CHAPTER 18

SPOILAGE, REWORK, AND SCRAP

## LEARNING OBJECTIVES

1. Distinguish among spoilage, rework, and scrap
2. Describe the accounting procedures for normal and abnormal spoilage
3. Account for spoilage in process costing using the weighted-average method
4. Account for spoilage in process costing using the first-in, first-out method
5. Account for spoilage in process costing using the standard-costing method
6. Account for spoilage in job costing
7. Account for rework in job costing
8. Account for scrap

## CHAPTER OVERVIEW

Chapter 18 focuses on how to account for defects that occur in the manufacturing process. Costs of defects are incorporated in the costing system for products. Both job costing and process costing, the two costing systems described in previous chapters, are used to illustrate the accounting and reporting of costs of defects. The accounting focus is on determining the cost of products and on valuing inventory and cost of goods sold. The defects refer to three types: spoilage, rework, and scrap.

More than in other chapters, the “how to account for” aspect is illustrated using journal entries. The journal entries can be used to compare the accounting for spoilage, for rework, and for scrap. Several comparisons are possible through use of the given journal entries: (1) between the inventory methods used in process costing (weighted average, FIFO, and standard costing); (2) between process costing and job costing; (3) between defects attributable to a specific job or common to all jobs in job costing; (4) among spoilage, rework, and scrap; or (5) between normal and abnormal spoilage. The entries are used in the text of the chapter. The exhibits illustrate process costing using the five-step procedure with the addition of spoilage.

The importance of the placement of the inspection point(s) is discussed in the chapter. The appendix also is used to emphasize the role of inspection points in recognizing defects and how they affect the accounting of costs of defects.

This chapter provides an introduction to costs of quality (Chapter 19) and adds an important dimension to determining the cost of a product (Chapter 17 and Chapter 4).

## CHAPTER OUTLINE

1. Accounting for spoilage
2. Role of spoilage in product cost determination
3. Change over time to less acceptable rate of defects
4. Focus on improving quality and reducing defects
5. Belief that highlighting and recording costs of defects as they occur help managers better determine what to do about defects and their costs

***Learning Objective 1:***

Distinguish among spoilage, rework, and scrap

1. Terminology
2. **Spoilage**: units of production that do not meet the standards required by customers for good units and that are discarded or sold for reduced prices (partially completed or fully completed units of output)
3. **Reworked units**: unacceptable units of production that are subsequently repaired and sold as acceptable finished goods
4. **Scrap**: material left over when making a product that has low sales value compared with the sales value of the main product
5. Different types of spoilage
6. Accounting for spoilage: determine the magnitude of spoilage costs

***Learning Objective 2:***

Describe the accounting procedures for normal and abnormal spoilage

1. Accounting for spoilage: distinguish between the costs of normal and abnormal spoilage
2. **Normal spoilage**: spoilage as inherent in a particular production process and arises even under efficient operating conditions; expected spoilage
3. Management decides the spoilage it considers normal
4. Normal spoilage costs typically included as component of costs of good units manufactured because good units cannot be made without also making some units that are spoiled
5. Normal spoilage rates computed by dividing units of normal spoilage by total good units completed (not total actual units started in production)
6. **Abnormal spoilage**: spoilage that should not arise under efficient operating conditions
7. Regarded as avoidable and controllable *[Surveys of Company Practice]*
8. Abnormal spoilage costs treated as losses of accounting period in which detection of spoiled units occurs
9. Abnormal spoilage termed any spoilage in production process with ideal goal of zero defects

