

1 **Q. Please state your name and position with NW Natural.**

2 A. My name is Randolph S. Friedman. I am Manager, Gas Supply, for NW Natural
3 (company).

4 **Q. What are your responsibilities in this position?**

5 A. I am responsible for evaluating, negotiating, and administering natural gas
6 supply, transportation, and related contracts for the company, as well as
7 performing other assignments related to gas acquisition and supply planning
8 such as participating in regulatory proceedings. My department controls gas
9 flows on NW Natural's high-pressure distribution system while operating and
10 maintaining large regulators, industrial meter sets and other specialized
11 equipment. It also schedules all pipeline and storage supplies, coordinates the
12 interstate pipeline nomination process for all transportation customers on NW
13 Natural's system, and performs gas accounting and related functions. I report
14 directly to NW Natural's Vice President, Market Services Division.

15 **Q. What is your education and background?**

16 A. I hold Bachelor of Science degrees in Mechanical Engineering and Nuclear
17 Engineering from the University of California, Berkeley. I also hold a Master of
18 Science degree in Management from Purdue University.

19 I joined NW Natural in March 1989 as Gas Contracts Administrator. In
20 September 1992 I was promoted to the position of Manager, Gas Acquisition and
21 Pipeline Relations. Effective June 1, 1994, I became the Manager of Gas
22 Supply, my current position. While with NW Natural, I have provided testimony
23 in proceedings before the Federal Energy Regulatory Commission (FERC), the

1 Public Utility Commission of Oregon (OPUC), and the National Energy Board of
2 Canada (NEB).

3 Prior to NW Natural I was employed for seven years with Southern
4 California Edison Company, where my duties included load and fuel price
5 forecasting, generation and transmission project evaluation, and natural gas
6 procurement. I also provided technical support and testimony before the
7 California Public Utilities Commission, California Energy Commission and the
8 FERC.

9 **Q. What is the purpose of your testimony?**

10 A. The purpose of the testimony is to describe the existing components of NW
11 Natural's supply resource portfolio. It also discusses the benefits of market-area
12 storage development that are not quantifiable or otherwise contained Exhibit 16
13 (RSF-Exhibit).

14 **Q. Please describe NW Natural's overall supply resource strategy.**

15 A. NW Natural has built and/or put under firm contract a group of supply resources
16 as part of an overall strategy "to serve its core customers with reliable natural
17 gas supplies and energy services at the lowest possible cost."¹ Core market
18 requirements vary dramatically from season to season and can fluctuate
19 significantly even day to day. NW Natural's resource strategy is driven by the
20 need to acquire reliable resources whose maximum deliverability, in aggregate,
21 satisfy forecasted firm loads during periods of extremely cold weather. To satisfy

¹ 1995 Integrated Resource Plan Summary, page 1.

1 projected loads, NW Natural employs a combination of six types of supply-side
2 resources:

3 (1) Gas supplies purchased outside NW Natural's territory that require
4 transportation over the interstate pipeline system for delivery to NW Natural's
5 service territory;

6 (2) Supplies previously purchased and held in storage facilities (LNG and
7 underground) outside NW Natural's territory, which also are transported over the
8 interstate pipeline when requested by NW Natural;

9 (3) Supplies previously purchased and held in peaking facilities (Mist
10 underground storage and two LNG plants) owned and operated by NW Natural
11 and located within its territory; *i.e.*, not subject to interstate pipeline transportation
12 during withdrawal/vaporization;

13 (4) Supplies purchased from third party production wells in the Mist field
14 and delivered directly to NW Natural;

15 (5) Supplies that can be diverted upon request from industrial plants to
16 NW Natural under previously negotiated recall agreements; and,

17 (6) Diversion of supplies from interruptible sales customers of NW
18 Natural, *i.e.*, interruptible sales curtailment.

19 **Q. What is the existing maximum deliverability of the off-system resources**
20 **mentioned in item 1 above?**

21 A. Gas consumers in the Pacific Northwest are served by wells located thousands
22 of miles to the north or southwest. The largest gas-producing area is known as
23 the Western Canadian Sedimentary Basin, which covers northern British

1 Columbia, most of Alberta, and extends into the Northwest Territories. Due to
2 geographical and political boundaries, British Columbia and Alberta essentially
3 function as two separate supply areas. Domestic sources include various
4 smaller production zones located under the U.S. Rocky Mountains, mostly in the
5 states of Colorado and Wyoming, and the San Juan Basin in the "four corners"
6 area of the southwestern United States. While the San Juan Basin is sizable, it
7 currently flows almost no gas to the Pacific Northwest due to more favorable
8 economics for sale of the gas elsewhere.

