Project **Extractive Activities**

Topic **Accounting for stripping costs in the production phase – costs of waste removal and the associated benefit**

## Objective of this paper

1. In June 2009 a request was received for guidance in respect of the accounting treatment of stripping costs during the production stage of the mine. At the IFRIC meeting in November 2009[1], the IFRIC agreed to take the issue onto the agenda. At the IFRIC meeting in January 2010, the IFRIC agreed on a scope concept for the interpretation, articulated as:

   Accounting for the costs of removal of waste material in a surface mining activity during the production phase.

2. The objective of this paper is to discuss the costs of removal of waste material, considering whether they should be included in current period costs of production, capitalised as an asset, or a combination of both.

## Surface mining activity and the costs of waste removal

3. Surface mining is the predominant type of mining worldwide[2]. It usually requires a large capital investment, but generally results in high productivity, low operating costs and good safety conditions. Surface mining is the best method to access deposits of ore that are found near the surface. Strip mining (typically for coal) and open pit mining (e.g. for copper) are types of surface mining. Surface

[1] The papers discussed at the November 2009 IFRIC meeting were paper 2A *Preliminary Discussion – accounting for stripping costs in the production phase*, and paper 2B *Tentative agenda decision – Accounting for stripping costs in the production phase*

[2] Source*: 'Introductory Mining Engineering' (Second Edition) by Hartman and Mutmansky*

mining differs from underground mining, where the overlying material is left in place and the mineral is removed through shafts or tunnels.

4. In surface mining, the waste removal process is extensive[3]. The waste material is typically referred to as 'overburden'. 'Stripping' is the term used to describe the activity of removing and excavating the overburden to expose the ore deposit[4]. The nature of the overburden will vary, and will determine the type of waste removal activity – softer materials may not require breakage; more resistant rock will require blasting to break it up. Materials-handling equipment will then be chosen to satisfy the operating conditions: auger drills will be used for weak rock, compared to percussion drills for hard rock. Power shovels, front-end loaders and trucks and bulldozers will be employed for excavation and haulage activities. The displaced soil and other waste material will be usually used to re-fill the site once the mining operation has concluded.

5. In the mining industry, a period of waste removal or stripping activity is often referred to as a 'stripping campaign'. A number of factors will determine when stripping campaigns are done. One of the major considerations is climate – for example, severe cold weather may mean that stripping campaigns are run in the summer months when the ground is thawed, ahead of the mining in the winter months. The geometry of the mineral deposit and the overburden, as well as the planned production rate of the mine, will also dictate waste removal activities.

6. Costs are incurred during the waste removal process. Waste removal costs are commonly known in the mining industry as 'stripping costs'. These costs typically include direct costs incurred in the activity (labour, fuel, haulage and transportation of waste, materials consumed and the costs of machinery employed), as well as an allocation of indirect costs, such as supervisors' salaries.

7. **By incurring costs to remove waste, the entity creates a benefit; that is, of improved access to the mineral ore body**. An ore body that has been cleared of

[3] The average tonnage of waste required to produce a ton of ore in surface mining is approximately 2.6, compared to 0.07 for underground mining (*Hartman and Mutmansky,* page 153)
[4] *Hartman and Mutmansky,* page 153

waste is more valuable to a mining entity than one where less or no waste has been removed. Access to reserves therefore becomes easier and less costly. The access benefit relates to the *volume* of ore above which the waste has been removed.

| **Question 1 for the IFRIC** |
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| Does the IFRIC agree that the benefit to the entity created by waste removal activities is of improved access to the volume of ore to be mined? |

## Accounting for the benefit created

8. The staff's view is that conceptually, accounting for the waste removal costs incurred to create the benefit of access should follow the **realisation (or consumption) of the benefit.** The staff think that the benefit is realised **when the entity mines the section of the ore body that has been cleared of waste, or 'stripped'**. Accordingly, the staff thinks that the waste removal costs should be capitalised until the ore is mined, at which time the costs should be included in the cost of ore inventory produced.

9. Practically, the waste removal costs, when incurred, will be accumulated in a cost account (with the credit entry being made to cash or accounts payable). When the ore is mined, the staff think that the costs should be attributed to either the income statement or the balance sheet, according to when the benefit is realised. This concept is further discussed below, under 'current period benefit' (paragraphs 13 - 14) and 'future period benefit' (paragraphs 15 - 21).

