DRYFEAS

Lumber Kiln Drying Operation Financial Feasibility Analysis Spreadsheet: Program User's Manual
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Robert Govett, University of University of Wisconsin - Stevens Point[1]
Scott Bowe, University of University of Wisconsin – Madison
Rusty Dramm, USDA-FS State & Private Forestry, Technology Marketing Unit
Steve Bratkovitch, USDA-FS State & Private Forestry, Technology Marketing Unit
Terry Mace, Wisconsin Department of Natural Resources

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[1] Robert Govett, College of Natural Resources, University of Wisconsin – Stevens Point, Stevens Point, WI 54481. Phone: 715-346-4212; FAX: 715-346-4812. E-mail: rgovett@uwsp.edu

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The Lumber Kiln Drying Operation Financial Feasibility Analysis ("DRYFEAS") personal computer spreadsheet program grew out of the requests for some practical decision-making assistance with financial feasibility analysis related to lumber dry kiln operations, similar to what had been developed for financial feasibility analysis of prospective sawmill operations with the SAWFEAS model. The nature of these requests was most typically related to interest in analysis of a new start-up kiln drying operation, but also in some circumstances has related to purchase of an existing kiln drying operation, or expansion of an existing operation. As a result of considerable efforts undertaken in extension and outreach efforts in applied research for the forest industry in the development of a number of specialized personal computer spreadsheets for analysis of various forest industry operations - the idea of developing a computer spreadsheet model specific to lumber kiln drying operations was a natural step. In the early 1990s a basic version of such a model was developed which was first publicly presented within discussion as part of a paper presented at the Forest Products Society Meeting: "Profitable Solutions to Quality Drying of Softwoods and Hardwoods" in Charlotte N.C. May 1994. The program discussed as part of the presentation and within the companion paper was the genesis of what would become the DRYFEAS model which has continued to expand and evolve until it reached its fully expanded form as discussed within this manual.

The DRYFEAS model itself has existed in various forms and formats for more than a dozen years in various forms before this publication of the model, and it has quite a history of practical use by industry. The model is not specific to hardwood or softwood drying applications, but it has been more typically been used for analyses of hardwood lumber drying operations. Part of the reason behind this is due to the training in use of the DRYFEAS model that has been offered through extension/outreach and industry association training sessions in the Lake States Region, but of equal or greater importance is the nature of the hardwood lumber industry. Where the opportunity generally exists for a sawmill or intermediary to readily sell either green or dry hardwood lumber, and with the extensive mix of species groups, grades and thicknesses and customer specified moisture contents, the hardwood market inherently provides a more complicated mix of constraints and opportunities inviting further study. Contrasting this would be as compared to softwood markets, where the lion's share of the softwood volume is essentially sold in ALS standard dried surfaced sizes at standard moisture contents and produced in circumstances where dry kiln capacity is commonly linked with mill productive capacity as a typical production design criteria.

The DRYFEAS model has been successfully used without modification in real-world financial feasibility analysis by a number of firms for analysis of new start-up operations, for analysis of the purchase of existing operations, and for technical and financial consideration in major expansion of existing operations. This includes the model being used by some very large independent firms that are among the largest drying operations within the Lake States region, by multi-national companies, by small independent sawmills making the first steps of forward integrating in adding kilns, and even by very small custom kiln drying operations. Within the initial design and continued development of the DRYFEAS program, an underlying objective

has always been (to the degree possible) to allow knowledgeable users to relatively easily make program changes and modification, to better suit the model to their particular circumstances. This has been a philosophical approach to virtually all specialized models developed by the authors for industry use in such analyses. This is achieved to varying degrees in all the models in terms of avoiding hidden elements of logic, calculation, etc. but it is never completely accomplished because the ability in tailoring the model hinges upon the user's ability in understanding the model, modeling, and the basics of the analysis. By its nature the DRYFEAS program has been one of the more difficult deterministic models to put directly in the hands of a user in industry without training – not just in terms of their being able to make modifications to the model, but even being able to use the model. In terms of an example, experience has taught that the SAWFEAS (Sawmill Financial Feasibility Analysis) model can generally be put in the hands of most capable spreadsheet users with some reasonable level of business or engineering training coupled with a good understanding of sawmill operations - and expect that those users could generally use the model with little difficulty. In contrast, with the DRYFEAS model, there has always tended to be a greater need for specific and detailed training by the typical users who would most likely need the model. There are a number of reasons for this, chief among them include the DRYFEAS model's technical aspects (such as calculation of capacity constraints based on user operational assumptions, and assessment of relative profitability of different items to be dried) are new concepts for most users (the mechanisms were originally developed as unique within the model). But also many potential users have little background in analyses of stand-alone businesses and/or many have not before realistically considered the analysis of kiln drying operations as separate from sawmill operations.

For a number of years now, training in the use of the DRYFEAS model has been a routine part of Lake States Lumber Association Education Inc short-courses held by extension and government personnel within the Lake states region and in a number of other venues as well. Following this training, it has typically been possible to put the model in the hands of an industry user (or extension specialist assisting them). It is hoped that this manual will be a significant companion to short-course efforts in serving as a user reference, but also for many prospective users who do not have ready access to short-courses for whatever reason, it is hoped this manual may provide sufficient training for most prospective users to effectively function within the basic use of the model.

A very common circumstance in which companies will typically be using the DRYFEAS model for the first time is for a preliminary financial feasibility analysis of a new drying operation or an acquisition of an existing operation. In most cases the model is (or should be) initially used prior to devoting extensive time, energy and excessive expense in developing a detailed business plan. Generally where people are aware of the (DRYFEAS) model, understand what it is capable of providing, the use of the model typically becomes a first-step (or very early step) in planning. In contrast there are many circumstances where use of the model comes into the analysis at some much later step, where it is demonstrated that considerable time, trouble and effort could have been saved by earlier use. An example of this is in the model's calculations of capacity constraints which link production assumptions for lumber drying board foot volumes with kiln capacity and projected parameters of drying operations. This represents some fairly tedious calculations to achieve correct balancing assumptions or in contrast some wildly inaccurate assumptions. In terms of example, in a number of circumstances the DRYFEAS model has

shown early assumptions in feasibility analyses to be off by nearly 50% in terms of estimated required kiln-drying capacity or in terms of potential production volumes. This feature of the model alone has earned it significant kudos for analysts who have struggled with such problems, but it is really just a beginning point in analysis.

In some circumstances, the use of the DRYFEAS model may corroborate the view that the proposed operation appears to be a sound concept as envisioned, and where that might not be the case, in other circumstances by using the model to perform "what-if?" analyses the concept of the proposed operation may be changed to a small or to a large degree so the concept may be improved. In some other circumstances the program has demonstrated that what has been contemplated as a business venture has little hope of success, even if inputs to the model are generated when viewed through rose-colored glasses – where this happens it allows for early re-focusing of efforts where flaws or weaknesses in plan logic may be discovered. Also in some cases the model is used in testing a series of alternative ideas for a single individual and finally resting on a general strategy which appears to have good potential of success for that individual's circumstances.

