GUIDELINES FOR SUBSTANTIATING ADDITIONAL OBSOLESCENCE FOR PERSONAL PROPERTY AND FIXTURES

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INTRODUCTION

The State Board of Equalization (Board) co-administers property tax in California with the county assessors. The 58 county assessors are charged with the assessment of locally assessed real and personal property for taxation purposes and resolution of appeals of property values at the local level in conjunction with county assessment appeals boards. The Board's role is advisory and does not include setting values for any locally assessed property or resolving disputes over those assessments.

All property is taxable (or assessable) unless it is exempt by the Constitution or statutes.[1] This taxable property may be defined as real property or personal property. *Real property* includes the possession of, the claim to, the ownership of, and the right to the possession of land and improvements. For valuation purposes, all improvements should be subclassified as structure items or fixtures because fixtures are treated differently for valuation purposes.[2] *Personal property* includes all property except real property. Unlike real property, personal property is not governed by the base year value limitations of article XIII A of the California Constitution (Proposition 13) and must be valued on an annual basis.[3]

Property statements are filed by assessees and are used by county assessors to gather information and ultimately determine the assessable value of personal property and fixtures on an annual basis. These statements must be filed timely[4] and signed under penalty of perjury by the deadline as prescribed under Revenue and Taxation Code section 441.[5] If a property statement is filed by May 7, a property owner may amend the statement until May 31 for errors or omissions that were not the result of willful intent to erroneously report. The auditor-appraiser determines the taxable value of the property reported on the statement, and the value is placed on the local assessment roll. The county assessor is required to complete the local assessment roll and deliver it to the county auditor on or before July 1.[6]

In most cases, valuation of the personal property and fixtures reported on the property statement involves using the cost approach and the application of factors that are provided in Assessors' Handbook Section 581 (AH 581), *Equipment and Fixtures Index, Percent Good and Valuation Factors*. AH 581 contains several tables of equipment index, percent good, and valuation factors. The tables are intended to promote uniformity of assessment for use in the mass appraisal of

[1] California Constitution, article XIII, section 1.
[2] See Assessors' Handbook Section 504 (AH 504), *Assessment of Personal Property and Fixtures*, and Assessors' Handbook Section 502 (AH 502), *Advanced Appraisal*, for information on the importance on classification of structure items and fixtures.
[3] Exceptions are manufactured homes and floating homes.
[4] Property statements should be filed with the county assessor between the lien date (January 1) and 5 p.m. on April 1. A late penalty applies if the statement is filed after May 7.
[5] All statutory references are to the Revenue and Taxation Code unless otherwise specified.
[6] Sections 616 and 617.

equipment and fixtures when determining value for taxation purposes. *Mass appraisal* is the process of valuing a group of properties as of a given date using standard methodology for taxation purposes. Use of mass appraisal by county assessors is supported in a court decision which, in part, found that:

> …After considering the circumstances and the various factors influencing value, it is the assessor's duty to exercise a prudent discretion in reaching conclusions. The magnitude of the assessor's task—appraisal and assessment of all property within a limited time—demonstrates the necessity for him to promulgate general rules, formulas, and percentages for depreciation, construction costs, square foot area charges, and other factors, in order to secure uniformity.[7]

Application of the index and percent good factors determines the value of equipment and fixtures for property taxation purposes. ***Relevant data pertinent to the assessment of a specific property should always be reviewed and considered because the value determined by use of data contained in AH 581 may need to be adjusted for actual available market data***. However, in order to ensure that the evidence is considered, it should be submitted prior to the enrollment of the assessment; otherwise, it might only be considered if a timely assessment appeal application is filed or an audit is conducted.

To assist a county assessor in (1) reviewing data that may be submitted by an assessee, or (2) valuing property using a method other than application of the factors provided in AH 581, the following information is provided on the cost approach, comparative sales approach, income approach, and other methods of calculating depreciation.[8] For additional information on personal property and fixture valuation issues, see Assessors' Handbook Section 504, *Assessment of Personal Property and Fixtures*.

APPROACHES TO VALUE

Rule 3, *Value Approaches*,[9] prescribes the application of one or more of the following approaches to value in order to arrive at fair market value:

- Comparative sales approach
- Replacement/reproduction cost approach
- Historical cost approach
- Income approach
- Stock and debt approach

[7] *Louis F. Domenghini as Trustee v. County of San Luis Obispo* (1974) 40 Cal.App.3d 689, 695-696.
[8] See Assessors' Handbook Section 501 (AH 501), *Basic Appraisal*, AH 502, and AH 504 for additional information on these approaches.
[9] All references to Rules are Property Tax Rules from Title 18, Public Revenues, California Code of Regulations.

The three major appraisal approaches for estimating value for locally assessed property are the cost, comparative sales, and income approaches.

Although all three approaches to value should be considered, the use of all three may not always be appropriate. The nature of a property, its market, and the availability of data will normally dictate which approach(es) is most applicable. The appraiser/auditor-appraiser, therefore, should analyze all the data available on a subject property and use the most applicable approach(es) in the appraisal. An appraiser/auditor-appraiser should have knowledge of each approach as it applies to personal property and business fixtures to make this determination. This is supported by Rule 3, which states in part:

> In estimating value as defined in section 2 [Rule 2], the assessor shall consider one or more of the following [approaches to value], as may be appropriate for the property being appraised.

In the absence of reliable sales data, the cost and income approaches assume greater importance. If a property is owned for the purpose of producing rental income, and if there is an active rental market for similar property, the income approach is generally most appropriate. Additionally, pursuant to Rule 8, subsection (a), the income approach:

> …is the preferred approach for the appraisal of land when reliable sales data for comparable properties are not available. It is the preferred approach for the appraisal of improved real properties and personal properties when reliable sales data are not available and the cost approaches are unreliable because the reproducible property has suffered considerable physical depreciation, functional obsolescence or economic obsolescence, or a substantial over-or underimprovement, is misplaced, or is subject to legal restrictions on income that are unrelated to cost.

However, if there are neither comparable sales nor reliable income data available, the cost approach becomes more appropriate.

Each appraisal approach used should be carried out independently from the others and completed on the basis of market data supporting that approach, and all data should be derived from the market relevant to the property being appraised. The process of resolving the differences among value indicators is called *reconciliation*. In reconciliation, the appraiser should consider the various factors influencing value that are either not reflected or only partially reflected in the value indicators. The result of reconciliation should be a meaningful, defensible conclusion concerning the final value estimate.

These *Guidelines* focus on quantifying additional obsolescence of personal property and fixtures when using the cost approach. For additional information on using the comparative sales approach and the income approach to value personal property and fixtures, see AH 504.

COST APPROACH

The cost approach to value estimates the value of an asset or a group of assets as the original cost or historical cost of the asset (or group of assets), adjusted to account for changes in value since purchase and/or installation. The rationale for the use of the cost approach is based upon the economic *principle of substitution.* This principle holds that a rational person will pay no more for a property than the cost of acquiring a satisfactory substitute, assuming no costly delay.[10] The cost approach is the method of valuation used most frequently to value personal property and business fixtures for assessment purposes because it lends itself to mass appraisal and is employed based on information provided on yearly property statements.[11]

Rule 6, subdivision (a), directs when to use the cost approach:

> The reproduction or replacement cost approach to value is used in conjunction with other value approaches and is preferred when neither reliable sales data (including sales of fractional interests) nor reliable income data are available and when the income from the property is not so regulated as to make such cost irrelevant. It is particularly appropriate for construction work in progress and for other property that has experienced relatively little physical deterioration, is not misplaced, is neither over- nor underimproved, and is not affected by other forms of depreciation or obsolescence.

