6	13.77	13.79	14.0	14
2002	8	JP5	168.6	13.6	14.10	13.90	16.2	44

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

Table 41. Hydrogen Content Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	14.5	14.64	14.18	14.7	11
2001	8	JP4	1.6	14.6	14.63	14.62	14.7	7
2002	8	JP4	1.5	14.5	14.72	14.70	14.8	17

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

Table 42. Hydrogen Content Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	13.4	13.55	13.73	14.0	71
2001	2	JP8	313.1	13.3	13.82	13.69	14.5	457
2001	3	JP8	1,074.1	13.4	13.79	13.72	17.5	885
2001	4	JP8	105.5	13.4	13.85	13.73	14.6	223
2001	5	JP8	443.2	13.0	13.57	13.60	14.2	282
2001	7	JP8	366.6	13.4	13.97	11.42	27.0	107
2001	8	JP8	331.6	13.6	13.89	13.52	14.4	258
2001	9	JP8	83.6	13.7	13.78	13.79	13.9	13
2002	1	JP8	6.6	13.4	13.49	13.40	13.8	112
2002	2	JP8	251.9	13.4	13.84	12.70	14.5	352
2002	3	JP8	1178.3	13.4	13.77	13.57	15.6	873
2002	4	JP8	95.5	13.4	13.74	13.71	14.3	192
2002	5	JP8	422.5	13.0	13.58	13.60	14.3	297
2002	6	JP8	44.0	NR	NR	NR	NR	0
2002	7	JP8	417.6	13.4	13.75	11.32	14.0	127
2002	8	JP8	384.2	13.4	13.91	13.38	14.2	182
2002	9	JP8	117.9	13.7	13.77	13.77	13.8	13

[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
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
2001	1	F76	4.1	208	218.10	217.95	228	2
2001	3	F76	114.7	212	237.82	238.13	247	37
2001	5	F76	109.2	206	236.17	233.44	250	39
2001	6	F76	147.5	194	220.15	220.33	234	22
2001	7	F76	92.8	198	215.33	216.18	231	20
2001	8	F76	157.5	189	229.87	231.94	268	43
2001	9	F76	43.7	198	226.50	229.64	238	6
2002	3	F76	99.8	114	150.17	148.26	247	38
2002	5	F76	141.1	195	234.25	234.40	253	49
2002	6	F76	127.7	198	212.10	215.15	236	28
2002	7	F76	109.7	198	216.94	215.34	240	18
2002	8	F76	122.6	220	238.61	224.76	263	23
2002	9	F76	45.7	204	217.60	217.21	236	5

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

Table 44. Distillation (10% Recovered) Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	186	191.83	188.21	198	43
2001	3	JP5	327.4	171	177.22	176.21	199	125
2001	5	JP5	196.4	193	197.25	197.29	201	118
2001	6	JP5	59.3	189	191.17	191.19	192	12
2001	7	JP5	86.9	187	192.13	192.00	199	23
2001	8	JP5	160.9	187	191.61	190.90	199	35
2001	9	JP5	9.8	198	197.70	197.70	198	1
2002	2	JP5	7.1	184	194.79	194.89	206	38
2002	3	JP5	310.5	169	173.85	173.27	196	108
2002	5	JP5	177.4	193	196.80	196.76	201	118
2002	6	JP5	75.7	186	190.46	189.77	195	13
2002	7	JP5	51.8	189	193.95	193.65	198	14
2002	8	JP5	168.6	186	191.41	191.38	197	45

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

Table 45. Distillation (10% Recovered) Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	87	88.77	88.33	91	12
2001	8	JP4	1.6	87	89.81	89.44	91	7
2002	8	JP4	1.5	87	90.69	90.35	95	17

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

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

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	169	178.95	176.49	192	71
2001	2	JP8	313.1	151	180.74	181.69	216	460
2001	3	JP8	1,074.1	158	177.24	178.10	199	886
2001	4	JP8	105.5	156	174.63	172.82	193	224
2001	5	JP8	443.2	144	178.69	171.47	201	282
2001	7	JP8	366.6	159	172.53	170.62	190	139
2001	8	JP8	331.6	156	167.65	166.30	181	264
2001	9	JP8	83.6	165	168.08	168.39	172	13
2002	1	JP8	6.6	168	181.31	179.42	192	113
2002	2	JP8	251.9	160	181.93	183.98	206	372
2002	3	JP8	1178.3	149	178.23	178.74	285	878
2002	4	JP8	95.5	158	177.17	175.02	205	192
2002	5	JP8	422.5	144	179.34	172.12	201	297
2002	6	JP8	44.0	168	169.53	170.32	173	43
2002	7	JP8	417.6	162	171.61	170.51	190	158
2002	8	JP8	384.2	158	167.37	167.05	176	192
2002	9	JP8	117.9	166	170.47	154.77	182	12

