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TEMPES CORPORATION (B)

Thinking About Environmental Impacts*: *Materials, Costs, Performance, Regulations, and Marketing

In keeping with Tempes Corporation's traditional approach to capital budgeting, cash flows and other financial measures of the design choice have been estimated. Yet Susan Barclay, the *Water Moccasin* business manager, is not satisfied: having examined the cash flow analysis, she realizes that these data do not capture the effects of a range of potentially important factors. In particular, she is concerned that environmental issues may influence projected cash flows. After all, the company president requested that two designs be prepared so that costs and benefits of using recyclable engineering thermoplastic could be compared with those of the more traditional design. Now the challenge is to better understand these tradeoffs.

The first step is to learn more about plastics and cadmium, and the implications for the design choice facing the company. Barclay has called on her colleagues, and in particular the environmental compliance officer, for information on the materials they are considering. She has received a memo summarizing a number of articles and other information (see **Exhibit 1**)

This case was prepared by Lawrence Molinaro, Jr., William Lovejoy, and Christopher A. Cummings, as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. It was subsequently revised by Anjali Sastry and Henry Jacoby, Sloan School of Management, Massachusetts Institute of Technology. This case was developed with support from the Management World Resources Institute.

While the results of the search do not indicate that one design would be clearly superior to another, they have given the business manager plenty to think about. Calling an informal meeting, Barclay asks her colleagues to come up with a list of all the factors that might affect costs, performance, marketing, compliance, and liabilities. As the meeting begins, it becomes clear that the environmental dimensions of the design choice are significant.

Your Task

Using the Smith memo as a starting point, prepare a list of key environmental considerations that could affect Design A and Design B. You and your colleagues may do this as a team. You may also want to indicate the direction in which each factor might impact the company's costs or revenues. Although you may not all agree on the ranking, you should also prioritize these items into an approximate order to highlight those considerations likely to be most important.

Exhibit 1
Information on plastics and cadmium

Memorandum

To: Susan Barclay
From: Leslie Smith, environmental compliance officer
Re: Water Moccasin revision - potential environmental issues

This is to follow up on our conversation of last week. I've assembled some information for you about potential concerns that affect the product design choice. I'm highlighting two key issues here: (1) plastics, including recycling; and (2) cadmium.

First, on plastics. Here's an excerpt from a recent newspaper article in the *Boston Globe*:

Baton Rouge -- State environmental officials today began assessing the toxic contamination of groundwater supplies in the wake of a leak detected at a local chemical plant.

Engineers at the chemical company Acrylon, a maker of a variety of chemicals, detected a leak of sulfuric acid late Sunday night, company officials said. John Muller, Director of Environmental Affairs at the company, said the leak had been contained and his staff was taking all necessary action to ensure public safety.

The accident renewed calls for a ban by local citizen-action groups on underground storage, called "deep well injection," of hazardous waste. In recent years, the technique has raised increasing concerns about the possibility of wastes contaminating drinking water supplies. Only some twenty states still allow this method of waste disposal.

Public officials said it was too early to determine the extent of the contamination. Acrylic polymer is an important ingredient of many plastic products and synthetic fibers from automobile taillights to construction panels and contact lenses. Acrylon markets acrylic polymer under the Polymite © brand.

The desirability of plastics is also affected by recycling regulations and concerns. Recently, recycling has attracted increasing attention from regulators, designers, and consumers. For instance, I found this report on *National Public Radio*:

Doreen McCallum, newscaster: The US President wants Congress to reauthorize the Resource Conservation and Recovery Act, which governs the generation, transportation, and disposal of solid and hazardous waste materials. Legislation revamping current RCRA programs has already been introduced on the hill. NPR's Greg Edwards reports.

Greg Edwards: Two bills calling for increased stringency in the management of hazardous waste are now being considered, and Senator Bob Bentley, considered within the Senate a leader on environmental issues, is expected to introduce his own bill this morning. Recently, US industry has come under fire from environmental groups for not cutting waste volumes. If

passed, these bills will likely increase the cost associated with hazardous waste disposal.

Bentley's proposal is expected to draw on a program adopted in Germany in 1989. Klaus Töpfer, the German Environmental Minister, mandated a 30% reduction in disposal of household waste, both to landfills and incinerators, and has given private industry until 1995 to reach targets of 80% and 90% recycling, depending on the material. Germany has also tightened landfill standards that may ban landfill disposal of plastics. If a product cannot meet the specified recycling levels, then it must disappear. EC commissioners are also considering adopting similar legislation for the entire Community. According to Bentley, regulation of plastics and recycling are central components of the plan. In response to the new bill, the President said he is open to new ideas, but will defer to the EPA Administrator on details. I'm Greg Edwards in Washington.

Note that Western Europe is expected to become an important market for Tempes equipment, as it accounts for an increasing portion of Tempes' annual sales. One quarter of the company's European revenues come from Germany.

Recycling has also resulted in a new trend in design, as a *Business Week* article notes:

Problem: you manufacture autos, computers, washing machines, refrigerators, even teapots....You use plastic, lots of it. But plastic waste is piling up all over the country. Social and political pressure to recycle the material is growing fast. What should you do? Solution: design for disassembly. Simplify parts and materials and make them easy and inexpensive to snap apart, sort, and recycle.

As *Business Week* observes, three factors work against recycled plastics. The performance and tolerance of recyclable plastics, especially after several recycling iterations, has yet to be fully determined. And the look of recycled plastic has less aesthetic appeal and might be perceived by consumers as "low-value." Finally, the lack of a recycling infrastructure (including markets and a recycling coding system) remains an impediment to post-consumer recycling.

Cadmium also poses potential problems. This metal is classified as a hazardous waste by the EPA and is prohibited from municipal landfills. Of primary concern to us is the manufacture of fasteners, bolts, and, in particular, threaded screws. The processes for each of these usually involve one or more washing steps. Even with careful attention to standard procedures, there is always a risk of sending cadmium into common sewers. There is also the risk of cadmium wastes entering the groundwater via spills. While there have been virtually no incidents of groundwater contamination from sources like Tempes' operations, I recommend we increase our diligence regarding the use of cadmium in-house.

This is especially true in light of the proposed redesign of the *Water Moccasin* line. I believe that you mentioned that at least one of these designs calls for a cadmium-coated flange and fastener. You also said that one of these steps would use an aqueous wash. Please let me know the specs for this, as we may need to coordinate a new hazardous waste collection schedule with engineering and operations. The process plans will also need to be reviewed by state regulators.

You had also asked about reporting requirements and potential liabilities. Regarding reporting: any use of cadmium will need to be audited and reported under SARA Title III. Several consulting firms in the area can accomplish this task.

Regarding potential liabilities, I have assessed the probability of groundwater contamination with cadmium from manufacturing operations. Estimated probabilities of contamination, costs of remediation, and penalties and fines under current laws are:

Probability:	1 in 100,000 per month over the eight-year operating period
Remediation:	$12-40 million
Penalties:	$1-$3 million

Note that these costs do not take into account future laws, potential punitive damages, and other financial impacts (such as difficulty in selling contaminated land). If sewer contamination or a spill on Tempes land were to occur, we might also be required to ensure even more diligence to prevent additional accidents. (Such steps may include installing expensive new wastewater monitoring equipment or implementing process changes, for instance.)

I hope this is useful to you. Please let me know if you need any additional information.