Rule 6 allows and prescribes more than one type of cost approach that an appraiser may use. The two variations of the cost approach provided are reproduction cost and replacement cost. In general, for mass appraisal purposes, the county assessor applies an index factor to historical or original cost to estimate reproduction cost new or replacement cost new.[12] However, replacement cost new is generally the proper starting point for developing an opinion of value using the cost approach.

REPRODUCTION COST APPROACH

The reproduction cost approach uses the cost to replace an existing property with an identical property, a replica, as a basis for estimating value. It is frequently not possible or desirable to duplicate an existing property due either to the:

- Lack of certain materials or trade skills; or
- Functional obsolescence that may exist for the property.

The difficulty of using reproduction cost increases as a property ages. When a property would not or cannot be exactly duplicated, as is often the case, reproduction cost loses validity as an

[10] See AH 501 for more information regarding the principle of substitution.
[11] See AH 504.
[12] Rule 6 uses the terms *historical cost* and *original cost* synonymously—the cost of the property when new. The term *acquisition cost* is used as the cost to the current owner. For purposes of these *Guidelines*, the terms are used as defined in Rule 6.

indicator of market value. This lack of validity can be overcome if depreciation is accurately estimated, but this can be somewhat difficult to determine for an exact replica.

REPLACEMENT COST APPROACH

Replacement cost is the cost to replace an existing property with a property of equivalent utility as of a particular date. The replacement cost is the most meaningful approach considering the principle of substitution.

In the replacement cost approach, elements of a property that would clearly not be included in a substitute of equal utility are excluded from the estimated replacement cost. For example, a buyer may not look for an identical new property to replace an older property. The buyer would look instead for the best way to perform the same function(s). The best way may be to use the latest state-of-the-art technology and materials, or to purchase another used piece of equipment able to perform to specifications of equivalent utility. In making this decision, a buyer would look at various aspects of available properties. These considerations include, but are not limited to, the:

- Cost to acquire each property,
- Age of the properties,
- Remaining expected lives of the properties, and
- Expected cost to operate each in comparison to the property being replaced and to each other.

VARIATIONS OF THE COST APPROACH

The reproduction cost approach and the replacement cost approach, as discussed in Rule 6, are the variations most commonly used to value personal property and business fixtures at the county level. In general, these variations of the cost approach use historical or original cost information to estimate a reproduction cost new (current cost new to reproduce an *identical* property) or replacement cost new (current cost new to replace a property with a *similar* property of the same utility). Then, the reproduction or replacement cost new is adjusted to reflect depreciation to arrive at a value for taxation purposes.[13]

The indexes and percent good factors provided in AH 581 are intended for use in the mass appraisal of equipment and fixtures when determining the value for taxation purposes. In most cases, it is a practical method for mass appraisal purposes.

When using the factors and valuation method contained in AH 581, an appraiser should not only estimate a full economic cost (replacement cost new or reproduction cost new) and consider all forms of depreciation that apply to a particular property, but should also be aware of the limitations inherent to this approach. It is important for an appraiser to recognize the limitations

[13] Alternatively, one factor may be developed and used to estimate value using one mathematical operation (original/historical cost times value factor equals value estimate, as opposed to original/historical cost times index factor times percent good factor equals value estimate).

of the cost approach in regard to a specific property because adjustments may be needed, or a different approach to value warranted. The annual business property statement allows property owners to identify all property specific conditions that would warrant adjustment. Supplemental information that may be presented by the assessee may be valid, whether or not submitted with the business property statement. However, in order to ensure that the evidence is considered, it should be submitted prior to the enrollment of the assessment; otherwise, it might only be considered if a timely assessment appeal application is filed or an audit is conducted.[14]

VALID COST COMPONENTS

Rules 6 and 10 define valid cost components as including labor, material, entrepreneurial services, interest on borrowed or owner-supplied funds, freight or shipping costs, installation costs, sales or use tax, and "other costs typically incurred in bringing the property to a finished state (or to a lesser state if unfinished on the lien date)."[15] In general, the cost to be assessed is that to the end-user or the retail level. Additional information on the cost components is included in AH 504.

It is important that the appropriate cost components be reflected in the historical cost when developing the cost indicator. A property's recorded purchase price does not necessarily reflect all costs required to estimate value for assessment purposes, nor does it necessarily exclude costs which do not contribute to value. In other words, not all costs contributing to value are booked and not all costs booked contribute to value. For example, the booked cost may represent acquisition cost as opposed to historical cost—acquisition cost being the cost to the current owner, and historical cost being the original cost when new. If either the historical cost or the cost to the current owner does not accurately reflect all valid cost components or market value at the time the property was purchased,[16] resulting cost approach value estimates may not be good indicators.

DEPRECIATION OF MACHINERY AND EQUIPMENT

Depreciation, for appraisal purposes, is a loss in value from any cause. It is the difference between the value of a hypothetical new, similar property and the current value of the subject property; the total measure of the reduced value at a particular point in time. It is a by-product of the value estimate.

For appraisal purposes, depreciation occurs in two different ways. First, and probably most important, the remaining economic life of a property may decline. Instead of yielding benefits for ten years as when new, a property may now have only eight years remaining service. Second, there may be a reduction in net benefits from the property. Fewer benefits may be provided, or the same benefits are provided at a higher cost (thus, fewer net benefits are provided). Thus, a decline in the remaining life or the efficiency of property causes depreciation.

[14] Rules 191 and 305.
[15] Rule 6, subdivision (b).
[16] *Dennis* v. *County of Santa Clara* (1989) 215 Cal.App.3d 1019.

The appraiser's definition and use of depreciation is fundamentally different from the accountant's definition and use of depreciation. The accountant uses depreciation to amortize a property's cost over the estimated life of the property.

The appraiser should recognize that depreciation from reproduction cost new is different from depreciation from replacement cost new when these costs are different. In situations where equipment has undergone minimal changes in technology, reproduction cost and replacement cost are likely to be similar. Although depreciation may be estimated in a lump sum, it is important to be aware of each type of depreciation in order to determine:

1. If all necessary adjustments have been made;
2. That there are no duplicate allowances for any one type; and
3. If information submitted by a taxpayer (with the business property statement or through an appeal) calculates depreciation in a manner consistent with accepted principles.

Appraisers analyze three generally recognized types, or causes, of depreciation:

- Physical deterioration
- Functional obsolescence
- External, or economic obsolescence

A property may suffer from more than one form of depreciation at one time. That is, a single piece of equipment may contain elements of physical deterioration as well as both functional and external obsolescence. In some cases, calculation methodologies may be used to separately estimate the amount of depreciation attributable to each cause. These methodologies should be used in situations where the taxpayer questions the accuracy of the mass appraisal method on the valuation of his/her property. When estimating each element of depreciation it is important to ensure that the estimate is attributable only to that element of depreciation. For example, if estimating physical deterioration, it is important to avoid including elements that may be attributable to functional obsolescence and/or external obsolescence.

