

2021 Final Exam—Question 1

HYDROGEN PEROXIDE MERGER

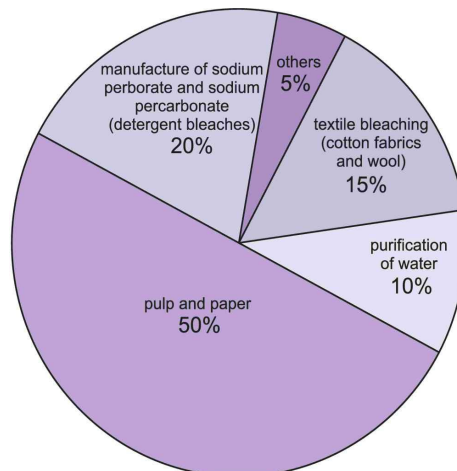
You are an associate in Finch & Wilk. Bvonik Chemicals Corporation, a client of the firm, is considering making an offer to acquire HP Specialty Chemicals Corporation for \$1.1 billion in cash. Bvonik and HP are the largest and third-largest sellers, respectively, of standard grade hydrogen peroxide (H_2O_2) in the United States.

Jonathan Wilk, a partner with whom you work, has been asked by Bvonik to provide them with a preliminary antitrust risk assessment of the transaction. Wilk has told Bvonik that the acquisition most likely would be reviewed by the Federal Trade Commission. Bvonik is seeking Wilk's advice on whether the parties can successfully convince the FTC to close the investigation, either cleanly or with some mutually acceptable consent order. Wilk has asked you to draft the memorandum to the client to provide this preliminary risk assessment. In particular, he would like you to address (1) whether the transaction is likely to be investigated or challenged and by whom, (2) if investigated or challenged, the likelihood that Bvonik would be able to successfully defend on the merits; and (3) if unsuccessful, the implications for the transaction. Wilk noted that it was premature for the memorandum to address any contractual risk-shifting provisions until the initial risk assessment had been completed and vetted with the client.

The "loop" within Bvonik on this possible transaction is very small, and the company has been able to provide you with only a limited amount of information and data. What follows is the information you have been able to obtain from the client and from public sources. Wilk asks that, for the purpose of your memorandum, you accept the client's estimates as fact but be sure to note this assumption in your memorandum.

Hydrogen peroxide. Hydrogen peroxide, a commodity chemical recognized by the American Chemical Society, is a powerful oxidation, sterilization, and bleaching agent. For most end uses, there are no effective substitutes. Hydrogen peroxide products are used in a wide variety of industries, including pulp and paper, food packaging, agriculture, chemical synthesis, mining, personal care. Small amounts are even used as rocket fuel. The pulp and paper industry uses

Figure 1.1
End Uses of Hydrogen Peroxide



about 50% of the hydrogen peroxide produced in North America, primarily for bleaching pulp and deinking recycled paper.

Today, hydrogen peroxide is manufactured almost exclusively by the anthraquinone process, which the German chemical company BASF developed in 1939. Manufacturers move a working solution through a hydrogenation, oxidation, and extraction process involving dedicated specialized equipment. The process produces a noncommercial “crude” hydrogen peroxide. Next, manufacturers dilute the crude with water to create homogeneous commercial “standard grade” solutions of 35%, 50%, and 70% hydrogen peroxide by weight.¹ Manufacturers stabilize the solution with very small amounts of chemical additives (usually tin) to inhibit the hydrogen peroxide from decomposing. Stabilizer packages can be specific to end use, but all manufacturers have stabilizer packages for all significant end uses. The manufacturing technology is mature and has seen no innovation for several decades. Manufacturing marginal costs for standard grade products (all measured by their hydrogen peroxide content) are constant across all plants and average about \$803 per ton.

Figure 1.2
Hydrogen Peroxide Manufacturing Plant



All manufacturers produce all standard concentration levels of hydrogen peroxide on the same equipment. Manufacturers can easily and readily change their production mix between different standard grade concentrations and additives with essentially no switching costs. Each manufacturer’s product portfolio of standard grade hydrogen peroxide covers the entire range of end-use applications.

¹ By comparison, medical grade hydrogen peroxide that consumers may purchase over the counter (OTC) is a 3% concentration.

Manufacturers deliver standard grade hydrogen peroxide directly to customers in bulk, by either rail tank car for long distances or tank truck for shorter distances. The United States Department of Transportation classifies hydrogen peroxide solutions greater than 8% by weight (and so including all standard grades) as a Class 5.1 hazardous oxidizing substance and regulates its transportation accordingly. The Environmental Protection Agency (EPA) and the Occupational Health and Safety Administration (OSHA) also regulate hydrogen peroxide solutions. As a result of the existing excess capacity in the industry and the barriers posed by environmental permitting, no new standard grade hydrogen peroxide plants have been built in the last 20 years and none are expected in the foreseeable future.

Standard grade hydrogen peroxide is an intermediate product that has no immediate end uses. Rather, manufacturers sell standard grade hydrogen peroxide to third-party chemical companies that further process the chemical to make hydrogen peroxide-based “specialty grade” products that they sell to end-use purchasers.²

Hydrogen peroxide suppliers. Five companies sell standard grade hydrogen peroxide to customers in the United States out of ten plants. Table 1.1 gives the details.

