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The Moulder Company: Alternative Strategies for Toxics Use Reduction

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INTRODUCTION

Moulder Company was founded in 1922 by William A. Moulder III, son of a shipping magnate from Framingham, Mass. Moulder left Framingham and moved to Western Massachusetts to seek his fortune in wood products manufacturing. For decades, Moulder Company specialized in value-added products, such as fine-milled lumber, doors, and specialty moldings. In the 1950s, he expanded Moulder Co.'s product line to include a Seating Division that focused on stadium seating. William Moulder ran the company until he retired in the late 1970s, and his son-in-law, Wilson Jacobs, took over as President. Jacobs expanded the company and organized it into four divisions. The Seating Division eventually became the largest and most profitable part of the company.

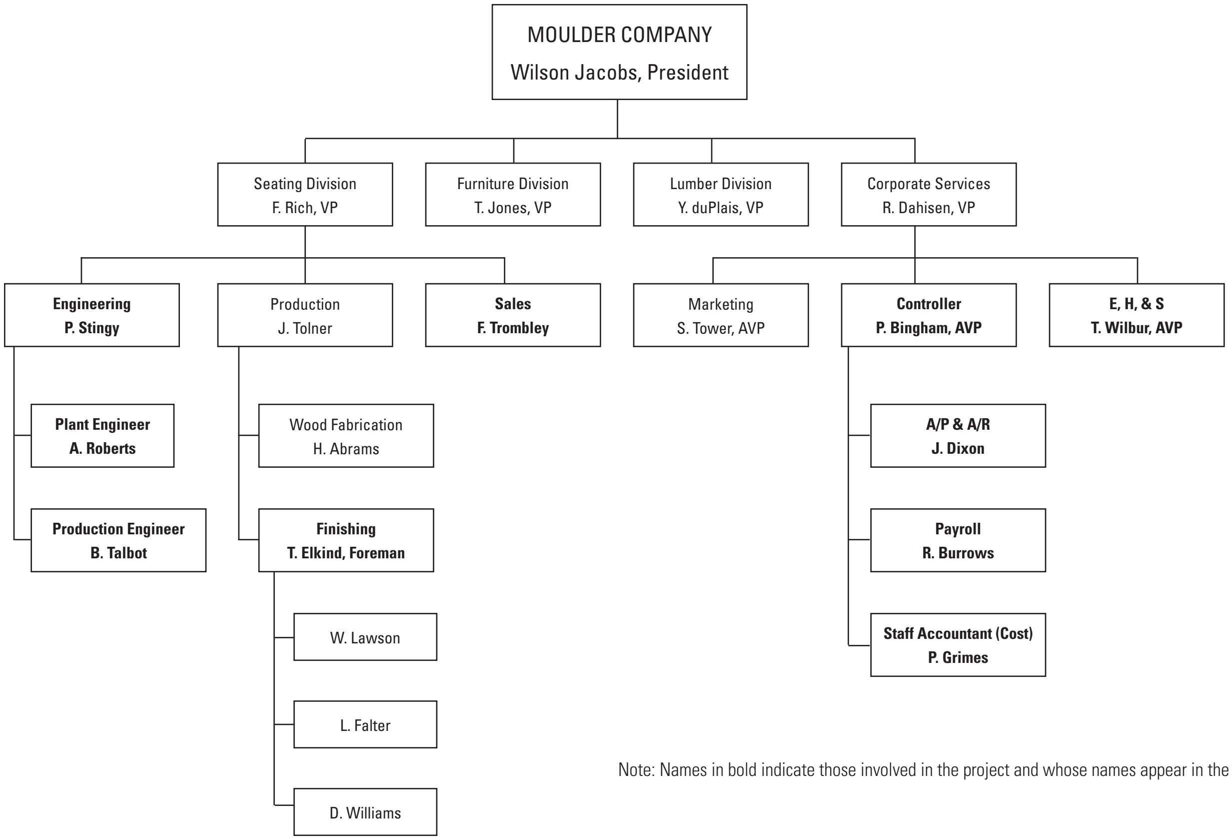
Both Moulder and his successor Jacobs viewed environmental management expenditures as a burden on the business that reduced profits and inhibited productive investment in a new plant and equipment. Yet the industrial environment had undergone changes because of increased environmental activism that was particularly intense in the New England region. A recent news article became a wake-up call for the Moulder Co. enterprise. A community activist group with strong connections to the local newspaper and other regional environmental groups had begun scrutinizing the company. Shortly thereafter, the local paper ran a front-page article featuring Moulder Co.'s Toxics Release Inventory (TRI) reporting data and its environmental impacts.[1]