[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
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
2001	1	F76	4.1	346	347.00	346.98	348	2
2001	3	F76	114.7	347	362.25	362.23	373	37
2001	5	F76	109.2	347	360.81	361.01	381	39
2001	6	F76	147.5	352	373.16	373.39	385	22
2001	7	F76	92.8	357	367.41	367.87	384	20
2001	8	F76	157.5	330	359.89	361.56	377	43
2001	9	F76	43.7	336	348.67	350.31	358	6
2002	3	F76	99.8	351	449.52	445.56	725	38
2002	5	F76	141.1	351	359.77	361.17	371	49
2002	6	F76	127.7	369	376.73	376.20	382	28
2002	7	F76	109.7	356	364.50	365.99	372	18
2002	8	F76	122.6	332	355.90	360.49	385	24
2002	9	F76	45.7	339	347.40	347.44	353	5

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

Table 48. Final Boiling Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	240	253.36	248.61	266	43
2001	3	JP5	327.4	261	278.21	278.40	294	125
2001	5	JP5	196.4	245	261.54	262.18	280	118
2001	6	JP5	59.3	246	256.58	256.32	273	12
2001	7	JP5	86.9	243	258.77	259.63	355	23
2001	8	JP5	160.9	247	270.51	271.22	292	35
2001	9	JP5	9.8	270	270.10	270.10	270	1
2002	2	JP5	7.1	247	252.87	253.03	263	38
2002	3	JP5	310.5	270	277.07	277.18	282	108
2002	5	JP5	177.4	252	262.32	262.67	287	118
2002	6	JP5	75.7	271	287.38	284.48	374	13
2002	7	JP5	51.8	247	254.10	253.50	261	14
2002	8	JP5	168.6	245	265.79	268.39	297	45

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

Table 49. Final Boiling Point Conformance – JP-4.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
2000	8	JP4	1.1	252	256.93	257.42	261	12
2001	8	JP4	1.6	254	256.24	256.40	259	7
2002	8	JP4	1.5	254	258.54	257.58	260	17

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

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

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	148	253.39	247.21	270	71
2001	2	JP8	313.1	243	259.97	259.32	303	460
2001	3	JP8	1,074.1	212	256.57	260.16	281	886
2001	4	JP8	105.5	227	261.03	261.52	298	224
2001	5	JP8	443.2	167	267.73	280.72	318	282
2001	7	JP8	366.6	231	256.84	254.05	356	139
2001	8	JP8	331.6	170	269.51	269.75	284	264
2001	9	JP8	83.6	262	272.23	274.09	296	13
2002	1	JP8	6.6	245	261.65	258.54	375	113
2002	2	JP8	251.9	246	261.28	259.21	303	372
2002	3	JP8	1178.3	158	257.60	263.04	280	878
2002	4	JP8	95.5	240	262.58	263.14	288	192
2002	5	JP8	422.5	241	270.50	282.10	318	297
2002	6	JP8	44.0	249	253.81	253.39	258	43
2002	7	JP8	417.6	230	261.35	259.17	289	158
2002	8	JP8	384.2	248	270.98	268.84	286	192
2002	9	JP8	117.9	258	267.32	266.18	289	13

[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
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
2001	1	F76	4.1	70	72.00	71.96	74	2
2001	3	F76	114.7	69	83.84	83.59	94	37
2001	5	F76	109.2	62	71.74	71.81	79	39
2001	6	F76	147.5	61	73.59	74.44	98	22
2001	7	F76	92.8	62	69.30	69.46	81	20
2001	8	F76	157.5	50	74.60	75.77	100	43
2001	9	F76	43.7	62	75.67	77.08	84	6
2002	3	F76	99.8	23	46.11	45.46	91	38
2002	5	F76	141.1	64	75.67	75.83	87	49
2002	6	F76	127.7	60	65.93	67.75	85	28
2002	7	F76	109.7	64	72.00	68.17	88	17
2002	8	F76	122.6	60	83.33	86.79	100	24
2002	9	F76	45.7	70	74.60	74.27	87	5

[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
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
2001	2	JP5	7.5	60	62.14	60.99	67	43
2001	3	JP5	327.4	61	62.61	62.53	66	125
2001	5	JP5	196.4	61	64.56	65.27	89	118
2001	6	JP5	59.3	63	64.33	64.36	67	12
2001	7	JP5	86.9	60	63.70	63.66	69	23
2001	8	JP5	160.9	60	64.00	63.08	94	35
2001	9	JP5	9.8	54	54.00	54.00	54	1
2002	2	JP5	7.1	60	62.89	62.90	68	38
2002	3	JP5	310.5	60	62.09	62.05	66	108
2002	5	JP5	177.4	61	63.92	64.38	71	118
2002	6	JP5	75.7	61	63.23	63.22	65	13
2002	7	JP5	51.8	61	63.71	63.57	66	14
2002	8	JP5	168.6	60	62.98	62.56	67	45