Table 1.1
Total Sales by Plant

	Total Sales		U.S. Exports		Capacity		
	Tons	Revenues	Tons	Revenues	Tons	%Utilization	Excess
Bvonik							
Mobile, AL	128,000	\$140.8			160,000	80%	32,000
Portland, OR	110,184	\$132.0			125,000	88%	14,816
Maitland, Ontario	48,583	\$60.0	18,700	\$23.1	75,000	65%	26,417
HP							
Bayport, TX	71,579	\$74.8			74,000	97%	2,421
Vancouver, BC	52,337	\$62.7	26,700	\$32.0	100,000	52%	47,663
Solvay							
Deer Park, TX	101,273	\$111.4			120,000	84%	18,727
Longview, WA	112,938	\$135.3			135,000	84%	22,062
Arkema							
Memphis, TN	56,000	\$61.6			90,000	62%	34,000
Becancour, Quebec	40,486	\$50.0	8,000	\$9.9	60,000	67%	19,514
Nouryon							
Columbus, MS	44,000	\$48.4			65,000	68%	21,000
TOTAL	765,380	\$877.0	53,400	\$65.0	1,004,000	76%	238,620

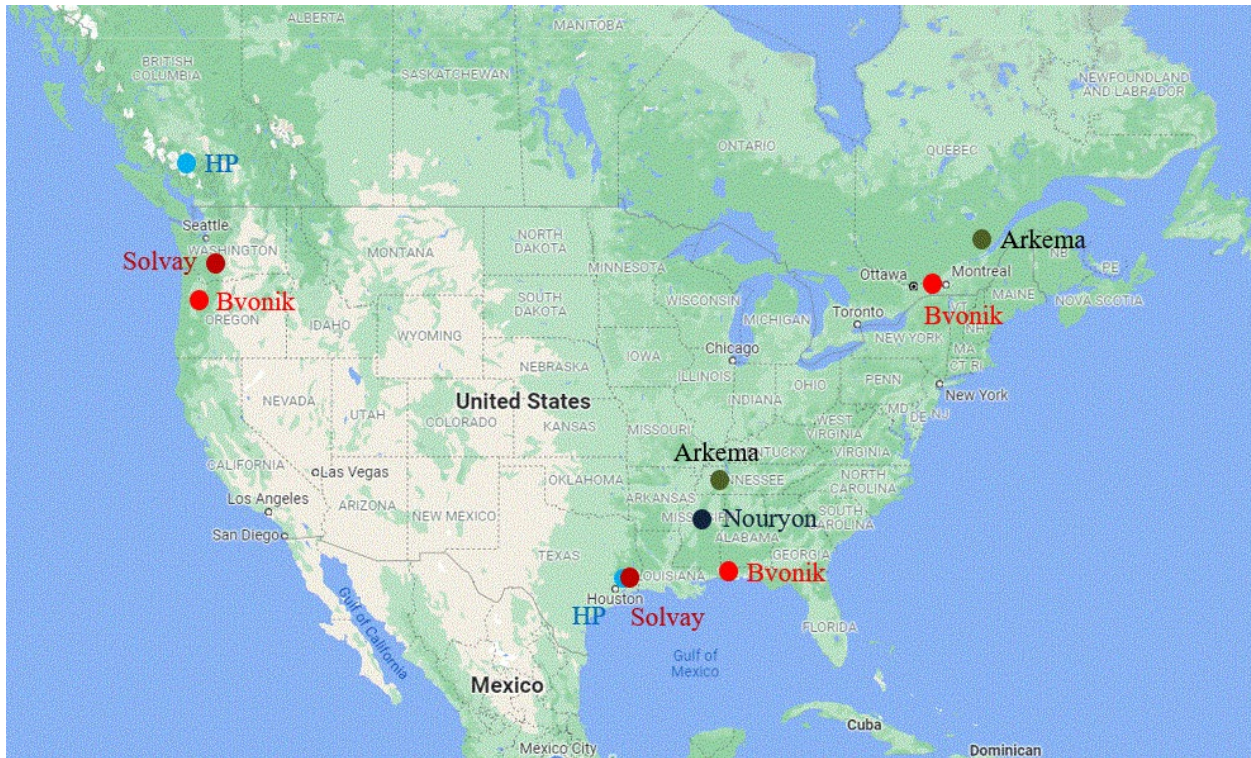
As Table 1.1 shows, seven plants are located in the United States. There are also three plants located in Canada that sell into the United States. There are no other plants in Canada and there are no plants in Mexico. Most plants have some geographic separation from the other plants. The exception is HP’s Bayport plant and Solvay’s Deer Park, TX plant, which are only 10 miles apart.

The five companies listed in Table 1.1 belong to the Hydrogen Peroxide Manufacturers Association (HPMA). This trade association and its members are active in dealing collectively with the DOT, EPA, OSHA, and other government agencies that regulate the manufacture,

² **Note to students:** For the purpose of this exam question, we will assume (contrary to fact) that standard grade hydrogen peroxide manufacturers are not vertical integrated into specialty grade chemicals.

transportation, or use of hydrogen peroxide products. They are also active in dealing with the U.S. Congress, the United States Trade Representative, and the Department of Commerce on import, export, and tariff issues. Finally, the HPMA collects data from members and distributes monthly aggregated (noncompany specific) statistics to its members on average prices and production costs as well as on production, capacity, and capacity utilization by plant.

Figure 1.3
Locations of Hydrogen Peroxide Manufacturing Plants in North America



Sale of standard grade hydrogen peroxide. Standard grade hydrogen peroxide suppliers compete for customers through bids for high-volume, multiyear contracts at delivered prices. A customer publishes a request for proposal (RFP) for a given location, specifying the standard grade it wants to purchase, its volume requirements, and contract term. The customer almost always engages in further negotiations with two or more bidders over the bid price to “play” one bidder off another and thereby obtain a lower final price. When a manufacturer supplies a customer out of multiple plants, prices are negotiated individually for each plant. For any RFP, the winning bidder quickly becomes known, usually from an announcement or comment from the customer or the winning bidder. Failing that, it is easy to observe the supplier’s name on the tank cars delivering the product.