Jacobs finally hired Terry Wilbur, a full-time environmental manager with several years of experience in the field. Wilbur took over the duties of several engineers, who had performed the work in their spare time, with a mandate to ensure compliance while "keeping environmental spending within reasonable limits." Wilbur realized the mandate would be difficult to fulfill given the significant environmental risks. Regulators were increasingly assertive, and stakeholders were more vocal. Additionally, guidelines under the Massachusetts Toxics Use Reduction Act (TURA) suggested a proactive pollution prevention (P2) approach, which also could unveil strategic possibilities that forward-thinking companies could use.[2]

Soon after beginning his new role, Wilbur set up the Environment, Health, and Safety (EH&S) team. Drawn primarily from the Seating Division and Corporate Services (see Figure 1 for organizational chart), the core members of the EH&S team included Wilbur; Phil Bingham, the controller who oversaw all accounting and tax functions at Moulder; and Paul Grimes, the staff accountant who was recently hired to support operational accounting and internal reporting.

At the first meeting, the EH&S team invited all members of the Engineering, Production, and Controller Divisions to explore options and develop an actionable plan. Again Wilbur highlighted the importance of P2.[3] He explained that P2 was basic to nearly all emerging trends in environmental rulemaking and regulatory compliance and included initiatives such as product design changes and technology or process

Figure 1
Moulder Company Organizational Chart



Note: Names in bold indicate those involved in the project and whose names appear in the case.

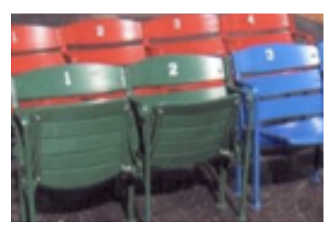
modifications that involved substituting toxic chemicals with safer alternatives. Wilbur pointed out that more facilities were affirming the benefits of P2 that source reduction led to cost savings in areas such as reduced capital investment for end-of-pipe control, lower waste-disposal costs, lower costs for complying with environmental regulations, less need for worker protective equipment, and lower annual operating and maintenance costs. In addition, P2 also encompassed good operating practices such as waste segregation (separating recycling and other forms of waste), preventive maintenance, training and awareness programs, and production scheduling.[4]

The audience responded with both enthusiasm and apprehension. This was a whole new perspective to the audience, and they quickly realized that it called for significant change in procedures and outlook. Nevertheless, all were aware that the time had come to address the regulators' concerns, particularly volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions.[5] The difficult question now was where to begin, so Wilbur began to assess environmental concerns at Moulder Co.

SEATING DIVISION AND FINISHING PROCESSES

Moulder's Stadium Seating Division produces two product lines: bleachers and stadium chairs. Bleachers are manufactured from flat boards while the stadium chairs require specialized manufacturing processes because of the complex shapes of the arms, backs, and seats.


BLEACHER


STADIUM

Most pollutants (particularly VOCs) emerged during the finishing processes, with larger proportion from the stadium chairs. Moulder Co. uses two types of finishing operations: (1) Manual application of coatings for the flat boards used in the bleacher seating and (2) spray application for the complex wooden shapes of the stadium chairs. Wilbur focused his P2 assessment on the spray finishing of the arms, backs, and seats of the stadium chairs since this accounted for the highest use of coating materials.