10. The staff draws support for its view from paragraph 53 of the *Framework for the Preparation and Presentation of Financial Statements*, stating that the benefit embodied in an asset is the *potential to contribute* to the entity's cash flows. That benefit will be realised or consumed whenever the contribution is made – when the ore is mined, which could be in a current period (inventory), or in a future period (long term assets). Paragraph 56 of IAS 16 *Property, Plant and Equipment* states that 'the future economic benefits embodied in an asset are consumed by an entity principally through its use'.

11. Further, paragraph 3.25 of the working draft of the Extractive Activities' Discussion Paper, posted on the IASB's website in August 2009 states the following:

    'Many mines are developed in stages, with the result that production may take place in one area while development continues elsewhere in the mine. The project team's view is that these development costs should be recognised as part of the legal rights asset to the extent that they have a future economic benefit beyond the current reporting period. Where development costs benefit only the current reporting period, they are a component of the cost of inventory produced in the current period and should be accounted for in accordance with IAS 2 *Inventories*.'

12. An ore body is typically mined in stages or sections, over a period of years. This means that the benefit of improved access created by an individual stripping campaign could be realised as follows:

    (a) All in the current period (paragraphs 13 - 14),

    (b) All in future periods (paragraphs 15 - 21); or

    (c) Some in the current period and some in future periods (paragraphs 22 - 35 ).

***Current period benefit only***

13. During the production phase, inventory will be produced in anticipation of sale. The inventory of a mining entity is ore which has been extracted, and processed to the degree required to convert it for sale. The primary basis of accounting for inventories is cost[5]. Paragraph 10 of IAS 2 *Inventories* states that 'The cost of inventories shall comprise all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.'

14. The staff thinks that, if stripped ore is mined in the current period, then the associated waste removal costs should be included in the cost of the inventory produced in the current period. These costs are part of the cost of generating

[5] As an exception to this general rule, paragraph 3 of IAS 2 states that producers' inventories of mineral ores may be stated at net realisable value when this is accepted industry practice. The staff are not aware of this exception being widely used in the mining industry

saleable material from the mine, by providing access to the ore. They can be viewed as costs of conversion, and may be viewed as directly related to the units of production, or as variable production overheads, in accordance with the provisions of IAS 2.

| **Question 2 for the IFRIC** |
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| Does the IFRIC agree that, if all of the ore associated with stripping performed in the current period is mined in the current period, then the associated waste removal costs should be included in the cost of the inventory produced in the current period, according to IAS 2? |

***Future period benefit only***

15. The staff think that if stripped ore is going to be mined in a future period, the realisation of the benefit is consequently 'deferred' until that future period, and that the accounting should reflect this timing.

16. The staff think that the improved access created through the stripping activity is a benefit that will be realised in the future, and meets the definition of an asset, according to paragraph 49(a) of the *Framework for the Preparation and Presentation of Financial Statements*:

    (a) an asset is a resource controlled by the entity

        The entity controls the benefit obtained from the waste removal activity, by either owning the land which it is mining, or owning the rights to mine the land.

    (b) as a result of past events, and

        The improved access may arise 'as a result of past events' – the stripping campaign that was undertaken.

    (c) from which future economic benefits are expected to flow to the entity.

        Waste removal activity creates a future benefit - the entity can access reserves that are economically recoverable in the future, and is able to do so at a lesser cost than was possible prior to the stripping campaign.

| **Question 3 for the IFRIC** |
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| Does the IFRIC agree that the enhanced access to the ore that is created by the stripping activity, and that will be realised in the future, meets the definition of an asset? |

*Classification of the future period benefit asset - tangible or intangible?*

17. Some think that waste removal activities benefiting future periods are intangible in nature, without physical substance. They are activities undertaken to enhance the mineral base, through easier access to the ore, and the benefit they create is not a tangible one. They think that they do not qualify as 'property, plant and equipment' (PPE) as defined by IAS 16[6].