[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
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
2001	1	JP8	38.4	42	53.18	54.05	63	71
2001	2	JP8	313.1	40	50.66	50.81	69	460
2001	3	JP8	1,074.1	38	50.07	49.65	84	886
2001	4	JP8	105.5	38	49.48	48.20	66	224
2001	5	JP8	443.2	40	49.79	50.73	88	282
2001	7	JP8	366.6	38	46.38	45.96	64	140
2001	8	JP8	331.6	39	42.49	42.20	52	264
2001	9	JP8	83.6	40	41.08	41.19	43	13
2002	1	JP8	6.6	38	49.86	47.49	84	113
2002	2	JP8	251.9	41	51.27	52.46	67	372
2002	3	JP8	1178.3	38	50.64	50.10	72	878
2002	4	JP8	95.5	38	49.83	48.74	68	193
2002	5	JP8	422.5	40	51.53	50.91	71	297
2002	6	JP8	44.0	39	40.70	41.42	43	43
2002	7	JP8	417.6	38	44.87	44.63	59	158
2002	8	JP8	384.2	38	42.73	43.33	48	192
2002	9	JP8	117.9	39	42.31	42.46	44	13

[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
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	47.1	50.20	49.78	51.8	5
2001	1	F76	4.1	48.4	48.55	48.55	48.7	2
2001	3	F76	114.7	50.5	52.79	52.78	56.7	37
2001	5	F76	109.2	43.0	46.93	47.37	49.4	39
2001	6	F76	147.5	52.0	54.24	54.74	58.0	22
2001	7	F76	92.8	48.5	52.39	52.72	58.0	20
2001	8	F76	157.5	43.0	51.66	52.27	58.2	43
2001	9	F76	43.7	49.4	50.68	50.52	51.9	6
2002	3	F76	99.8	46.5	51.41	51.33	54.0	38
2002	5	F76	141.1	43.4	47.07	47.34	57.0	49
2002	6	F76	127.7	52.0	53.37	53.66	56.0	28
2002	7	F76	109.7	50.3	52.05	49.70	54.1	17
2002	8	F76	122.6	43.0	54.62	54.53	61.0	24
2002	9	F76	45.7	48.8	50.56	50.56	52.2	5

[Spec = 43 min] ¤ [Volume in Millions of Gallons]

Table 55. Cetane Index Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	2	JP5	7.5	39.3	44.66	42.92	47.3	42
2001	3	JP5	327.4	45.8	47.62	47.67	48.9	125
2001	5	JP5	196.4	32.8	39.98	38.84	44.3	118
2001	6	JP5	59.3	44.7	46.77	46.76	48.2	12
2001	7	JP5	86.9	39.9	42.74	42.74	45.0	23
2001	8	JP5	160.9	41.5	45.45	45.79	47.3	35
2001	9	JP5	9.8	45.2	45.20	45.20	45.2	1
2002	2	JP5	7.1	39.7	45.02	45.03	47.4	38
2002	3	JP5	310.5	46.3	48.15	48.18	50.6	108
2002	5	JP5	177.4	33.2	40.25	39.06	44.8	118
2002	6	JP5	75.7	44.6	46.28	45.93	48.0	13
2002	7	JP5	51.8	41.5	44.41	44.52	48.2	14
2002	8	JP5	168.6	40.5	45.42	45.59	49.0	45

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

Table 56. Cetane Index Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	WtAvg	Max	Count
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
2001	1	JP8	38.4	35.2	39.04	39.83	43.0	71
2001	2	JP8	313.1	38.7	46.22	44.38	60.2	460
2001	3	JP8	1,074.1	10.9	42.50	43.13	54.8	885
2001	4	JP8	105.5	37.0	43.20	43.17	47.6	224
2001	5	JP8	443.2	33.5	39.62	39.63	46.1	281
2001	7	JP8	366.6	34.0	44.06	33.74	49.6	96
2001	8	JP8	331.6	38.0	42.39	43.44	49.4	263
2001	9	JP8	83.6	43.0	44.91	45.08	48.1	13
2002	1	JP8	6.6	13.6	39.83	38.29	44.6	112
2002	2	JP8	251.9	40.5	45.73	42.24	55.5	352
2002	3	JP8	1178.3	31.6	42.78	41.92	49.6	845
2002	4	JP8	95.5	35.0	42.34	42.34	49.0	192
2002	5	JP8	422.5	33.1	39.75	38.95	44.8	296
2002	6	JP8	44.0	44.5	45.24	45.15	46.0	43
2002	7	JP8	417.6	36.0	42.55	37.05	48.9	133
2002	8	JP8	384.2	37.0	41.90	24.73	46.6	174
2002	9	JP8	117.9	44.4	44.95	44.94	46.0	13

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

Table 57. Combustion Net Heat Conformance – JP-5.