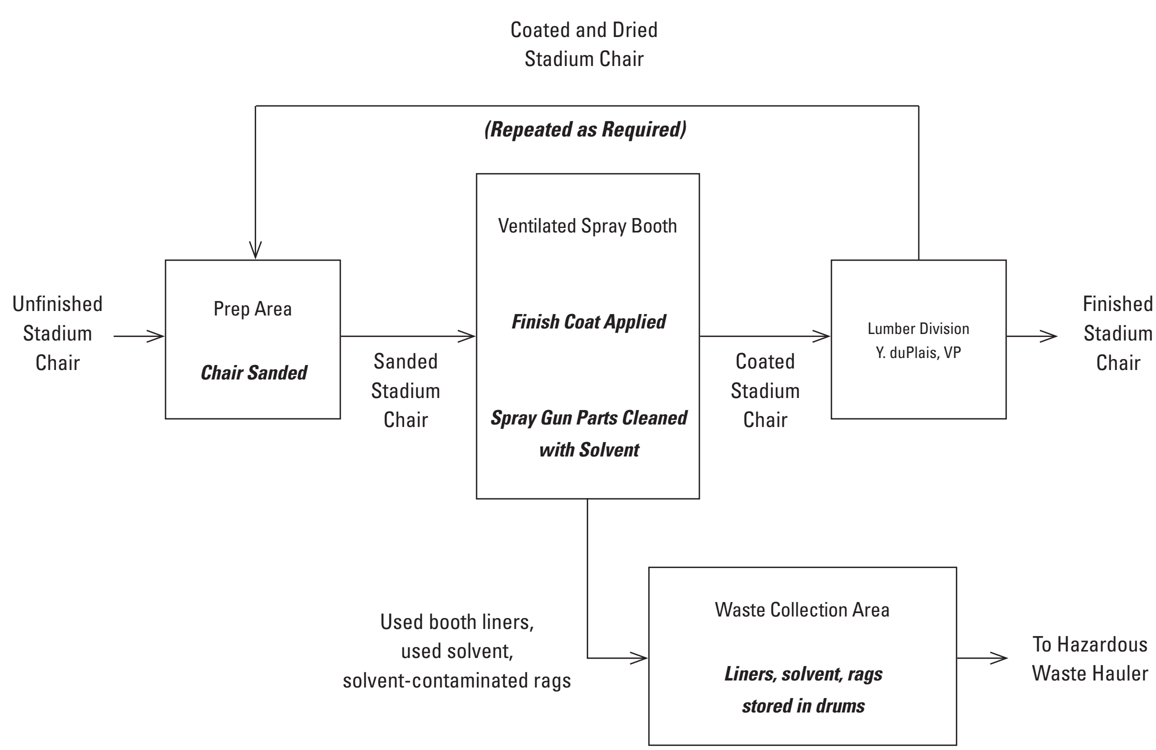
The finishing process would begin after the wooden components of the stadium chairs were assembled onto metal frames and then carried into a large ventilated spray booth. Typically three or four coats were applied with high volume, low pressure (HVLP) spray guns: stain, sealer, and two lacquer topcoats. After each coat, the part was carried to a flash-off area to dry, then to a prep area for sanding before being returned to the spray booth for the next coat. The spray gun assembly (lines, nozzles, and so on) were cleaned with a hydrocarbon solvent, such as toluene, at the end of each shift and whenever lacquer pigments were changed. Because these solvents emit VOCs, the paint booths were equipped with filtered ventilators. Spray operators were outfitted with protective suits and full-head respirators to meet the U.S. Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH) guidelines.[6] The spray booth had a coated paper liner that was able to be stripped and replaced as needed.

All stadium seating was custom made-to-order with different finishing specifications that required various finishing times and quantities of materials. Depending on the work flow and order backlog, workers moved back and forth between the bleacher and the stadium chair finishing operations.

The coating materials, purchased in 55-gallon drums, were moved to the production area as needed, and the contents were transferred into the spray dispensers. Employees were responsible for cleaning the spray equipment with solvent after each shift or for coating changeovers. They obtained solvent from a 55-gallon drum stored near the work area. When drums were empty, the person who emptied them would contact the store room for replacements.