18. Alternatively, some think the asset created by the waste removal activity is part of the 'mineral asset' or 'mine property'[7], terms that are used in practice to describe the depreciable cost of building, developing and constructing the mine. Therefore, forming part of a tangible item. Classification of the future benefit asset as PPE is seen commonly in practice - according to KPMG's publication, *The Application of IFRS: Mining (September 2009)*[8], 55% of the companies surveyed classified waste removal costs ('deferred stripping costs') as property, plant and equipment, 25% classified the costs as separate non-current assets, and 5% classified them as separate current assets. Of the remaining companies surveyed, 10% expensed the deferred stripping costs as incurred and 5% did not disclose the category used.

19. An option is for the interpretation not to specify whether the asset should be tangible or intangible, and leave that judgement to the entity's management. Paragraph 15 of IFRS 6 *Exploration for and Evaluation of Mineral Resources* gives an entity a similar choice, stating that the entity should classify exploration

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[6] Paragraph 6: *Property, plant and equipment* **are tangible items that:**

(a) are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and

(b) are expected to be used during more than one period.

[7] Other similar terms used include 'mine development', 'mine infrastructure', 'mining interests' and 'mine plant and facilities'.

[8] An executive summary of this publication can be found online at www.kpmg.com/Global/Issuesandinsights/articlespublications

and evaluation assets as tangible or intangible according to the nature of the assets acquired.

20. However, the staff think that it may be more helpful to constituents if the nature of the asset is specified as tangible or intangible. The staff think that the asset is conceptually of a tangible nature - that waste removal activities that are directly attributable to bringing the mine asset to the condition and location intended by management for its use; that is, to produce saleable ore in the future. Therefore, the cost of the stripping activities should be included in the cost of the mine property, plant and equipment. The staff therefore recommend accounting for the asset according to the principles of IAS 16.

*Scope considerations*

21. The staff have however noted that paragraph 3(d) of IAS 16 states that the standard does not apply to 'mineral rights and mineral reserves such as oil, natural gas and similar non-regenerative resources'. However, paragraph 3 goes on to state that the standard *does apply* to property, plant and equipment used to develop or maintain assets such as described in paragraph 3(d). The debate is really whether waste removal activities with a future benefit represent PPE used to 'develop or maintain' mineral reserves, rather than an addition to the mineral rights and resources themselves.

| **Question 4 for the IFRIC** |
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| 4.1 Does the IFRIC agree with the staff recommendation in paragraph 20, that the principles of IAS 16 are appropriate to account for the asset created by the stripping activity? |
| 4.2 Does the IFRIC think that the scope of IAS 16 needs to be amended to specifically include accounting for waste removal costs in the production phase? |

***Allocating the benefit between current and future periods***

22. A stripped ore body may sometimes be partially mined in the current period, and partially in a future period. In these circumstances, it is necessary to discern how much of the benefit created by stripping the area is realised in the current period, and how much is realised in the future period. Allocating the associated waste removal cost between the two periods will be necessary in these circumstances.

23. The staff considered two approaches to determine how to allocate waste removal costs between current and future periods: the strip ratio approach and the specific identification approach.

*The strip ratio approach*

24. This approach makes use of a strip ratio (life-of-mine strip ratio, or average strip ratio) which will be calculated using the long-term mine plan data. Appendix A provides some background information about the mine plan, and the calculation of the strip ratio.

25. Because the deposit of minerals is not uniform throughout a mine, an entity will, in practice, be mining a ratio of waste materials to mineral ore that is different from the calculated average strip ratio. Therefore, for each period, the entity will (using the same formula as the average strip ratio) calculate an *actual* strip ratio of waste removed in the period vs. ore extracted in the period. This will be compared to the average strip ratio. Refer to Appendix B for an illustration of the accounting effect of using the strip ratio approach.

26. The advantage of this approach is that it makes use of a calculation (the strip ratio) which is performed anyway as part of the mine plan process. The disadvantage is that the approach could be seen to be a ‘smoothing’ mechanism, and may not report the economic reality of the mining operation.

27. A further disadvantage of the approach is that the ratio may indicate an asset to be recognised where one does not exist in terms of the Framework, for example, stripping costs ‘spike’ because thicker overburden is encountered; however no future benefit is gained by removing this ‘higher than average’ waste. Conversely, ‘normal’ levels of stripping may create a future benefit (where the ore is only to be mined in a future period), but the ratio may not necessarily indicate that an asset should be recognised, because the costs incurred are within average or normal limits defined for that mine.