In many situations, however, it may be impossible to categorize the amount of depreciation attributable to each cause. Regardless of whether total depreciation is calculated as a whole or as a sum of parts, recognizing and identifying the types of depreciation applicable to a property may aid in estimating total depreciation to arrive at value.

Physical Deterioration

Physical deterioration is the loss in value which may be the result of wear and tear either from use or exposure to various elements. This type of depreciation is expected on most equipment. Virtually all properties deteriorate as they age, and it is not abnormal unless equipment is put to excessive use or misused. Good maintenance will slow the process, while lack of maintenance and/or overuse will increase physical deterioration.

Much physical deterioration can be cured. However, the relationship between the costs involved and the economic benefit derived determines whether it is economically feasible to cure or repair physical deterioration. An element of physical deterioration is considered *curable* when the cost to cure the deficiency is less than the resulting economic benefit. When the cost to cure the deficiency is greater than the resulting economic benefit, the element of physical deterioration is considered *incurable*.

Functional Obsolescence

Functional obsolescence is the loss of value in a property caused by the design of the property itself. For example, when the capacity of a property to perform the function for which it was intended declines, functional obsolescence is present. Functional obsolescence may include such things as changes in taste in the marketplace, changes in equipment design, materials, or process, or poor initial design.

Changing technology commonly creates functional obsolescence for machinery and equipment. Older machines, and sometimes newer machines or entire lines of equipment, even though still in use may be made obsolete by new technologies and manufacturing processes and the market value may be reduced because of functional obsolescence.

Functional obsolescence may be less tangible or visible than physical deterioration, but it may be more significant. However, it may be curable. An element of functional obsolescence is considered *curable* when the cost to cure the deficiency is less than the present value of the excess operating expense associated with allowing the conditions creating the functional obsolescence to continue over the remaining life of the property. When the cost to cure the deficiency is greater than the present value of allowing the conditions which result in functional obsolescence to continue, the element of functional obsolescence is considered *incurable*.

External Obsolescence

External obsolescence, also known as economic obsolescence, is a loss in value resulting from adverse factors external to the property that decrease the desirability of the property. This type of depreciation may include the loss of value due to any one or a combination of the following factors:

- Inflation
- High interest rates
- Legislation or regulations
- Environmental factors
- Inadequate demand for the product relative to production capacity
- Increased competition

- Changes in raw material supplies
- Increasing costs of raw materials, labor or utilities without a corresponding price increase of the product

Loss in value attributable to external obsolescence is usually beyond the owner's control. It can be identified by studying the overall market conditions for a property. For example, if the output of a machine is superseded in the marketplace by output of a different material (for examples, fiberglass for metal or plastic for wood) and the market no longer absorbs the superseded output, then the machinery has suffered external obsolescence. Continued operation or continued profitability does not necessarily disprove the existence of external obsolescence or indicate that no external obsolescence exists.

METHODS OF ESTIMATING DEPRECIATION

There are several methods of estimating depreciation for appraisal and assessment purposes. The appraiser's methods are not the same as the accountant's methods because an accountant uses depreciation to recover cost over a pre-selected useful life of the property as determined by GAAP and/or federal and state income tax laws, while an appraiser uses depreciation to estimate market value.

Five methods are discussed in this section:

- Market method
- Equipment index factor and percent good factor method
- Sampling method
- Straight-line or age-life method
- Breakdown method

Of the five methods, only the breakdown method measures depreciation according to its separate sources: physical deterioration, functional obsolescence, and external obsolescence. The other methods measure depreciation from all sources in a lump sum. Although some of these methods are time-consuming and may not be practical in mass appraisal (particularly the breakdown method), it is important to be familiar with each of the methods. If a taxpayer provides information on the valuation of his/her property using one of the methods either as an attachment to a business property statement or through the appeal process, the appraiser must be familiar with the method in order to determine the validity of the appraisal.

Market Method

The *market method* of calculating value factors (and/or developing depreciation tables) relies on market data, with adjustments made for relevant property characteristics incorporated. It is a method of estimating a property's total depreciation directly without utilizing indirect engineering economics calculations. The market method is the preferred method when reliable

data[17] are available because it captures all forms of depreciation, including both external and functional obsolescence.

Using a variation of this methodology, an appraiser may gather market data for identical or similar property to compare the used price of an asset to the original new price of that same asset. The difference is the appraiser's estimate of a value factor (used price divided by new price = value factor)[18] at the age it was at the time of sale. The estimates are reduced to a table of value factors. When arrayed on a scattergram, a best-fit curve, passing through the entire mass of points, estimates average value factors at each age and the average decline in value per year. (It is usually set to 100 percent at age 0 in order to correspond with the assumption that a new asset is purchased at its market value when new.) When reliable, accurate, and representative data are available regarding machinery and equipment and fixtures, use of this approach (or a modified version) is the preferred method.

Equipment Index Factor and Percent Good Factor Method

The valuation of personal property and business fixtures for assessment purposes most often involves the use of a mass appraisal method. The property statement is organized to facilitate the use of such a method, specifically equipment index and percent good factors. Property (normally equipment) is valued based on information reported on property statements. Each piece of equipment is not identified and valued separately, but rather, the equipment is valued as a group based on the type of business and the classification of the property.[19] The first step in the calculation process is to "trend" the historical cost of the property to an estimated reproduction or replacement cost new (by applying the appropriate index factor to historical cost). This trending is accomplished using an equipment index factor. The next step is to apply a percent good factor to trended historical cost in order to calculate reproduction or replacement cost new less depreciation.

Equipment index factors and percent good factors in AH 581 are computed and published by the Board for use in estimating reproduction cost new and equipment/fixture value, respectively. The tables are based upon data for different types of property.

Equipment Index Factors

Equipment index factors are developed for use in mass appraisals for converting original cost to estimates of reproduction cost or replacement cost new. Index factors are used to adjust a property's historical cost for price level changes since the property was acquired. The index factors recommended by the Board, updated and distributed annually in AH 581, include three separate index factor tables: Table 1, *Commercial Equipment*; Table 2, *Industrial Machinery and Equipment*; and Table 3, *Agricultural and Construction Equipment.* The tables rely on indexes

[17] See AH 501, Chapter 6, under the discussion of the cost approach for information regarding data collection and analysis.
[18] Using the market method, a combined factor may be estimated similar to the valuation factors in AH 581 or the result of multiplying the index factor and the percent good factor used from the tables in AH 581.
[19] An exception is form AH 571-F, *Agricultural Property Statement;* each piece of equipment is listed separately on this form.

published by the U.S. Government Bureau of Labor Statistics (BLS) and on information published by Marshall & Swift/Boeckh, LLC (Marshall & Swift). The BLS and Marshall & Swift have indicated to Board staff that their indexes attempt to track price changes for an identical product sold under identical terms over time, such that the indexes approximate an estimate of reproduction cost new. Thus, when the original cost of property is multiplied by the Board's index factor for the year of acquisition, the product typically approximates current reproduction cost new.

