

CHAPTER 11

COST ALLOCATION FOR JOINT PRODUCTS AND BY-PRODUCT/SCRAP

12.	<u>Products</u>	<u># of Units</u>	<u>SV at Split-Off</u>	<u>Total SV</u>	<u>Classification</u>
	Boco	1,200	\$6.000	\$ 7,200	Joint product
	Loco	1,000	\$1.750	\$ 1,750	By-product
	Roco	5,000	\$2.500	\$12,500	Joint product
	Soco	3,800	\$4.200	\$15,960	Joint product
	Moco	4,100	\$1.900	\$ 7,790	Joint product
	Coco	200	\$0.250	\$ 50	Scrap
	Doco	300	\$1.800	\$ 540	Scrap
	Joco	1,000	\$0.020	\$ 20	Scrap
	Voco	6,000	\$0.001	\$ 6	Waste

All classifications are based on the respective proportional sales values. It is even possible that Coco and Joco would be considered waste. A further consideration would be any selling or disposal costs that would affect the net inflows to Triscuit Co.

13. a. Allocation rate = $\$16,200,000 \div 36,000,000 \text{ feet} = \0.45 per foot

Grade A: $\$0.45 \times 27,000,000 = \underline{\$12,150,000}$

Grade B: $\$0.45 \times 9,000,000 = \underline{\$4,050,000}$

b. Incremental revenue ($27,000,000 \times \$0.80$)	\$ 21,600,000
Incremental costs ($27,000,000 \times \$0.75$)	<u>(20,250,000)</u>
Increase in income ($27,000,000 \times \$0.05$)	<u>\$ 1,350,000</u>

Based on the incremental change in net income, the company should process Grade A lumber further.

14. a. Sales value of milk	\$377,400 (68%)
Sales value of sour cream	<u>177,600 (32%)</u>
Total sales value	<u>\$555,000</u>

Since the milk represents 68 percent of the total sales value at split-off, \$125,800 represents 68 percent of the total joint cost. Total joint cost for June is $(\$125,800 \div 0.68)$ or \$185,000.

- b. 190,000 pints = 95,000 quarts of sour cream

Quarts of milk	240,000 (72%)
Quarts of sour cream	<u>95,000 (28%)</u>
Total quarts	<u>335,000</u>

Since the milk represents 72 percent of the total physical quantity produced, \$125,800 represents 72 percent of the total joint costs. Total joint cost is $(\$125,800 \div 0.72)$ or \$174,722.

15. Two ounces of each 16 ounces (or 12.5 percent) are lost to waste, leaving 87.5 percent of total lbs. available.

a.	Joint Products	Unit Weight	Total Pounds	Lbs. of Product	Percent	Allocated Joint Cost
	Fish	0.500	75,000	37,500	57	\$ 81,396
	Oil	0.250	75,000	18,750	29	41,412
	Meal	0.125	75,000	9,375	14	19,992
		<u>0.875</u>		<u>65,625</u>	<u>100</u>	<u>\$142,800</u>

b.	Joint Products	Lbs. of Product	Selling Price per Lb.	Total	Percent	Allocated Joint Cost
	Fish	37,500	\$4.50	\$168,750	55	\$ 78,540
	Oil	18,750	6.50	121,875	39	55,692
	Meal	9,375	2.00	18,750	6	8,568
				<u>\$309,375</u>	<u>100</u>	<u>\$142,800</u>

- c. Although an unchanging measure, the physical measure of pounds treats all products as equally valuable. Because of inflation and market price variability, sales value is a changing measure; however, this method is a better way of matching joint cost to the benefits from the production process because of the substantial differences in per pound prices among the three products.

16. a.	Product	# of Pounds	Proportion	Joint Cost	Allocated Joint Cost
	Steaks	3,312	24%	\$26,400	\$ 6,336
	Roasts	6,210	45	26,400	11,880
	Ground Beef	4,278	31	26,400	8,184
	Total	<u>13,800</u>	<u>100%</u>		<u>\$26,400</u>

The problem with this method is that the joint cost assigned to each product is approximately \$1.91 per pound, which makes every pound of ground beef sold appear to lose \$1.01.

b.	Product	# of Pounds	SV at Split Off	Total SV	Percent	Allocated Joint Cost
	Steaks	3,312	\$4.25 per lb.	\$14,076	34%	\$ 8,976
	Roasts	6,210	\$3.80 per lb.	23,598	57	15,048
	Ground Beef	4,278	\$0.90 per lb.	3,850	9	2,376
	Total			<u>\$41,524</u>		<u>\$26,400</u>

The problem mentioned in (a) is corrected with this method because the joint cost assigned to each pound of ground beef sold is now only \$0.56.

c.	Selling price	\$ 2.10
	Allocated joint cost	(0.56)
	Special label	(0.15)
	Profit desired	<u>(0.40)</u>
	Allowable separate cost	<u>\$ 0.99</u>

The \$0.40 per pound should not be considered a “real” profit amount because the allocated joint cost would change simply based on the allocation method chosen. However, the sausage sale would be profitable because the incremental revenue of \$1.20 (\$2.10 – \$0.90) is greater than the incremental cost of \$1.14 (\$0.15 + \$0.99).