**Do multiple choice 1 and 2.** **Assign Exercise 18-16.**

II. Accounting for spoilage in costing systems

1. Process costing and spoilage
2. Accounting for units of normal spoilage *[Exhibit 18-1]*
3. **Inspection point**: stage of production cycle at which products are examined to determine whether they are acceptable of unacceptable units—spoilage assumed to occur at the stage of completion where inspection takes place
4. Count all normal spoilage when computing outputs (physical or equivalent units)
5. Results in lower cost per equivalent unit (divisor includes normal spoilage units so is larger)
6. Total cost of completed units is sum of cost of good units completed (units **x** cost per equivalent unit) plus cost of spoiled units (units detected at inspection point **x** cost per equivalent unit)
7. Highlights cost of normal spoilage in production report to focus management’s attention on reducing spoilage
8. Leads to more accurate product costs because makes visible costs associated with normal spoilage and spreads cost over good units
9. Do not count spoilage when computing output in equivalent units
10. Results in higher cost per equivalent unit (divisor does not include normal spoilage units so is smaller)
11. Spreads costs of normal spoilage over all units, completed and ending work in process
12. Ending work-in-process units charged with spoilage of two periods
13. Less accurate product costs; costs of spoilage not highlighted
14. Illustration of accounting for spoilage in five-step procedure (units and costs accounted for detail spoilage) using approach of counting spoilage when computing output

***Learning Objective 3:***

Account for spoilage in process costing using the weighted-average method

1. Weighted-average method and spoilage *[Exhibit 18-2]*
2. Step 1 includes normal and abnormal spoilage in units accounted for
3. Step 2 includes normal and abnormal spoilage in calculation of equivalent units
4. Step 3 uses the equivalent units calculated in Step 2 to calculate the cost per equivalent unit
5. Step 4 summarizes total costs to account for
6. Step 5 assigns cost to units completed and transferred, to spoiled units (both normal and abnormal), and to units in ending work in process

* Costs of normal spoilage added to cost of the related good units
* Cost per good unit is more than sum of cost per equivalent unit of input costs because cost per good unit is sum of total costs transferred out (includes cost of normal spoilage) divided by number of good units produced
* Cost of abnormal spoilage assigned to Loss from Abnormal Spoilage account and are not included in good-unit cost

**Do multiple choice 3 and 4.** **Assign Exercises 18-17, 18-18, and 18-24 and Problems 18-30 and 32.**

***Learning Objective 4:***

Account for spoilage in process costing using the first-in, first-out method

1. FIFO method and spoilage *[Exhibit 18-3]*
2. Modified FIFO keeps costs of beginning work in process separate and distinct from costs of work done in current period—all spoilage costs assumed to be related to units completed during the current period, using units costs of current period
3. Pure FIFO would split normal spoilage costs between goods started and completed during current period and goods completed from beginning work in process (Footnote 4)

**Do multiple choice 5. Assign Exercises 18-19, 18-20, and 18-25 and Problems 18-31 and 33.**

***Learning Objective 5:***

Account for spoilage in process costing using the standard-costing method

1. Standard-costing method and spoilage—standard costs assigned to units completed, including units of normal spoilage and abnormal spoilage, and to ending work in process *[Exhibit 18-4]*

**Assign Exercises 18-23 and 18-26.**

1. Illustration of journal entries
2. Inspection points and allocating costs of normal spoilage
3. Spoilage might occur at various stages of the production cycle, although typically detected only at one or more inspection points
4. Costs of spoiled units assumed to be all costs incurred by spoiled units prior to inspection point
5. Net cost of spoilage is difference between disposal value of spoiled units and costs of the spoiled goods accumulated to inspection point
6. Unit costs of normal and abnormal spoilage are same when two are detected at same inspection point
7. Costs of abnormal spoilage are separately accounted for as losses of the accounting period in which they are detected
8. Common approach: presume normal spoilage occurs at inspection point and allocate cost over all units that have passed that point
9. Appendix to chapter contains discussion and illustration of different inspection points and spoilage
10. Frequent and early inspections reduce amount of materials and conversion costs wasted on units already spoiled
11. Job costing and spoilage

***Learning Objective 6:***

Account for spoilage in job costing

1. Normal spoilage attributable to a specific job: job bears the cost of the spoilage reduced by current disposal value of that spoilage
2. Normal spoilage common to all jobs: cost of spoilage costed as manufacturing overhead
3. Abnormal spoilage: charged to an abnormal loss account

