CHAPTER 7

STANDARD COSTING AND VARIANCE ANALYSIS

22. a. Total purchases = AP × AQ_p = \$0.13 × 115,000 = \$14,950

b. Material price variance = (AP × AQ_p) – (SP × AQ_p)
= \$14,950 – (\$0.14 × 115,000)
= \$14,950 – \$16,100
= \$1,150 F

b. Material quantity variance = (SP × AQ_u) – (SP × SQ)
= (\$0.14 × 100,000) – (\$0.14 × 97,900)
= \$14,000 – \$13,706
= \$294 U

23. a. \$10,080 ÷ 4,200 = \$2.40 per quart
SQ = 1,000 units × 4 quarts = 4,000

AQ × AP	AQ × SP	SQ × SP
4,200 × \$2.40	4,200 × \$2.50	4,000 × \$2.50
\$10,080	\$10,500	\$10,000
	\$420 F	\$500 U
	Material Price Variance	Material Usage Variance

b. The price variance would be based on the quantity of material purchased, while the usage variance would be based on the quantity of material used in production. Because the usage variance is based on the same quantities as in (a), it does not change.

AQ_p × AP	AQ_p × SP
6,000 × \$2.40	6,000 × \$2.50
\$14,400	\$15,000
	\$600 F
	Material Price Variance

c.

Raw Material Inventory	15,000	
Material Price Variance		600
Accounts Payable		14,400
Work in Process Inventory	10,000	
Material Usage Variance	500	
Raw Material Inventory		10,500

d. The purchasing agent would have responsibility for the price variance and the production manager would have responsibility for the usage variance.

(CPA adapted)

24. a. Material purchase price variance = ($2.10 – $1.40) = $0.70 F variance per pound; $0.70 × 100,000 lbs. = $70,000 F

b. June 3,000 × 5 = 15,000 SQ; $2.10 × (16,400 – 15,000) = $2,940 U
July 3,400 × 5 = 17,000 SQ; $2.10 × (17,640 – 17,000) = $1,344 U
Aug. 2,900 × 5 = 14,500 SQ; $2.10 × (14,950 – 14,500) = $ 945 U
Sept. 2,500 × 5 = 12,500 SQ; $2.10 × (13,100 – 12,500) = $1,260 U

c. It is possible that the material purchased had been damaged in some way or became tainted for use while being stored at the bankrupt vendor's location. (Bell Inc. should carefully assess the effect of this material's usage on labor efficiency to see if there is an unfavorable variance there.)

25. a. & b.

Purchasing agent's responsibility:
Material price variance = $(AP \times AQ_p) - (SP \times AQ_p)$
$= (\$0.64 \times 25,600) - (\$0.70 \times 25,600)$
$= \$16,384 - \$17,920$
$= \$1,536$ F

Production supervisor's responsibility:
Standard quantity of materials = 600 × 35 lbs. = 21,000
Material quantity variance = $(SP \times AQ_u) - (SP \times SQ)$
$= (\$0.70 \times 21,400) - (\$0.70 \times 21,000)$
$= \$14,980 - \$14,700$
$= \$280$ U

c. Explanations offered should consider the pattern of the variances. The pattern is a favorable price variance and an unfavorable quantity variance. A favorable price variance could have been obtained because the material was acquired in a larger-than-normal quantity with a pricing discount. Or the material was acquired from a vendor having a distress sale. Another reason would be that the quality of the scrap iron was not as high as the quality usually purchased. If the latter is the case, it could have influenced the excessive material usage and waste. Alternatively, the quantity variance could be just inefficiency in the production process.

26. a. Standard hours = 5 × 670 = 3,350

b. Wage rate per hour = $60,407.50 ÷ 3,310 = $18.25

c.

AP × AQ	SP × AQ	SP × SQ
	$18 × 3,310	$18 × 3,350
$60,407.50	$59,580	$60,300
	$827.50 U	$720 F
	Labor Rate Variance	Labor Efficiency Variance
	$107.50 U	
	Total Labor Variance	

27. a. Since the labor rate variance is favorable, the actual cost of direct labor is less (by $5,500) than the standard cost. The standard cost is $80,500.

AP × AQ		SP × AQ
$7.50 × 10,000		SP × 10,000
$75,000		$80,500
	$5,500 F	
	Labor Rate Variance	

$80,500 ÷ 10,000 actual direct labor hours equals a standard rate of $8.05.

b. Since the actual hours are 1,000 less than the standard, the efficiency variance is 1,000 hours × $8.05 = $8,050 U.