While transportation over very long distances can be cost prohibitive, manufacturers commonly serve customers efficiently and at competitive terms within a radius of approximately 800 miles around a production plant in the Southern and Central United States and up to 1000 miles in the Pacific Northwest and in the Northeast and Western states. As a result, all companies that supply in the region where the customer is located will respond with bids. The HPMA has separate

committees for each of these three regions.³ Customers consume all the standard grade hydrogen peroxide they purchase as an input to specialty products they produce; customers do not purchase and resell standard grade hydrogen peroxide.

Apart from the occasional difference in additives, all standard grades of hydrogen peroxide are chemically identical except for concentration. All things being equal, the price of a 30% solution of hydrogen peroxide would be half as much as a 60% solution. This allows the industry to calculate prices per a theoretical ton of 100% hydrogen peroxide. The following table gives industry averages published by the HPMa by region on price, cost, and percentage margin per ton of H₂O₂ contained in the product:

Table 1.2
Industry Averages by Region
(on 100% H₂O₂ basis)

	Price	Margin	Cost
Pacific Northwest/Western	1198	0.33	803
Northeast	1235	0.35	803
Southern/Central	1100	0.27	803

So, for example, the average price of 70% standard grade hydrogen peroxide in the Pacific Northwest would be $\$1198 \times 70\%$ or $\$836.60$ per ton. As noted, these numbers are industry averages. The HPMa reports, however, that prices, margins, and costs for all members are, with rare exceptions, within 3% points up or down from the industry average. So, for example, the maximum margin earned by any plant in the Pacific Northeast/Western region would not be more than 36% and the minimum margin would be no less than 30%. Differences among suppliers result primarily from the absorption of some freight costs to be competitive for a customer as well as from differences in the production efficiencies of the various plants.

Customers are very sensitive to differences in prices among available hydrogen peroxide suppliers. Standard grade hydrogen peroxide is a standardized homogeneous product and customers will choose suppliers based on the lowest delivered cost.

U.S. tariffs on hydrogen peroxide are only 2.6%, and Canadian plants compete for U.S. customers within 1000 miles of their plants in the Pacific Northwest and in the Northeast. Last year, hydrogen peroxide imports from Canada accounted for 9.7% by revenues and tons of total consumption by U.S. customers in the Pacific Northwest. When for exchange rate or other reasons, prices from U.S. plants in either area increase by 5% relative to those offered by the Canadian plants, U.S. customers will immediately shift at least 14% of their purchases from U.S. plants to Canadian plants (which have the capacity to supply this demand). The reverse is also

³ To be precise, the industry defines these regions as follows:

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont in the United States and Ontario and Quebec in Canada.

Pacific Northwest/Western: Arizona, California, Idaho, Oregon, Montana, Nevada, Utah, Washington, and Wyoming in the United States and Alberta, British Columbia, Manitoba, and Saskatchewan in Canada.

Southern/Central United States: Alabama, Arkansas, Colorado, the District of Columbia, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, Mississippi, North Carolina, North Dakota, Nebraska, New Mexico, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Virginia, Wisconsin, and West Virginia.

true. U.S. plants compete for Canadian customers. Plants in the Central and Southern United States, however, are too far from consumers in the Pacific Northwest and Northeast to supply them competitively even if prices in those regions were to increase by 5%.⁴

There are no hydrogen peroxide plants in Mexico within 1000 miles of the United States, so there are no imports into the Southern and Central United States even if U.S. prices in that region increased. Likewise, the U.S. plants in the Pacific Northwest and the three Canadian plants are too far from consumers in the Southern and Central United States to supply them competitively even if prices in that region were to increase by 5%.

Table 1.3 summarizes U.S. production, imports, exports, and consumption:

Table 1.3
U.S. Production and Consumption

	Tons	Revenues
United States production	623,974	\$704.3
Exports to Canada	17,800	\$21.3
Imports from Canada	53,400	\$65.0
Total U.S. consumption	659,574	\$747.9
Pacific Northwest	232,022	\$278.0
Northeast	26,700	\$33.0
Southern/Central	400,852	\$437.0

On the other hand, because hydrogen peroxide has no effective substitutes for most end uses, aggregate demand is very inelastic. In particular, customers of standard grade hydrogen peroxide in any region of the country would shift less than 0.1% of the quantities they currently purchase to other products if the prices of hydrogen peroxide from all realistic suppliers were to rise by 5%.

Upon questioning, Bvonik representatives revealed that prices in all regions tend to “ratchet up” on pricing. That is, when an input price such as electricity increases, manufacturers quickly increase prices to cover cost increases. But when input prices decrease, manufacturers are slow to decrease prices and rarely decrease prices to the full extent of the input cost decline. Bvonik also revealed that HP appears to price aggressively in the Central/Southern region to keep its Bayport, TX plant fully loaded. Bvonick believes that HP’s average price in the Central/Southern region is only \$1045 per ton, 5% points lower than the industry average. By contrast, Bvonick’s average price in the region is around \$1100 per ton, the industry average. Using this aggressive pricing strategy, HP has been able to maintain a 97% capacity utilization compared to a 76% nationwide industry average. HP, however, does not follow an aggressive pricing strategy in the Pacific Northwest/Western region and has only a 52% capacity utilization in its Vancouver plant.

The deal. Bvonik is considering a purchase price of \$1.1 billion in cash for HP. Bvonik estimates that this represents a 32% premium over HP’s going concern value, which Bvonik executives say is materially less than the average premium of 36% that has been recently paid for chemical companies.

⁴ U.S. plants in the Pacific Northwest also compete for customers in Canada within 1000 miles of the plant. When prices from Canadian plants increase relative to prices charged by U.S. plants within 1000 miles of the Canadian customer, Canadian customers will shift about 14% of their purchases from Canadian plants to U.S. plants.