**Do multiple choice 6. Assign Exercise 18-27 and Problem 18-34.**

1. Rework: units of production that are inspected, determined to be unacceptable, repaired, and sold as acceptable finished goods

***Learning Objective 7:***

Account for rework in job costing

1. Normal rework attributable to a specific job—rework costs charged to that job
2. Normal rework common to all jobs—costs of rework charged to manufacturing overhead and spread, through allocation, over all jobs
3. Abnormal rework—charged to separate loss account

**Do multiple choice 7–9.**  **Assign Problem 18-35.**

1. Scrap (not recognized as normal or abnormal)

***Learning Objective 8:***

Account for scrap

1. Accounting for scrap
2. Planning and control, including physical tracking of scrap
3. Inventory costing, including when and how it affects operating income
4. Recognizing value of scrap in accounting records—help measure efficiency and help keep track of scrap to reduce chances of theft
5. At time of sale of scrap
6. Immaterial: memo of quantity and separate line item of other revenues
7. Material: sold quickly after produced
8. Attributable to a specific job: sales traced to specific jobs that yielded scrap
9. Common to all jobs: sales reduce manufacturing overhead—indirectly affects manufacturing overhead rate
10. At time of production of scrap *[Concepts in Action]*
11. Material but not sold quickly after produced—inventoried
12. Recorded at conservative estimate of net realizable value so production costs and related scrap recovery recognized in same accounting period (selling or reusing it)
13. Recorded at “reasonable value” when volatile market prices while waiting for most attractive market price—such cases make it difficult to determine reasonable value
14. Entries to inventory
15. Attributable to a specific job: reduce work in process
16. Common to all jobs: reduce manufacturing overhead

**Do multiple choice 10.**  **Assign Problem 18-36.**

**CHAPTER QUIZ SOLUTIONS:** 1.**c** 2.**b** 3.**d** 4.**c** 5.**a** 6.**c** 7.**a** 8.**c** 9.**d** 10.**b**

**CHAPTER QUIZ**

1. [CPA Adapted] In manufacturing its products for the month of September 2003, El Dorado Corporation incurred normal spoilage of $7,000 and abnormal spoilage of $3,000. How much spoilage cost should El Dorado charge as inventoriable for the month of September 2003?

a. $0 b. $3,000 c. $7,000 d. $10,000

2. [CPA Adapted] Spoilage from a manufacturing process was discovered during an inspection of work in process. In a process-costing system, the cost of the spoilage would be added to the cost of the good units produced if the spoilage is

Normal Abnormal

a. Yes Yes

b. Yes No

c. No No

d. No Yes

**The following data apply to questions 3–5.**

Watkins Company had the following production for the month of June:

Units

Work in process, June 1 6,000

Started during June 24,000

Completed and transferred to finished goods 18,000

Abnormal spoilage incurred 3,000

Work in process, June 30 9,000

Materials are added at the beginning of the process. As to conversion cost, work in process was 20% complete at the beginning and 70% complete at the end of the month. Spoilage is detected at the end of the process.

3. [CPA Adapted] Using the weighted-average method, the equivalent units for June, with respect to conversion cost, were

a. 30,000. b. 24,300. c. 23,700. d. 27,300.

4. Assume the manufacturing cost of the spoiled goods is $6,000. The journal entry to record the spoilage is

a. Manufacturing Overhead Control 6,000

Work in Process 6,000

b. Materials Control 6,000

Work in Process 6,000

c. Loss from Abnormal Spoilage 6,000

Work in Process 6,000

d. Finished Goods 6,000

Work in Process 6,000

5. Using the first-in, first out (FIFO) method, the equivalent units for June, with respect to conversion cost, were

a. 26,100. b. 23,100. c. 22,500. d. 19,500.