Used solvent was dumped into an open drum, which was then resealed and sent to a centralized waste disposal holding area. Contaminated rags and spray booth liners were also deposited into drums and sent to the waste disposal holding area. Maintenance staff was responsible for calling a certified hazardous waste hauler to pick up the drums when the holding area approached capacity. Figure 2 outlines the steps in the stadium chair finishing process.

Figure 2
Flowchart of Stadium Seating Finishing Production



Financial feasibility was a crucial component of Wilbur's mandate to explore pollution prevention options. Wilbur soon realized that the cost system was not equipped to provide the granular information to analyze environmental costs. The current management accounting system provided an aggregated picture of direct labor and materials costs by job. Bingham noted that the cost classification system had applied a traditional approach to costs, without any consideration of environment-related factors. The next important step was to gather the required information for the financial analysis.

The meeting brought many key elements into focus. Before adjourning the meeting, two teams were assigned to prepare reports for the next meeting. Wilbur would oversee both: Grimes's team would gather cost information on current finishing operations in the stadium division, and Bingham's team (including Pete Stingy from the Engineering division and Flora Trombley, the sales manager) would explore alternatives to the stadium chair finishing operations.

COLLECTING THE COST INFORMATION

Grimes reviewed the financial records with the finishing processes to identify a list of annual operating costs associated with finishing the stadium chair products. The records provided information on coating materials, production labor, and maintenance (primarily cleaning solvents). Grimes realized that there were other finishing costs within the overheads but was not sure how to identify or classify them. Wilbur and Grimes went to work examining the records and interviewing the operations personnel, and they identified the other costs for finishing, namely solvent disposal, rag and spray booth disposal, electricity for ventilation, heating oil, environment compliance, and employee and EH&S team training. Grimes then began gathering the costs, another significant challenge involving further interviews of personnel involved in activities associated with finishing. The foreman, Tim Elkind, kept track of the total number of hours worked at each area. He had assigned finishers on a rotating basis to track the amounts of each type of finishing material used for each job.

Wilbur handled most of the environmental compliance work—tracking hazardous waste, labeling it, liaising between divisions, and more—but acknowledged that he had not yet kept very good track of the amount of time he spent within each division, much less on any specific activity. Wilbur needed an estimate of his own time spent on compliance, and, after some reflection, estimated that "I spend about an eighth of my time on compliance activities for stadium chair finishing operations."

It was particularly difficult to estimate cleaning solvent use. Alan Roberts, the plant engineer, recalled that, "We used a total of about five to six drums per month for all operations, but we do not track solvent use for stadium chair finishing." After a pause, he added: "Probably half of what is used for stadium chair finishing ends up as fugitive emissions or is absorbed by cleaning rags."[7]

Roberts estimated such "fugitive emissions" amounted to "about a drum per month for stadium chair finishing." Disposal cost for rag and spray booth liner was $10,000 per year for stadium chair finishing. EH&S team training cost for the finishing line was about $2,000 per person. Moulder Co. trained two employees per year.

The energy costs for finishing stadium chairs posed another challenge. A quick call to Bill Talbot, the production engineer, confirmed that a portion of the heating oil bill could be linked to stadium seating. He estimated that such heating oil cost attributable to stadium chair finishing was the increased ventilation requirements to contain "fugitive emissions." Such ventilation costs resulted in an overall increase in the heating costs of about 25%. In addition, he also estimated that the portion of electricity bill attributable to stadium chair finishing ventilation was about 10%.

Grimes compiled the information from the team's records and discussions with other employees, adding a checklist for computing the current costs for stadium chair finishing (see Appendix A).

POLLUTION PREVENTION OPTIONS

Meanwhile, the second team had begun to conduct extensive research into options to the current sealer and lacquer finishing. Emphasizing the need to meet the TURA guidelines, the team came up with three options for the stadium chair.