17. a.

	<u>Games</u>	<u>News</u>	<u>Documentaries</u>
Revenues	\$ 34,040,000	\$ 30,720,000	\$ 189,320,000
Separate costs	<u>(31,040,000)</u>	<u>(16,320,000)</u>	<u>(110,720,000)</u>
NRV	<u>\$ 3,000,000</u>	<u>\$ 14,400,000</u>	<u>\$ 78,600,000</u>
% of \$96,000,000 total	3%	15%	82%

Joint cost allocation:

Games (\$24,000,000 × 0.03)	\$ 720,000
News (\$24,000,000 × 0.15)	3,600,000
Documentary (\$24,000,000 × 0.82)	<u>19,680,000</u>
Total	<u>\$24,000,000</u>

	<u>Games</u>	<u>News</u>	<u>Documentaries</u>
Revenues	\$ 34,040,000	\$ 30,720,000	\$ 189,320,000
Separate costs	(31,040,000)	(16,320,000)	(110,720,000)
Allocated costs	<u>(720,000)</u>	<u>(3,600,000)</u>	<u>(19,680,000)</u>
Net profit	<u>\$ 2,280,000</u>	<u>\$ 10,800,000</u>	<u>\$ 58,920,000</u>

b.

	<u>Games</u>	<u>News</u>	<u>Documentaries</u>
Revenues	\$34,040,000	\$30,720,000	\$189,320,000
% of \$254,080,000 total	13%	12%	75%

Joint cost allocation:

Games (\$24,000,000 × 0.13)	\$ 3,120,000
News (\$24,000,000 × 0.12)	2,880,000
Documentaries (\$24,000,000 × 0.75)	<u>18,000,000</u>
Total	<u>\$24,000,000</u>

	<u>Games</u>	<u>News</u>	<u>Documentaries</u>
Revenues	\$ 34,040,000	\$ 30,720,000	\$ 189,320,000
Separate costs	(31,040,000)	(16,320,000)	(110,720,000)
Allocated costs	<u>(3,120,000)</u>	<u>(2,880,000)</u>	<u>(18,000,000)</u>
Net profit	<u>\$ (120,000)</u>	<u>\$ 11,520,000</u>	<u>\$ 60,600,000</u>

- c. As the manager of the Games Group, I would be very concerned about the effects of allocating joint cost using the method in (b). The result of the allocation is to make the Games Group appear to be unprofitable.

Points (some of which could be rebutted) students might make in their presentations include:

- (1) The allocation of joint cost is totally arbitrary; there is no cause and effect relationship represented in the allocations in (b).
- (2) The Games Group appears to have a different degree of facilities utilization than the News and Documentaries, given the high relationship of its separate costs to the separate costs of the other two groups. The allocations in (b) fail to consider this fact.

- (3) The Games Group could be a start-up division and, as such, may be incurring substantially higher costs and may not have begun to reach its revenue potential.

18. a. Units of output allocation:

$$\text{Total bottles} = 20,000 + 32,000 + 28,000 = 80,000$$

Perfume $[(20,000 \div 80,000) \times \$1,080,000]$	\$ 270,000
Eau de Toilette $[(32,000 \div 80,000) \times \$1,080,000]$	432,000
Body Splash $[(28,000 \div 80,000) \times \$1,080,000]$	<u>378,000</u>
Total	<u>\$1,080,000</u>

Weight-based allocation:

$$\text{Total weight} = (20,000 \times 1) + (32,000 \times 2) + (28,000 \times 3) = 168,000$$

$$\text{Perfume} = 20,000 \div 168,000 = 12\%$$

$$\text{Eau de Toilette} = 64,000 \div 168,000 = 38\%$$

$$\text{Body Splash} = 84,000 \div 168,000 = 50\%$$

Perfume $(\$1,080,000 \times 0.12)$	\$ 129,600
Eau de Toilette $(\$1,080,000 \times 0.38)$	410,400
Body Splash $(\$1,080,000 \times 0.50)$	<u>540,000</u>
Total	<u>\$1,080,000</u>