Bvonik strongly believes that the deal will be profitable for its shareholders given the significant cost savings that will result from the transaction and the low premium Bvonik would pay.

First, Bvonik believes it can eliminate \$22 million annually in fixed costs by closing down HP's headquarters, eliminating HP's executive officers and directors, and consolidating all back office, sales, and marketing operations into Bvonik's existing infrastructure.

Second, Bvonik believes it can significantly improve the productive efficiency of both of HP's plants. Although HP uses the same technology and equipment as other manufacturers, HP is well-known in the industry as having the least efficient plants. Bvonik believes that HP's average cost of producing hydrogen peroxide is \$815 per ton or about 1.5% above the industry average. By contrast, Bvonik's is perhaps the most efficient of the hydrogen peroxide producers, with an average cost of \$763 per ton or about 5% points lower than the industry average. Bvonik believes that these differences in operating efficiencies result from differences in the unpatented trade secret know-how used to reduce raw materials waste and energy consumption. With a small investment to add some additional monitoring and testing equipment to HP's plants, Bvonik believes that it can use its existing know-how and reduce HP's average marginal cost in both HP plants to about \$775 per ton or about 3.5% below the industry average—not quite down to Bvonik's costs but still a significant reduction of \$40 per ton. If successful, this would increase the combined profits by \$5.0 million per year on HP's current annual production of 123,916 tons.

Bvonik's CEO says that the below-average deal premium and the annual recurring synergies of \$27.0 million make the deal a profitable investment.⁵

Finally, when asked about how customers would respond to the deal, Bvonik's CEO said that the reactions were likely to be mixed. Purchasing agents will be reflexively against the deal because it removes a competitor. More senior executives are more likely to be indifferent because standard grade hydrogen peroxides tend to constitute a small proportion of the cost of many of the specialty goods their companies produce and sell. A notable exception may be the pulp and paper industry, where hydrogen peroxide is a material cost in paper production.

⁵ Bvonik's financial records show that its weighted average cost of capital is 8%.

Hydrogen Peroxide Merger

Note: I have not included any discussion of the boilerplate in this outline. I have attempted to be reasonably complete in the preliminary risk analysis. Given the time limits on the exam, I did not expect you to come near this level of completeness. Rather, I focused on the extent to which the answer spotted and analyzed the most important issues.

INTRODUCTION

1. Assignment requires a memorandum of law for a law firm client performing a preliminary risk assessment of the possible acquisition by Bvonik of HP for \$1.1 billion in cash
 - a. Inquiry risk
 - b. Substantive risk
 - c. Relief risk (including possible consent settlement)BUT do not address contract risk-shifting provisions
2. Add note that memorandum accepts client's facts and estimates, but the facts—and hence conclusions—may change with further investigation

KEY POINTS

1. Bvonik and HP are the largest and third-largest sellers, respectively, of standard grade hydrogen peroxide (H₂O₂) in the United States (five total)
2. Acquisition for \$750 million in cash—HSR reviewable (FTC)
3. Commodity chemical – produced in different concentrations but all priced on 100% basis
4. No effective substitutes—highly inelastic demand (5% price increase → 0.1% quantity loss) → standard grade hydrogen peroxide is a relevant product market
5. Five suppliers out of ten plants (7 U.S., 3 Canada)—all sell into the U.S.—appear to clump in three geographic regions (only two with potential overlaps)
6. Each manufacturer covers the entire range of end uses and all H₂O₂ produced on the same equipment with essentially no switching costs
7. Delivered in bulk to the customer in rail tank car or truck
8. Delivery radius: 1000 miles (PNW/W); 800 miles (S/C)
9. All companies in a region bid for every contract—Canada plants in PNW/W and NE regions (see n.3)
10. Cost prohibitive for out-of-region plant to bid to supply an in-region customer (for all regions) → separate regional geographic relevant markets
11. Average prices differ among regions
12. Sold in high-volume multiyear supply contracts
13. Price transparency on bids (after the fact)
14. Active trade association (HPMA)—includes extensive data collection and dissemination
15. Table 1.2: Average price, margin, cost by region
16. Customers very price sensitive—choose suppliers on lowest delivered cost
17. Coordinated effects:
 - a. Prices tend to “ratchet up”: Prices increase with input cost increases but do not decline as much with input cost decreases → oligopolistic behavior/tacit collusion

- b. 3→2 in S/C; 5→4 in PNW/W
- 18. HP Bayport (S/C) prices aggressively to keep plant loaded → “maverick”
- 19. No recapture unilateral effects (homogeneous product with minor spatial differentiation)
- 20. No second cost auction unilateral effects (see map: merging parties are never uniquely first- and second-lowest cost bidders)
- 21. High barriers to entry (cost of new plant + regulatory barriers)
- 22. Annual synergies: \$22m fixed; \$5m marginal
- 23. Do synergies cover 32% deal premium? (8% WACC)
- 24. Pulp & paper customers could complain

CONCLUSIONS

1. Inquiry risk
 - a. Deal HSR reportable—Overlap likely to be apparent
 - i. Preliminary investigation—concentrated regional markets, could be customer complaints in interviews (especially from pulp & paper customers)
 - ii. Second request
 - b. Others--unlikely
2. Relevant product market: Standard grade hydrogen peroxide
 - a. Complete supply-side substitutability (products the same except for concentration and additives)
3. Relevant geographic markets
 - a. Pacific Northwest (including Canada)—3 plants
 - b. Southern/Central United States—5 plants
4. *PNB* presumption
 - a. Pacific Northwest (including Canada)
 - i. 3 → 2 merger
 - ii. Combined share: 59%
 - iii. Strong *PNB* presumption from Merger Guidelines
 - iv. Well supported by case law
 - b. Southern/Central United States
 - i. 5 → 4 merger
 - ii. Combined share: 49%
 - iii. *PNB* presumption from Merger Guidelines
 - iv. Supported by case law
5. Additional evidence
 - a. Coordinated effects: Present
 - b. Unilateral effects
 - i. Recapture: Minimal at best (homogeneous product with only minor spatial differentiation)
 - ii. Second cost auction: Rejected (merging plants are never uniquely the lowest and second-lowest cost bidders)
 - c. Elimination of a maverick: HP in S/C
6. Defenses

