

# CHAPTER 18

## Spoilage, Rework, and Scrap

# CHAPTER 18, LEARNING OBJECTIVES

1. Understand the definitions of spoilage, rework and scrap
2. Identify the differences between normal and abnormal spoilage
3. Account for spoilage in process costing using the weighted-average method and the first-in, first-out (FIFO) method
4. Account for spoilage at various stages of completion in process costing

# BASIC DEFINITIONS

- ⦿ Spoilage—units of production, whether fully or partially completed, that do not meet the specifications required by customers for good units and that are discarded or sold for reduced prices.

# BASIC DEFINITIONS, CONCLUDED

- Rework—units of production that do not meet the specifications required by customers but that are subsequently repaired and sold as good finished goods.
- Scrap—residual material that results from manufacturing a product. Scrap has low total sales value compared with the total sales value of the product.
  - Scrap is similar to byproducts but scrap arises as a residual from the manufacturing process and is not a product targeted for manufacture or sale by the firm.

# ACCOUNTING FOR SPOILAGE

- ◉ A certain amount of spoilage, rework or scrap is inherent in many production processes.
- ◉ Accounting for spoilage aims to determine the magnitude of spoilage costs and to distinguish between costs of normal and abnormal spoilage.<sup>1</sup>
- ◉ To manage, control, and reduce spoilage costs, they should be highlighted, not simply folded into production costs.

# TWO TYPES OF SPOILAGE: NORMAL

- Normal spoilage is spoilage inherent in a particular production process that arises even under efficient operating conditions.
  - Normal spoilage rates are computed by dividing the units of normal spoilage by total good units completed, not total actual units started in production.
  - Management makes a conscious decision about the production rate per hour which generates a certain level of normal spoilage.

# TWO TYPES OF SPOILAGE: ABNORMAL

- Abnormal spoilage is spoilage that is not inherent in a particular production process and would not arise under efficient operating conditions.
  - Abnormal spoilage is considered avoidable and controllable.
  - To highlight the effect of abnormal spoilage costs, companies calculate the units of abnormal spoilage and record the cost in the Loss from Abnormal Spoilage account, which appears as a separate line on the income statement.

# SPOILAGE IN PROCESS COSTING USING WEIGHTED AVERAGE AND FIFO COSTING

- Units of normal spoilage can be counted or not counted when computing output units (physical or equivalent) in a process costing system.
- Counting all spoilage is considered preferable and will be used in our examples here.



# INSPECTION POINTS AND SPOILAGE

- Inspection point—the stage of the production process at which products are examined to determine whether they are acceptable or unacceptable units.
- Spoilage is typically assumed to occur at the stage of completion where inspection takes place.
- As a result, if for example, materials were added at the beginning of the process, and inspection occur at 70%, the spoiled units in this case are assumed to be 100% complete for direct materials, and 70% for conversion costs.

# THE FIVE-STEP PROCEDURE FOR PROCESS COSTING WITH SPOILAGE (SLIGHT MODIFICATIONS TO ACCOMMODATE SPOILAGE)

- ◉ Step 1: Summarize the flow of physical units of output—identify both normal and abnormal spoilage.
- ◉ Step 2: Compute output in terms of equivalent units. Spoiled units are included in the computation of output units.

# THE FIVE-STEP PROCEDURE FOR PROCESS COSTING WITH SPOILAGE (SLIGHT MODIFICATIONS TO ACCOMMODATE SPOILAGE)

- Step 3: Summarize total costs to account for.
- Step 4: Compute cost per equivalent unit.
- Step 5: Assign total costs to:
  1. Units completed
  2. Spoiled units
  3. Units in ending work-in-process

## Exercise: Weighted-average method, spoilage, equivalent units.

- Consider the following data for November 2014 from Gray Manufacturing Company, which makes silk pennants and uses a process-costing system. All direct materials are added at the beginning of the process, and conversion costs are added evenly during the process. Spoilage is detected upon inspection at the completion of the process. Spoiled units are disposed of at zero net disposal value. Gray Manufacturing Company uses the weighted-average method of process costing.

	Physical Units (Pennants)	Direct Materials	Conversion Costs
Work in process, November 1 <sup>a</sup>	1,000	\$ 1,423	\$ 1,110
Started in November 2014	?		
Good units completed and transferred out during November 2014	9,000		
Normal spoilage	100		
Abnormal spoilage	50		
Work in process, November 30 <sup>b</sup>	2,000		
Total costs added during November 2014		\$12,180	\$27,750

<sup>a</sup>Degree of completion: direct materials, 100%; conversion costs, 50%.