Year	Region	Fuel	Volume	AG			BTU			MJ		
				Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
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
2001	2	JP5	7.5	—	—	—	18,593	18,614.2	18,640	43.2	43.28	43.3
2001	3	JP5	327.4	—	—	—	18,569	18,577.3	18,589	43.2	43.22	43.7
2001	5	JP5	196.4	—	—	—	—	—	—	42.8	43.01	43.2
2001	6	JP5	59.3	—	—	—	—	—	—	43.2	43.33	43.4
2001	7	JP5	86.9	—	—	—	—	—	—	43.0	43.16	43.3
2001	8	JP5	160.9	—	—	—	18,558	18,558.0	18,558	43.0	43.26	43.6
2001	9	JP5	9.8	—	—	—	—	—	—	43.1	43.10	43.1
2002	2	JP5	7.1	—	—	—	—	—	—	43.2	43.28	43.6
2002	3	JP5	310.5	—	—	—	18,545	18,571.7	18,586	43.2	43.25	43.5
2002	5	JP5	177.4	—	—	—	—	—	—	42.9	43.04	43.1
2002	6	JP5	75.7	—	—	—	—	—	—	43.3	43.33	43.5
2002	7	JP5	51.8	—	—	—	—	—	—	42.3	43.14	43.3
2002	8	JP5	168.6	—	—	—	—	—	—	43.2	43.32	44.0

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

Table 58. Combustion Net Heat Conformance – JP-4.

Year	Region	Fuel	Volume	AG			BTU			MJ		
				Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
2000	8	JP4	1.1	—	—	—	18,753	18,857.0	18,882	43.6	43.84	43.9
2001	8	JP4	1.6	—	—	—	18,766	18,814.3	18,882	43.6	43.74	43.9
2002	8	JP4	1.5	—	—	—	18,753	18,802.7	18,839	43.6	43.72	43.8

[Spec: Aniline-G. = 4500 min, Net Heat = 18385 BTU or 42.8 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
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
2001	1	JP8	38.4	—	—	—	—	—	—	43.0	43.10	43.3
2001	2	JP8	313.1	—	—	—	18,488	18,617.3	18,696	42.9	43.20	46.3
2001	3	JP8	1074.1	—	—	—	18,481	18,584.9	18,862	41.2	43.22	44.3
2001	4	JP8	105.5	—	—	—	18,418	18,605.0	18,698	43.1	43.34	44.0
2001	5	JP8	443.3	—	—	—	18,463	18,555.1	18,585	42.8	43.06	44.1
2001	7	JP8	366.7	—	—	—	—	—	—	41.4	43.24	45.3
2001	8	JP8	331.6	—	—	—	18,454	18,572.0	18,738	42.0	43.23	47.5
2001	9	JP8	83.6	—	—	—	—	—	—	43.2	43.25	43.3
2002	1	JP8	6.6	—	—	—	—	—	—	42.1	43.22	52.1
2002	2	JP8	251.9	—	—	—	18,506	18,623.2	19,619	43.0	43.20	43.4
2002	3	JP8	1178.3	—	—	—	18,487	18,587.4	18,813	13.9	43.19	45.7
2002	4	JP8	95.5	—	—	—	18,533	18,555.1	18,577	27.6	43.19	44.1
2002	5	JP8	422.5	—	—	—	—	—	—	42.8	43.11	44.2
2002	6	JP8	44.0	—	—	—	—	—	—	43.3	43.34	43.4
2002	7	JP8	417.6	—	—	—	—	—	—	43.0	43.21	43.6
2002	8	JP8	384.2	—	—	—	17,955	18,261.3	18,849	43.1	43.23	43.5
2002	9	JP8	117.9	—	—	—	—	—	—	42.2	43.18	43.3

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

Table 60. Viscosity Conformance – F-76.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
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
2001	1	F76	4.12	2.50	2.500	2.500	2.50	2
2001	3	F76	114.69	2.60	3.158	3.152	4.02	37
2001	5	F76	109.17	2.50	3.643	3.686	4.20	39
2001	6	F76	147.49	2.80	3.265	3.271	3.90	22
2001	7	F76	92.83	2.30	2.778	2.807	3.39	20
2001	8	F76	157.47	2.17	3.366	3.430	4.30	43
2002	3	F76	99.8	2.35	3.283	3.288	4.20	38
2002	5	F76	141.1	3.10	3.703	3.777	4.20	49
2002	6	F76	127.7	2.70	3.165	3.203	3.80	28
2002	7	F76	109.7	2.40	2.897	2.787	3.50	17
2002	8	F76	122.6	1.70	3.327	3.325	4.20	24
2002	9	F76	45.7	2.48	2.756	2.751	3.13	5

[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
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
2001	2	JP5	7.52	4.60	5.163	5.053	6.00	43
2001	3	JP5	327.42	4.30	5.046	4.984	6.74	125
2001	5	JP5	196.44	5.40	6.294	6.339	8.50	118
2001	6	JP5	59.29	4.45	4.879	4.871	5.10	12
2001	7	JP5	86.91	3.70	4.892	4.864	6.07	23
2001	8	JP5	160.94	2.69	5.427	5.407	6.37	35
2001	9	JP5	9.83	5.90	5.900	5.900	5.90	1
2002	2	JP5	7.1	3.30	5.460	5.441	6.21	38
2002	3	JP5	310.5	4.60	4.910	4.872	6.45	108
2002	5	JP5	177.4	5.50	6.089	5.942	6.90	116
2002	6	JP5	75.7	4.67	5.513	5.287	6.30	13
2002	7	JP5	51.8	4.00	5.177	5.107	6.11	14
2002	8	JP5	168.6	4.41	5.292	5.344	7.13	45