In situations where equipment has undergone minimal changes in technology, reproduction cost and replacement cost are likely to be similar. In industries where the equipment used is undergoing rapid changes in technology or where technology may not rapidly change but newer technology is available, further adjustments are likely to be needed to arrive at replacement cost new. Thus, there may be situations where market evidence supports the need to make adjustments to reproduction cost to account for functional obsolescence before the percent good factors can be applied when determining value for taxation purposes. Any such adjustments should be based on reasonable evidence, and appropriate adjustments should be made to arrive at replacement cost new. County assessors should consider such evidence provided by assessees when making these adjustments.

Price Changes

Price changes are usually an increasing factor (inflation). Price changes are measured from a base year, in which a beginning index number is typically set at 100. During those periods of time when the cost of raw material and/or labor actually declines, however, price changes may be a decreasing factor (deflation). If raw materials, labor, and other costs rise, the index will probably increase.

Effects of Technological Progress

If technological progress has occurred since the acquisition date of an asset, the cost of producing a functionally superior but physically similar asset may now be lower. Consequently, the current replacement cost new of previously existing assets will probably decline.

Indications of changes in technology may include increased capacity of new equipment, changes in equipment design, material, or process, or lower operating or acquisition costs for new equipment. Forces that may cause obsolescence include changes in taste in the marketplace and regulatory requirements.

Percent Good Factors

In a mass appraisal program, percent good factors are frequently used in estimating depreciation. Percent good, as a percentage, is the complement of depreciation. For example, if total depreciation is 20 percent, then percent good is 80 percent. The percent good concept is used in the appraisal process for two reasons: (1) it focuses the appraisal on the benefits remaining or the economic life remaining in the property rather than the benefits used; and (2) it saves one arithmetical operation.

Percent good factors are provided in AH 581 for use in valuing personal property and fixtures. In general, an *average service life* (the average life term of a group of items) estimate is needed in order to use the table. In mass appraisal situations, estimating life for each piece of equipment is not practical; therefore, service life is not generally estimated on an individual basis. (It may occur in practice, however, when the assessee files an appeal, when an audit is conducted, or when equipment is self-constructed.) Average service life can be estimated by an appraiser based on a mortality study of individual acquisitions and retirements, historical usage of property, useful life expectancy as reflected by the applicable industry, or other information as available.

Any percent good table or depreciation schedule, including those published by the Board, should be used only as a guide in the estimation of value. They may reflect more or less depreciation than the actual market indicates.

Sampling Method

Indexes published in AH 581 are based on government price indexes derived by market sampling. When necessary, and resources are available, the county assessor may conduct similar such studies to derive his/her own indexes.

In order to promote uniformity in appraisal practices and values throughout the state, the Board issues information and data relating to commercial and industrial property. This information includes, but is not limited to, appropriate index factors and percent good factors. Most counties do not have staff to conduct independent and statistically sound sampling procedures to develop their own valuation factors. Furthermore, achieving statistically sound samples may be very difficult for a county assessor seeking to develop valuation factors because it can be difficult to obtain data from entities that are outside the county assessor's jurisdiction and are not stakeholders in the outcome. Moreover, when counties develop and use different valuation factors for property, value inequities may result between counties for the same type of property.

Most notably, where the equipment index and percent good factors provided by the Board and other approaches to value and methods of estimating depreciation are not good indicators of value, a county assessor may wish to use some type of sampling methodology to develop his/her own factors. To use sampling, county assessors must develop and use recognized methods that will be accepted with confidence by the Board and assessees. In developing a sample plan, technique, and program, consulting a textbook on statistics for information on the theory and application of sampling is recommended. For an example, see the *Board's Sales and Use Tax Audit Manual,* Chapter 13: *Statistical Sampling*.[20]

Straight-Line or Age-Life Method

Under *straight-line* or *age-life method*, depreciation is estimated by dividing the actual or effective age of the property by the estimated economic life. The straight-line or age-life method is based on the relationship between physical age and estimated economic life. *Physical life* is the estimated number of years that a new property will physically endure before it deteriorates or

[20] See AH 504, Appendix G.

fatigues to an unusable condition purely from physical causes, without considering the possibility of earlier retirement due to functional or external obsolescence.[21] Economic life of a property represents the period of time during which the property has value.

Although straight-line depreciation may have little or no bearing on market value, effective age should be recognized whenever data reasonably indicates that effective age is different than actual age. *Effective age* is the apparent age of a property in comparison with a new property of like kind; that is, the age indicated by the actual condition of a property.[22] Because there may be a large variation in the condition of property having the same age, the effective age (as opposed to the actual age) is the best indicator of the market's perception of age.

This approach does not reflect the relationship between the present worth of the future earnings of a property versus the present worth of future earnings of a new replacement property. It ignores the principle that money has a time value (income earned in the near future has a greater value than the same amount of income to be earned in the distant future). Thus, it tends to understate the economic value of older property that is producing a current income comparable to the current income that would be produced by a new replacement. Conversely, this method does not reflect additional depreciation that should be recognized if the existing property benefits are *less* than the benefits that would be earned by a new replacement. While an estimate of depreciation is easily achieved, the result is an approximation based on the usually faulty assumption that property depreciates on a straight-line basis throughout its economic life. Therefore, this method should be used in combination with another method or methods.

Breakdown Method

The *breakdown method* measures depreciation according to its separate sources: physical deterioration, functional obsolescence, and external obsolescence. When using the breakdown method to measure depreciation, each type of depreciation is deducted separately in a specific order. For example, under the cost approach, the appraiser would first deduct the percentage of depreciation attributed to physical deterioration from replacement cost new. Second, the appraiser would deduct the percentage of depreciation attributed to functional obsolescence from replacement cost new less physical deterioration. Third, the appraiser would deduct the percentage of depreciation attributed to external obsolescence from replacement cost new less physical deterioration and functional obsolescence. In some cases, it may be more appropriate to deduct external obsolescence before functional obsolescence depending on the methodology used. However, if an appraisal is presented that deducts each type of depreciation in a different order, a reasonable explanation should be provided to support the reason for using a methodology contrary to industry accepted appraisal practice and standards.

[21] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets,* Second Edition, p. 74.
[22] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets,* Second Edition, p. 71.

The following provides information to assist an appraiser in recognizing various methods that may be used by taxpayers when providing valuation evidence with a business property statement or through the appeal process.

Estimating Physical Deterioration

In general, physical deterioration is measured as a percentage. For example, a new property would have 0 percent physical deterioration. A percentage attributed to physical deterioration is the first deduction from replacement cost new in the breakdown method. There are various methods of estimating physical deterioration. The American Society of Appraisers identifies three methods of measuring physical deterioration.[23] These methods include observation, formula ratio, and direct dollar measurement.