In working with the model in providing assistance to entrepreneurs, there is a good bit of "fun" in using the model to demonstrate there is good potential for the venture that has been envisioned, and in then seeing the model results being used as a springboard through to the development of a full-blown business plan, that is carried forward to business start-up (and on occasion using the model to answer some of the questions of lenders and financers). But as also noted, in some other cases when the model demonstrates the proposed plan simply will not work as it was hoped it would, the idea for the drying operation start-up or expansion may be simply abandoned. It should be noted that discovering in advance that business failure is the most likely outcome is also an important use of the model. Although there is no joy in demonstrating to someone that their hopes and dreams as they have crafted them are not going to work out - there is considerable satisfaction in being able to walk them through to that conclusion, step by step, before they have invested considerable money in an operation that will not work out - particularly where you have experience in working with people having gone down that path and knowing that it could have been prevented with better preliminary analysis. In many circumstances, what might have appeared to be a good concept for a business had not been fully thought through to reach a more logical conclusion that the concept was actually flawed or more typically in the case of drying operations that some critical facets for success might be missing from the operation – this could relate to economies of scale, available mix of products to be dried, market factors or a host of other problems. An important benefit of using the DRYFEAS program is that it "forces" a more holistic consideration to those important elements of the proposed operation that might have been forgotten or ignored.

The normal way in which the DRYFEAS program is first used is in a preliminary analysis form, to develop a reasonably functional working model of the planned operation. In doing this, required variable inputs may range in quality from being carefully calculated or "known" quantities to very rough guesses. Variables that are first entered in to the model will frequently need to be refined at a later time (except in some few cases where, starting with only a relatively few "solid" variable inputs, generous "good case" to "best case" assumptions for all important unknowns may project an unattractive outcome, where much further data input refinement is

probably not necessary). The working model (although it will typically contain some fairly "rough" estimates), provides an excellent starting point for further more holistic study of the proposed enterprise and it becomes a focal point for the group to center on in circumstances where there is an operational group in a large organization conducting the analysis (as is typical in large operations), as opposed to a single individual (as is typical in small entrepreneurial start-ups). There is a tendency on the part of many people (perhaps most people) to focus on what interests them most as related to business planning, and in so doing to give less attention to a less-interesting aspect that may be critically important. This is common where people involved in the analysis may have a strong certain type of background necessary for the analysis (e.g. kiln operator very familiar with schedules for various species and sizes of lumber, but perhaps having limited background in basic financial statements). This is normal, and the model can help people to quickly get beyond this pitfall. As an example, regardless of the background of someone involved in analysis, it is typical that reasonable estimates for some key variables may be known early in analysis, but the appropriate value of some other key variables may be unknown at that point in time. However, in many circumstances a reasonable range could be easily estimated – and in using the model in a heuristic process (i.e. performing a series of "what if" entries), the businesses sensitivity to that variable outcome becomes better understood. Some users of the model have commented that this utility in helping them to better identify and then focus on what is most important in their data collection is one of the most powerful aspects of the model.

Frequently in working with companies who are interested in using the DRYFEAS model; once a functional working model of the business venture may inputted into the DRYFEAS model, and the person who will be using the model is individually trained in how the model works (and they understand what variables need to be refined) - the model is in their hands to carry forward in performing more detailed analysis. Alternatively, users have been trained in use of the model through industry and extension short-courses (a number of which have been conducted in the past decade) and based on that experience have an understanding such that they are usually able to then perform initial model set-up on their own. Development of this user's manual was undertaken with the encouragement and support of the United States Forest Service personnel, and others, to spread the model to a wider audience where someone reasonably well versed in analyses of this type could get beyond the hurdle of being a first time user without training by having access to this basic user's manual.

It must be noted the DRYFEAS model is not designed to serve in directly generating the pro-forma financial statements to be used in a business plan – rather it is most commonly used as a pre-cursor to the development of those aspects of the plan. The DRYFEAS model does readily serve as a companion to (but is not a substitute for), suitable pro-forma financial statements prepared by an accounting professional, and in many cases elements of the pro-forma financials have been estimated from using the DRYFEAS model results as a starting point. In terms of example of differences, a major difference between the DRYFEAS model and what is commonly found in the pro-forma financials of a typical business plan would include that the DRYFEAS model is designed to consider a 20 year period on an annual period basis, while most business plans (designed to meet the requirements of a typical lender) consider the pro-forma financial statements for a three year period, with the first year on a monthly basis, and the subsequent years on a quarterly summary basis. Also it may be noted that the DRYFEAS model does some fairly detailed calculations in some cases (e.g. for different item inputs of species, costs, etc.) that

are typically much more generalized within most business pro-forma financial statements. As noted the DRYFEAS model is a suitable and useful spring-board to carry forward with the business plan's pro-forma financial statements – additionally, the DRYFEAS model can be an excellent tool to better understand some estimates used as elements within the business plan, and it is an excellent mechanism for checking and corroborating elements of the business plan. It is in this function where it can provide an additional measure of comfort to lenders and decision makers who might be reviewing the final business plan. (Note: If the model is used in a corroboration role, it is generally advised that an unmodified version of the model be used for that purpose.)

Experience has demonstrated that modification of the DRYFEAS model spreadsheet should only be undertaken by someone with superior knowledge of the topic, the program logic, and spreadsheet programming – and that mix of knowledge is frequently the case for experienced professionals such as accountants or engineers who have spent a little time in using the model. (As an example; it is a fairly simple process for an experienced spreadsheet user to figure out ways to expand the array of product input items to be dried beyond the 20 items.) Generally it is imprudent to modify the model by deletion of any rows, columns or other elements (what may seem unimportant may be needed for calculations somewhere else). However, there is little risk of creating problems by using existing elements of the model in doing additional calculations. It should be noted that in most cases where someone with some expertise or knowledge in analyses of this type might have a reasonable desire that the model perform something in a different way, or be in some way expanded or contracted a bit, that same person can typically also understand how the model could be modified in that fashion. The DRYFEAS model is a useful tool in the hands of a user who understands the model and has the kind of background necessary to perform such analyses. It is not advised that the DRYFEAS spreadsheet be used as the sole decision criteria as a "go-ahead", in important analyses - except in the hands of experienced user with considerable background and expertise in such analyses and in use within a limited fashion (such as in calculation of variables related to addition of kiln capacity). In most circumstances the DRYFEAS model should simply be one key decision criteria (or the key decision criteria) to the point of a "go-ahead" to development of a business plan that will carefully consider all elements of the proposed venture.

Important estimates for data entry of variables in the DRYFEAS model regarding lumber drying times and load factors (among other things), if not readily available from historic operational data may be available from secondary data sources, or from experts in the field. **The example data which are included for variables in the DRYFEAS model are there as an illustration of how the model works – these data are NOT designed to serve as default entries or to in any other fashion represent appropriate entries representing a prospective user's circumstances being modeled.** If a proposed kiln drying operation is being considered in conjunction with a new sawmill operation, it may be useful to also consider using the companion program "SAWFEAS" in modeling for sawmill planning analysis. In using both the SAWFEAS and DRYFEAS programs together, this will ultimately provide "stand-alone" feasibility analyses for each of the two sides of the operation and avoid the potential for "masking" problems where it might not otherwise be obvious that one side of the operation might be subsidizing the other. The two separate analyses (sawmill and dry kiln) may be easily considered in separate analyses as independent profit centers or they may be considered as separate but related business entities,

or as an alternative, a summary of the key information from the DRYFEAS program may be incorporated directly into the SAWFEAS program or vice-versa. Much of the logic, form, format and general "feel" to the DRYFEAS model are shared with the SAWFEAS model, making it much easier to learn to use either model if the prospective user has familiarity with the other model.

This user's manual will follow the DRYFEAS model, from top to bottom, explaining what entries are required and what is being done in the various parts of the spreadsheet (with some key warnings as needed) – section headings and row labels will be taken exactly as they are on the spreadsheet itself to allow for ease in going between the model and this manual, both in a hard copy format, or the manual may be used in a hard-copy format while following along with the spreadsheet – or just as simply – the manual may be viewed as an active window in your word processing program as you shift back and forth between the manual text and the active spreadsheet. Items taken directly from the model for explanation in this manual *will generally be displayed in the manual in italics format (like this) in the manual*, for clarity that it is directly within the spreadsheet model.