6. Under process costing and job costing, the accounting treatment for the normal spoilage (assume related to normal factory operations) is

Process costing Job costing

a. Loss account is charged. Loss account is charged.

b. Upon transfer, spoilage costs are transferred Loss account is charged.

along with other costs.

c. Upon transfer, spoilage costs are transferred Manufacturing overhead control is charged.

along with other costs.

d. Manufacturing overhead control is charged. No entry.

7. [CPA Adapted] During August 2003, Stirtz Company incurred the following costs on Job 924 for the manufacture of 600 scoreboard clocks:

Original cost accumulation:

Direct materials $2,250

Direct manufacturing labor 1,800

Manufacturing overhead (150% of direct manufacturing labor) 2,700

$6,750

Direct costs of reworked 15 units:

Direct materials $150

Direct manufacturing labor 240

$390

The rework costs were attributable to exacting specifications of Job 924, and the full rework costs were charged to the specific job. The cost per finished unit of Job 924 was

a. $12.50. b. $11.25. c. $11.61. d. $11.90.

**The following data apply to questions 8 and 9.**

MedTech, Inc., manufactures surgical instruments to the exacting specifications of various customers. During April 2003, Job 911 for the production of 4,500 instruments was completed at the following costs per unit:

Direct materials $ 60

Direct manufacturing labor 20

Allocated manufacturing overhead 80

$160

Final inspection of Job 911 disclosed 100 defective units and 50 spoiled units. The defective instruments were reworked at a total cost of $12,000, and the spoiled instruments were sold to a jobber for $3,000.

1. [CPA Adapted] What would be the unit cost of the good units produced on Job 911?

a. $160 b. $162 c. $164 d. $168

1. If the costs associated with spoilage and reworked units are considered as normal to manufacturing operations, the unit cost of the good units produced on Job 911 is

a. $165. b. $164. c. $162. d. $160.

1. [CPA Adapted] The sale of scrap from a manufacturing process usually would be recorded as a(n)

a. increase in manufacturing overhead control. c. increase in finished goods control.

b. decrease in manufacturing overhead control. d. decrease in finished goods control.

## WRITING/DISCUSSION EXERCISES

1. **Distinguish among spoilage, rework, and scrap**

How is the criterion for “unacceptable” developed for categorizing spoilage and reworked units? A company policy would need to be established to guide the designation of “unacceptable” as to units produced. The policy would necessarily reflect the type and use of the product, customer opinion, industry standards, and corporate ethos, among other factors. As noted in the text, the example of the manufacture of high precision machine tools that needed to be built to very exacting tolerances would have a different criterion for unacceptable units than molded plastic sandals.

1. **Describe the accounting procedures for normal and abnormal spoilage**

***If “some amount of spoilage, rework, or scrap appears to be an inherent part of many production processes,” then why set a goal of zero defects?*** Defects are costly. The cost-benefit guideline should be used in working to eliminate the costs of defects to reduce costs to a greater extent than the costs incurred to bring about that reduction. In some situations, the cost of defects cannot be measured in financial terms. In those instances, the costs of virtually eliminating all defects seem necessary and worthwhile. For example, in the late 1960s at some military supply commands in the United States, the goal for filling certain orders from the U. S. military front lines in Vietnam was to have zero defects. The orders were to be filled exactly as requested and within the time limit demanded (usually within 24 hours from receipt of order). For industry, the focus on eliminating defects highlights the high costs associated with unacceptable units of product and is a worthy goal. Spoilage can occur in an environment of “zero defects” but will be considered abnormal rather than normal.

1. **Account for spoilage in process costing using the weighted-average method**

***How does a company choose the percentage-of-completion placement and the number of inspection points?*** Costs of spoilage may be substantial resulting in the company working to reduce such costs. Inspection points also have a cost. Managers should be guided by the cost-benefit concept. Another guideline to follow, if possible, would be to identify critical points in the processing of the product. If a particular process were relatively expensive, placing an inspection point immediately before it would keep the spoiled units out of that costly process, especially if the costs to inspect were less than the processing. If a process was identified as a point at which most spoilage occurred, an inspection point immediately after that process could eliminate more costs being added to spoiled units. The accounting for spoilage can only occur after detection of the spoiled units, therefore, the inspection points are important.