- a. Entry/expansion/repositioning
 - i. *Entry*: Rejected (cost and time of building a new plant; time and cost of overcoming regulatory barriers)
 - ii. *Expansion*: Almost surely not likely: Given existing high level of excess capacity and “ratcheting up” of prices historically, incumbent firms have not been cutting prices to expand capacity premerger—no reason to expect them to do so postmerger
 - iii. *Repositioning*: Rejected (homogeneous product, no supply-side substitutes)
 - b. Power buyers: Rejected
 - i. Nothing in facts suggests that any buyer can protect itself
 - ii. But in any event, success of apparent tacit collusion in “ratcheting up” prices indicates that there are some customers that cannot protect themselves
 - c. Efficiencies (annually recurring): Rejected
 - i. \$22 million in fixed costs: Not cognizable
 - ii. \$5 million in marginal cost savings: Not timely, not verifiable (agency view since not supported by independent studies); almost surely not sufficient; unlikely to be passed on to consumers (given “ratcheting up” of prices historically)
 - d. Failing firm: Nothing in facts support
7. Relief risk
- a. Almost certain challenge in both PNW/W and S/C markets
 - b. Consent decree: Rejected (would reject a divestiture of an overlapping plant in each market; no trade-up opportunity to Bvonik)
 - c. *Bottom line*: Almost certain that transaction will be blocked

ANALYSIS

Inquiry risk

1. *Federal*: Transaction value: \$1.1 billion in cash → HSR reportable (reviewable by the FTC)
2. *State AGs*: Unlikely to have any interest
 - a. Industrial merger of an intermediate (nonconsumer) product
 - b. No threat of plant closing
3. *Private parties*
 - a. *Customers*: Not a consummated deal—unlikely interest & free-rider problem to challenge with litigation; more likely to complain to FTC (especially pulp & paper customers)
 - b. *Competitors*: No apparent opportunities for foreclosure; in interest of competitors if prices increase (if anything, transaction likely to be supported by competitors given its likely anticompetitive effects)

Substantive risk

1. Relevant product markets—Homogeneous products
 - a. Observations
 - i. Standard grade products are chemically identical except for concentration (and occasional differences in additives)
 - ii. Priced on hydrogen peroxide content (regardless of concentration)
 - b. *Brown Shoe* test
 - i. Outer boundaries
 1. Homogeneous product + price-sensitive customers → High cross-elasticity of demand & reasonable interchangeability of use
 2. Most end uses have no effective substitutes → Low cross-elasticity/ interchangeability of use with products outside of the market
 - ii. Practical indicia
 1. Commodity chemical recognized by the American Chemical Society; regulated by the USDOT, EPA, and OSHA as a hazardous substance
 2. Product's peculiar characteristics and uses: Unique with no substitutes for most end uses
 3. Unique production facilities: Dedicated specialized production equipment; easy switching among all grades; all manufacturers
 4. Distinct customers
 5. Distinct prices
 6. Sensitivity to price changes: Customers highly sensitive to relative price differences among suppliers
 7. Specialized vendors: Only seven firms produce; high barriers to entry due to existing excess capacity and environmental permitting
 - c. HMT
 - i. Homogeneous product → Apply critical loss test⁶
 - ii. Percentage actual loss for 5% SSNIP: < 0.1%
 - iii. Percentage critical loss sufficiency test (use maximum average margin of 35%):⁷
$$(\%CL =) \frac{\Delta q_{cl}}{q} = \frac{\delta}{\delta + m} = \frac{0.05}{0.05 + .35} = 12.5\%$$
 - iv. Percentage actual loss(0.1%) < percentage critical loss (12.5%) → Candidate market is a relevant market

⁶ This jumps the gun a bit. Here, there appear to be several regional relevant geographic markets. A HMT test requires that both the product and geographic boundaries of the candidate market be specified. But if hydrogen peroxide satisfies a critical loss sufficiency test using the highest margin of any possible regional market, then a fortiori it satisfies the HMT for all regional markets.

⁷ It is proper to use the highest average regional margin of 35% rather than the highest possible firm margin of 38% since the critical loss test assumes that all firms in the candidate market increase their prices by the SSNIP.

2. Relevant geographic markets (two)
 - a. Pacific Northwest (including Canada): Three plants
 - i. Commercial realities
 1. Three plants in PNW/W are in the same relevant geographic market
 - a. Plants in the PNW/W competitively ship up to 1000 miles → significant overlap of draw areas of the three PNW/W plants⁸
 - b. Shipments across the U.S.-Canadian border in both directions
 - c. All plants within the region respond to RFPs from customers within the region
 - d. Customers will shift to foreign suppliers in response to small domestic relative price increases
 - e. Suppliers have the excess capacity and willingness to supply foreign demand
 - f. Indicates that the three plants in the PNW/W are in the same relevant geographic market
 2. Other plants are not in the same relevant geographic market
 - a. Minimal to no overlap with shipping areas with plants outside of PNW/W
 - b. Average prices differ among regions, although average costs are the same
 - c. HPMA treats PNW/W as a distinct region
 - ii. HMT: Two U.S. plants only: Use percentage critical loss sufficiency test to check
 1. Percentage actual loss for 5% SSNIP: 14%
 2. Percentage critical loss (use average margin of 33%):
$$(\%CL =) \frac{\Delta q_{cl}}{q} = \frac{\delta}{\delta + m} = \frac{0.05}{0.05 + 0.33} = 13.2\%$$
 3. Percentage actual loss (14% > percentage critical loss (13.2%) → Candidate market fails the sufficiency test
 4. But this does not mean that the candidate market fails a full HMT
 - a. Can estimate the margins of the two U.S. plants to obtain critical loss for a two-U.S. firm candidate market:

⁸ This should be apparent from the map, but if in doubt check with Google Maps for driving distances between plants.