Observation Method

One method of estimating physical deterioration is the *observation method*.[24] Under this method, physical deterioration is estimated by observing the condition of the property. Physical deterioration is calculated as a percentage, which is deducted from replacement or reproduction cost new. The appraiser conducts a physical inspection to identify the wear and tear of the equipment in order to estimate physical deterioration of the subject property when compared to that property if it was new. Although some wear and tear may be visible to the appraiser, not all wear and tear can be observed. To identify all wear and tear, the appraiser may interview knowledgeable personnel and inspect maintenance records. Under the observation method, the appraiser estimates physical deterioration as a percentage based on his/her subjective opinion. Therefore, the appraiser should gather as much information as practicable to ensure that each estimate of physical deterioration is as accurate as is possible under the circumstances.

The following is an excerpt from *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets* (pages 68-69) and is provided to illustrate guidelines in determining the overall condition of equipment when estimating physical deterioration using the observation method. The following is provided for illustration purposes only, an appraiser should identify his/her overall guidelines when utilizing the observation method and identify a percentage range to use within each classification (for example, identify applicable percentage range to use for equipment in excellent condition vs. very good condition).

[23] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 71.
[24] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 71.

New (N)	This term describes new items that have not been used before.
Excellent (E)	This term describes those items that are in near-new condition and have had very little use.
Very Good (VG)	This term describes an item of equipment in excellent condition capable of being used to its fully specified utilization for its designed purpose without being modified and without requirement of any repairs or abnormal maintenance at the time of inspection or within the foreseeable future.
Good (G)	This term describes those items of equipment which are in good operating condition. They may or may not have been modified or repaired and are capable of being used at or near their fully specified utilization.
Fair (F)	This term describes those items of equipment which because of their condition are being used at some point below their fully specified utilization because of the effects of age and/or application and which may require general repairs and some replacement of minor elements in the foreseeable future to raise them to be capable of being utilized to or near their original specifications.
Poor (P)	This term is used to describe those items of equipment which because of their condition can be used only at some point well below their fully specified utilization, and it is not possible to realize full capacity in their current condition without extensive repairs and/or the replacement of major elements in the near future.
Salvage (S)	This term is used to describe those items of equipment whose value remains in the whole property or a component of the whole property that has been retired from service.
Scrap (X)	This term is used to describe those items of equipment which are no longer serviceable and which cannot be utilized to any practical degree regardless of the extent of the repairs or modifications to which they may be subjected. This condition applies to items of equipment which have been used for 100 percent of their useful life or which are 100 percent technologically or functionally obsolete and are no longer serviceable and have no value other than for their material content.

Formula Ratio Method

A second method of estimating physical deterioration is the *formula ratio method*.[25] Use versus total use and age/life are two different formula ratios identified. In general, when using the use versus total use ratio, a percentage is calculated by dividing the use of the equipment at a point in time by the total use expected out of the property (use / total use = percent of physical deterioration). If the use exceeds the expected (or projected) total use of the equipment or if the equipment is rebuilt, then an adjustment is necessary to the total use. (For example, if a piece of equipment is expected to be used for 50,000 hours but it is rebuilt at 50,000 hours and is expected to continue operation for additional 25,000 hours, physical deterioration using the use vs. total use method is calculated as follows: [50,000 / (50,000 + 25,000)] x 100 = 67 percent.)

In general, when using the age / life ratio, a percentage is calculated by dividing the effective age of the equipment at a point in time by the physical life of the equipment (effective age / physical life = percent of physical deterioration). For older equipment, an adjustment is necessary to the denominator in the equation as follows: effective age / (effective age + remaining physical life) = percent of physical deterioration. Chronological age is not synonymous with effective age. "*Chronological age* is the number of years that have elapsed since an item or a property was originally built or placed in service."[26] "*Effective age* is the apparent age of a property in comparison with a new property of like kind; that is, the age indicated by the actual condition of a property.[27]

Remaining physical life is the estimated period during which a property of a certain effective age is expected to physically endure before it deteriorates or fatigues to an unusable condition purely from physical causes, without considering the possibility of earlier retirement due to functional or external obsolescence.

The discussion of use versus total use and the age / life ratio, formula ratio methods, are presented in a simplified format. The discussion does not consider the time value of money; a more detailed treatment would consider the time value of money. The "time value of money" refers to the fact that a dollar today is worth more than a dollar in the future. Time value of money concepts and techniques are used to calculate and to compare the values of sums of money at different points in time.

Direct Dollar Measurement Method

A third method of estimating physical deterioration is the *direct dollar measurement method*.[28] This method is recommended for equipment that may have a physical problem that requires a large expenditure to cure the physical problem. Under this method the curable physical

[25] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 71 and 72.
[26] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 73.
[27] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 73.
[28] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 82 - 86.

deterioration is estimated using the direct dollar measurement method and the incurable physical deterioration is estimated using either the observation method or one of the formula ratio methods. In other words, under the direct dollar measurement method, calculation of physical deterioration is a two step process.

Under the direct dollar measurement method, curable physical deterioration is estimated by determining the cost to cure the physical problem with the property. Once the cost to cure the physical problem with the property is calculated, it is deducted from the reproduction cost new of the property to compute the reproduction cost new less curable physical deterioration. The next step is to calculate the incurable physical deterioration using the observation method or one of the formula ratio methods. As described under the applicable headings above, these calculations result in a percentage. The percentage is applied to the reproduction cost new less curable physical deterioration to determine incurable physical deterioration. The curable physical deterioration is added to the incurable physical deterioration to compute the total physical deterioration. This total is divided by the reproduction cost new to calculate a composite physical deterioration percentage that can be applied to replacement cost new in the breakdown method.

Estimating Functional Obsolescence

When the capacity or efficiency of a property to perform the function for which it was intended declines, functional obsolescence is present. Two common methods of estimating functional obsolescence in equipment, if present, include analysis of excess capital costs and analysis of excess operating expenses. Functional obsolescence is considered curable if, on the appraisal date, it is economically feasible to cure the problem; otherwise, it is incurable.

Excess Capital Costs

If the property's replacement cost is less than its reproduction cost, excess capital costs may be estimated by calculating the difference between reproduction cost and replacement cost. In situations where equipment has undergone minimal changes in technology, reproduction cost and replacement cost are likely to be similar. In these situations, there would be no functional obsolescence due to excess capital costs. But, in industries where the equipment used is undergoing rapid changes in technology, there could be functional obsolescence due to excess capital cost.

If the replacement property's capacity is greater than the subject property's capacity, the cost-to-capacity method[29] may be used to estimate the cost of the subject property with the same capacity as the replacement property. The cost-to-capacity method uses a scale factor to estimate the cost of the subject property. The cost-to-capacity formula is as follows:

$$C_2 = C_1 (Q_2 / Q_1)^x$$

C_2 = desired cost (replacement cost) of capacity Q_2
C_1 = known cost of capacity Q_1

[29] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 61-65.

Q_2 = capacity of subject property
Q_1 = capacity of replacement property
x = scale factor[30]

The cost estimate that results from the cost-to-capacity method represents the cost of a new, modern replacement asset of the same capacity as the subject property. Subtracting this cost from the trended acquisition cost represents functional obsolescence from excess capital costs. (See Step 1 in the Example of the Breakdown Method.)

Excess Operating Expenses

Functional obsolescence may also be caused from excess operating expenses. In some cases, replacement equipment not only has less of an acquisition cost but may also be less expensive to operate. In other words, operation of inefficient equipment may result with excess operating expenses (labor, material, overhead, etc.).