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

Table 62. Viscosity Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
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
2001	1	JP8	38.36	3.51	4.330	4.046	6.11	71
2001	2	JP8	313.10	2.60	4.605	4.676	6.70	460
2001	3	JP8	1,074.10	0.40	4.123	4.239	8.00	886
2001	4	JP8	105.52	2.61	4.191	4.145	6.40	224
2001	5	JP8	443.25	3.60	5.081	5.086	7.00	282
2001	7	JP8	366.65	2.37	3.932	3.904	5.40	140
2001	8	JP8	331.57	0.36	4.079	3.963	4.90	264
2001	9	JP8	83.58	3.81	4.057	4.111	4.28	13
2002	1	JP8	6.6	3.06	4.587	4.388	5.90	113
2002	2	JP8	251.9	2.69	4.739	4.904	7.06	372
2002	3	JP8	1178.3	1.50	4.237	4.395	6.77	878
2002	4	JP8	95.5	3.35	4.663	4.538	7.30	192
2002	5	JP8	422.5	3.70	5.136	5.054	6.90	297
2002	6	JP8	44.0	3.44	3.574	3.533	3.75	43
2002	7	JP8	417.6	3.01	3.957	3.949	8.00	158
2002	8	JP8	384.2	3.30	4.067	3.840	5.39	192
2002	9	JP8	117.9	3.67	4.038	4.027	4.22	13

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

Table 63. Freezing Point Conformance – JP-5.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
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
2001	2	JP5	7.52	-54.00	-51.674	-50.745	-48.00	43
2001	3	JP5	327.42	-65.00	-48.069	-48.083	-46.00	125
2001	5	JP5	196.44	-78.00	-52.761	-54.768	-46.00	118
2001	6	JP5	59.29	-56.00	-52.417	-52.462	-49.00	12
2001	7	JP5	86.91	-80.00	-58.872	-58.067	-48.00	23
2001	8	JP5	160.94	-52.90	-49.523	-49.613	-47.00	35
2002	2	JP5	7.1	-50.50	-48.653	-48.668	-47.50	38
2002	3	JP5	310.5	-55.00	-47.915	-47.908	-46.00	108
2002	5	JP5	177.4	-78.00	-54.254	-57.027	-46.00	118
2002	6	JP5	75.7	-63.00	-56.462	-57.438	-52.00	13
2002	7	JP5	51.8	-80.00	-58.071	-57.335	-46.00	14
2002	8	JP5	168.6	-57.00	-49.584	-49.833	-46.50	45

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

Table 64. 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
2001	8	JP4	1.55	-66.00	-63.214	-63.142	-61.00	7

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

Table 65. Freezing Point Conformance – JP-8.

Year	Region	Fuel	Volume	Min	Avg	Wt Avg	Max	Count
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
2001	1	JP8	38.36	-67.00	-62.493	-58.223	-51.00	71
2001	2	JP8	313.10	-64.00	-51.189	-51.564	47.00	460
2001	3	JP8	1,074.10	-70.00	-52.936	-52.559	47.00	886
2001	4	JP8	105.52	-64.00	-52.405	-51.178	-47.00	224
2001	5	JP8	443.25	-78.00	-55.114	-53.966	-46.00	280
2001	7	JP8	366.65	-66.00	-52.268	-51.650	47.00	140
2001	8	JP8	331.57	-59.80	-50.858	-50.468	-47.00	264
2001	9	JP8	83.58	- 51.00	-48.769	-48.597	-47.00	13
2002	1	JP8	6.6	-66.00	-56.423	-60.486	-47.30	113
2002	2	JP8	251.9	-64.10	-50.957	-51.274	-45.50	372
2002	3	JP8	1178.3	-91.50	-52.473	-52.606	-46.00	878
2002	4	JP8	95.5	-82.00	-50.930	-50.596	-47.00	193
2002	5	JP8	422.5	-73.00	-54.848	-55.274	-47.00	296
2002	6	JP8	44.0	-48.50	-48.000	-48.020	-47.50	43
2002	7	JP8	417.6	-80.00	-54.429	-54.287	-47.50	158
2002	8	JP8	384.2	-58.30	-50.155	-50.932	-47.00	191
2002	9	JP8	117.9	-60.00	-52.231	-51.736	-48.00	13

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

Conclusions

Test properties reported in this section are further divided into JP5, JP8 and, where applicable, F76. Aviation fuel histograms for years 1998 through 2001 were compared against 2002 for trends in statistical values. Charts showing regional statistics were also reviewed. Trends noted in this section are general in nature. A very large percentage of the fuels met all specification requirements. In the few batches where test results were off-specification, they were waived, reported incorrectly by the refiner, or transcribed into the database incorrectly. Transcription errors occurred in a very small number of the total reported batches, many of which were due to illegible paper copies. Transcription errors found during review for publication were changed, when the correct value was known, in the supporting data tables on the accompanying CD. Inconsistent reporting from Region 3 produced most of the problems with tabulation and graphing in this report. Errors introduced by PORTS was another contributor.