AP × AQ	SP × AQ	SP × SQ
$7.50 × 10,000	$8.05 × 10,000	$8.05 × 9,000
$75,000	$80,500	$72,450
	$5,500 F	$8,050 U
	Labor Rate Variance	Labor Efficiency Variance

c.

Work in Process Inventory	72,450	
Labor Efficiency Variance	8,050	
Labor Rate Variance		5,500
Wages Payable		75,000

(CPA adapted)

28. a. Actual cost = Standard cost + Total unfavorable variance
= ($250 × 350) + $3,500
= $87,500 + $3,500
= $91,000

b. Labor efficiency variance = (SP × AH) – (SP × SH)
= ($250 × 330) – ($250 × 350)
= $82,500 – $87,500
= $5,000 F

c. Rate variance + Efficiency variance = Total variance
Rate variance + (–$5,000 F) = $3,500 U
Rate variance = $3,500 + $5,000
Rate variance = $8,500 U

d.

Work in Process Inventory	87,500	
Labor Rate Variance	8,500	
Wages Payable		91,000
Labor Efficiency Variance		5,000

e. Because the favorable efficiency variance is coupled with an unfavorable rate variance, one explanation is that the firm used, on average, a more skilled mix of labor than it expected to use. For example, the firm may have used more senior auditors and managers than it intended to use. Without additional information on the original mix of employees and the actual mix of employees, no specific conclusions can be reached.

29.

	Case A	Case B	Case C	Case D
Units produced	1,000	**1,000**	240	1,500
Standard hours per unit	3.5	0.9	**2.5**	**3.0**
Standard hours	**3,500**	900	600	**4,500**
Standard rate per hour	$7.25	**$10.20**	$10.50	$7.00
Actual hours worked	3,400	975	**560**	4,900
Actual labor cost	**$23,800**	**$8,970**	$6,180	$31,850
Labor rate variance	$850 F	$975 F	300 U	**$2,450 F**
Labor efficiency variance	**725 F**	$765 U	**$420 F**	$2,800 U

Case A:

Standard hours = 1,000 × 3.5 = 3,500

LRV = AQ (AP – SP)
–$850 = 3,400 (AP – $7.25)
–$850 = 3,400AP – $24,650
$23,800 = 3,400AP
$7.00 = AP

Actual labor cost = $7.00 × 3,400 = $23,800

LEV = SP (AQ – SQ)
LEV = $7.25 (3,400 – 3,500) = $7.25 (–100) = $725 F

Case B:

Units produced = 900 ÷ 0.9 = 1,000

LEV = SP (AQ – SQ)
$765 = SP (975 – 900)
$765 = SP (75)
$10.20 = SP

LRV = AQ (AP – SP)
–$975 = 975 (AP – $10.20)
–$975 = 975AP – $9,945
$8,970 = 975AP
$9.20 = AP

Actual labor cost = $9.20 × 975 = $8,970

Case C:

Standard hours = 600 ÷ 240 = 2.5

(AP × AQ) – LRV = (SP × AQ)
$6,180 – $300 = $5,880
$5,880 = $10.50 × AQ
$5,880 ÷ $10.50 = AQ
AQ = 560

LEV = SP (AQ – SQ)
LEV = $10.50 (560 – 600) = $10.50 (–40) = $420 F

Case D:
Actual labor rate = $31,850 ÷ 4,900 = $6.50

LRV = AQ (AP – SP)
LRV = $31,850 – ($7 × 4,900)
LRV = $31,850 – $34,300
LRV = $2,450 F

LEV = (SP × AQ) – (SP × SQ)
$2,800 = $34,300 – $7SQ
–$31,500 = –$7SQ
SQ = 4,500

Standard hours per unit = 4,500 ÷ 1,500 = 3

30. a. Material price variance = $61,000 – ($3 × 20,000)
= $61,000 – $60,000
= $1,000 U

Standard quantity of material = 3,900 × 4.8 = 18,720 gallons
Material quantity variance = ($3 × 18,350) – ($3 × 18,720)
= $55,050 – $56,160
= $1,110 F

b. Standard quantity of time = 3,900 × 1/3 hour = 1,300 hours

($9.02 × 1,290)	($9.00 × 1,290)	($9.00 × 1,300)
$11,635.80	$11,610.00	$11,700.00
	$25.80 U	$90.00 F
	Labor Rate Variance	Labor Efficiency Variance
	$64.20 F	
	Total Labor Variance	

c.