28. Also, through the research the staff have done, the staff have noted that there may be variations in how the waste-to-ore ratio is calculated – which could lead to diversity in practice and reduced comparability between entities.

*Specific identification approach*

29. Under this approach, the costs of a stripping campaign are allocated or 'tagged' to the section of mineral ore that becomes accessible as a result of the campaign. As that section of ore is mined, any waste removal costs tagged to that section of ore will be accounted for as part of the inventory produced in that period.

30. Some think that this 'tagging' approach is practically cumbersome and resource-intensive to maintain. Some outreach done by the staff in this area has indicated that, practically, costs associated with a particular stripping campaign can be quite easily isolated and 'tagged' to an area being stripped. Mining entities usually have the ability to track volumes of ore to be stripped and mined. Practically, entities may make use of separate general ledger accounts or separate asset accounts in the fixed asset subledger, to record the costs associated with a particular area.

31. The staff understand from the research done that stripping campaigns are usually identified when the mine plans are created. Typically, a stripping campaign that is likely to create a future benefit will be highlighted some time in advance of it taking place. This enables management to prepare for the campaign, from an operational and financial recording point of view.

32. Not all stripping campaigns may be identified at mine plan stage - it could happen that the geology of the mine (or the area in which the mine is located) changes unexpectedly – more rarely as a result of an event such as an earthquake, or perhaps the entity's knowledge of the geology may change if new information comes to light. These factors may cause a stripping campaign to be required, that was not originally planned. Such a stripping campaign would be accounted for in the same way as stripping campaigns that were identified at mine plan stage.

33. This approach of specific identification has a similar conceptual basis to component accounting provisions relating to depreciation in IAS 16 *Property, Plant and Equipment*. Paragraph 43 of IAS 16 states that 'Each part of an item of property, plant and equipment with a cost that is significant in relation to the total cost of the item shall be depreciated separately'. Accounting for an asset in this way better reflects the entity's consumption (through use) of the benefits inherent in the asset.

34. The advantage of the specific identification approach is that operational results will better reflect the economics of the mine activities. Ore deposits are seldom homogenous over the mine, and the entity is likely to have varying costs of extraction. This approach will generate results that are more reflective of actual waste removal activities, compared to the more standardised reporting achieved with the strip ratio.

***Staff recommendation***

35. The staff recommend the specific identification approach for determining how to allocate waste removal costs between current and future periods.

| **Question 5 for the IFRIC** |
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| 5.1 Does the IFRIC agree with the staff recommendation in paragraph 35?<br><br>5.2 Does the IFRIC think it is necessary for the interpretation to include guidance on what distinguishes a stripping campaign that is likely to create an asset from more routine waste removal activity? |

## The unit of account – a reflection of the preceding analysis

36. The staff suggest that, when accounting for stripping costs, the unit of account should be *the stripping campaign.* As discussed in paragraph 5, a period of waste removal or stripping activity is often referred to as a 'stripping campaign'. In applying the stripping campaign as the unit of account, the area over which the stripping is done is *known and identifiable,* and the costs relating to the campaign *are separable* from the other operating costs of the mine.

37. Defining the stripping campaign as the unit of account may overcome the problems of identifying production stripping in a mine containing a number of pits. The focus would be on the specific area that the stripping was taking place, and there would not need to be a debate about whether the stripping activity related only to a single pit, or to the entire ore base.

38. The unit of account concept will be revisited in Paper 2B *Accounting for stripping costs in the production phase – attribution of the stripping cost asset*.

| **Question 6 for the IFRIC** |
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| Does the IFRIC agree, in principle, that the stripping campaign could be considered the unit of account for this interpretation? |
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## Application guidance in other GAAP

***ASC Subtopic 930-330 Extractive Activities−Mining−Inventory[9].***

39. For entities applying US GAAP, production stripping costs are accounted for by applying the principle that once a mine begins commercial production, all subsequent costs to remove materials from the mine are costs of current production and represent a component of inventory cost.