Of particular interest are the results for Total Sulfur. In efforts to reduce greenhouse gas emissions, the allowable sulfur in both marine/ground diesel fuel and aviation fuel either have been or are proposed to be lowered, in order to reduce sulfur dioxide formation. Data in this report now shows that 99% of JP5 met a standard of 0.20% sulfur or lower and that 100% of JP8 now meets the standard of 0.21% or lower for fuel purchased under DESC contracts. Sulfur can be lowered either by using lower sulfur crude oils or by a desulfurization refining technique.

API Gravity

JP5: Most fuel met specification limits. The overage of half of one percent is negligible. Histograms still show a decrease in the lighter end of the range with the volume procured within the 44-45 °API ranges increasing over the past years to almost half the total volume. Table 8 shows that Region 3 now produces the heaviest JP5.

JP8: All fuel met specification limits. Histograms show a gradual shift towards heavier JP8 as reflected in the Mean values. Table 10 shows that Region 6 produces the heaviest JP8, surpassing Region 5 over last year.

F76: All fuel met specification limits. Table 7 shows that while Region 7 now produces the heaviest F76, the trend observed last year brings all Regions closer together.

Aromatics

JP5: All fuel met specification limits. Histograms show that the peaking of nodes, to a predominance of reporting at 18 to 19. Table 11 evidences continuance to lower percentage fuels.

JP8: All fuel met specification limits. Histograms show a consistent Mean value, and trend towards a flattening mid-range with more fuel creeping into the lower ranges continues. Table 13 confirms the decreasing minimum values across most regions.

Olefins

(No longer required to be checked; still reported by some refineries with the aromatics results)

JP5: Histograms increase shown in the Mean value, with a large jump between 2000 and 2001, is not so pronounced 2001 to 2002. Table 14 confirms the increasing trend, particularly in Region 5.

JP8: Histograms and Table 16 show the same general trends as for JP5. It is possible that since this is elective, it may be more indicative of refineries reporting than industry trend.

Total Sulfur

JP5: All fuel met specification requirements. Histograms show that while over 45% of the fuel is purchased at or below 500 ppm of sulfur. Table 18 shows Region 6 still far outstrips others, with the lowest sulfur values.

JP8: Incorrect reporting again taints results for Total Sulfur. The Mean Value and a slight flattening of lower ranges, observed last year, continue. Table 20 shows that Region 4 has fallen second to Region 1 in fuel with the lowest sulfur.

F76: The off-specification result was verified on test reports, as with last year. The Histogram shows a fair shift in higher occurrence nodes, compared to last year. The user should note, however, that the radical change in the appearance of the chart is due to a change in the reporting volume, to provide greater detail.

Mercaptan Sulfur

(Not required if Doctor Test is Negative)

JP5: All fuel reported met specification limits. Problems with reporting through PORTS, however, resulted in the loss of several datasets for this characteristic. As such, the radical shift from .00175% – .002% distributions to those plotted at .00075% – .001% may be discountable.

JP8: A sampling of the off-specification results was verified on the test reports. Histograms, while still showing a consistent Mean value and a redistribution of last year's peak node at 0.00075% – 0.001% spread across 0.00025% – 0.001%. Table 23 shows Regions 1 and 9 with the lowest average values.

Particulate Contamination

JP5: Not all fuel met specification limits. Histograms show consistent Mean values and the same relative curve shape; over one percent of fuel in 2002 was over spec. Table 25 shows the Region with fuel having the highest average and maximum values.

JP8: The same is true, as for JP5. Histograms show PC still increasing in Mean value for 2002 and the higher ranges of PC values increasing. This is a disturbing trend, which we will continue to monitor.

F76: All fuel met specification limits. Table 24 shows Region 5 reaching Max, and Region 3 having the best results.

Filtration Time

JP5: All JP5 met specification limits. Histograms show the same relative shape as 2001, with most of the fuel occurring between 3-5 minutes. Table 28 shows a continuance in the decreasing trend in times.

JP8: All fuel met specification limits. The overage shown is a result of the inability of the software used to correctly plot temporal values, as discussed earlier.

Total Acid Number

JP5: Off-specification results were verified on test reports, originating this year from Region 8. Histograms show that the Mean value that leveled off in 2001 holding but with the node shifting. This will need to be observed over time, though, for anything conclusive.

JP8: All fuel met specification limits. The overage shown is, again, shortcomings in the software used, to plot results as intended.