SOME BASICS TO BE MENTIONED BEFORE BEGINNING:

The DRYFEAS model is released in an Excel workbooks format; however, the basic model (as it will be described here) is all contained within a single worksheet in a fully functional form so if it may be necessary to convert or transfer elements of the model to other spreadsheets or common compatible programs, that should not represent significant problem. As an example, the model can be pulled up under the "Calc" program from OpenOffice.org (a free office suite) that is a multiplatform and multilingual office suite and an open-source project, where the product is free to download, use, and distribute. As within any spreadsheet model of this type, it is advised that the user save the DRYFEAS spreadsheet file under its standard name as it is received or down-loaded (to serve as a "master" backup), and then save the file under a different (or slightly modified) name and use that (different named file) as the working copy. The program file will easily fit on older 3.5 inch floppy-disk storage medium (and of course on a flash drive, CD or zip drive) as a back-up to file storage on the computer's hard-drive. In first time review and use of the program, it is suggested to first scroll down through the program to get a feel for what will be required and what the outputs will be, then go back to the top of the spreadsheet model and more carefully look at the requirements before making entries.

There are a number of rows at the top of the DRYFEAS model that contain basic contact and background information for the user who might not have other background (such as is contained in this manual). These rows of "boilerplate" are unnecessary for in-house use or where the model is going between users that are familiar with it, however, the "identity" may be useful where the model is passed along to others, who may then become aware this manual exists. When using the model with lenders as a preliminary discussion item, or as corroboration to pro-forma financials in a final business plan, keeping the initial label rows in the model is typically desirable, where many lenders are comfortable where a "canned" model (i.e. a standardized model) is being used in those purposes. The closure point for this background introductory information reflects the following:

NOTE: Except where otherwise specified, all production input information is to be estimated for the first full year of operation. This permits production data inputs to be easily estimated for an initial partial production year (period #1) as some percentage of the first full year (period #2) of operation. For the second full year and later years (period #3 and greater) summary and key item variables are also easily modified based upon percentage changes. If greater precision in data input is desired for any or all periods, the basic input matrix may be used and copied as input values for any period of interest.

As is indicated here, the model considers that the length of the initial (time) period of operation for a proposed business start-up will rarely be the full fiscal or calendar year, representing the other periods of the model (i.e. it is unlikely that start-up will be on January 1st). For this reason, the full-year estimates which are used pertain to the first FULL year (i.e. period #2, or the second year). The first year, almost always a partial year with regard to production etc., will be represented as a percentage fraction of the (period #2) first full year (e.g. if calendar years are used in the analysis and start-up for the first year begins July, this would be about 50%) . Over the years this has generally been demonstrated to be an easy and efficient way to deal with the partial year start-up issues. The exception is that the user needs to remember that initial estimates of costs and prices are really to be represented for the first full year (i.e. not necessarily current prices/costs) and that the partial year start-up costs and prices will be represented as percentage fractions of the "year #2" entries.

(note: an "e>>" in column A indicates an entry is required in one or more cells in that row the "e>>" notes in any other column amplifies some flags.)

As indicated the "flag" in column A that is shown as "**e>>**" indicates an entry is required in one or more cells in that row. In many places throughout the model this is a single entry required, however, within the financial section, in many cases entries are needed for the full 20 year period and within the production section, entries are required for all species or species groups which are listed as product items.

Title: *SAMPLE ANALYSIS FOR HYPOTHETICAL LUMBER DRYING COMPLEX*

This title can (and typically should) be modified or changed to describe your analysis, and of course moved elsewhere on the spreadsheet if desired. Generally though, other major labels and titles in the spreadsheet should not be changed or moved if a person reading or using your adaptations to the model might be trying to simultaneously use this manual.

Major Section: *DEFINITION OF VARIABLES FOR SPECIES TO PROCESSED*
Up to 20 rows in this section are used to define what is being assumed with regard to the species to be processed. Within column C there is an entry to be made for *Variable ID* and in column D for *Comments* entered in column D for each corresponding variable in column C that are simply whatever might be desired sufficient in detail to describe the variable for reference – these *Comments* entries are not used elsewhere. In the illustration example provided in the model, the 20 potential variables are used, in an effort to provide a fairly clear picture of how the entries

could be used, representing a grade/species/thickness (or some aggregation). Within the entry for *Variable ID*, the length of the entry should in each case be made short enough to serve as the column headers for that species or species group under the following section. The user simply enters the variable names as desired (Caution – if the existing example labels are something you want to use and to move, or if you move them after entry – be cautious not to "CUT and paste" as other cells are linked to these – rather COPY and paste.) It is entirely the user's choice as to how detailed or generalized the variable identification entries might be, certainly all the operations key item species/thicknesses (and/or species groups) should be represented, probably by grade where appropriate. For items that represent a very minor percentage of production, one or more "other" aggregations might be desired, or at the other extreme, if desired, the spreadsheet could be modified to consider a huge array of variables. Before getting too carried away with such things, it is important to recognize that production assumptions and projections will be needed for each variable. It is most strongly suggested that as a beginning point, it will be desirable to keep the variable array limited, ideally using less than the 20 potential variables, and focusing on the most important variables (product items), and to expand it later if necessary, once the model is better understood. On some occasions there are users who believe it is critically essential to attempt to enter each and every possible item in each and every grade/thickness/species item that could possibly be dried, generating an enormous amount of input variables, despite the fact that the lion's-share of virtually all production could easily be represented in less than 20 discrete items. On a few occasions these same individuals have indicated a belief the list could not be initially reduced as a starting point, even though they could not begin to estimate any required input parameters regarding volume, price, etc. Hopefully this will underscore the desirability of generalization and simplification as an initial starting point, and adding in complexity as needed and possible. In learning to use the model and what it can do, it is highly desirable to keep it simple, using no more than the 20 "item" variables. Once the model is fully understood, in subsequent runs if it may ultimately be desirable to input more than the 20 variable items designed in the model, this can be done in one of two ways. The easiest way to do this is to do a preliminary or separate run of some number of similar items, then to use the results as an aggregation entry for aggregated volume and weighted average of other parameters as an input of an aggregation variable (as an example, this could be something along the lines of 4/4 lumber of minor species in various grades with a common kiln residence time, using a weighted average cost and pricing structure). The other alternative (for an experienced spreadsheet user) is to simply add direct input items to the model. This would be most easily done by doing a "cut and paste" of the entries in the summary columns and the labels in column "W" and column "X" respectively, moving these items to the right, but keeping them with the same row alignment. This can effectively be done to add as many columns for as many items as is desired. In doing this, the user should remember to include all the required information in each row, beginning with the entry for volume and continuing through to the last entries before the key information summary. The user also would need to remember to reset the functions (currently in column "W") so the total and averages would include the data from the new columns that have been added as being represented in the range. (Note: If a user might "insert columns" instead of doing a "cut and paste" movement of information in the appropriate rows of columns "W & X", this will also move elements in row "w" throughout the spreadsheet, including the unintended result of shifting column "W" entries in the cash-flow section.)