40. The staff think that this approach works well for circumstances where the benefit of access to the ore is realised in the current period, according to the discussion in paragraphs 13 - 14 of this paper. However, the approach does not reflect the possibility that waste removal costs incurred in the current period may benefit future production.

***EIC-160 Stripping Costs Incurred in the Production Phase of a Mining Operation.***

41. For entities applying Canadian GAAP, production stripping costs are accounted for according to the benefit received by the entity. Stripping costs will be accounted for as a current period inventory cost if they benefit the current period. They should be capitalised, however, if the stripping activity generates a future benefit for the entity.

42. This approach is similar to the specific identification approach, discussed in paragraphs 29 - 34 of this paper. It is also consistent with the recommendations in this paper for accounting for the current and future period benefits. In addition, the staff thinks that the approach provides a good solution to the dilemma of allocating the benefit between current and future periods, when the distinction is not clear.

[9] EITF 04-6 *Accounting for Stripping Costs Incurred during Production in the Mining Industry*

## Appendix A - Additional Information about the mine plan and strip ratios

### The Mine Plan

A1 Mine planning is done in order to analyse the overall economics of the deposit and its extraction. The mine planning department of an entity will prepare a long-range mine plan, a short-range mine plan and a production schedule.

#### The long-range mine plan

A2 The long-range mine plan commonly refers to the general extraction plan for a mine, over the entire life of the mine or a major portion thereof. The mine is normally divided up into large geometric blocks, and values are assigned to each block based on the estimated ore grade within it. Computer software is used for this purpose. Possible extraction sequences are then analysed to provide information about pit limits and the sequence of exploitation to be followed. The pit limit is the boundary of the pit where the mine breaks even (profit margin is zero).

A3 Pit limits are usually calculated using a *maximum allowable stripping ratio,* or $SR_{max.}$ This ratio expresses volumes of overburden to be moved per unit weight of ore recovered, in order for the mine to break even. This ratio is determined solely by economics. An *overall stripping ratio,* or $SR_{o,}$ has more direct physical significance, and is the ratio that is referred to in paragraph 24 of the paper. This concept is further discussed below.

A4 A long-range mine plan is subject to change over the life of the mine, due to market and technological factors, amongst others. For this reason, the mine plan should be updated at regular intervals. It forms a basic ‘plan of attack’ on the deposit and is an important part of the economic success of the mine.

#### Short-range mine plans

A5 Once the long-range mine plan has been completed, a series of short-range mine plans will be developed to drive the mining process. A short-range plan will outline the sequence of overburden removal and extraction of ore for a few months in advance. The series of short-range plans could cover a period of 10 years or more ahead. Cash flow is an important input into the short-range

planning process, as is timing stripping sufficiently ahead of production to keep new production faces available.

### Production scheduling

A6 This is the plan for assignment of production equipment to the blocks of ore to be extracted, on an hour-to-hour or shift-to-shift basis. This plan may be altered daily, to accommodate changes in variables.

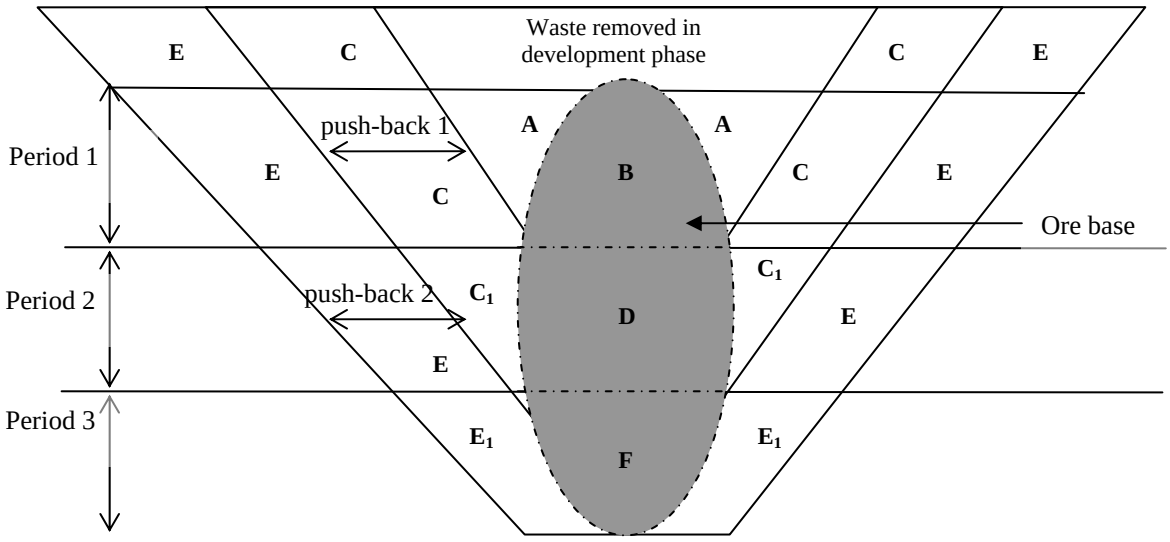
### The Overall Stripping Ratio ($SR_o$)