9 With the deregulation of wellhead gas production, commencing in 1978
10 with the Natural Gas Policy Act and culminating in 1989 with the Natural Gas
11 Wellhead Decontrol Act, availability of gas supply has become a diminishing
12 concern. While market dynamics may shift buyer preferences between gas
13 sourced in British Columbia, Alberta, the Rockies and the San Juan Basin, the
14 current and future expectation is that supply will be available in the field when
15 needed. Accordingly, the deliverability of NW Natural's resource portfolio tends
16 not to be limited by available supply, but by the terms of the delivery
17 mechanisms used to move the gas to market, *i.e.*, upstream pipeline
18 transportation contracts.

19 All of the gas used in NW Natural's system (with the exception of the
20 relatively small volumes of native gas produced in the Mist field) is transported at
21 one time or another over the system of Northwest Pipeline Corporation (NPC).
22 Gas produced in British Columbia is transported first over the system of
23 Westcoast Energy Inc. (WEI) before reaching NPC. NW Natural does not

1 directly hold transportation service on WEI, but relies instead on its gas suppliers
2 to provide that service.

3 Gas produced in Alberta is transported first over the NOVA Corporation of
4 Alberta (NOVA) system, then transfers to the Alberta Natural Gas Company Ltd.
5 (ANG) system, and then transfers to the Pacific Gas & Electric Gas Transmission
6 Northwest (GTNW, formerly Pacific Gas Transmission) system before reaching
7 NPC. NW Natural holds transportation agreements on GTNW, ANG and NOVA,
8 though for NOVA deliveries it relies on suppliers for a portion of the required
9 transportation service.

10 During the 1980's, deregulation of the interstate pipeline industry led to
11 the conversion of pipeline sales agreements to transportation service. NW
12 Natural's largest contract with NPC was, and continues to be, the sales
13 conversion agreement executed in 1989. As part of this sales conversion
14 process, a very small NW Natural transportation contract also was created with
15 GTNW. The maximum deliverability under these contracts, and all other
16 upstream pipeline agreements subsequently described in this section, are listed
17 in Table 2, Exhibit 16 (RSF-Exhibit/2).

18 In 1989, NW Natural entered into four long-term supply contracts to
19 replace the sales function formerly provided by NPC. Two of those supply
20 contracts, with CanWest Gas Supply Inc. (CanWest) and Amoco Canada
21 Petroleum Company Ltd. (Amoco), still remain in effect. They along with other
22 existing supply agreements are listed in Table 1, Exhibit 16 (RSF-Exhibit/1).

1 Rapid load growth experienced since the late 1980's led to NW Natural's
2 participation in two sets of expansion projects on the NPC, GTNW, ANG and
3 NOVA systems. For the first set of pipeline expansions, completed in 1993, NW
4 Natural signed related supply contracts with Engage Energy Canada, L.P.
5 (Engage - formerly Westcoast Gas Services, which originally was Unigas
6 Corporation), POCO Petroleum Ltd. (Poco) and Summit Resources Limited
7 (Summit). NW Natural entered into capacity contracts with NPC, GTNW and
8 ANG, but relied on its three suppliers to provide delivery from NOVA. With this
9 new capacity, NW Natural was able to tap directly into supply sources in Alberta
10 for the first time. Due to the then-existing regulatory environment, NW Natural's
11 capacity and supply contracts were relatively long-term in nature.

12 The subsequent NPC expansion, in 1995, turned into a capacity
13 "rationalization" process on the GTNW, ANG and NOVA systems due to
14 unfolding deregulation in California. NW Natural, along with other growing
15 Northwest companies, took assignment of portions of Pacific Gas & Electric
16 Company's GTNW, ANG and NOVA capacity, inheriting the original termination
17 dates in those agreements. NW Natural did not enter into any related supply
18 contracts, instead relying on the availability of short-term (spot) gas supplies
19 within Alberta to fill that capacity as needed.

20 Since 1995, NW Natural has entered into smaller capacity acquisition
21 agreements with Duke Energy Trading & Marketing, LLC (Duke), Avista
22 Corporation (Avista, formerly Washington Water Power), and Weyerhaeuser
23 Company (Weyerhaeuser). All three of these contracts provide NW Natural with

1 long-term NPC delivery capacity into constrained locations (laterals from the
2 NPC mainline). Effective November 1, 1998, there are no term (greater than one
3 year) supply contracts related to these capacity agreements.