Major Section: *LUMBER INFORMATION*
This major section requires the input of a variety of important information about the defined species variables (i.e. by each ITEM (e.g. SPECIES/SIZE) TO BE DRIED) which were entered above – these data will be used in various calculations. Within this section, a labeling convention used throughout the spreadsheet becomes obvious that is now worth explaining. In addition to the "flag" in column A shown as "e>>" that indicates an entry is required in one or more cells in that row, the label for that row in column B will be (primarily) **In Lower Case Letters**. In contrast, there are many rows with data where entries are clearly not required but there is information in the row other than explanatory notes or headings. In these rows the data in cells in that row are calculated and the label for that row in column B will be (primarily) **In UPPER CASE LETTERS.**

Volume (MBF) of Lumber Item to be Dried per year (input volume): This row requires an input in each cell for which there is a defined species variable – the input is the volume input of lumber to be dried in thousand board feet (MBF), and subsequent entries for that variable on a per unit basis will also be per MBF unless otherwise noted.

% lumber volume downfall in drying (i.e. % volume lost if re-scaled after drying): This simply represents the expected percentage of volume that will be "lost" (due to shrinkage) in drying if the lumber is to be re-scaled for sale after drying. If this is not a concern (e.g. sale on the green scale basis, or custom drying) the % can simply be set to a "zero" ("0") value. Where a percentage of volume lost in drying is entered, the output volume (of lumber available for sale on a dry scale basis) will be reduced appropriately.

% of lumber having grade downfall in drying: This is similar to the expected percentage of volume lost in drying but represents an expected percentage of grade downfall from the grade going into the kiln. This percentage fraction of lumber will have an associated downfall price instead of the dry in-grade price. As with the volume downfall, if this is not a concern (e.g. sale on the green grade/scale basis, or custom drying) the % can simply be set to a "zero" ("0") value.

Typical months in the year the item is dried –asks for an estimate of the months per year the variable item will be dried and will be used in later calculations. If the item is dried more-or-less "year-round", then an entry of "12" would be appropriate, but for certain species handled more along a seasonal basis, reflecting that would be desirable. Where this could be important would be in circumstances where the species mix may radically change within the seasons of the year where that could impact inventory values. For example, with hard maple, there may be a real effort to avoid sawing the species in summer months due to potential for loss with stain. In the case of a high-value species (e.g. hard maple) sawn on a more seasonal basis, log and lumber inventory values may mushroom during those months the item is sawn, as compared to a "normal" or "year-round" average month.

Average # of days lumber item is held in air drying
Average # of days lumber item is held in predryer
Average # of days item REQUIRED to be held in kiln (given pre-dry assumptions) – these rows ask for estimates of days that lumber is held green and in-process for the purposes of estimating lumber inventory values in later calculations. The "*Average # days...*" in each category is

straight-forward, with the kiln residence time reflecting what is required based upon the assumption made with regard to preparatory predrying – this time estimate should not include unnecessary unproductive time where the load is left sitting in the kiln (example – over part of the weekend) waiting for unloading – but it should include all aspects of the typical drying cycle, including bringing the load up to temperature, and any stress-reversal and/or conditioning typical for that lumber type.

Load factor for item size expressed by load as % of 4/4 nominal equivalent – this requires an estimate of the item "load-factor" reflecting kiln loading as a percentage of a 4/4 lumber load. In terms of explanation, a kiln's nominal lumber volume capacity (of a single charge) is on the basis of some assumptions regarding the lumber nominal and actual thickness, sticker thickness, etc. The program in its standard form assumes that kiln (nominal volume) capacity is based on a 4/4 (nominal 1 inch thickness) lumber size. In this regard, if the assumed item is a typical load of 4/4 lumber, then the "load factor" should be 100%. However something different would typically have a different load factor. For example, 5/4 lumber (being thicker than 4/4 lumber) would require less courses in filling the kiln (and less space required for stickers per MBF) in loading the kiln, such that a larger MBF volume of 5/4 lumber could be loaded in the kiln than if the kiln were loaded with 4/4 lumber. In the example, with a 110% load factor for 5/4 lumber, 10 MBF of nominal kiln capacity with 4/4 lumber could actually hold 11 MBF of 5/4 lumber in the same space. The model will use the data provided in estimates of volumes of lumber that can be dried, given the user's input of nominal equivalent data.

Average # of days item is held after kiln drying - It is the user's choice with regard to how "*Average # days lumber held after kiln drying*" is to be used, that is, if this may simply include days the item is physically held, or it may also include days in shipment, or even if a decision may be made to include the days the item may be reflected in an "accounts receivable" status awaiting payment (that may be highly desirable in estimating accounts receivable and dry inventory). The user (ideally) should be consistent and should remember what is being expressed (although by the number of days shown, it should be obvious given knowledge of the operation being modeled).

GREEN - Average Purchased/Transfer price for item $/MBF (Green)
DRY IN-GRADE - Average Selling/Transfer price for item $/MBF in-grade (Dry)
DRY DOWNFALL - Average Selling/Transfer price for item $/MBF downfall (Dry) – these rows ask for straight-forward estimates of raw material costs and typical product selling prices (and the dry downfall price being a reasonable best guess in most circumstances). Weighted average prices will obviously need to be estimated or calculated for products mixes where different grades (and/or species and grades) in a delivered mix might be included in a variable definition.

Working Capital Cost for Inventory (%/yr) – this row ask for an estimate of the working capital cost required to carry the inventory. In most cases this would reflect the expected interest rate to be paid on a line of credit used to support inventory and accounts receivable, or the cost of long-term debt.

The following rows of the "Lumber Information" major section are all calculated entries with information as follows:

AVERAGE ADJUSTED DRY LUMBER PRICE $/MBF-DRY (w' downfall adjustment) – this is the calculated weighted average value $/MBF for the dry product, adjusted to reflect the effects of volume and grade downfall

TOTAL $ VALUE (for year) OF LUMBER INPUT TO BE DRIED
TOTAL $ VALUE (for year) OF DRY LUMBER (adjusted for downfall) – these are straight-forward calculated total values for green lumber input and dry lumber output, and,
TOTAL GROSS MARGIN FOR ITEM (considers raw material cost only) – is the calculated difference between these two values, reflecting "profit" for the total item on the basis of raw material cost only (and not considering inventory carrying costs or other costs).

POTENTIAL $ VALUE LOST FOR ITEM IN DOWNFALL
TOTAL LUMBER VOLUME (MBF) FOR ITEM LOST IN SHRINKAGE – these indicate the calculated value and volume of material that is "lost" due to downfall for the item as a total, and
TOTAL VOLUME MBF DRY SCALE (dry scale after shrinkage) – is the calculated total output volume of the item on a dry-scale basis.

GREEN/IN-PROCESS INVENTORY CARRYING COST (working capital interest)
DRY LUMBER INVENTORY CARRYING COST (working capital interest)
TOTAL INVENTORY CARRYING COST FOR ITEM (working capital interest) – these indicate the calculated total (annual) interest costs of carrying the inventory of the designated item in the green/in-process, and dry forms and in total. This is calculated based upon the volumes, user estimates of days held, and the interest cost for working capital that is required to carry inventory. These data will be used in other calculations, but can represent a real eye-opener if the analyst wishes to examine options in a "what-if?" format.

TOTAL ANNUAL GROSS MARGIN FOR ITEM (considers RM & WCi costs) - is the "same" gross margin calculation as done earlier, except that interest cost of working capital for carrying the item in inventory is included along with the raw material cost.

$/MBF GROSS MARGIN FOR ITEM (considers RM & Working Capital Interest Costs) - is the "*TOTAL ANNUAL GROSS MARGIN FOR ITEM (considers RM & WCi costs)*" calculation from the prior row, now being expressed on a $/MBF basis.