A7 This stripping ratio is calculated as:

$$\frac{\text{Volume of overburden } (m^3)}{\text{Weight of ore (tonnes)}}$$

A8 The ratio indicates the ratio of waste removed to ore recovered. It is also often referred to as the' life-of-mine strip ratio', or 'average strip ratio'. This ratio provides an *average*, over *the life of the mine*, of how much waste will be stripped in order to yield a tonne of ore.

A9 The diagram[10] and explanation below provide an illustration of what the strip ratios mean. Note that periods 1 – 3 are during the production phase.




[10] Adapted from the presentation made to the IFRIC in November 2009 by Niall Weatherstone, Chief Adviser – Evaluation of Rio Tinto London Limited.

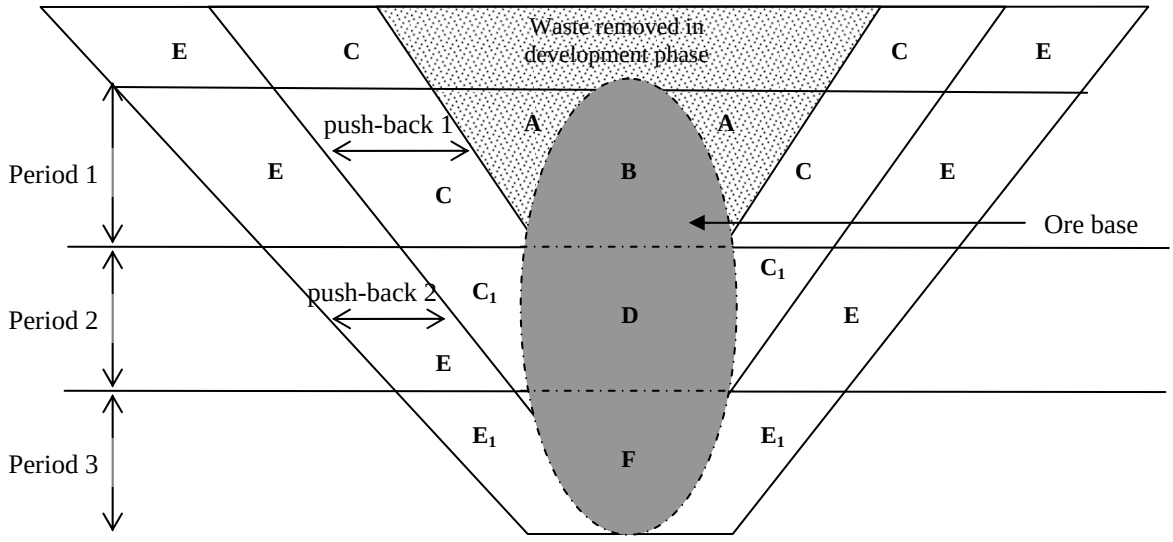
***Period 1***

A10 In period 1, the ore base (depicted by **B + D + F**) is accessed for the first time. The uppermost waste on the surface was removed during the development phase.

A11 The section of the ore base mined in the current period is depicted by area **B**. Some waste removal (**A**) takes place at the same time in order to fully expose the ore at **B**. Area **A** may have a strip ratio of, say, 3:1, meaning that 3 times as much waste material is being removed for every measure of ore extracted. Within **B**, negligible or no waste is removed – the strip ratio would be 0:1 – indicating for every measure of ore extracted, there is no waste component.