4 Other supply contracts, as shown in Table 1, Exhibit 16 (RSF-Exhibit/1),
5 reflect seasonal (winter) purchase arrangements and generally are congregated
6 in the Rocky Mountain area. NW Natural contracts for almost all of its winter
7 season supplies from Rocky Mountain producers for a number of reasons. First,
8 there are no interstate pipelines upstream of NPC, meaning no exposure to year-
9 round upstream demand charges as with Canadian supplies. Second, Rocky
10 Mountain suppliers have easier access to summer peaking loads such as electric
11 generation plants in the California and the southwestern U.S., so seasonal
12 arrangements fit well into their sales portfolios. Lastly, it provides geographic
13 supply diversity during cold weather operations, improving the performance of
14 NPC's system and hence increasing NW Natural's overall firm resource
15 reliability. NW Natural has purchased some winter seasonal supplies out of
16 Alberta, and will continue to do so as economic and operational considerations
17 dictate.

18 **Q. Please describe the off-system firm storage resources mentioned in item 2**
19 **above.**

20 A. For more than 20 years, NW Natural has contracted for firm off-system storage
21 at the Jackson Prairie underground storage facility near Chehalis, Washington,
22 and the Plymouth LNG (liquefied natural gas) plant in Washington located near
23 Umatilla, Oregon. Jackson Prairie is operated by Puget Sound Energy (PSE),

1 and its ownership is split equally between PSE, Avista and NPC. Plymouth is
2 owned and operated by NPC. NW Natural and others contract for Jackson
3 Prairie and Plymouth service from NPC under uniform terms and conditions
4 regulated by FERC. In the early 1990's, FERC unbundled storage and
5 transportation service at Jackson Prairie and Plymouth. Also, the Jackson
6 Prairie owners have pursued a series of small expansions. NPC's tariffs for
7 unbundled redelivery transportation service from both facilities does not match
8 mainline service, *e.g.*, its cost can be much less expensive than normal
9 transportation service. Additional redelivery transportation service has not
10 always increased in proportion to expanded underground storage withdrawal
11 capacity, but NW Natural is able to use its regular NPC service to supplement as
12 necessary. Maximum withdrawal capacity, inventory, and related redelivery
13 transportation service agreements for Jackson Prairie and Plymouth are
14 summarized in Table 3, Exhibit 16 (RSF-Exhibit/3).

15 **Q. What is the existing maximum deliverability of the on-system resources**
16 **mentioned in items 3, 4 and 5 above?**

17 A. Maximum capabilities for NW Natural's Newport and Portland LNG plants,
18 existing Mist (Bruer/Flora) storage, and the new Calvin Creek storage facility are
19 contained in Table 3, Exhibit 16 (RSF-Exhibit/3). Also shown are the nominal
20 volumes of Mist production gas currently received from Enerfin Resources
21 Company (Enerfin), and the recall agreements currently in effect with Portland
22 General Electric (PGE), Georgia-Pacific Corporation (GP), James River
23 Corporation (JR), Weyerhaeuser, and IGI Resources, Inc. (IGI).

1 The recall arrangements provide NW Natural with a quasi-storage service.
2 In effect, alternate fuel at industrial sites (diesel, #6 oil, *etc.*) becomes a
3 substitute for natural gas, allowing that gas to flow to NW Natural when
4 requested. The service has some similarities to an LNG plant in that it is
5 expensive (tied to alternate fuel plus other possible costs) and has a short
6 duration (constrained by tank storage and/or emission limits). Few industrial
7 sites are interested in providing this type of service in that it is not part of their
8 core business (*e.g.*, making paper) and adds to their business risks.

9 NW Natural's total firm resource portfolio, as summarized from Exhibit 16
10 (RSF-Exhibit/1 – 4), is provided at Table 5 in Exhibit 16 (RSF-Exhibit/4).

11 **Q. What about curtailment of interruptible sales customers as mentioned in**
12 **item 6 above?**

13 A. Currently, NW Natural could curtail load totaling roughly 20,000 to 30,000
14 dekatherms per day (Dth/day) under interruptible sales schedules. However, it
15 would be redundant to include this amount in Exhibit 16 (RSF-Exhibit/4).
16 Interruption of certain customers does not increase total deliverability of
17 resources to NW Natural's system; it only reallocates what already was
18 delivered. Interruptible loads are served only if there is an excess of firm
19 resources as compared to firm loads. If there is no excess, then there is no gas
20 supply for the interruptible customers, *i.e.*, curtailment implicitly has occurred.