The following half-dozen rows all involve calculations of "*MBF days*" that requires some explanation, as it is a concept created within this model (and earlier forms of the model) to facilitate these types of analyses. The concept is best understood in considering the kiln itself, which in concept may be considered as analogous to a large "box" that can hold a certain volume of lumber (e.g. XXX MBF) at any one time. For example, in the case of "hardwood kilns", the MBF volume of lumber that the kiln will be able to hold should be approximately equal to nominal capacity of the kiln if it is loaded with 4/4 lumber, or somewhat predictably more (or less) if loaded with something different. The total volume of lumber that could be dried in a kiln in a given period of time (e.g. in a year) is a function of the nominal volume of the kiln, the

loading factor (i.e. the actual volume of lumber the kiln can hold as compared to nominal capacity), AND the time that a given charge of lumber must occupy the kiln for the charge to be dried (including time spent loading, unloading and unproductive idle time). Shorter versus longer drying cycle times allow for a larger total volume of lumber to be dried in the kiln over a given period of time (all other things being equal). To measure kiln use (and ultimately capacity over time), the MBF day is used to represent 1 MBF of lumber held for 1 day. This represents a capacity use (volume and time) and if something other than the basic 4/4 size is used, then that can all then ultimately can be converted into "4/4 EQUIVALENT MBF DAYS" to allow apples versus apples comparisons and aggregate calculations. As mentioned, the easiest way to grasp this concept is to apply it to the kiln itself, which has discrete and finite physical dimensions, and where lumber must be resident within the kiln for a certain period of time for drying. Consider for example a (nominal) 10 MBF kiln that might have an expected 5 days per year downtime for maintenance, and be available for the other 360 days in the year. This 10 MBF of kiln capacity for 360 days would represent 3,600 MBF kiln days of available capacity. Assume that the kiln would be used to dry dead-green red oak with a 30 day cycle time (assume load/unload is including for purposes of simplicity), the kiln could be loaded with 10 MBF of red oak which would stay resident in the kiln for 30 days (10 MBF X 30 days = 300 MBF days 4/4 equivalent) and this could be repeated 11 times in the year, totaling 12 charges for the year in aggregate (10 MBF X 30 days = 300 MBF days X 12 turns/yr = 3,600 MBF days required to dry the 120 MBF of total lumber). In this example, if it was desired to increase production, suppose that the kiln residence time might be reduced to 15 days, if 45 days in a predryer was part of the process before the kiln, and it could be calculated that twice as much lumber could be dried in the kiln (10 MBF X 15 days = 150 MBF days X 24 turns/yr = 3,600 MBF days required to dry the 240 MBF of total lumber), but as a concomitant part of the process, the volume of lumber in inventory will be more than doubled, and it may also be calculated that 10 MBF X 45 days = 450 MBF predryer days X 24 turns/yr = 10,800 MBF predryer days will be required to dry the 240 MBF of total lumber for that kiln, and that a minimum predryer capacity of 10,800 MBF days/360 days = 30 MBF of nominal capacity would be required. Given physical boundaries of the structure, physical capacity of kilns and predryers is an integral part of the model's calculations in constraints/opportunities, but the same concept of MBF days is also used in record-keeping and for other purposes.

TOTAL MBF AIR DRY DAYS REQUIRED FOR ITEM/YEAR
TOTAL MBF PREDRYER DAYS REQUIRED FOR ITEM/YEAR – these rows define the calculated total MBF days for each item in dry-yard and/or the predryer on a nominal basis.

TOTAL 4/4 EQUIVALENT MBF PREDRYER DAYS REQUIRED FOR ITEM/YEAR – this row simply transforms the prior row nominal calculation of required predryer days to a 4/4 equivalent. This permits summation across all lumber items to permit calculation of capacity requirements based upon user input specifications.

TOTAL MBF KILN DAYS REQUIRED FOR ITEM/YEAR - this row defines the calculated MBF kiln days for each item on a nominal basis

TOTAL 4/4 EQUIVALENT MBF KILN DAYS REQUIRED FOR ITEM/YEAR - this row simply transforms the prior nominal calculation to a 4/4 equivalent. As with the predryer capacity estimates, this permits summation across all lumber items to permit calculation of kiln capacity requirements based upon user input specifications of volumes to be dried, cycle time, etc..

TOTAL MBF DRY (finished good) STORAGE DAYS REQUIRED FOR ITEM/YEAR – this row defines the calculated total MBF days for the item using the parameters defined by the user, as previously noted, this may represent the time the item is physically held prior to shipment, or the time until payment is received on average, or whatever intermediate assumptions might be made, with how this should be considered being "user's choice" as to how it is defined.

AVERAGE TOTAL DAYS ITEM IS HELD – this is a simple summary of the total days held in each of the in-process categories and the dry category all combined.

TOTAL MBF ITEM AS % OF TOTAL MBF VOLUME ALL LUMBER DRIED – this is a simple percentage calculation of the total volume of the item as a percentage of the total volume of all items (on a green input basis). It gives an indication of the item's "importance" with regard to the volume of the item as a percentage of total volume of lumber dried. (Note: The value of item as a % of total value is also calculated later in the model.)

SUMMARY (Total or Average) – it should be noted that the individual entry items are collectively brought together in a summary basis (in total or in average as appropriate depending upon the variable item) with column "W". In some cases these summaries (in column "W") are simply informational, but in some other cases they are important elements for further calculations within following sections of the model.

Major Section: *DRY KILN INFORMATION* – this section is an entry and calculation section within which assumptions are entered with regard to the dry kilns. The size and number of kilns, and how they are used, will ultimately define the potential volume of lumber that can be processed in a given period of time. The assumptions regarding lumber information will be later considered with regard to kiln information to ensure that all assumptions (in aggregate) are realistic.

KILN INFORMATION – information is supplied on a kiln by kiln basis (A through T) for up to 20 individual kilns in the spreadsheet (without modification) – the number of kilns could be easily modified by additional row entry or the volume could more easily be modified by aggregation of the capacity of similar kilns into a single entry in one or more of the columns.

Kiln's "rated" size in MBF when loaded with 4/4 lumber – this is a straight-forward entry of the kiln's nominal capacity. It should be noted this is not simply a "label" entry – the number will be used in volume capacity use calculations and the rated size should reasonably reflect capacity as stated. (Consequently in the possible event that a column may be used as an aggregation entry for a number of kilns of a certain size/type, the entry should reflect the total nominal capacity.)

Expected kiln downtime days per year (e.g. maintenance) - this is a straight-forward entry of the kiln's downtime days which will be used to calculate available days. Do not include, any of the time for loading, unloading or waiting to load or unload, or any operational time activities within this entry. This should reflect typical planned shutdowns (e.g. maintenance) but also should include if there is a general shutdown (e.g. a holiday shutdown) that also includes the kilns, which should also be reflected here.

CALCULATED DAYS KILN IS AVALABLE/YEAR – this is a calculated entry based upon 365 days per year, less expected kiln downtime days per year (e.g. maintenance and shut-down).

Estimated "Ideal" maximum # of charges/year as anticipated this kiln will be used – this entry asks for an estimate of the expected number of charges that could be put through the kiln in a given year – for example, if the kiln would be primarily used for thinner and easy to dry items that are dried in a relatively short cycle-time, then the kiln would be capable of drying more charges in a year than if it was primarily to be used in drying refractory lumber or thicker stock. (Note: The purpose of this estimate is that it will influence the frequency of turns which will affect the probability of time that might be lost in the event of the analyst deciding that kilns would not be unloaded and loaded on weekends. The decision to not unload/load on weekends will typically be a greater penalty in lost potential as the number of charges per year is increased. The model will calculate an estimated penalty (as a % of lost capacity) resulting from a decision to not unload/load on the weekend.)