Raw Material Inventory	60,000.00	
Material Price Variance	1,000.00	
Accounts Payable		61,000.00
Work in Process Inventory	56,160.00	
Material Quantity Variance		1,110.00
Raw Material Inventory		55,050.00
Work in Process	11,700.00	
Labor Rate Variance	25.80	
Labor Efficiency Variance		90.00
Wages Payable		11,635.80

31. a. Actual material price = $83,300 ÷ 17,000 = $4.90 per square yard
Material price variance: AQ_p (AP – SP) = 17,000 × ($4.90 – $5.00) = $1,700 F
Material usage variance: SP × (AQ_u – SQ) = $5 × (16,500 – 15,000) = $7,500 U

b.

Raw Material Inventory	85,000	
Accounts Payable		83,300

Material Price Variance		1,700
Work in Process Inventory	75,000	
Material Usage Variance	7,500	
Raw Material Inventory		82,500

c. Actual labor rate = \$79,800 ÷ 7,600 = \$10.50
Labor rate variance: AQ × (AP – SP) = 7,600 × (\$10.50 – \$10.00) = \$3,800 U
Labor efficiency variance = (SP × AQ) – (SP × SQ)
= (\$10 × 7,600) – (\$10 × 7,500)
= \$76,000 – \$75,000
= \$1,000 U

d. Work in Process Inventory	75,000	
Labor Rate Variance	3,800	
Labor Efficiency Variance	1,000	
Wages Payable		79,800

e. The material price variance is favorable. The purchasing agent may have purchased an optimum quantity with a negotiated price. It is also possible that the materials are of lower quality. This possibility is suggested by both the unfavorable material usage variance and the unfavorable labor efficiency variance. It is possible that the workers had difficulty working with the materials or that the inferior quality slowed down the machinery or resulted in defective units being produced. All of these factors would require additional materials to be used to complete the required production level. The unfavorable labor rate variance could have been the result of the company using more experienced workers, a tight labor market due to a strong economy or standards that had not been updated for a change in contractual wage rates negotiated in a union contract.

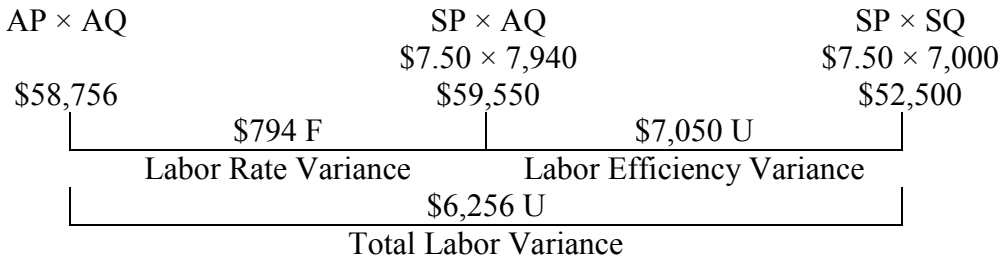
(CPA adapted)

32. a. Standard quantity of material = 2 yards × 10,000 shirts = 20,000 yards
Standard labor time = 0.7 hours × 10,000 shirts = 7,000 DLHs

b.

$AP \times AQ_p$		$SP \times AQ_p$
		\$3 × 30,000
\$89,700		\$90,000
	\$300 F	
	Material Price Variance	

$SP \times AQ_u$		$SP \times SQ$
\$3 × 20,120		\$3 × 20,000
\$60,360		\$60,000
	\$360 U	
	Material Quantity Variance	



c. The pattern is a favorable material price variance and an unfavorable material quantity variance. If the quality level of cotton is below the expected level, a favorable price variance would be incurred. However, the lower quality cotton could result in more waste and shrinkage during production and thus more materials yardage is required to make a t-shirt than expected.

d. The favorable labor rate variance is coupled with an unfavorable labor efficiency variance. One explanation is that the firm used, on average, a less skilled mix of labor than it expected to use and thus the average labor time per t-shirt was greater than expected. Additionally, the use of inferior quality material could also have contributed to the excess time taken to manufacture the shirts.

e. Material Price Variance	300	
Cost of Goods Sold	60	
Material Quantity Variance		360
To dispose of the material variances		
Labor Rate Variance	794	
Cost of Goods Sold	6,256	
Labor Efficiency Variance		7,050
To dispose of the labor variances		