Approximated NRV computation:

Perfume $[20,000 \times (\$16.50 - \$2.50)]$	\$280,000	30%
Eau de Toilette $[32,000 \times (\$13.00 - \$1.50)]$	368,000	40%
Body Splash $[28,000 \times (\$12.00 - \$2.00)]$	<u>280,000</u>	<u>30%</u>
Total	<u>\$928,000</u>	<u>100%</u>

Approximated NRV allocation:

Perfume $(\$1,080,000 \times 0.3)$	\$ 324,000
Eau de Toilette $(\$1,080,000 \times 0.4)$	432,000
Body Splash $(\$1,080,000 \times 0.3)$	<u>324,000</u>
Total	<u>\$1,080,000</u>

b. Cost assigned to inventory = Allocated joint cost + Separate costs

Units of output allocation:

Perfume $[\$270,000 + (\$2.50 \times 20,000)]$	\$ 320,000
Eau de Toilette $[\$432,000 + (\$1.50 \times 32,000)]$	480,000
Body Splash $[\$378,000 + (\$2.00 \times 28,000)]$	<u>434,000</u>
Total	<u>\$1,234,000</u>

Ending inventory valuation based on units of output:

Perfume $[\$320,000 \times (600 \div 20,000)]$	\$ 9,600
Eau de Toilette $[\$480,000 \times (1,600 \div 32,000)]$	24,000
Body Splash $[\$434,000 \times (1,680 \div 28,000)]$	<u>26,040</u>
Total	<u>\$59,640</u>

Ending inventory valuation based on weight:

Perfume

$$(\$129,600 + \$50,000) = \$179,600 \text{ total cost}$$

$\$179,600 \div 20,000 \text{ ounces} = \8.98 per ounce	
$600 \text{ bottles} \times 1 \text{ ounce} \times \$8.98 =$	\$ 5,388
Eau de Toilette	
$(\$410,400 + \$48,000) = \$458,400 \text{ total cost}$	
$\$458,400 \div 64,000 \text{ ounces} = \7.16 per ounce	
$1,600 \text{ bottles} \times 2 \text{ ounces} \times \$7.16 =$	22,912
Body Splash	
$(\$540,000 + \$56,000) = \$596,000 \text{ total cost}$	
$\$596,000 \div 84,000 \text{ ounces} = \7.10 per ounce	
$1,680 \times 3 \text{ ounces} \times \$7.10 =$	<u>35,784</u>
Total	<u>\$64,084</u>

Ending inventory valuation based on approximated NRV:

Perfume	
$(\$324,000 + \$50,000) = \$374,000 \text{ total cost}$	
$\$374,000 \div 20,000 \text{ ounces} = \18.70 per ounce	
$600 \text{ bottles} \times 1 \text{ ounce} \times \$18.70 =$	\$11,220
Eau de Toilette	
$(\$432,000 + \$48,000) = \$480,000 \text{ total cost}$	
$\$480,000 \div 64,000 \text{ ounces} = \7.50 per ounce	
$1,600 \text{ bottles} \times 2 \text{ ounces} \times \$7.50 =$	24,000
Body Splash	
$(\$324,000 + \$56,000) = \$380,000 \text{ total cost}$	
$\$380,000 \div 84,000 = \4.52 per ounce	
$1,680 \times 3 \text{ ounces} \times \$4.52 =$	<u>22,781</u>
Total	<u>\$58,001</u>

- c. Relative to all of the products, once the joint cost is assigned and a cost per ounce is computed, Scent of Money does not appear to be selling its products at high enough prices. Per-unit product losses of \$2.20 are being generated on the sale of each bottle of perfume, \$2.00 per bottle of eau de toilette, and \$1.56 per bottle of body splash.

19. a.

JP-4539	4,500	$0.125 \times \$558,000 =$	\$ 69,750
JP-4587	18,000	$0.500 \times \$558,000 =$	279,000
JP-4591	<u>13,500</u>	$0.375 \times \$558,000 =$	<u>209,250</u>
	<u>36,000</u>	<u>1.000</u>	<u>\$558,000</u>

b. JP-4539	$4,500 \times \$14 = \$ 63,000$	$0.14 \times \$558,000 = \$ 78,120$
JP-4587	$18,000 \times \$ 8 = 144,000$	$0.32 \times \$558,000 = 178,560$
JP-4591	$13,500 \times \$18 = \underline{243,000}$	$0.54 \times \$558,000 = \underline{301,320}$
	<u>\$450,000</u>	<u>1.00</u> <u>\$558,000</u>

c. JP-4539	$4,500 \times (\$24 - \$4) = \$ 90,000$	$0.17 \times \$558,000 = \$ 94,860$
JP-4587	$18,000 \times (\$15 - \$5) = 180,000$	$0.33 \times \$558,000 = 184,140$
JP-4591	$13,500 \times (\$22 - \$2) = \underline{270,000}$	$0.50 \times \$558,000 = \underline{279,000}$
	<u>\$540,000</u>	<u>1.00</u> <u>\$558,000</u>