A method that may be used to quantify obsolescence from excess operating costs is summarized as follows (calculates the excess cost to operate the equipment rather than the cost to cure the deficiency of the equipment):[31]

A = Operating expense per unit of production for the subject property
B = Operating expense per unit of production for replacement property
C = Difference in operating expense per unit *(A – B = C)*
D = Annual excess operating expense *(projected annual units of production x C = D)*
E = Income tax on incremental income (to account for additional income using modern equipment due to less operating expenses)
(D x combined federal and state income tax rate = E)
F = Annual excess operating expense reduced by income tax on incremental income *(D – E = F)*
G = Remaining economic life of subject property
H = Present value factor for annuity (G @ appropriate discount rate)

Operating Obsolescence = Annual excess operating expense reduced by income tax on incremental income x applicable present value factor for annuity
(F x H)

The American Society of Appraisers also identifies situations where functional obsolescence may be typically found. Examples given include:

> …plants involved in the process industry, plants involved in industries that either use assets or manufacture products with a high degree of technology, older plants that have increased in size over time, plants in which there are a number of

[30] Scale factor is discussed in the guidelines under the heading of "Inutility."
[31] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets,* Second Edition, p. 89.

identical units, plants involved in industries that handle large volumes of material, and plants with areas of inactive machinery.[32]

Estimating External Obsolescence

External obsolescence is typically incurable because it is not within the control of the property owner, but it is not always permanent. External obsolescence can either diminish or increase in the future. If the external obsolescence is not permanent, the estimated duration of the obsolescence should be considered in the determination of value. Compared to physical deterioration and functional obsolescence, external obsolescence is the most difficult to measure. It is difficult to measure because it may not be easy to isolate the impact of adverse factors external to the property when other factors are present. In the breakdown method, calculation of external obsolescence is typically the last step in the determination of market value. The measurement of external obsolescence is removed from replacement cost new less physical deterioration and functional obsolescence. The American Society of Appraisers describes an inutility adjustment as one method of measuring external obsolescence and also provides a discussion on other methods available.[33]

Inutility

An inutility penalty may be used to measure external obsolescence. One factor that may cause external obsolescence is a reduced demand for the product. Therefore, a plant not operating at full capacity may be a sign of external obsolescence, but it may also be a sign of functional obsolescence and/or physical deterioration. For example, a plant may not operate at capacity due to reduced demand for the product (external obsolescence), or it may not operate at full capacity due to a bottleneck in the production line that does not exist with replacement property (functional obsolescence), or it may not operate at full capacity due to poor condition of the equipment (physical deterioration). It is important to identify the cause of obsolescence when using the breakdown method.

The following is one method for calculating an inutility penalty.[34]

$$\text{Inutility percent} = [1 - (\text{Capacity B} / \text{Capacity A})^{x}] \times 100$$

Capacity A	=	rated or design capacity
Capacity B	=	actual production
x	=	exponent or scale factor

In estimating inutility, information on the rated or design capacity for a property may be acquired from the manufacturer of the equipment and/or it may be identified in the property's instruction/operation manual. Information on the actual production (actual or predicted use) of the property may be acquired from the plant manager and/or equipment operation logs. In

[32] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 90.
[33] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 96-102.
[34] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, p. 98.

addition, it may not always be appropriate to use a property's rated or design capacity as "Capacity A" for determining obsolescence.[35] If the expected capacity of the user differs from the rated capacity of the manufacturer, it may be valid to use the expected capacity instead of the rated or design capacity when the expected capacity is less than the rated or design capacity.

The scaling factor is based on the concept that the cost of property of different capacities may vary in a nonlinear fashion because of economies of scale. Therefore, as capacity increases, so does cost, but at a different rate and vice versa. Simply put, property with twice the capacity of the current property may not cost twice as much to build, or property with half the capacity may not cost half as much to build. Scaling factors generally range from .4 to slightly higher than 1.0[36] and will vary depending upon the type of equipment and the labor/material ratios. The most common scale factors are between 0.6 and 0.7.[37] In appraisal texts and literature, the general discussion regarding scaling factors references a single purpose plant or piece of equipment. Scaling factors should be selected for the property in question.

Additionally, inutility must be evaluated in the context of whether the obsolescence has already been recognized through market forces typically in place for a recent sale. For example, recently purchased equipment is presumed to be acquired at market value, reflecting the expected capacity (rate or design capacity) and usage (actual production) at the time of acquisition; any additional inutility adjustment should be viewed in this context. However, even recently purchased equipment, the price and capacity of which is used to establish replacement cost new, may require further adjustment for inutility. For example, in situations where the planning, development, and installation stages are lengthy, and the economy changes whereby it reduces the demand for the product in a way not anticipated during the planning of the property, an inutility adjustment may be appropriate where supported by demonstrable and credible evidence. Although this situation is the exception, it is important for an appraiser to consider the entire context of the acquisition and operation to make a determination concerning the presence or absence of obsolescence.

Other

Other methods are mentioned by the American Society of Appraisers to measure external obsolescence.[38] One of the methods is to measure external obsolescence due to excess operating expenses caused by external factors. This is analogous to the method that is used to measure functional obsolescence due to excess operating expenses caused by internal factors.

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[35] As indicated above, a plant not operating at full capacity may be a sign of external obsolescence, functional obsolescence, and/or physical deterioration. It is important to identify the cause of obsolescence when using the breakdown method.

[36] Frazier Capital Publications, *Business Valuation Resource Guide*, p. 211.

[37] Donald S. Remer and Lawrence H. Chai, *Design Cost Factors for Scaling-up Engineering Equipment*, Chemical Engineering Progress (Aug. 1990), pages 77 - 82. Kenneth K. Humphreys and Paul Wellman, *Basic Cost Engineering*, Second Edition (1987), pages 7 – 13. Donald S. Remer and Lawrence H. Chai, Estimate Costs of Scaled-Up Process Plants, Chemical Engineering Progress (Apr. 1990), pages 138 – 139, and pages 141 – 175.

[38] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 101-102.

The difference in the computation for external obsolescence and for functional obsolescence is the reason attributed to the excess operating expenses (see the discussion under estimating functional obsolescence for additional information on this method). The presence or absence of one form of external obsolescence does not rule out the presence of a different form. Care must be taken not to double count functional and external obsolescence, but care must also be taken to consider each aspect of obsolescence that may impact the property value.

Example of the Breakdown Method

The following example demonstrates application of the breakdown method to estimate full cash value of business personal property. As indicated previously, the breakdown method measures depreciation according to its separate sources: physical deterioration, functional obsolescence, and external obsolescence.

Example

A taxpayer acquired the following Model A Widget Production Equipment for $400,000 in 2004.

Subject Property—Widget Production Equipment, Model A

- Capacity is 1,000 units per day (260,000 units per year)*
- Reproduction cost using trending is $520,000**
- Model A no longer produced
- Operating cost per year is $50,000***

* Rates capacity from manufacturer of Widget Production Equipment (Model A).