<sup>b</sup>Degree of completion: direct materials, 100%; conversion costs, 30%.

**Required:**

Compute equivalent units for direct materials and conversion costs. Show physical units in the first column of your schedule.

Flow of Production	(Step 1) Physical Units	(Step 2) Equivalent Units	
		Direct Materials	Conversion Costs
Work in process, beginning (given)	1,000		
Started during current period	<u>10,150<sup>a</sup></u>		
To account for	<u>11,150</u>		
Good units completed and transferred out during current period:	9,000	9,000	9,000
Normal spoilage*	100		
100 × 100%; 100 × 100%		100	100
Abnormal spoilage <sup>†</sup>	50		
50 × 100%; 50 × 100%		50	50
Work in process, ending <sup>‡</sup> (given)	2,000		
2,000 × 100%; 2,000 × 30%		2,000	600
Accounted for	<u>11,150</u>		
Equivalent units of work done to date		<u>11,150</u>	<u>9,750</u>

**<sup>a</sup> From below, 11,150 total units are accounted for. Therefore, units started during current period must be = 11,150 – 1,000 = 10,150.**

**<sup>\*</sup> Degree of completion of normal spoilage in this department: direct materials, 100%; conversion costs, 100%.**

**<sup>†</sup> Degree of completion of abnormal spoilage in this department: direct materials, 100%; conversion costs, 100%.**

**<sup>‡</sup> Degree of completion in this department: direct materials, 100%; conversion costs, 30%.**

## Exercise: 18-18 Weighted-average method, assigning costs (continuation of 18-17).

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Required:

- For the data in Exercise 18-17, summarize the total costs to account for; calculate the cost per equivalent unit for direct materials and conversion costs; and assign costs to units completed and transferred out (including normal spoilage), to abnormal spoilage, and to units in ending work-in-process inventory.

		<b>Total Production Costs</b>	<b>Direct Materials</b>	<b>Conversion Costs</b>
<b>(Step 3)</b>	Work in process, beginning (given)	\$ 2,533	\$ 1,423	\$ 1,110
	Costs added in current period (given)	<u>39,930</u>	<u>12,180</u>	<u>27,750</u>
	Total costs to account for	<u>\$42,463</u>	<u>\$13,603</u>	<u>\$28,860</u>
<b>(Step 4)</b>	Costs incurred to date		\$13,603	\$28,860
	Divided by equivalent units of work done to date		<u>÷11,150</u>	<u>÷ 9,750</u>
	Cost per equivalent unit		<u>\$ 1.22</u>	<u>\$ 2.96</u>
<b>(Step 5)</b>	Assignment of costs			
	Good units completed and transferred out (9,000 units)			
	Costs before adding normal spoilage	\$37,620	$(9,000^{\#} \times \$1.22) + (9,000^{\#} \times \$2.96)$	
	Normal spoilage (100 units)	<u>418</u>	$(100^{\#} \times \$1.22) + (100^{\#} \times \$2.96)$	
(A)	Total cost of good units completed & transf. out	38,038		
(B)	Abnormal spoilage (50 units)	209	$(50^{\#} \times \$1.22) + (50^{\#} \times \$2.96)$	
(C)	Work in process, ending (2,000 units)	<u>4,216</u>	<u><math>(2,000^{\#} \times \\$1.22) + (600^{\#} \times \\$2.96)</math></u>	
(A)+(B)+(C)	Total costs accounted for	<u>\$42,463</u>	<u>\$13,603</u>	+ <u>\$28,860</u>



# Final Exam: June 2015

## **Question (1):**

The Modern Business Company (MBC) uses process costing. The following data are available for process(x) for April 2015:

- Units started 8,000 – work in process ending units 2,000.
- Work in process beginning units 4,000 – spoiled units 1,000.
- Total cost of work in process beginning \$ 25,000.
- Costs added during the month:
  - Direct material (A) \$ 40,000.
  - Direct material (B) \$ 18,000.
  - Conversion costs \$ 75,600.
- **Additional information:**
- Direct material (A) is added once at the beginning of the process.
- Direct material (B) is added once at 80% level of manufacturing.
- Work in process beginning units are 40% complete for conversion costs.
- Work in process ending units are 70% complete for conversion costs.
- Normal spoilage is 4% of units passed the inspection level.
- Units are inspected at 65% level of manufacturing .