Code # entry for Loading/Unloading weekends ("0"=yes "1"=no) – the code is a number, either "0" or "1". The "0" entry represents that the kiln will be unloaded and reloaded on any given weekend if the charge of lumber is completed during the weekend. The entry of "1" represents that if the kiln charge has it's drying cycle completed at some time over the weekend, the charge will be left to sit in the kiln (with the kiln being idle/unproductive) until Monday, when the work-week begins and the kiln is then unloaded and reloaded at that time.

ADJUSTED DAYS KILN IS AVAILABLE (w' lost days due to no weekend load/unload) - this is a calculated entry based upon the prior "*CALCULATED DAYS KILN IS AVALABLE/YEAR*" (365 days per year, less expected kiln downtime days per year), being further adjusted to reflect expected lost production time associated with refusing to unload/load on the weekend.

ADJUSTED ESTIMATED CHARGES/YEAR (adjusted w' weekend load/unload loses) - this is a calculated entry based upon the prior "*Estimated "Ideal" maximum # of charges/year as anticipated this kiln will be used*" being further adjusted to reflect expected lost production time associated with refusing to unload/load on the weekend.

Estimated time to load kiln (hours)
Estimated time to unload kiln (hours) – these are straight-forward entries of the expected actual time (in hours) that is required to load and to unload the kiln. This time (which can be significant in the case of loading and unloading some large package type kilns) will be considered in adjustment of the days that the kiln is expected to be available in a year.

Code # entry for Loading/Unloading on any shift versus first shift only ("0"=yes "1"=no) – as with the loading/unloading on the weekend entry prior, the code is a number, either "0" or "1". The "0" entry represents that the kiln will be unloaded and reloaded on any shift as the cycle is completed. The entry of "1" represents that if the kiln charge has it's drying cycle completed and being unloaded and reloaded during the (present) first shift, the charge will be left to sit in the kiln (with the kiln being idle/unproductive) until the next "first shift" and the kiln is then begun to be unloaded and reloaded at that time. If a dried charge will be left to sit overnight in the kiln waiting for unloading/reloading (with the kiln being idle/unproductive), then this will be considered in adjustment of the days that the kiln is expected to be available in a year.

ADJUSTED DAYS KILN AVAILABLE/YEAR (with all load/unload loses) – this is a calculated entry based upon the days available per year, less all adjustments associated with unloading/loading, including not unloading and loading overnight.

ADJUSTED ESTIMATED CHARGES/YEAR (adjusted w' all load/unload loses) - this is a calculated entry based upon the prior estimates being further adjusted to reflect expected lost production time associated with unloading/loading, including not unloading and loading overnight.

ESTIMATED AVAILABLE MBF KILN DAYS/YEAR (after all adjustments) – this is a calculated entry reflecting the MBF kiln days available from the kiln, after time availability has been adjusted to reflect maintenance downtime and other downtime, idle time waiting to unload/load, the time associated with loading and unloading.

EFFECTIVE AVAILABLE CAPACITY EXPRESSED AS % of RATED CAPACITY - this is a calculated entry reflecting the MBF kiln days estimated to be actually available from the kiln, expressed as a percentage of theoretical maximum. This is presented for each kiln specified within the appropriate column and for all kilns in aggregate overall in the summary column (column W).

It should be noted that in going through the estimates of the Major Section: *DRY KILN INFORMATION* – this typically serves as an "eye-opener" for many managers, as it allows them to see the potential affects of various decisions with regard to potential capacity lost for various operational decisions. Later calculations will provide some insight as to the cumulative affect of these decisions (coupled with other operation decisions) in their effect on volume of lumber dried and profit potential.

Major Section: *PREDRYER INFORMATION*– this section is an entry and calculation section within which assumptions are entered with regard to the predryers. It is similar to the kiln information section, but much shorter and simpler. The size and number of predryers, and how they are used, will ultimately define the potential volume of lumber that can be held at any given period of time. The assumptions regarding lumber information will be later considered with regard to predryer information to ensure that all assumptions are realistic. The section is smaller (and simpler) than the kiln information section, where the predryer can generally be loaded and unloaded while operating, and it is reasonable to assume that the kiln (and not the predryer) is

(generally) the constraining element. If predryers are not going to be used in the operation being modeled, the predryer rated size should simply be set to "0" (versus going to a good bit of time and trouble to delete predryers from the model).

PREDRYER INFORMATION – as with the kiln information, this information is supplied on a predryer by predryer basis (W through Z) for up to 4 individual predryers in the spreadsheet (without modification) – the number can (of course) be easily modified by additional row entry or the volume can be modified by aggregation.

Predryer "rated" size in MBF when loaded with 4/4 lumber - as with the kiln information, this is a straight-forward entry of the predryer's nominal capacity. (It should be noted this is not simply a "label" entry – the number will be used in volume calculations.) If predryers are not going to be used in the operation being modeled, the size should simply be set to "0".

Expected predryer downtime days per year (e.g. maintenance) – this is a straight-forward entry of the kiln's downtime days which will be used to calculate available days. If there is a general shutdown (e.g. a holiday shutdown) that also includes the kilns, this should also be reflected here.

CALCULATED NUMBER OF DAYS PREDRYER IS AVALABLE/YEAR – this is a calculated entry based upon 365 days per year, less expected downtime days per year (e.g. maintenance).

ESTIMATED AVAILABLE MBF PREDRYER DAYS/YEAR (after all adjustments) - this is a calculated entry reflecting the MBF predryer days available, after time availability has been adjusted to reflect all downtime.

Major Section: *IN PROCESS LUMBER INVENTORY ESTIMATES BASED ON GREEN PRICE & KILN USAGE* - This section provides some important item summary calculations for the in-process lumber inventory (i.e. lumber held in air dry, the predryer and kilns) for each of the species/item variables that have been entered. Included within this, in addition to year-round average numbers, are estimates for "*INVENTORY IN A "DRY AT MAXIMUM" MONTH*" this represents a "what-if" estimation considering if the entire volume of lumber to be dried in the item were dried in as short a period as possible (e.g. all at once, and/or if the volume were to exceed full capacity, then by using all capacity and drying as soon as possible). This allows examination and consideration of the potential effects of unusual activities. For example, average annual inventory estimates reflect the handling of items that could typically be of differing (high and low) values. The analyst may wish to consider a "what-if" affect on inventory values if within the short-term a relatively large volume of material within an "*ITEM*" were to be dried at once. For example, the analyst might wish to consider what might happen to inventory values in the short-term if only the highest grades of hard maple were dried at some point in time. This section would show the mushrooming of the inventory value in that item for a "*DRY AT MAXIMUM" MONTH*" (and provide insight with regard to capital requirements to cover that short-term inventory). In a similar vein, the reduction in inventory value if the in-process lumber were relatively low value items is also explored.

ITEM (e.g. SPECIES/SIZE) TO BE DRIED - the defined species variables (i.e. by each ITEM (e.g. SPECIES/SIZE) TO BE DRIED) which were entered above.

ESTIMATED HIGHEST ITEM INVENTORY VALUE IN A "DRY AT MAXIMUM" MONTH – this calculation represents a "what-if" rough estimation considering if the entire volume of lumber to be dried in this item category were dried in as short a period as possible (e.g. all at once using part or all of the kiln capacity, or if that volume would be exceeding total kiln capacity, then using all available capacity and drying as soon as possible). The assumption would be that for "*A "DRY AT MAXIMUM" MONTH*" to meet the condition, if necessary any or all of the kilns would be filled to capacity with just that item, and if the volume of the item to be dried exceeded this capacity, then it is assumed the predryer would also be filled with the item as necessary and possible (even if the item would not normally be sent to the predryer), and that appropriate air dry capacities would also be staged to continue with the "*DRY AT MAXIMUM*" condition. In some (probably most) circumstances the inventory value estimate for "*A "DRY AT MAXIMUM" MONTH*" for an item would be the item's total green lumber input value (e.g. this would always be the case if the 4/4 equivalent volume of lumber for the item was less than total kiln and predryer capacity). However for larger volume items, the total volume of lumber to be dried would not (logically) ever be on hand as it would assume excess air dry days beyond assumptions for a fraction of the volume.