Project A involves switching from sealer and lacquer coatings that average 26% solids to coatings with 35% solids. To enable proper application of the material with HVLP guns, Moulder Co. would have to heat the coatings in-line and would need to work with its equipment supplier to modify the spray gun caps, nozzles, and tips. These high-solids coatings with HVLP spray guns contain approximately 40% fewer VOCs and 80% fewer HAPs.

The second option, Project B, involves a more significant switch from nitrocellulose-based to water-based coatings. While the potential environmental gains are significant, the financial benefits are less certain, and Wilbur is also concerned about quality issues. Some customers ("Customer S" in particular) make it clear that they prefer the high gloss of the conventional nitrocellulose lacquer. Nevertheless, the water-based coatings would reduce VOCs and HAPs by more than 75% and would eliminate the need to use chlorinated solvents for clean-up.[8] The water used for cleaning the spray equipment would require some type of treatment to allow its discharge under an existing National Pollutant Discharge Elimination System (NPDES) permit, but Wilbur didn't anticipate any problems with that, other than a potential additional permit fee of about $500 per year.

The third option, Project C, emerged from a suggestion from an employee who had previously worked for a competitor in the Northwest. It involves the possibility of installing a state-of-the-art ultraviolet coating system. Although such systems had been installed in the industry primarily to coat flat boards, such as those used on the bleacher seating, new equipment had been introduced by one vendor to enable the use of ultraviolet coating on the more complex dimensions of other wood seating and furniture.[9] The technology looked promising but did not yet have an extensive track record for the type of application Moulder Co. was considering. Moreover, an automated system would require a significant up-front investment. Yet it did have the potential to generate major savings in materials and labor and provide significant environmental advantages.

Wilbur's research team examined the alternative projects in detail, considering the differences in technology and its impact on the cost elements identified earlier. Their summary estimates are explained in Appendix B.

PREPARING THE FEASIBILITY REPORT

At the next meeting, the two teams discussed their findings. Wilbur explained the need to prepare a feasibility report that integrated all the research and analysis. This report was to be presented to the management team headed by Jacobs and would need to highlight the technical, financial, and qualitative aspects of alternatives to the existing system. Technical aspects included reliability and effectiveness of new equipment in meeting pollution and toxics use targets, while qualitative factors include the impacts of the new processes on product and environment quality. While the engineering team focused primarily on technical and qualitative aspects, the financial component, as Wilbur observed, provided a basis for determining the viability of technical and qualitative aspects of the analysis. Financial feasibility for new investments was determined through a capital budgeting process based on company-wide criteria.

Bingham remarked that capital budgeting at Moulder Co. had always been a fairly informal process. Equipment investments required a five-year payback, while smaller equipment required three years. The hurdle rate (cost of capital) for all divisions was set at 20%. All long-term analysis assumed an economic lifetime of 10 years, using the straight-line method for depreciation. Bingham noted that the hurdle rate included a risk premium, particularly given uncertainties in regulatory mandates for toxics emissions. Wilbur then reviewed the alternative project options. He suggested that a discount on risk premium was in order if toxics emissions could be reduced significantly. In particular, Project C could warrant such a discount given its potential of eliminating the use of toxics in the Toxics Release Inventory, thereby transforming stakeholder perceptions of the company. There was also the possibility that improved quality and stakeholder appreciation could have a positive impact on the prices of some orders. Trombley pointed out that product enhancement from Project C processes might lead to an overall increase in annual cash flow from increased prices and sales, while adoption of Project B would cause customers who prefer the high-gloss finish ("Customer S") to seek other alternatives.

CONCERNS AND FUTURE CHALLENGES

The meetings had raised awareness of the new realities of the regulatory environment for toxics. Without a doubt, change was inevitable. Significant concerns now emerged about cost allocation for the different job orders that varied with finishing details. Trombley expressed her concern that the prices did not sufficiently reflect the specific requirements of some customers. The Production Engineers inquired about the need to determine environmental costs that may occur during other phases of the product cycle and other products (e.g., the bleacher product). Clearly there was concern that not all environment costs were identified, that some remained hidden. While the early concern was the need to control costs, Bingham now understood the need to make changes to the cost systems, including adding more relevant cost classifications. Clearly that involves significant time and effort and, most importantly, attaining clear directives from top management.