A12 Also in period 1, push-back 1[11] is done (the areas designated as **C**), where waste is stripped back around the ore body, in order to provide access to the section of the ore base which is only going to be mined in period 2 (area **D**). For the push-back, the strip ratio would be something like 15:1, indicating that 15 times more waste is being removed for every measure of ore.

***Period 2***



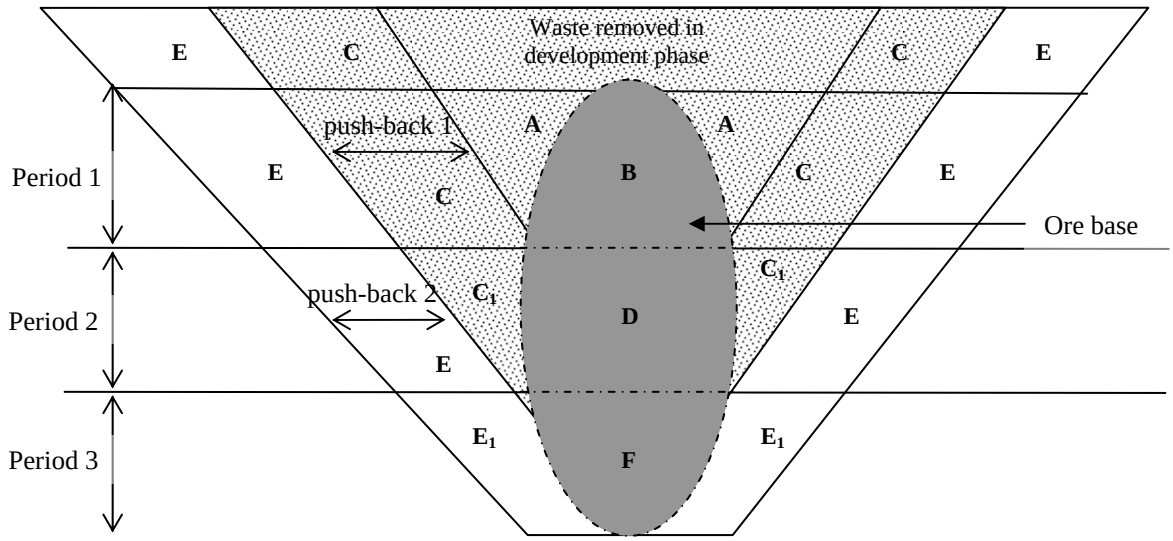

[11] A push-back is a term commonly used in the mining industry to describe a stripping campaign undertaken for a specific purpose.

A13 Push-back 1 (area **C**) performed in period 1 has provided access to the section of the ore base **D**, which can now be mined in period 2.

A14 Some waste removal (**$C_1$**) takes place at the same time in order to fully expose the ore at **D**. Area **$C_1$** may have a strip ratio of, say, 4:1, meaning that 4 times as much waste material is being removed for every measure of ore extracted. Within **D**, negligible or no waste is removed – the strip ratio would be 0:1 – indicating for every measure of ore extracted, there is no waste component.

A15 Once again, at the same time as ore is being extracted, push-back 2 is undertaken (areas designated as **E**), in order to provide access to the section of the ore base which is only going to be mined in period 3 (area **F**). The strip ratio of this push-back is, say, 20:1. The proportionate amount of waste material in this push-back is higher than in push-back 1, possibly due to geology and depth factors.