Smoke Point

JP5: All fuel met specification limits. Histograms still show a stable Mean value.

JP8: All fuel met specification limits. Histograms show the same basic shape and consistent Mean values. Table 37 shows both increasing and decreasing trends across all regions.

Naphthalenes

JP8: All fuel met specification limits. Histograms show the same basic shape of the curve with consistent Mean values as for 2001.

Hydrogen Content

JP5: All fuel met specification limits. Histograms still show consistent Mean values but with the node at 13.8 – 14 moving to 14+ peaks. Table 40 shows consistent average and maximum values.

JP8: Off-specification results were verified on the test reports. Histograms show the same basic shape and consistent Mean values. Table 42 shows consistent average and maximum values.

F76: All fuel met specification limits. Table 39 shows consistent averages across all Regions.

Flash Point

JP5: All fuel met specification limits. Histograms show a stable Mean value and the same basic shape of the curve as in 2001. Table 52 shows a flattening of last year's increase in average values in Regions 6 and 7.

JP8: All fuel met specification limits. Histograms show a consistent Mean value and maintaining the slight shift in the curve towards higher flash points. Table 53 shows relatively stable averages.

F76: Most fuel met specification limits. The off-spec results are a result of error prone reporting from Region 3.

Cetane Index

JP5: This property is a report only. Histograms show a maintained node at the 45 – 48 range. The shape of the curve still seems to be moving towards higher cetane values with consistent Mean values.

JP8: This property is a report only. Histograms show the same basic shape with consistent Mean values.

F76: All fuel met specification limits. Table 54 shows an overall decreasing trend in average values across all Regions.

Viscosity

JP5: All fuel met specification limits. Histograms show a trend towards higher viscosity values.

JP8: All fuel met specification limits. Histograms still show a more pronounced node at the 3.8 – 4.4 range.

F76: All fuel met specification limits. Table 60 shows a still decreasing trend in average values for most Regions.

Freezing Point

JP5: Most fuel met specification limits, with overages being waived for individual shipments. Histograms show a consistent Mean value and, again, a more pronounced node at the -46 to -49 range with less fuel at the -61 to -64 range.

JP8: Fuel met specification limits, except for spotted overages of no more than one half of a percent. DESC will continue to monitor this situation as warranted.

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 2001 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. Although contractors are not required to report results at both, most have been doing so. As indicated in the last edition, this coverage will be discontinued after this issue, for that reason. This is upheld by results similar to those in past analyses; since none have shown stark differences for equating JFTOT results in support of the efforts of the December 1998 ASTM conference on the issue.

DESC Contracts provide for two options in performing and reporting JFTOT. The first, Option A, states a test at 275°C will be performed (report only results) in addition to the 260°C test required by the specifications. The test at 260°C is used as the basis for acceptance. The second option, Option B, states that the fuel can be tested at 275°C against the limits cited in the specifications (tube deposit rating of 3 max and pressure differential of 25 mm Hg max). Acceptance is based on the 275°C results. If the test fails at 275°C, then perform an additional test at 260°C. In this case, the results at 260°C will be the basis for product acceptance with the 275°C results also reported. If results for both temperatures are reported, then the 260°C results will always be used as the basis for acceptance or rejection, even if both are passing results. JFTOT test results are entered into the PQIS database with unique Test Method codes to differentiate the test temperature employed.

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 fuel reported at 260 °C in 2001, less than 15% had questionable results at 275 °C, requiring retesting at the lower temperature.

Table 66. JFTOT Test Temperatures.