The new initiatives had raised an awareness of the impact of the firm's operations on the employees and society. Society's concerns, such as resource usage, health hazards from contaminants, climate change, and other such externalities largely overlooked in the past, were now part of the conversation. Wilbur realized that much remained to be done for Moulder Co. to adapt to the environmental risks in the emerging regulatory environment, not the least of which was getting buy-in from top management. Nevertheless, he was optimistic. They had gotten off to a good start!

SUGGESTED DISCUSSION QUESTIONS

Assume you are part of Wilbur's EH&S team responsible for preparing the feasibility report that would justify a course of action. Answer the questions below as a basis for preparing the report:

1. To perform the financial analysis, compare Projects A, B, and C by using payback period, net present value (NPV), and internal rate of return (IRR). Consider tax implications on operating cash flows, including the impact of depreciation tax shield assuming that all assets have a 10-year useful life and tax rate of 25%. (Hint: To calculate cash outflows, adjust tax deductions; depreciation tax shield is considered separately.)

   Present sensitivity analysis of NPV for Projects B and C, considering the following:
   - Risk assessment considered in cost of capital hurdle rates: Wilbur assessed that Project B merited a 1% discount and Project C merited a 2% discount because of reduced hazards from toxics emissions.
   - Sales impacts on projects as indicated by Trombley: Trombley's projections showed an estimated $6,000 net decrease in annual cash flow in Project B from loss of "Customer S" and an estimated $20,000 net increase in annual cash flows for Project C from changes in sales and selling prices.

2. Compare the alternatives by integrating any qualitative and technical aspects of the project that might argue for or against its implementation. Indicate your preferred option in the context of the three components of the feasibility report and explain your reasons for choosing that option. Consider the implications of the cost accounting systems, particularly any observed weakness.

3. The discussions during the meeting also exposed weaknesses in the cost accounting system. Describe how the cost system could be adapted to support environmental costing (review relevant readings on environmental management accounting from the Reference List), emphasizing how the system could develop and support:

   a. Cost classifications to identify and measure environmental impacts of toxics,
   b. Cost allocation (applying Activity-Based Costing) to improve pricing and cost controls for multiple products, and
   c. Management of environment costs and decision making through improved measurement of cost.

REFERENCE LIST

Environmental Protection Agency (EPA), "An Introduction to Environmental Accounting As A Business Management Tool: Key Concepts and Terms," June 1995, http://1.usa.gov/1HWWaNs.

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IMA (Institute of Management Accountants), *Enterprise Risk Management: Tools and Techniques for Effective Implementation*, Statements on Management Accounting, 2014, www.imanet.org/docs/default-source/thought_leadership/governance_systems/erm_tools_and_techniques.pdf?sfvrsn=4.

ISO (International Organization for Standardization), "Environmental management: The ISO 14000 family of International Standards," 2009, www.iso.org/iso/theiso14000family_2009.pdf.

United Nations Division for Sustainable Development, "Environmental Management Accounting Procedures and Principles," 2001, New York, N.Y., www.un.org/esa/sustdev/publications/proceduresandprinciples.pdf.

APPENDIX A

INFORMATION FOR COMPUTING CURRENT COSTS

Robert Burrows from the Payroll department had information on compensation, including:

	Rate (including all benefits)
Vice Presidents	$60,000 annual salary
Assistant Vice Presidents (EH&S Team Manager)	$50,000 annual salary
Engineering Staff	$45,000 annual salary
Foreman	$20 per hour
Office Staff	$15 per hour
Finishers	$15 per hour

Moulder Co. operated for 50 weeks during the year. An average work week consisted of 40 hours.