** Reproduction cost new determined using the Bureau of Labor Statistics' *Producer Price Indexes*. Series Id: WPU 107, Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Fabricated Structural Metal Products, Base Date: 1982. [212.6 (2008 index)/163.4 (2004 index) = 1.30 index factor]. 2004 acquisition cost of $400,000 x 1.30 = $520,000 reproduction cost.

*** Operating cost includes cost of labor, material, overhead, etc. Cost estimate based on information received from the plant manager and the plant controller using the subject equipment.

What is the estimated full cash value as of the Model A Widget Production Equipment as of the January 1, 2009 lien date?

Step 1: Determine the replacement cost new of the equipment as of January 1, 2009. *Replacement cost new* is the cost to replace an existing property with a property of equivalent utility as of a particular date and is the most meaningful under the principle of substitution. In situations where equipment has undergone minimal changes in technology, reproduction cost and replacement cost are likely to be similar.

For purposes of this example, assume that Widget Production Equipment has undergone more than minimal changes in technology; Model A Widget Production Equipment is no longer produced and is not available for purchase as of January 1, 2009. Instead, the available replacement property on January 1, 2009 is Model B Widget Production

Equipment. Therefore, the appraiser identifies the following Model B Widget Production Equipment as the replacement for the subject property.

Replacement Property—Widget Production Equipment, Model B

- Model B's capacity is 1,200 units per day (312,000 units per year)+
- Replacement cost (using price guide publication) is **$550,000**
- Model B is the replacement equipment for Model A
- Operating cost per year is $30,000++

+ Rated capacity from manufacturer of Widget Production Equipment (Model B).
++ Operating cost includes cost of labor, material, overhead, etc. Cost based on information received from the plant manager and the plant controller using the replacement equipment.

Comment: The subject asset has a capacity of 260,000 units per year while the replacement asset has a capacity of 312,000 units per year. This is a betterment that must be reflected in the Replacement Cost. One method to be considered would be to ratio the Replacement Cost down to subject capacity through the use of a Scale Factor as follows:

Subject Capacity = 260,000 units/year

Replacement Capacity = 312,000 units/year

Replacement Cost = $550,000

Using the cost-to-capacity method,[39] the Subject's Replacement Cost for an asset of the same capacity would be as follows:

$$\text{Subject Replacement Cost} = \$550{,}000 \times (260{,}000/312{,}000)^{0.7}$$

$$= \$550{,}000 \times 0.8333^{0.7}$$

$$= \$550{,}000 \times 0.8802$$

$$= \$484{,}110$$

The $484,110 represents the cost of a new, modern replacement asset of the same capacity of the subject. Subtracting the $484,110 from the trended acquisition cost represents functional obsolescence from excess capital costs of $35,890 ($520,000 – 484,110).

Step 2: Estimate physical deterioration. *Physical deterioration* is the loss in value which may be the result of wear and tear from either use or exposure to various elements. There are various methods of measuring physical deterioration. Therefore, after reviewing the available data, the appraiser decides to use the age/life ratio. When using the age/life ratio, a

[39] American Society of Appraisers, *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, Second Edition, pp. 61-65.

percentage is calculated by dividing the age of the equipment at a point in time by the life of the equipment (effective age/physical life = physical deterioration percentage).[40]

In general, the age/life ratio does not reflect the time value of money (income earned in the near future has a greater value than the same amount of income to be earned in the distant future). In order to reflect the time value of money when using the age/life ratio, a rate of return is applied to the ratio.

- Effective age: In estimating the effective age of the Model A Widget Production Equipment, the appraiser interviews the plant manager and operators of the equipment. The appraiser discovers that the equipment goes through a major overhaul once a year and is considered to be in above-average condition. The appraiser estimates the effective age of the equipment to be 3 years.

- Physical life: In estimating the physical life of the Model A Widget Production Equipment, the appraiser interviews the plant manager, operators of the equipment, plant managers of other manufacturing companies that use Model A Widget Production Equipment, and the company that manufactures the equipment. The appraiser estimates the physical life of the equipment to be 20 years.

- Rate of return is 7 percent (this is the rate of return used in the calculation of the percent good factors for 2009).[41]

  1 – (PW$1/P for 17 (20 – 3) years @ 7% / PW$1/P for 20 years @ 7%) =
  1 – (9.763223 / 10.594014) =
  1 - .9215792 = .078 (7.8 % Physical deterioration)

  484,110 x .078 = $ 37,761

Step 3: Calculate replacement cost new less physical deterioration.

Replacement cost new (Step 1)	$484,110
Physical deterioration (Step 2)	- 37,761
Replacement cost new less physical deterioration	**$446,349**

Step 4: Estimate functional obsolescence. *Functional obsolescence* is the loss of value in a property caused by the design of the property itself. Two common methods of estimating functional obsolescence, if present, include analysis of excess capital costs and analysis of excess operating expenses.

[40] When using the age/life ratio for older equipment, a percentage is calculated as follows: effective age/(effective age + remaining physical life).

[41] See 2009 update of Assessors' Handbook Section 581 (AH 581), *Equipment Index and Percent Good Factors*, page 19. The following formula is from page 9 of Assessors' Handbook Section 582, *Explanation of the Derivation of Equipment Percent Good Factors*. The factors are from page 37, column 5 of Assessors' Handbook Section 505, *Capitalization Formulas and Tables*.

- Excess capital cost: The appraiser begins with replacement cost in the appraisal; therefore, the step attributed to calculation of functional obsolescence from excess capital costs is eliminated. As indicated in Step 1, the $484,110 represents the cost of a new, modern replacement asset of the same capacity of the subject. Subtracting the $484,110 from the trended acquisition cost represents functional obsolescence from excess capital costs of $35,890 ($520,000 – 484,110).

- Excess operating expenses: Calculation of excess operating expenses quantifies the economic penalty of operating the equipment rather than the cost to cure. The appraiser estimates functional obsolescence due to excess operating expenses as follows:

Operating expense per unit of production for the subject property (A)	19¢ per unit*****
Operating expense per unit of production for replacement property (B)	10¢ per unit******
Difference in operating expense per unit (C) [A-B=C]	19¢ - 10¢ = 9¢ per unit
Annual excess operating expense (D) [Projected annual units of production x C=D]***	175,000 x 9¢ = $15,750
Income tax on incremental income (to account for additional income using modern equipment due to less operating expenses) (E) Combined federal and state income tax is 40% [D x 40%]	$15,750 x 40% = $6,300
Annual excess operating expense reduced by income tax on incremental income (F) [D – E = F]	$15,750 - $6,300 = $9,450
Remaining economic life of subject property (G)****	17 years
Present value of $1 per period factor for annuity (H) [17 years, discount rate 10%]*****	8.021553
Operating obsolescence [F x H]	$9,450 x 8.021553 = **$75,804**

* Operating cost per year $50,000/260,000 units per year.

** Operating cost per year $30,000/312,000 units per year.

*** Projected annual units of production of subject equipment (175,000) based on interview with the plant manager.

**** *Remaining economic life* is the expected remaining life of the property on the appraisal date. For purposes of the subject property, the remaining economic life is 17 years (physical life – effective age).

***** The discount rate selected is for purposes of demonstrating the calculation of excess operating expenses. For information on calculation of a discount rate, see AH 502.