	B Oregon	S Washington
Revenues	\$132.0	\$135.3
Quantity	110,184	112,938
Price per ton	1198	1198
Cost	803	803
\$margin	395	395
%margin	32.97%	32.97%
Critical loss		
δ	0.05	0.05
%m	32.97%	32.97%
Critical loss	13.17%	13.17%

- b. Since the actual loss of 14% is greater than the critical loss of 13.17%, the two-plant candidate market fails the critical loss test, although it is borderline
- i. NB: This is not quite correct since the \$803 margin is an average and not exact. We do not know the exact margins of the two U.S. plants, but we know that since HP Canada is a high-cost plant, the proper average of the two U.S. plants should be more than \$803 (making the actual critical loss for the two plants lower than 13.17%).
- c. Three important points on this
- i. It was not necessary to perform a critical loss test on a two-U.S. firm candidate market. You could have started with a three-firm candidate market (à la Warren-Boulton in H&R Block/TaxACT)
 - ii. If you performed a critical loss test on a two-U.S. firm candidate market, it was not necessary for an acceptable response to calculate the actual margins and perform a “true” critical loss test. It was sufficient if you observed that (1) the candidate market failed the critical loss sufficiency test, (2) this did not necessarily mean that the candidate market failed a true critical loss test, and (3) the geographic boundary would be determined using the qualitative factors (especially since the failure of the sufficiency test was borderline)⁹

⁹ I did count as an error if you performed the critical loss (sufficiency) test on the two-U.S. firm candidate market in an analytically incorrect way (e.g., finding that actual loss was greater than critical loss and erroneously concluding from this that the candidate market was a relevant market).

- iii. I made an error in drafting the hypothetical (although you should have concluded with the answer I intended). The 14% diversion was inconsistent with the homogeneous nature of hydrogen peroxide, the low U.S. tariff, and the ability of the HP Vancouver plant to compete against the two U.S. PNW plants given the Vancouver plant's effective shipping distance. To be consistent with the other facts, what I should have written is that U.S. customers would have shifted all of their demand to the Vancouver plant and purchased as much as the Vancouver plant would supply at the non-SSNIP prices. At a minimum, the Vancouver plant would have supplied an amount equal to its premerger excess capacity (47,663 tons) or about 21% of the PNW U.S. supply. When I make a mistake in writing the exam, as I did here, I adjust the grading accordingly to offset any confusion I may have caused.
- iii. HMT: Expand market to include Vancouver plant
 1. Percentage actual loss for 5% SSNIP: <0.1
 2. Percentage actual loss (0.1% < percentage critical loss (12.20%) → Candidate market is a relevant market
 3. Also note that U.S. plants in the Eastern and Southern/Central regions are too far to competitively supply customers in the Pacific Northwest even with a 5% relative price increase.
- b. Southern/Central United States: 5 plants
 - i. Commercial realities
 1. Plants in the S/C competitively ship up to 800 miles → significant overlap of draw areas of all S/C plants
 2. Entirely self-contained region—no shipments into the region from Canadian or other U.S. plants even with a 5% relative price increase.
 3. Indicates that all and only plants in the S/C region are in the same relevant geographic market
 - ii. HMT: Percentage critical loss sufficiency test (use average margin of 27%)
 1. Percentage actual loss with a 5% SSNIP: 0.1%
 2. Percentage critical loss:

$$(\%CL) = \frac{\Delta q_{cl}}{q} = \frac{\delta}{\delta + m} = \frac{0.05}{0.05 + 0.27} = 15.16\%$$

3. Percentage actual loss(0.1%) < percentage critical loss (15.16%)
→ Candidate market is a relevant market

3. Market participants, market shares, and the *PNB* presumption

a. Pacific Northwest/Western

- i. *Query*: Should all of Vancouver be included or only that portion that it currently sells into the United States plus the additional amount it would sell in the event of a 5% relative price increase by the two U.S. plants?
1. *Answer*: The judicial and HMT tests showed that the two U.S. plants were not a relevant market and that the relevant market had to include the Vancouver plant.
 2. Therefore, include 100% of the Vancouver plant as a current market participant under judicial precedent and Merger Guidelines
- ii. HHI analysis:

1. HHIs: The problem stated that standard grade hydrogen peroxide is sold in a bidding market. This raises two possibilities for calculating HHIs:
 - a. *Revenue shares*: Appropriate if the bids are frequent and for small contracts
 - b. *Number of bidder shares*: Appropriate if bids are infrequent and large

Although I had the first case in mind, I did not provide enough detail in the problem for you to determine that. Therefore, I accepted both ways of calculating HHIs.