21 **Q. Are there any other existing resources NW Natural could rely on that are**
22 **not discussed above?**

1 A. NW Natural may be able to purchase additional supplies delivered to its service
2 territory using third party transportation (firm or interruptible) on NPC, or
3 transported using NW Natural's own interruptible transportation contracts.
4 However, our experience has been that the former source is extremely limited,
5 and the latter is not available at all on peak load days. This outlook is not
6 expected to change given the continued rapid customer growth throughout the
7 Pacific Northwest, the increasing occurrence of NPC operating restrictions during
8 even relatively mild weather conditions, and the modest nature of current
9 upstream pipeline expansion plans. The company would pursue third party and
10 interruptible deliveries if and when viable opportunities appear.

11 Finally, NW Natural is allowed in its tariffs to pre-empt the supplies of its
12 transportation customers to protect high priority customers. Given the disruptive
13 and potentially destructive effects of this type of action, NW Natural does not
14 include preemption in any part of its normal supply planning process.

15 **Q. Please describe the non-quantifiable benefits of market-area storage**
16 **development.**

17 A. The testimony of Dr. John A. Hanson Exhibit 13(JAH-Testimony) describes the
18 1995 IRP quantitative analysis of the costs and benefits of the Calvin Creek
19 project, such as the savings realized through the avoidance of new upstream
20 pipeline capacity subscription. In addition, Calvin Creek and the rest of NW
21 Natural's on-system storage resources (existing Mist storage and two LNG
22 plants) provide other benefits to customers that are very difficult to quantify. This
23 difficulty stems from their irregular nature, or the delving into operational details

1 that would be impractical to include in Dr. Hanson's analysis. These include the
2 following:

3 (a) Improve Overall System Reliability: Over the past three years, NPC
4 has experienced several interruptions in service associated with pipeline ruptures
5 (e.g., at Castle Rock in March 1995, and at Kalama and Everson, Washington, in
6 February 1997), and compressor station forced outages (e.g., at Chehalis
7 through much of 1997). Marketing practices of NPC also have an impact on
8 upstream deliveries, as NPC has imposed operational flow orders (OFO's) on
9 NW Natural and other shippers to allow other transactions to flow on the NPC
10 system. While NPC has pledged to both improve their system reliability and
11 refrain from disruptive marketing practices, NW Natural still remains captive to
12 NPC for almost all gas deliveries and is likely to remain so for the foreseeable
13 future. On-system storage offers the only real alternative to NPC service as it
14 shifts NPC deliveries from critical winter periods to the more manageable
15 summer months. The benefits derived by NW Natural are difficult to quantify
16 because they depend on a projection of the timing and severity of future NPC
17 forced outages and OFO's, which by their nature are unpredictable.

18 (b) Relieve Localized Upstream Constraints: NW Natural receives service
19 from NPC at approximately 40 interconnections (gate stations), some of which
20 are located on NPC's mainline transmission pipelines. However, most of the
21 gate stations are located on laterals off the mainline, and as such are more
22 prone to operational constraints as load growth continues. In some cases,
23 expanding on-system storage provides an alternative to paying NPC to expand

1 its piping and/or enlarge gate stations. The methodology for reimbursing NPC
2 for these costs has changed over the years, but at this time would require a
3 direct payment by NW Natural. As an example, NPC previously estimated the
4 cost of expanding the Portland lateral by 32,000 Dth/day at approximately \$2.5
5 million, which with a gross-up for income taxes would require NW Natural to pay
6 well over \$3 million. Expansion of Mist, however, will displace some of NW
7 Natural's load off the largest gate station on the Portland lateral. Hence, NW
8 Natural could avoid a Portland lateral expansion. Benefits such as this typically
9 would be more difficult to quantify because they require micro-system load
10 growth forecasts, and the assistance of NPC to estimate expansion costs.

11 (c) Intraday Flexibility: Gas is scheduled over interstate pipeline systems
12 according to a set of procedures that inherently limit shippers to a discrete set of
13 opportunities. For example, under the current pipeline industry standards,
14 shippers have two opportunities prior to a gas day to schedule gas flows, plus
15 two more opportunities to change gas flows during the gas day. For customers
16 with relatively stable loads, this typically is more than sufficient flexibility.
17 However, for customers with volatile load swings, it may not be enough. An LDC
18 such as NW Natural can experience more than a 10,000 Dth/day load swing for
19 every 1°F change in the weather. Being able to meet this swing requires almost
20 continuous flexibility, which on-system storage provides. The benefit of this kind
21 of flexibility is difficult to quantify because it depends on the penalties NPC might
22 have in place on any given day for flow overruns or underruns (taking more or
23 less gas off the pipeline than scheduled), which are known as "entitlement" days.