Tom Elkind, finishing foreman, had the following information:

"A total of 12 people are employed in the bleacher finishing and stadium chair finishing operations." The Weekly Summary Labor Report for stadium chair finishing looks like this:

Week Ending	5/4	5/10	5/17	5/24	5/31	6/7	6/14	6/21	6/28	7/5
Total Hours	340	345	305	290	295	330	325	315	335	320

Janet Dixon from Accounts Receivable and Accounts Payable/ Purchasing had the following information on the costs of chemical items to be used:

Item	**Cost (including taxes)**
Stain	$6.00 per gallon
Lacquer	$7.10 per gallon
Sealers	$5.00 per gallon
Solvent	$0.85 per pound (11 pounds per gallon)
Solvent Disposal	$1.10 per pound (11 pounds per gallon)
Electricity	About $4,000 per month
Heating Oil	About $6,000 per month

Coating materials used per year for stadium chair finishing:

Coating	**Gallons**
Stain	6,500
Sealer	8,000
Lacquer	10,000

CHECKLIST FOR COMPUTING CURRENT COSTS

Stadium chair finishing operations costs will include:

- **Coating Materials –** Dixon has provided the required information.
- **Production Labor –** Use weekly labor report to calculate average weekly hours worked.
- **Cleaning Solvent Costs for Maintenance –** Cleaning solvent for maintenance is twice the quantity of fugitive emissions, therefore two drums of cleaning solvent are required (55 gallons each) for regular maintenance.
- **Cleaning Solvent Disposal Costs –** One drum of solvent is filled with remaining solvent waste and requires disposal. The other drum is fugitive emissions.
- **Rag and Liner Disposal Costs –** Given in text.
- **Electricity –** Dixon has provided the required annual cost. Talbot estimated 10% for stadium chair finishing.
- **Heating Oil –** The average monthly heating oil includes the 25% increases in heating costs for ventilation. Only assign this 25% incremental cost of additional ventilation for stadium finishing operations.
- **Environmental Compliance –** Calculate Wilbur's time on stadium chair finishing.
- **Training Costs –** Calculated based on Roberts's estimates.

APPENDIX B: POLLUTION PREVENTION OPTIONS

The research team came up with three options (Projects A, B, and C) for the stadium chair, with careful consideration of cost implications and the use of toxic items listed under the Toxic Reduction Inventory, and presented them to Wilbur.

Project A – High-solids coatings with HVLP spray guns would have costs and savings as listed here:

- **Coating materials –** The higher-solids coatings are about double the cost of the low-solids coatings on a per-gallon basis, but less material is used to achieve the same finished thickness. Combined with the elimination of the second top coat, total quantity of coating purchased was expected to decline, but the total cost was projected to be about 10% more given the higher cost of the high-solids coatings. The supplier expected the price differential to decrease as more companies switched to higher-solids coatings.
- **Production labor –** The higher-solids coating would eliminate the need for a second top coat in most cases and thus would reduce labor by about 4,500 hours per year on constant volume. The sealer coat, however, would be more difficult to sand, requiring orbital rather than block sanders and an additional 1,000 hours of labor per year.
- **Maintenance –** Cleaning solvent requires an increase of about 30% more due to higher viscosity of the material.
- **Solvent disposal –** Increases disposal by one half of the increase in cleaning solvent (i.e., by 15%).
- **Rag and spray booth liner disposal –** No significant change.
- **Utilities (Electricity) –** Heating the coatings requires an additional $1,000, and increased air flow in the sealer flash-off area requires an additional $500.
- **Heating oil –** Increased air flow in the sealer flash-off area requires an extra $3,000.
- **Environmental compliance –** No significant change.
- **Training –** Extra production training in the first three to six months of operations would cost $5,000, and annual costs for training are unchanged.
- **Rework –** Rework incre ases to $15,000 per year because there is less margin for error with a single, heavier topcoat.
- **Plant and equipment –** An upgrade to the flash-off area and to modify spray-gun equipment costs an additional $30,000.