POTENTIAL # OF "DRY AT MAXIMUM" MONTHS FOR THIS ITEM – this calculation represents a "what-if" estimation considering the case of a "*DRY AT MAXIMUM*" condition, where this estimates the number of months that condition could exist. For some items which represent a large fraction of the total volume of lumber to be dried, the volume in that item could well exceed total kiln capacity and if those items also have a relatively long drying cycle time, this number could easily exceed a month

% TOTAL KILN CAPACITY THIS ITEM WOULD REQUIRE IN A "DRY AT MAXIMUM" MONTH – this calculation represents a "what-if" estimation considering the case of a "*DRY AT MAXIMUM*" condition, where this estimates the fraction of total kiln capacity that would be used for the item in a "*DRY AT MAXIMUM*" condition. For some (smaller total volume) items this will be less than total capacity.

% TOTAL PREDRYER CAPACITY ITEM WOULD REQUIRE IN A "DRY AT MAXIMUM" MONTH – as with the "*% TOTAL KILN CAPACITY THIS ITEM WOULD REQUIRE IN A "DRY AT MAXIMUM" MONTH*", this calculation represents a "what-if" estimation considering the case of a "*DRY AT MAXIMUM*" condition, where this estimates the fraction of total predryer capacity that would be used for the item in a "*DRY AT MAXIMUM*" condition (assuming that the item is indicated as being normally sent to the predryer in the data input by the analyst). For some (smaller total volume) items this will be less than total capacity, and for some items it would be "0" if the predryer use is not specified.

ITEM AVERAGE INVENTORY VALUE IN AN "AVERAGE" MONTH ITEM IS DRIED - this calculation represents a straight-forward estimation of the value of the in-process (air dry, predryer and kiln) volumes of lumber that would typically be on-hand in a typical month in which the item would be dried. For example, in the case of white-woods such as hard maple that might not be sawn in the summer months, this would represent the value of the typical inventory during a typical month in which the item was actually expected to be dried.

% OF EFFECTIVE KILN CAPACITY THIS ITEM USES IN AN "AVERAGE" MONTH ITEM DRIED - this calculation represents another straight-forward estimation of the fraction of total kiln capacity that would be used for the item in a normal condition for a month in which the item is dried. In almost all circumstances this will be (much) less than total capacity. (Note: the sum of the item percentages should not total 100% (except by chance) and it could easily exceed 100% in aggregate as this is reported for an average month the item is actually dried.)

ITEM AVERAGE INVENTORY VALUE AS A YEAR-ROUND "AVERAGE" – this calculation represents a straight-forward estimation of the value of the in-process (air dry, predryer and kiln) volumes of lumber that would theoretically be on-hand as in-process inventory in any given month. If the item is dried year-round then this would be the same as what would typically be on-hand and the theoretical would be the same as actual. However, if an item is not dried year round, then this "average" represents a condition which would not in fact exist, but rather would be somewhere between the value in a typical month in which the item would be dried and a "0" value for the month in which the item is not dried, weighted as appropriate. This "average" value is used in calculating average working capital requirements for inventory for each item (that is then aggregated for a total value). As noted before, in example, in the case of white-woods such as hard maple that might not be sawn in the summer months, this year-round average would not represent the full value of the typical inventory during a typical month in which the item was actually expected to be dried. Where the year-round averages are considered for average inventory, if some items are only dried part of the year, and if very high value items might then replace very low value items, the difference in "*VALUE IN AN "AVERAGE" MONTH ITEM IS DRIED*" as compared to "*VALUE AS A YEAR-ROUND "AVERAGE*" may wish to be considered with part of that value needing to be considered as a short term fluctuation. This would be important to consider in establishing a line of credit or in other financing considerations.

% OF EFFECTIVE KILN CAPACITY USED BY THIS ITEM AS A YEAR-ROUND "AVERAGE" - this calculation represents another straight-forward estimation, being the fraction of the effective total kiln capacity that would be used for the item in total as a year-round average (this is the fraction of the actual capacity available after down-time, load and unload time and delays are all considered). In this case the items in the columns will be totaled and the total cannot exceed 100% or the analyst's assumptions are unrealistic in some fashion (this will be "flagged" for attention later in summary).

% OF TOTAL NOMINAL KILN CAPACITY USED BY THIS ITEM PER YEAR - this calculation represents another straight-forward estimation, being the fraction of the nominal (i.e. stated or theoretical "best-case" total kiln capacity) that would be used for the item in total as a year-round average (this is the fraction of the theoretical capacity unadjusted for downtime and delays).

% OF EFFECTIVE PREDRYER CAPACITY USED BY THIS ITEM AS A YEAR-ROUND "AVERAGE" - this calculation represents another straight-forward estimation, being the fraction of the effective total predryer capacity that would be used for the item in total as a year-round average (this is the fraction of the actual capacity available after down-time is considered).

% OF TOTAL NOMINAL PREDRYER CAPACITY USED BY THIS ITEM PER YEAR - this calculation represents another straight-forward estimation, being the fraction of the nominal (i.e. stated or theoretical "best-case" total predryer capacity) that would be used for the item in total as a year-round average (this is the fraction of the theoretical capacity unadjusted for downtime).

Major Section: *DRY LUMBER INVENTORY ESTIMATES BASED ON DRY PRICE WITHOUT VOLUME LOSS TO SHRINKAGE ADJUSTMENT* - This section provides some important item summary calculations for the dry lumber inventory (i.e. dry lumber "on-hand" that has come out of the kiln) for each of the species variables that have been entered. Included within this, in addition to year-round average numbers, are "*HIGHEST POSSIBLE INVENTORY VALUE FOR THIS ITEM*", "*HIGHEST REALISTIC INVENTORY VALUE THIS ITEM IN A "DRY AT MAXIMUM" MONTH*" and "*HIGHEST REALISTIC INVENTORY VALUE THIS ITEM IN AN AVERAGE MONTH DRIED*" that represents some potential "what-if" estimations similar to the in-process inventory example. This allows examination and consideration of the potential effects of unusual activities or situations as explored within the effect on in-process inventory. It is important to remember and keep in focus that the user of the model defines what constitutes the dry lumber inventory. As indicated earlier within the entries for "*Average # of days item is held after kiln drying*" – It is the user's choice with regard to "*Average # days lumber held after kiln drying*" in terms of what is represented as dry lumber inventory. This may simply include only the actual days the item is held prior to shipment, or it could also include days in shipment. Further, a decision may be made to also include the days the item may be reflected in an "accounts receivable" status awaiting payment (and that may be highly desirable). What was cited as being important was that the user should be consistent, and should remember what is being expressed.

ITEM TO BE DRIED (i.e. ITEM SPECIES/SIZE) AS DRY LUMBER INVENTORY – this (as before) is the defined species variables (i.e. by each ITEM (e.g. SPECIES/SIZE) TO BE DRIED) which were entered above.

HIGHEST POSSIBLE INVENTORY VALUE FOR THIS ITEM – this calculation represents the largest volume of in-process (green) lumber inventory that could reasonably be expected to exist within a "*DRY AT MAXIMUM*" month, represented at a dry lumber price to determine value.