## **Required:**

- Prepare a production cost report for process (x) using FIFO method

## Exam 2015

## Question No. One:

## Production Cost Report April 30, 2015

	Physical Units	EU		
		DM (A)	DM (B)	CC
<b>Physical Flow:</b>				
W.I.P., Beg.	4,000			
Units Started	8,000			
Total units to account for	<b>12,000</b>			
<b>Units Completed &amp; Transferred out:</b>				
From W.I.P., Beg.	4,000	0	4,000	2,400
From Units Started	5,000	5,000	5,000	5000
Normal Spoilage	440	440	0	286
Abnormal Spoilage	560	560	0	364
W.I.P., Ending	2,000	2,000	0	1,400
Total work done to date	<b>12,000</b>	<b>8,000</b>	<b>9,000</b>	<b>9,450</b>
<b>Costs to account for:</b>				
W.I.P., Beg.	L.E. 25,000	-	-	-
Costs added during the month	133,600	40,000	18,000	75,600
Total Costs to account for	<b>L.E. 158,600</b>	%	%	%
% EU	-	<b>8,000</b>	<b>9,000</b>	<b>9,450</b>
Costs / EU	<b>L.E. 15</b>	<b>L.E. 5</b>	<b>L.E. 2</b>	<b>L.E. 8</b>
<b>Assignment of costs:</b>				
W.I.P., Beg.	L.E. 25,000			
Costs added to W.I.P., Beg.	27,200			
Good units completed	75,000			
Normal spoilage of good units*	3,672			
Net Cost of Units Completed & Transferred out		L.E. 130,872		
W.I.P., Ending	21,200			
Normal spoilage of W.I.P., Ending**	816			
Net Cost of W.I.P., ending		22,016		
Abnormal spoilage		5,712		
Total costs accounted for		<b>L.E.158,600</b>		

\* Normal spoilage of completed units= 4,488\* [9000/ (9000+2000)] = 3,672

\*\* Normal spoilage of WIP, ending= 4,488\* [2000/ (9000+2000)] = 816

<b>Cairo University</b>	<b>Final Exam.</b>	<b>June 14, 2010</b>
<b>Faculty of Commerce</b>	<b>Cost Accounting Systems</b>	<b>Time: 12-2 P.m.</b>
<b>The English Group</b>	<b>Fourth Year (Accounting)</b>	<b>Two hours</b>

**ANSWER THE FOLLOWING QUESTIONS:**

**QUESTION NO. 1**

The Nile Co. uses process costing. The following data are available for the second process (B) which receives the finished product of the previous process (A):

**Data of Process (B) for May 2010:**

- Units received from process (A) 8,000 at cost \$20 per unit.
- Work in process, May 1: 2,000 unit, 40% complete for conversion costs, their costs are: Transferred in \$12,000- Direct material \$18,000- Conversion cost \$10,000.
- Costs added during May: Direct material \$41,500- Conversion cost \$49,800.
- Units completed 6,000.
- Work-in-process ending units 3,000, 80% complete for conversion cost.

**Other Data:**

1. Inspection occurs at 70% manufacturing level.
2. Normal spoilage is 5% of all units passed the inspection level.
3. Direct material is added gradually as follows:
  - 45% of direct material is added at 25% level of manufacturing.
  - 35% of direct material is added at 60% level of manufacturing.
  - 20% of direct material is added at 90% level of manufacturing.

**Required:**

**Prepare the production cost report for process (B) using FIFO.**

## Exam 2010

## Question No. One:

## Production Cost Report May31,XX

	Physical Units	EU		
		TI	DM	CC
<b>Physical Flow:</b>				
W.I.P., Beg.	2,000			
Units Started	8,000			
Total units to account for	<b>10,000</b>			
<b>Units Completed &amp; Transferred out:</b>				
From W.I.P., Beg.	2,000	0	1,100	1,200
From Units Started	4,000	4,000	4,000	4,000
Normal Spoilage	450	450	360	315
Abnormal Spoilage	550	550	440	385
W.I.P., Ending	3,000	3,000	2,400	2,400
Total work done to date	<b>10,000</b>	<b>8,000</b>	<b>8,300</b>	<b>8,300</b>
<b>Costs to account for:</b>				
W.I.P., Beg.	\$ 40,000	-	-	-
Costs added during the month	251,300	160,000	41,500	49,800
Total Costs to account for	<b>\$ 291,300</b>	%	%	%
% EU	-	8,000	8,300	8,300
Costs / EU	<b>\$ 31</b>	<b>\$ 20</b>	<b>\$ 5</b>	<b>\$ 6</b>
<b>Assignment of costs:</b>				
W.I.P., Beg.	\$ 40,000			
Costs added to W.I.P., Beg.	12,700			
Good units completed	124,000			
Normal spoilage of good units*	8,460			
Net Cost of Units Completed & Transferred out		\$ 185,160		
W.I.P., Ending	86,400			
Normal spoilage of W.I.P., Ending**	4,230			
Net Cost of W.I.P., ending		90,630		
Abnormal spoilage		15,510		
Total costs accounted for		<b>\$ 291,300</b>		