20. a.	Final	Sales	Split-Off	Increm.	Increm.	Increm.
	Product	Value	Sales Value	Revenue	Cost	Profit
	Butter	\$ 6.00	\$4.00	\$2.00	\$3.00	\$(1.00)

Jam	14.00	6.40	7.60	4.00	3.60
Syrup	3.60	3.00	0.60	0.40	0.20

Only jam and syrup should be processed beyond the split-off point.

b. Joint cost	\$123,200	
Less NRV of syrup ($\$3.60 - \$0.40 \times 1,000$)	<u>3,200</u>	
Joint cost to be allocated	<u>\$120,000</u>	
Unit-based allocation:		
Butter ($10,000 \div 30,000 \times \$120,000$)	\$ 40,000	
Jam ($20,000 \div 30,000 \times \$120,000$)	<u>80,000</u>	
Total	<u>\$120,000</u>	
Weight-based allocation:		
Butter ($10,000 \times 16$ ounces)	160,000	50%
Jam ($20,000 \times 8$ ounces)	<u>160,000</u>	<u>50%</u>
Total product weight	<u>320,000</u>	<u>100%</u>
Butter ($0.50 \times \$120,000$)	\$ 60,000	
Jam ($0.50 \times \$120,000$)	<u>60,000</u>	
Total	<u>\$120,000</u>	
Sales value at split-off allocation [from (a)]		
Butter ($10,000 \times \$4.00$)	\$ 40,000	24%
Jam ($20,000 \times \$6.40$)	<u>128,000</u>	<u>76%</u>
NRV	<u>\$168,000</u>	<u>100%</u>
Butter ($0.24 \times \$120,000$)	\$ 28,800	
Jam ($0.76 \times \$120,000$)	<u>91,200</u>	
Total	<u>\$120,000</u>	

21. a.	<u>Fabric</u>	<u>Yarn</u>
Final revenues	\$ 540,000	\$ 420,000
Revenues at split-off	<u>(360,000)</u>	<u>(300,000)</u>
Incremental revenues	\$ 180,000	\$ 120,000
Incremental costs	<u>(120,000)</u>	<u>(102,000)</u>
Net benefit (cost) of further processing	<u>\$ 60,000</u>	<u>\$ 18,000</u>

Both products should be processed further.

b. The irrelevant item is the \$120,000 joint cost.

22.	<u>Incram.</u>	<u>Incram.</u>		<u>Process</u>
<u>Product</u>	<u>Revenues</u>	<u>Costs</u>	<u>Benefit/(Loss)</u>	<u>Further?</u>
JP#1	\$50	\$55	\$ (5)	No
JP#2	\$40	\$25	\$15	Yes
JP#3	\$65	\$45	\$20	Yes

25. a. If the by-product is accounted for at the time of production, by-product inventory is recorded at its net realizable value and that amount reduces the joint cost included in the gasoline's cost of sales. Therefore, cost of sales of the by-product would be zero.

Cost of sales for gasoline: Beginning inventory of gasoline	\$	0
Production costs to split-off point		240,000
Less NRV of by-product		
Sales of by-product	\$ 60,000	
Production & Marketing	<u>(50,000)</u>	<u>(10,000)</u>
Current manufacturing costs of gasoline		\$230,000
Ending inventory of gasoline		<u>(30,000)</u>
Cost of sales for gasoline		<u>\$200,000</u>

- b. If Go-Go had reduced the gasoline's joint cost, the average cost per gallon of gasoline would have been decreased. Thus, the ending inventory value would have been slightly less, and the gross margin would have been slightly more.

(CPA adapted)

27. Joint process cost	\$337,500
Less net realizable value of by-product inventory	<u>(65,000)</u>
Amount to be allocated	<u>\$272,500</u>

Proration of amount to be allocated based on weight:

<u>Product</u>	<u>Bushels</u>	<u>Proportion</u>	<u>Allocation</u>
Premium	16,500	0.25	\$ 68,125
Good	43,560	0.66	179,850
Fair	<u>5,940</u>	<u>0.09</u>	<u>24,525</u>
	<u>66,000</u>	<u>1.00</u>	<u>\$272,500</u>