***Period 3***

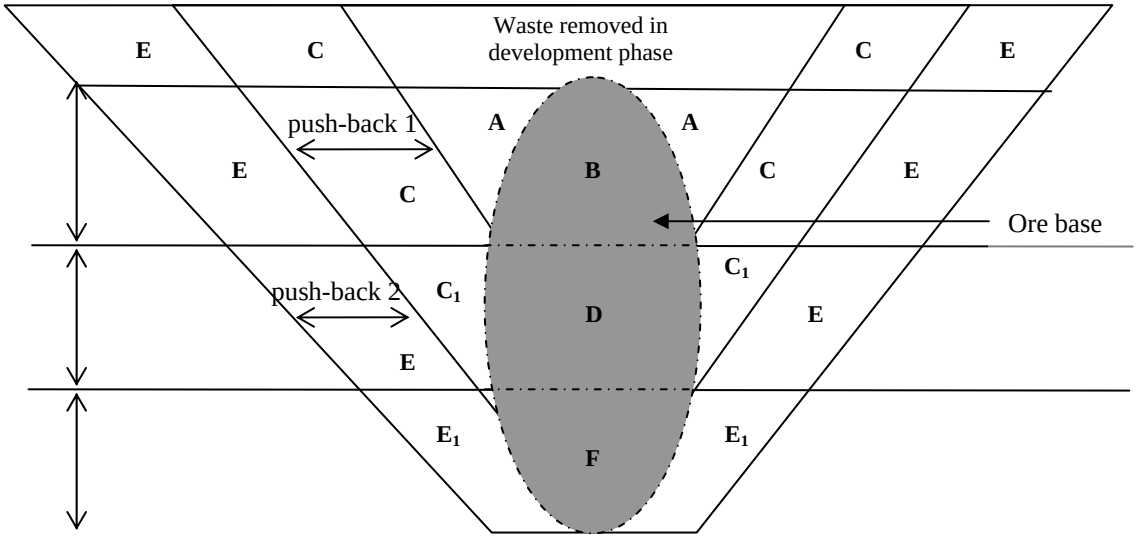



A16 Push-back 2 (Area **E**) in period 2 has provided access to section **F** of the ore base in period 3, which will now be mined.

A17 Some waste removal (**$E_1$**) takes place at the same time in order to fully expose the ore at **F**. Area **$E_1$** may have a strip ratio of, say, 5:1, meaning that 5 times as much waste material is being removed for every measure of ore extracted. Within **F**, negligible or no waste is removed – the strip ratio would be 0:1 – indicating for every measure of ore extracted, there is no waste component.

## Appendix B - Comparison of the accounting effect of the strip ratio approach and the specific identification approach

B1 Using the information in the example above, and assume that the average (or life-of-mine) strip ratio was calculated as 8:1.




B2 The table below explains the difference in accounting for waste removal costs under each method:

| Period | 'Current stripping' | Push-backs | Strip ratio approach | Specific identification approach |
|---|---|---|---|---|
| 1 | A = 3:1 | C = 15:1 | Calculate 'actual' strip ratio for the period as (say) 11:1. This exceeds the overall/average strip ratio of 8:1. The waste removal costs *representing the excess* will be capitalised. The remainder of the waste removal costs incurred in the period go to cost of production. | Waste removal costs relating to current stripping (**A**) will be a cost of production (i.e. as represented by the 3:1 ratio). *All* the costs relating to the push-back (as represented by the ratio 15:1 = Area **C**) will be capitalised. |
| 2 | $C_1$ = 4:1 | E = 20:1 | Calculate 'actual' strip ratio for the period as (say) 12:1. This exceeds the overall/average strip ratio of 8:1. The waste removal costs *representing the excess* will | Waste removal costs relating to current stripping (**$C_1$**) will be a cost of production (i.e. as represented by the 4:1 ratio). |

| | | | | |
|---|---|---|---|---|
| | | | be capitalised. The remainder of the waste removal costs incurred in the period go to cost of production. | *All* the costs relating to the push-back (as represented by the ratio 20:1 = Area **E**) will be capitalised.<br><br>In addition, the costs of the push-back in period 1 that were capitalised in that period will be fully amortised in period 2, as the related ('tagged') ore is mined. |
| 3 | $E_1$ = 5:1 | - | Calculate 'actual' strip ratio for the period as (say) 3:1. This is below the overall/average strip ratio of 8:1. Any waste removal costs incurred in the period will go to current production.<br><br>The difference between the overall/average strip ratio and the actual strip ratio will catalyse a amortisation of the previously capitalised costs. | Waste removal costs relating to current stripping (**$E_1$**) will be a cost of production (i.e. as represented by the 5:1 ratio).<br><br>In addition, the costs of the push-back in period 2 that were capitalised in that period will be fully amortised in period 3, as the related ('tagged') ore is mined. |