\* Normal spoilage of completed units=  $12,690 * [6000 / (6000 + 3000)] = 8,460$

\*\* Normal spoilage of WIP, ending=  $12,690 * 3000 / (6000 + 3000) = 4,230$

Cairo University	Cost Accounting Systems	4 <sup>th</sup> June 2009
Faculty of Commerce	Fourth Year (Accounting)	Time: 2 Hours
English Section		12-2

Answer the following Questions:

Question (1)

(Total marks 6)

Rotana Co. uses process costing method in the manufacturing of product (x). The following data are available for the cutting process for April 2009:

- Work in process units at March 31	4,000
- Units started	8,000
- Work in process units at April 30	5,000
- Units completed and transferred out	6,000
- Cost of work in process beginning (\$):	
- Direct material (A)	20,000
- Direct material (B)	30,000
- Conversion cost.	40,000
- Costs added during the period (S)	
- Direct material (A)	24,000
- Direct material (B)	37,200
- Conversion cost	41,750

Other Data:

- Work in process beginning is 60% complete for conversion costs. Work in process ending is 80% complete for conversion costs.
- Inspection occurs at 75% level.
- Direct material (A) is added at the beginning of the process.
- Direct material (B) is added gradually as follows:
  - 30% of direct material (B) is added at 50% level of manufacturing.
  - 45% of direct material (B) is added at 70% level of manufacturing.
  - 25% of direct material (B) is added at 90% level of manufacturing
- Disposal value of any spoiled unit is \$8
- Normal spoilage is 4% of all units passed the inspection level.

Required:

Prepare the Production-Cost Report for the cutting process for the month of April 2009 using FIFO.

## Exam 2009

## Question No. One:

## Production Cost Report April 30, 2009

	Physical Units	EU		
		DM (A)	DM (B)	CC
<b>Physical Flow:</b>				
W.I.P., Beg.	4,000			
Units Started	8,000			
<b>Total units to account for</b>	<b>12,000</b>			
<b>Units Completed &amp; Transferred out:</b>				
From W.I.P., Beg.	4,000	=0=	2,800	1,600
From Units Started	2,000	2,000	2,000	2,000
Normal Spoilage	440	440	330	330
Abnormal Spoilage	560	560	420	420
W.I.P., Ending	5,000	5,000	3,750	4,000
<b>Total work done to date</b>	<b>12,000</b>	<b>8,000</b>	<b>9,300</b>	<b>8,350</b>
<b>Costs to account for:</b>				
W.I.P., Beg.	\$ 90,000	-	-	-
Costs added during the month	102,950	24,000	37,200	41,750
<b>Total Costs to account for</b>	<b>\$ 192,950</b>	<b>%</b>	<b>%</b>	<b>%</b>
% EU	-	8,000	9,300	8,350
Costs / EU	\$ 12	\$ 3	\$ 4	\$ 5
<b>Assignment of costs:</b>				
W.I.P., Beg.	\$ 90,000			
Costs added to W.I.P., Beg.	19,200	\$ 109,200		
Good units completed		24,000		
Normal spoilage of good units*		2,340		
Less: Disposal value of spoiled units@		(1,920)		
<b>Net Cost of Units Completed &amp; Transferred out</b>			<b>133,620</b>	
W.I.P., Ending		50,000		
Normal spoilage of W.I.P., Ending**		1,950		
Less: Disposal value of spoiled units@@		(1,600)		
<b>Net Cost of W.I.P., ending</b>			<b>50,350</b>	
Abnormal spoilage		5,460		
Less: Disposal value of spoiled units		(4,480)		
<b>Net Cost of Abnormal spoilage</b>			<b>980</b>	
Material control [(480+520) * \$8]			8,000	
<b>Total costs accounted for</b>			<b>192,950</b>	