Project B – Water-based coatings option would have estimated cost items as follows:

- **Coating materials –** The water-based coatings cost approximately 10% more than what Moulder Co. was currently using, but Wilbur expects the relative difference to decrease.
- **Production labor –** Reduce labor to 500 hours per year.
- **Maintenance –** Using a water-based cleaning solvent would eliminate the need for a chlorinated solvent and would reduce cost by 20%.
- **Rag and spray booth liner disposal –** Cost would be reduced by 20%.
- **Utilities (Electricity) –** The ventilation requirements would be reduced by 25%.
- **Heating oil –** Heating oil requirements would be reduced by 25%.
- **Training –** Extra production training in the first three to six months of operations would cost $5,000, and annual training costs would be cut in half.
- **Water treatment –** Installing new lines and tankage would cost $75,000 initially, and then chemicals would cost $2,000 per year.
- **Environmental compliance –** Wilbur estimated that he would save about two hours per week if he eliminated using solvent at this operation but would add about an hour to check on the water treatment and discharge.
- **Permit fee –** Potential additional permit fee of about $500 per year.

Project C – Ultraviolet coatings option costs and savings were estimated as follows:

- **Coating materials –** The UV coatings cost more on a per-gallon basis, but personnel would use considerably less because the coatings have a higher percentage of solids, and over-spray is captured and recirculated into the spray equipment, virtually eliminating waste. Wilbur projected a reduction of about 30% in the cost of coating materials.
- **Production labor –** The automated system would enable the reassignment of at least two employees to other operations.
- **Maintenance –** UV coatings would reduce the amount of cleaning solvent required for clean-up by 90%.
- **Solvent disposal –** The use and disposal of solvent would be reduced by 90%.
- **Rag and spray booth liner disposal –** Would be reduced by 90%.
- **Utilities (Electricity) –** The ventilation requirements would be reduced by 25%. UV lamps would cost about $5,000 annually to operate.
- **Heating oil –** The ventilation requirements would reduce heating oil use by 25%.
- **Environmental compliance –** Would be reduced by 50%.
- **Training –** Extra training in the first three to six months of operations would cost $10,000. More production training on an annual basis would cost $3,000 per year.
- **Plant and equipment –** $350,000 for equipment and $130,000 for installation, phased start-up, and lost production during changeover.

ENDNOTES

[1]A TRI relates to the mandated list of toxic chemicals that companies need to report as mandated by federal law. For more information, see www2.epa.gov/toxics-release-inventory-tri-program.

[2]While TURA is the regulation in Massachusetts for toxic chemicals pollution prevention, provisions under TURA specifically relate to chemicals in the TRI list and changes to that list over time. When complying with TURA, companies effectively reduce their compliance burden on federal requirements under TRI reporting. More information on TURA is available from Massachusetts Department of Environmental Protection (MassDEP) at www.mass.gov/eea/agencies/massdep/toxics/tur.

[3]P2 stands in contrast to common environmental management methods like end-of-the-pipe pollution control and environmental remediation. The latter approach works at the facility boundary to clean up toxics that the operation has generated before they enter the general environment. Stack scrubbers and hazardous waste collection for special treatment are typical end-of-pipeline pollution control measures. On the other hand, P2 seeks to reduce or eliminate pollution problems at their source. More information on P2 is available from the EPA website at www.epa.gov/p2.

[4]For an example, see Edward C. Moretti, "Reduce VOC and HAP Emissions," *CEP Magazine,* June 2002, www.aiche.org/resources/publications/cep/2002/june/reduce-voc-and-hap-emissions.

[5]VOCs are emitted as gases from certain solids or liquids. They include a variety of chemicals, some of which may have short- and long-term adverse health effects. HAPs are air pollutants listed by the Environmental Protection Agency (EPA) and promulgated by the Clean Air Act Amendments of 1990 to achieve maximum achievable control.

[6] The CDC's guidelines for organic solvents are available at www.cdc.gov/niosh/topics/organsolv.

[7] The EPA defines fugitive emissions as "Those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening" (see title 40 of the Code of Federal Regulations, sections 70.2 and 71.2). See "Memorandum on Fugitive Emissions" at www.epa.gov/region07/air/title5/t5memos/fug-def.pdf.

[8] For more about chlorinated solvents, see www.worker-health.org/chlorinatedsolvents.html.