1 These penalties can range from zero to \$10/Dth. Accordingly, while there may
2 be relatively few entitlement days during the year, the penalty costs still can be
3 fairly sizable if gas flows are not properly managed.

4 (d) Imbalance Management: Intraday flexibility is important primarily on
5 entitlement days. In contrast, every month a calculation of each shipper's
6 cumulative imbalance is made by the upstream pipelines, with penalties imposed
7 for excessive imbalances not corrected in a timely manner. Storage is one of the
8 tools used to manage monthly imbalances. However, its value depends on the
9 costs of other alternatives, such as buying or selling gas as required or swapping
10 offsetting imbalances with other shippers.

11 (e) Baseloading More Upstream Supply Purchases: Due to the variability
12 of its load, NW Natural contracts a portion of its supplies on a discretionary
13 (swing) basis, which is a premium service commanding a higher price. This
14 helps NW Natural manage some of its day-to-day, weekday-to-weekend, and
15 week-to-week load fluctuations (though not necessarily intraday variations as
16 discussed in item (c) above). As NW Natural adds more storage withdrawal
17 capability and holds its upstream capacity relatively constant, it will be able to
18 baseload (commit to take every day) more of its supply purchases from other
19 regions. By increasing its local storage, NW Natural not only captures the
20 benefits of summer/winter price differentials, but also is able to eliminate more of
21 the premiums paid to suppliers by converting swing service to baseload
22 purchases, both summer and winter. Baseload purchases also lend themselves
23 to fixed pricing, either directly with the suppliers or through financial trades, while

1 swing purchases typically rely on the use of formulas tied to published price
2 indices. Accordingly, adding storage can reduce supply costs (through additional
3 baseloading of supply purchases) while also increasing price certainty. It is
4 difficult to quantify the benefits of the former factor, as premiums vary
5 significantly from season-to-season and year-to-year as the supply/demand
6 balance oscillates from periods of surplus to relative tightness. The latter factor
7 generates a reduction in gas price risk for all gas commodity customers on our
8 system, but its precise value is largely subjective. Based on our experience with
9 our customers, however, we believe price stability has importance.

10 **Q. Are there any other non-quantifiable benefits not included above?**

11 A. There are benefits of market-area storage development that are not associated
12 with NW Natural's gas supply function. For example, investments to build local
13 storage help build the tax base for local Oregon communities around the Mist
14 field. Similarly, construction and operation of NW Natural's storage facilities
15 provides local employment opportunities. Finally, storage development helps
16 propel further gas exploration programs in the Mist field, which when successful
17 leads to royalty payments to local land and mineral rights owners. However,
18 since all of these benefits are societal in nature, *i.e.*, they do not pertain directly
19 to NW Natural's customers, no attempt to quantify them is made here.

20 **Q. How can Mist serve NW Natural's customers in Washington state when the**
21 **company's distribution systems in Oregon and Washington are not**
22 **interconnected?**

1 A. While physically separate, NW Natural operates its system on an integrated
2 basis. For example, the company's firm transportation and storage agreements
3 with NPC allow deliveries in either state with considerable flexibility to shift gas
4 volumes between gate stations as loads vary. For these resources, state
5 boundaries have no meaning. Consequently, company resources situated in
6 Oregon, such as Mist and NW Natural's two LNG plants, can and do affect the
7 cost, availability and reliability of gas service in Washington because they act in
8 concert with transportation and storage supplies off NPC. If Mist and its other
9 Oregon-based resources were truly severed in some way from providing
10 assistance to Washington customers, NW Natural would need to contract with
11 NPC for more transportation and storage resources deliverable to its Washington
12 gate stations. Since Mist is cost-effective versus year-round NPC/upstream
13 supply contracts in serving low load factor firm customers, such a reallocation of
14 resources would lead to higher overall gas costs in Washington (and
15 correspondingly lower costs in Oregon). Consequently, NW Natural's integrated
16 system approach has benefits to the company's Washington customers.

17 **Q. Does this conclude your testimony?**

18 A. Yes.