HHI--Revenue shares

	Pacific Northwest				Bidder shares	
	Tons	Revenues	Share	HHI	Share	HHI
Bvonik						
Portland, OR	110,184	\$132.0	40%	1600	33%	1111
HP						
Vancouver, BC	52,337	\$62.7	19%	361	33%	1111
Solvay						
Longview, WA	112,938	\$135.3	41%	1681	33%	1111
Arkema						
Nouryon						
	275,459	\$330.0	100%	3642	100%	3333

Combined	59%	67%
Premerger HHI	3642	3333
Delta	1520	2222
Postmerger HHI	5162	5556

2. Strong PNB presumption
 - a. “Red zone” under the Merger Guidelines
 - b. Multiple litigated FTC/DOJ cases confirm the presumption
 - i. *PNB* itself
 - ii. *Baby Food* (check)
 - iii. *United States v. Anthem, Inc.*, 855 F.3d 345, 351 (D.C. Cir. 2017) (combined market share of 47%, delta of 537, and postmerger HHI of 3000);
 - iv. *FTC v. H.J. Heinz Co.*, 246 F.3d 708 (D.C. Cir. 2001) (combined market share of 33%, delta of 510, and postmerger HHI of 5285);
 - v. *United States v. H&R Block, Inc.*, 833 F. Supp. 2d 36, 72 (D.D.C. 2011) (combined market share of 28.4%, delta of 400, and postmerger HHI of 4691);
 - vi. *United States v. UPM-Kymmene OYJ*, No. 03 C 2528, 2003 WL 21781902 (N.D. Ill. July 25, 2003) (complaint alleging combined market share of 20%, delta of 190, and postmerger HHI of 2990).

- b. Central/Southern.
 - i. No imports from outside of the region.
 - ii. HHIs:

	HHI--Revenue shares				Bidder shares	
	Southern/Central		Share	HHI	Share	HHI
	Tons	Revenues				
Bvonik Mobile, AL	128,000	\$140.8	32%	1038.11	20%	400
HP Bayport, TX	71,579	\$74.8	17%	292.98	20%	400
Solvay Deer Park, TX	101,273	\$111.4	25%	649.84	20%	400
Arkema Memphis, TN	56,000	\$61.6	14%	198.70	20%	400
Nouryon Columbus, MS	44,000	\$48.4	11%	122.67	20%	400
	400,852	\$437.0	100%	2302.30	100%	2000
Combined			49%		40%	
Premerger HHI				2302		2000
Delta				1103		800
Postmerger HHI				3405		2800

- iii. *PNB* presumption
 - 1. “Red Zone” in Merger Guidelines
 - 2. Multiple litigated FTC/DOJ cases confirm the presumption
 - a. *PNB* itself
 - b. *United States v. Anthem, Inc.*, 855 F.3d 345, 351 (D.C. Cir. 2017) (combined market share of 47%, delta of 537, and postmerger HHI of 3000);
 - c. *FTC v. H.J. Heinz Co.*, 246 F.3d 708 (D.C. Cir. 2001) (combined market share of 33%, delta of 510, and postmerger HHI of 5285);
 - d. *United States v. H&R Block, Inc.*, 833 F. Supp. 2d 36, 72 (D.D.C. 2011) (combined market share of 28.4%, delta of 400, and postmerger HHI of 4691);
 - e. *United States v. UPM-Kymmene OYJ*, No. 03 C 2528, 2003 WL 21781902 (N.D. Ill. July 25, 2003) (complaint alleging combined market share of 20%, delta of 190, and postmerger HHI of 2990).
 - f. *see also In re Evanston Northwestern Healthcare Corp.*, No. 9315, 2007 WL 2286195, at *4 (FTC Aug. 6, 2007) (combined market share of 35%, delta of 384, and postmerger HHI of 2739).
- 4. Additional evidence
 - a. Coordinated effects
 - i. Pacific Northwest/Western
 - 1. Premerger susceptibility
 - a. Selection
 - i. Homogeneous product: Although there are multiple standard grades, they differ only in concentration and can be converted to 100% H₂O₂ for comparability
 - b. Internal stability
 - i. Only three firms premerger
 - ii. Cooperation through HPMA
 - iii. Firms appear to be tacitly coordinating on prices by “ratcheting up” prices when input costs increase but do not decrease prices as much when input prices decline → existing tacit collusion (and not just susceptibility)
 - iv. High probability of detection
 - 1. Monthly HPMA reports on production, capacity utilization
 - 2. Some price transparency from HPMA and customers

3. Winners of contracts are rapidly known through announcements or just look at whose rail cars are showing up
- v. *Contra*, large, multiyear contracts; significant excess capacity among all users
- c. No threat of external interference
 - i. Customers will not switch to other products
 - ii. No external sources
 - iii. High barriers to entry
2. Postmerger increase in probability and effectiveness
 - a. Merger to duopoly (3 → 2)
- ii. Central/Southern
 1. Premerger susceptibility
 - a. Same as above but five firms premerger
 - b. While five firms may be borderline by itself for a market premerger to be susceptible to tacit coordination, the firms are in fact tacit coordinating as evidenced by the “ratching up” of prices
 2. Postmerger increase in probability and effectiveness
 - a. Merger reduces to four firms—makes existing coordination even easier
 - b. Also eliminates the independence of HP, which appears to be acting as a maverick in the region
- b. Unilateral effects (recapture model): Rejected
 - i. The idea is that a profit-maximizing firm without recapture would lose profits if it increased prices: the profit gain on the inframarginal sales would be outweighed by the profit loss on the marginal sales. With sufficient recapture, the profit gain on the recaptured sales would be enough to offset the marginal losses to make the price increase profitable
 - ii. With a homogeneous product, however, there are no inframarginal sales: a firm increasing its price would lose all of its sales to competitors
 - iii. Moreover, with a homogeneous product, the lost sales would likely be distributed among the other competitors and not all go to the merger partner
 - iv. *Bottom line*: Since there would be no profit gain from inframarginal sales and less than 100% diversion to the merger partner, a recapture unilateral price increase would be unprofitable
- c. Unilateral effects (second cost auction model): Minimal if any
 - i. The idea is that in a bidding model for the supply of a homogeneous product, the winning bidder would be the firm with the lowest delivered cost and it would win with a bid just below the delivered cost of the second-lowest cost firm. If the lowest-cost and second-lowest cost firms merger, then postmerger the winning bidder would be the firm with the

lowest delivered cost and it would win with a bid just below the delivered cost of the third-lowest cost firm, thus increasing prices postmerger