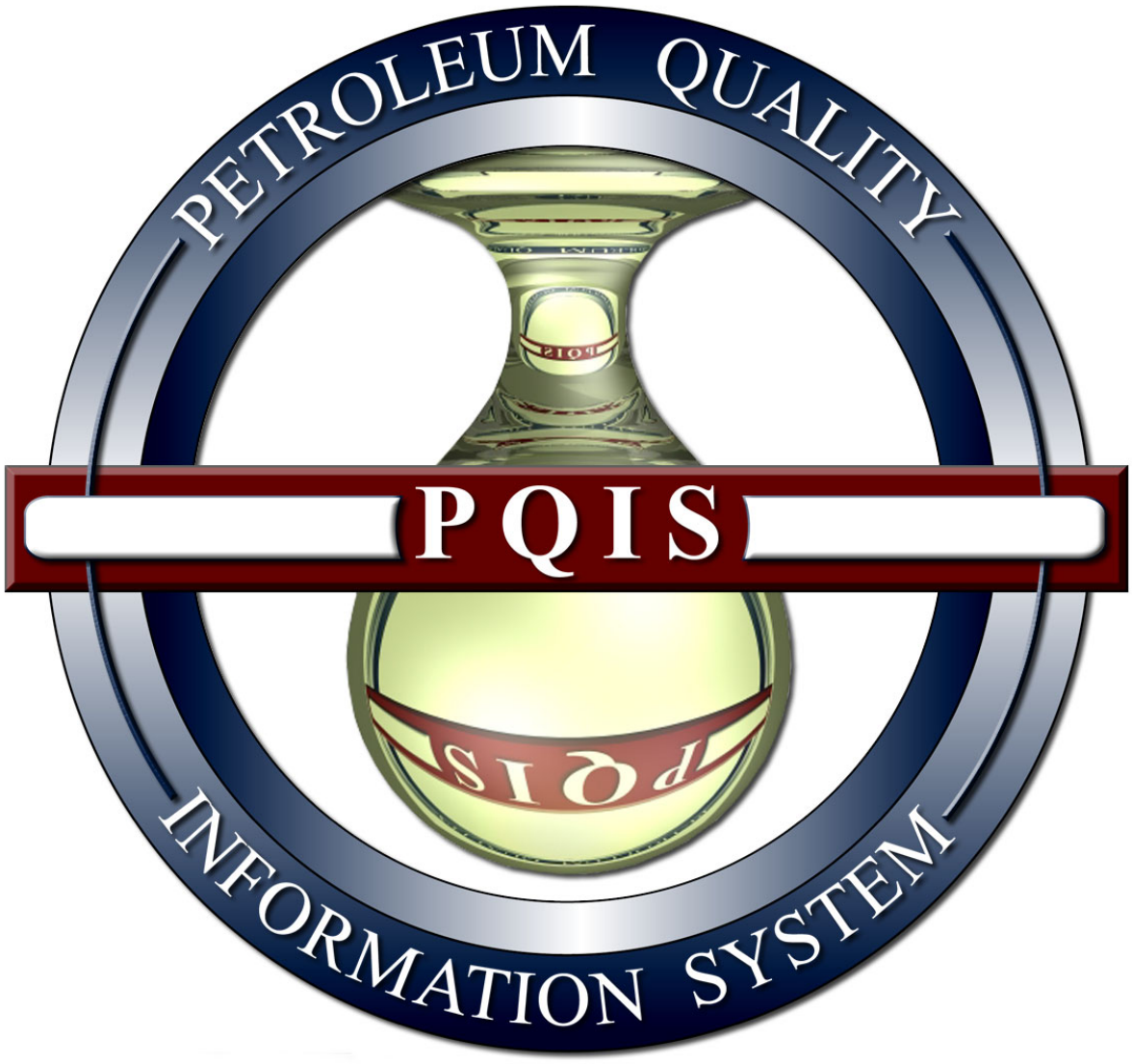
Year	Fuel	Test Temperature	Count	Volume
2000	JP5	260 °C	26	67.38
2000	JP5	275 °C	280	620.55
2000	JP8	260 °C	241	345.00
2000	JP8	275 °C	1834	2190.48
2000	AN8	260 °C	1	5.38
2001	JP5	260 °C	149	332.14
2001	JP5	275 °C	209	516.20
2001	JP8	260 °C	421	579.30
2001	JP8	275 °C	1921	2176.82
2002	JP5	260 °C	8	33.11
2002	JP5	275 °C	328	757.91
2002	JP8	260 °C	271	629.96
2002	JP8	275 °C	1968	2345.06

[Volume in Millions of Gallons]

Table 67. JFTOT Test Temperatures – Per Region.

Fuel	Region	Temp	2000		2001		2002	
			Count	Volume	Count	Volume	Count	Volume
JP5	2	275°C	46	8.00	34	5.90	38	7.07
	2	260°C	1	4.20	10	1.62	—	—
	3	275°C	115	304.61	125	327.42	108	310.51
	5	260°C	24	59.06	104	160.59	3	7.01
	5	275°C	79	132.50	14	35.84	115	170.38
	6	275°C	11	60.88	12	59.29	13	75.69
	7	275°C	1	4.11	23	86.91	12	41.88
	8	260°C	17	53.16	34	160.10	3	16.23
	8	275°C	—	—	1	0.84	42	152.38
	9	260°C	12	61.41	1	9.83	—	—
JP8	1	275°C	137	108.86	71	38.36	113	6.62
	2	260°C	15	16.34	396	254.65	32	21.32
	2	275°C	339	233.21	64	58.45	341	230.57
	3	260°C	62	87.49	817	876.86	84	291.31
	3	275°C	806	953.86	70	197.24	757	877.53
	4	260°C	1	0.35	218	98.83	1	0.34
	4	275°C	224	101.47	7	6.69	191	94.94
	5	260°C	52	61.68	217	372.83	55	56.16
	5	275°C	151	309.89	65	70.41	242	366.36
	6	275°C	—	—	—	—	43	44.02
	7	260°C	29	116.06	117	304.61	68	183.24
	7	275°C	52	61.40	23	62.04	91	234.31
	8	260°C	82	63.07	156	269.04	15	11.37
	8	275°C	109	299.67	108	62.53	177	372.80
	9	275°C	16	122.11	13	83.58	13	117.91
AN8	7	260°C	1	5.38	—	—	—	—

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



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