Step 5: Calculate replacement cost new less physical deterioration and functional obsolescence.

Replacement cost (Step 1)	$484,110
Physical deterioration (Step 2)	-37,761
Replacement cost less physical deterioration (Step 3)	$446,349
Less functional obsolescence from excess operating costs (Step 4)	-75,804
Replacement cost new less physical deterioration and functional obsolescence	**$370,545**

Step 6: Estimate external obsolescence. *External obsolescence* is a loss in value resulting from adverse factors external to the property that decreases the desirability of the property. Therefore, the appraiser estimates external obsolescence by calculating an inutility penalty[42] as follows:

Subject property: Capacity A[43] [Rated or design capacity]	260,000 units
Subject property: Capacity B [Actual production]	175,000 units
Exponent or scale factor+	.7

[42] Methodology from the American Society of Appraisers, *Valuing Machinery and Equipment; The Fundamentals of Appraising Machinery and Technical Assets*, p. 98. As indicated on page 19 of the guidelines, a plant not operating at full capacity may be a sign of external obsolescence, but it may also be a sign of functional obsolescence and/or physical deterioration. Therefore, when using the breakdown method it is important to identify the cause of obsolescence. In Step 1, the cost-to-capacity method was used to estimate the replacement cost of the subject property because the replacement property has a capacity of 312,000 units per year and the subject property has a capacity of 260,000 units per year (functional obsolescence caused from excess capital cost). Using the cost-to-capacity method, the replacement cost of property with the same capacity as the subject was estimated. In other words, this method estimated the replacement cost of property with a capacity of 260,000 units per year. Step 6 uses an inutility adjustment to estimate external obsolescence because although the subject property has a capacity of 260,000 units per year the actual production is 175,000 units per year due to external factors.

[43] Where expected capacity is less than rated or design capacity, see earlier discussion under the heading "Inutility."

Inutility percent
[1 – (Capacity B/Capacity A)^{x}] x 100
[1 – (175,000/260,000)$^{.7}$] x 100
[1 – (.673077)$^{.7}$] x 100
[1 - .757958] x 100
.242042 x 100 = 24.2042% (rounded to 24.2%) 24.2%

+ The exponent or scale factor may be found in various published sources and varies depending on the type of property.

Step 7: Calculate replacement cost new less physical deterioration, functional obsolescence, and external obsolescence (full cash value).

Replacement cost (Step 1)	$484,110
Physical deterioration (Step 2)	-37,761
Replacement cost less physical deterioration (Step 3)	$446,349
Less functional obsolescence from excess operating costs (Step 4)	-75,804
Replacement cost new less physical deterioration and functional obsolescence (Step 5)	**$370,545**
Less external obsolescence (24.2%) (Step 6) (370,545 x .242)	-89,672
Full cash value	**$280,873**

In conclusion, the estimated full cash value as of the January 1, 2009 lien date of the Model A Widget Production Equipment, which was purchased for $400,000 in 2004 (using the breakdown method of measuring depreciation) is $280,873.

TAXPAYER EVIDENCE

Assessees may present evidence to a county assessor to support their estimation of market value when they believe that application of the index and percent good factors do not produce results within an acceptable range of value. Evidence presented to a county assessor should be reviewed and considered if the information is submitted prior to the enrollment of the assessment; otherwise, the evidence may only be considered if a timely assessment appeal application is filed or an audit is conducted. Evidence may be presented in a number of ways, including in the form of an independent appraisal, a market study, price lists for new equipment, and/or data from used equipment price guides.

An independent appraisal is an appraisal conducted by an unrelated firm that specializes in the valuation of personal property and fixtures. The appraisal typically includes a listing of all of the property included in the valuation. The appraisal may include itemized valuations of each piece of equipment or a total value estimate. The format presented must clearly identify the appraisal approach and may vary depending on the appraisal approach (for example, cost, comparative sales, and income) used by the appraiser.

The evidence may also be presented in the format of a market study. An example of a market study is described as the market method presented earlier in these *Guidelines*. The market method is any method of calculating value factors (and/or developing depreciation tables) which

relies on market data, with adjustments made for relevant property characteristics incorporated in the data. Data used for the market study should include recent market sales that meet all conditions of an arm's-length transaction. Data from bankruptcy and/or liquidation sales would generally not provide good indications of market value.

Price lists for new equipment and price guides for used equipment are other sources that may be used to value personal property. When reliable evidence of current replacement costs is available in a verifiable format, it is more appropriate to use market-indicated costs rather than trended historical costs. Price lists and used equipment price guides provide market-indicated costs. If price lists for new equipment are used, adjustments may be necessary if the equipment being valued is no longer available in the market. In addition, depending on the technological advances in some industries, the price lists for new equipment may not provide any benefit. With regard to used equipment price guides, if no market exists for used equipment in a particular industry, such guides may not be a useful alternative.

The methods mentioned above are provided as examples of methods that may be used to determine fair market value when it is necessary to test whether the application of index factors and percent good factors in AH 581 provide an acceptable value indicator. Other methods may be presented depending on the type of data available.

Pursuant to section 441, subdivision (d):

> (1) At any time, as required by the assessor for assessment purposes, every person shall make available for examination information or records regarding his or her property or any other personal property located on premises he or she owns or controls.

Consistent with section 441, subdivision (d), any evidence and/or data submitted by the taxpayer may be subject to verification by the county assessor through a review of source documents. Therefore, the taxpayer should maintain supporting documents in order to comply with the county assessor's request for additional information and records. The records should not only support costs reported on the business property statement, but also support the evidence submitted by the taxpayer to the county assessor for review and consideration when they believe that application of the index and percent good factors do not produce results within an acceptable range of value. Examples of the types of records the county assessor may request include, but are not limited to:

- Accounting books and records
- Invoices
- Lease agreements
- Purchase agreements
- Sales and rental reports
- Production reports

- Maintenance records
- Construction contracts
- Cost segregation studies
- Board of directors' meeting notes
- Internal memos.

Some areas the county assessor should consider when reviewing evidence presented include the following:

- Are causes of rapid change in technology apparent in the industry?
- Does the appraisal used by the assessee to estimate fair market value include appropriate adjustments?
- Are the data provided by the assessee verifiable?
- Were the data applied/interpreted correctly?

LIMITATIONS OF THE COST APPROACH

An appraiser cannot assume that the cost approach, or any valuation approach, automatically provides the best indicator of value. All available information must be analyzed to determine the best indicator of value. When available or possible, it is best to compare the estimated value to actual market value of similar property to verify accuracy of results.

The cost approach, like other approaches to value, is not valid unless it is made as of a specific date. The fluctuating purchasing power of money, together with changes in the efficiency of labor and changing techniques of production, and other economic factors cause costs and depreciation to vary over time. It is therefore essential to specify that costs are as of a certain date (the appraisal date) in order for the principle of substitution to be meaningful. The cost approach is most reliable when the property being appraised is relatively new and has experienced little depreciation.

The cost approach is also limited by the accuracy of the information used. If the cost and depreciation estimates are skewed or otherwise unrepresentative of the property, the resulting value will not be an appropriate representation of the property's market value.