- ii. Observations
 - 1. Some spatial differentiation in plant location, but transportation costs do not appear to be that significant given the competitive shipping radius from the plant
 - 2. Also, some differentiation in production costs (with individual firms within $\pm 3\%$ of \$803)
- iii. Pacific Northwest/Western—Minimal if any
 - 1. Longview sits between Bvonik's Portland plant and HP's Vancouver plant → Merger does not involve the closest and second-closest plant to any customer
 - 2. We cannot tell from the facts when the transportation differential would be offset by any product cost differential (that would make the merging parties the lowest- and second-lowest delivered cost suppliers), but if it did, the price increase is likely to be minimal
- iv. Central/Southern—Minimal if any
 - 1. None on recapture from spatial differentiation
 - a. Solvay's Deer Park, TX plant is only 10 miles from HP's Bayport, TX plant and hence has essentially identical transportation costs
 - 2. Again, we cannot tell from the facts when the transportation differential would be offset by any product cost differential (that would make the merging parties the lowest- and second-lowest delivered cost suppliers), but if it did, the price increase is likely to be minimal
- d. Elimination of a maverick
 - i. HP appears to be a maverick in the Central/Southern but not in the Pacific Northwest/Western
 - ii. Could have coordinated and unilateral effects
- e. Deal premium analysis
 - i. The fixed and marginal cost savings do not cover the deal premium under any reasonable assumptions
 - ii. Deal premium: 32% over preannouncement value. So $(1 + 0.32)x = 1.1$ billion, where x is the preannouncement value. $x = \$833.33$ million.
Premium = \$1.1 billion - \$833.33 million = \$266.67 million

- iii. Fixed and marginal cost savings
 1. Annual fixed cost savings = \$22 million
 2. Annual marginal cost savings = \$5.0 million
 3. Total annual cost savings = \$27 million
 4. Bvonik's WACC = 8%
 5. PDV:
 - a. 10 years: \$181.17 million
 - b. 15 years: \$231.11 million
 - c. 21 years: \$270.45 million
 6. So it would take a time horizon of about 21 years just to break even
 - iv. Fixed and marginal cost savings + price increase
 1. Total annual cost savings = \$27 million
 2. Price difference = $1100 - 1045 = 55$
 3. HP Bayport quantity = 71,579 tons
 4. Annual profit from price increase = \$3,936,842
 5. Total annual profit gain = \$8,936,842
 6. Bvonik's WACC = 8%
 7. PDV:
 - a. 10 years: \$207.59 million
 - b. 15 years: \$264.80 million
 - c. 21 years: \$309.89 million
 8. A time horizon of about 15 years covers the premium.
 - v. BUT
 1. An increase in HP Bayport prices is likely to decrease the quantity sold and hence the profit contribution from the price increase. To make this up (and to decrease the time horizon), Bvonik must be counting on an additional price increase in the Pacific Northwest/Western and Central/Southern regions resulting from increased tacit coordination on prices facilitated by the merger
5. Defenses
- a. Efficiencies—Rejected
 - i. \$22 million annual fixed cost savings not cognizable
 - ii. \$5 million annual marginal cost savings cognizable only if passed on to consumers to offset any upward pricing pressure
 1. But the economic incentive here is for the combined company to increase prices
 2. In any event, “ratcheting up”—that is, increasing prices with cost increases but not decreasing prices as much with cost declines—indicates that not all efficiency cost savings will be passed on to consumers
 - iii. Usual problems of verifiability, timeliness

- iv. Sufficiency
 - 1. Almost surely insufficient in the S/C market even if realized:
 - a. Marginal cost savings: \$40 per ton
 - b. Gain from increasing prices to regional average: \$55 per ton
- b. Power buyers—Rejected
 - i. Observations
 - 1. Contracts are large and multiyear
 - 2. All companies (except HP in C/S) have significant excess capacity
 - 3. Suggests possibility of power buyers defense—although facts provide no explicit support for the mechanism
 - ii. BUT
 - 1. Could be more minor, nonpower buyers
 - 2. “Ratching up” of prices indicates that buyers have not been successful in protecting themselves from anticompetitive price increases
- c. Entry/expansion—Rejected
 - i. Entry
 - 1. High barriers to entry make unlikely and, in any event, untimely
 - a. Need to build new plants (no repositioning of existing plants producing other products)
 - b. Environmental permitting
 - c. Significant excess capacity
 - d. Nothing in facts suggest that any firm would be interested in entering
 - 2. Not verifiable (agency view since not supported by independent studies)
 - 3. Open question of sufficiency
 - ii. Expansion
 - 1. Almost surely not likely: Given existing high level of excess capacity and “ratching up” of prices historically, incumbent firms have not been cutting prices to expand capacity premerger—no reason to expect them to do so postmerger
 - iii. *Repositioning*: Rejected
 - 1. Homogeneous product, no supply-side substitutes
 - 2. No indication that equipment to produce other products could be repositioned to produce hydrogen peroxide
- d. Failing firm—Rejected
 - i. Both Bvonk and HP are profitable

Relief risk

1. A Section 7 violation is certain in the Pacific Northwest/West and almost certain in the Central/Southern region
2. There is no realistic fix
 - a. Each area would require a divestiture
 - b. Bvonik is bigger and more profitable than HP in both regions → No trade up possibility
3. *Bottom line*: The transaction will be blocked