1. **Account for spoilage in process costing using the first-in, first-out method**

The diagram in the chapter appendix shows that units from beginning work in process could have spoiled units at the 50% and 100% inspection points. The assumption is made with FIFO that the spoiled units are from those started and completed within the current time period. Isn’t that assumption a distortion of the costing process?

The text notes that the assumption is made with FIFO that the spoiled units are from those units started and completed within the current time period. In footnote 4 to the chapter, this issue is addressed. The modified method of FIFO produces useful information without material distortion. As noted in Chapter 17, “only rarely is an application of pure FIFO ever encountered in process costing.”

1. **Account for spoilage in process costing using the standard-costing method**

***Are standard costs calculated to include the possibility of normal spoilage?***

Normal spoilage is considered as “normal” if it occurs due to the nature of the particular production process and under efficient operating conditions. Standards are developed for a particular production process and under efficient operating conditions. Additional costs are not included in standards to allow for normal spoilage. The production process could be redesigned to result in greater efficiencies and that would require updating of standards. The redesign could be done to reduce costs of spoilage.

1. **Account for spoilage in job costing**

If having spoiled units reduces the opportunity to produce more good units, how is that loss of capacity acknowledged through the accounting for spoilage? The accounting system does not track opportunity costs. The loss of ability to produce greater numbers of good units of product due to the presence of spoiled units is not calculated nor reported in a typical accounting system. The rate of defects regarded as normal should be examined on a regular basis and benchmarks used to compare to competitors. If the rate of defects is reduced, the accounting system would reflect that reduced rate to designate normal spoilage.

1. **Account for rework in job costing** *[See next page.]*
2. **Account for scrap**

***What is the difference between scrap and a byproduct?*** Scrap and byproducts are the same in many respects. Both are accounted for in similar ways. Both have little or no sales value. Both result from a production process. Scrap, however, is material left over when making a product—material that was considered an input to the production process. A byproduct is a result of a process, an output. Scrap can become a product. An example is egg shells. For companies that use eggs in the production of a main product, recent discoveries have shown the value of separating the membrane from the hard portion of the shell. The membrane contains collagen that is useful for producing many products. The bony part of the shell would provide other products useful for other purposes.

**7.** *[From previous page]* **Account for rework in job costing**

***Compare journal entries used to account for costs of defects in process costing and job costing.***

# **Process Costing Job Costing**

*(Common to all production) (Specific job) (Common to all)*

# Spoilage

*Abnormal Loss from Abnormal Spoilage Loss from Abn. Sp. Loss from Abn. Sp.*

*Work in Process WIP WIP*

*Normal Finished Goods -No entry- MOH Control*

*Work in Process (stays in WIP) WIP*

*Rework*

*Abnormal Loss from Abnormal Rework Loss from Abn. Sp. Loss from Abn. Sp.*

*Materials Control Matls. Control Matls. Control*

*Wages Payable Control Wages Pay. Ctl. Wages Pay.Ctl.*

*Manufacturing OH Allocated MOH Alloc. MOH Alloc.*

*Normal Manufacturing Overhead Control WIP MOH Control*

*Materials Control Matls. Control Matls. Control*

*Wages Payable Control Wages Pay. Ctl. Wages Pay.Ctl.*

*Manufacturing OH Allocated MOH Alloc. MOH Alloc.*

# Scrap

*At sale Cash (Accounts Receivable) Cash (A/R) Cash (A/R)*

*Manufacturing OH Control WIP MOH Control*

*At production Materials Control Matls. Control Matls. Control*

*Manufacturing OH Control WIP MOH Control*