HIGHEST REALISTIC INVENTORY VALUE THIS ITEM IN A "DRY AT MAXIMUM" MONTH - this calculation represents the "*HIGHEST POSSIBLE INVENTORY VALUE FOR THIS ITEM*" that could reasonably be expected to exist within a "*DRY AT MAXIMUM*" month, represented at a dry lumber price to determine value, adjusted to reflect a lower value if the user reflects less than a month as the "*Average # of days item is held after kiln drying*" within model entry.

HIGHEST REALISTIC INVENTORY VALUE THIS ITEM IN AN AVERAGE MONTH DRIED - this calculation represents the total monthly volume of lumber in the item for a month in which drying is done for that item, expressed at the dry lumber value, unless "*Average # of days item is held after kiln drying*" is greater than "30", in which case the value is adjusted by a ratio to consider holdover to a future month or months. As an example if "*Average # of days item is held*

after kiln drying" equals 45 days then the value would be adjusted by multiplying by the ratio of 45 days/30 days or 1.5, to account for inventory from portions of two months drying.

AVERAGE INVENTORY VALUE THIS ITEM IN AN AVERAGE MONTH DRIED - this calculation represents a straight-forward estimation of the value of the dry lumber inventory in a typical month in which the item would be dried. For example, in the case of white-woods such as hard maple that might not be sawn in the summer months, this would represent the value of the typical inventory during a typical month in which the item was actually expected to be dried. This is simply the value for "*HIGHEST REALISTIC INVENTORY VALUE THIS ITEM IN AN AVERAGE MONTH DRIED*" unless "*Average # of days item is held after kiln drying*" is less than 30, in which case the value is adjusted by a ratio to consider that on average only a fraction of the volume should be expected to be in inventory. As an example if "*Average # of days item is held after kiln drying*" equals 10 days then the value would be adjusted by multiplying by the ratio of 10 days/30 days or 1/3, to account for the more rapid turn through inventory.

AVERAGE INVENTORY VALUE THIS ITEM AS A YEAR-ROUND AVERAGE VALUE – this calculation represents a straight-forward estimation of the value of the dry lumber inventory that would theoretically exist in any given month. If the item is dried year-round then this would be the same as what would typically be on-hand and the theoretical would be the same as actual. However, if an item is not dried year round, then this "average" represents a condition which would not in fact exist, but rather would be somewhere between the value in a typical month in which the item would be dried and a "0" value for the month in which the item is not dried, weighted as appropriate. This "average" value is used in calculating average working capital requirements for inventory for each item (that is then aggregated for a total value. As noted before, in example, in the case of white-woods such as hard maple that might not be sawn in the summer months, this year-round average would not represent the full value of the typical inventory during a typical month in which the item was actually expected to be dried. Where the year-round averages are considered for average inventory, if some items are only dried part of the year, and if very high value items might then replace very low value items, the difference in "*VALUE IN AN "AVERAGE" MONTH ITEM IS DRIED*" as compared to "*VALUE AS A YEAR-ROUND "AVERAGE*" may wish to be considered with part of that value needing to be considered as a short term fluctuation. This would be important to consider in establishing a line of credit or in other financing considerations.

Major Section: *REVIEW OF INPUT ASSUMPTIONS*
This section provides overall item summary and some calculations for each of the *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variables that have been entered. In some cases these are listed in rows above and are brought together for summary purposes, in others, new elements are now calculated or displayed.

MBF VOLUME of ITEM AS A INPUT (GREEN LUMBER) VOLUME
AVERAGE VALUE IN $/MBF FOR DRY LUMBER (with the downfall adjustment)
TOTAL ITEM INPUT $ VALUE as GREEN LUMBER
TOTAL ITEM $ VALUE as DRY LUMBER (with the downfall adjustment)
TOTAL GROSS MARGIN FOR ITEM PER YEAR (considers raw material cost only)
MBF AIR DRY DAYS REQUIRED FOR ITEM PER YEAR

MBF PREDRYER DAYS REQUIRED FOR ITEM PER YEAR
MBF KILN DAYS REQUIRED FOR ITEM PER YEAR
ITEM AS % OF THE BOARD FOOT VOLUME OF ALL LUMBER DRIED
ITEM AS % of TOTAL $ VALUE of GREEN LUMBER INPUT
ITEM AS % of TOTAL $ VALUE of DRY LUMBER OUTPUT
GROSS MARGIN FOR ITEM AS a % of the TOTAL GROSS MARGIN
ITEM USE OF PREDRYER AS % TOTAL MBF PREDRYER DAYS USED
ITEM USE OF KILNS AS % TOTAL MBF KILN DAYS USED
AVERAGE AIR DRY DAYS REQUIRED FOR ITEM
AVERAGE PREDRYER DAYS REQUIRED FOR ITEM
AVERAGE KILN DAYS REQUIRED FOR ITEM
AVERAGE TOTAL DRYING DAYS REQUIRED FOR ITEM
AVERAGE DAYS HELD AFTER DRYING FOR ITEM
AVERAGE TOTAL DAYS REQUIRED FOR ITEM (DRYING AND HELD AFTER DRYING) -
these rows all display values which are calculated (and explained) prior in various areas, brought
together here for a summary review, or are simply a straight-forward calculated percentage of
overall volume, value or average as labeled.

Major Section: *GROSS MARGINS ON AN ITEM BASIS IN $/MBF DAYS (4/4 equiv.) IN KILN,
PREDRYER, AIR DRYING and DRY DAYS* – This section provides information regarding
potential gross margins on an *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variable basis in ways
which allow some measure of reasonable direct comparison. In many softwood lumber drying
applications this may be of little more than casual interest where drying may be a virtual
prerequisite to the selling of the product, but within the hardwood lumber industry, these kinds of
considerations are much more important. Generally some well established green and dry markets
should exist for almost any item (species/grade/size) that would be considered in the analysis,
kiln capacity is not typically sized to match mill production (e.g. could be much larger, smaller,
or in many circumstances it is a completely separate entity). What this means is that, even within
an integrated sawmill and dry kiln facility, the dry kiln operation is not necessarily linked in any
established fashion with the mill operation. Simply the drying operation could dry a fraction of
mill production (to be determined to best advantage) with the remainder of lumber sold green,
also the kiln operation could buy lumber from other producers for drying, even where lumber
from the integrated sawmill might be sold green. The logic is that the drying operation should
seek to maximize the earnings in the drying operation. The "how" in accomplishment of this is
easy in theory, that is, to simply maximize the difference in dry versus green values, but to
accomplish that in practice is somewhat more complicated. In comparing one item to another it is
not sufficient to simply consider the differences between the respective green and dry prices on a
volume (e.g. per MBF) basis, because the time the items might need to be held could be quite
different. Considering the two in comparison in differences in value per MBF days (4/4
equivalent) is a large step in an improved direction but still inadequate, for although this begins
to capture differences in inventory carrying costs, the other part of the equation relates to use of
kiln, predryer and air dry spaces over time. Simply put, the investment cost associated with the
space represented in an MBF day in a kiln is typically much more valuable than associated with
the same space in a predryer, that is also that much more valuable than the same space in the air
dry yard. In terms of example, two different items may have the same difference in green versus

dry price on an MBF basis and be held the same number of days in total, but the preference of holding one versus the other would be quite different if one item were held in the kiln for most of the time, while the other was held in air dry for a relatively long time with only a short time in the kiln. Typically the most expensive space is, of course, kiln space, so with all things being more or less "equal" this tends to favor items that would (naturally) have a relatively short turn in kiln residence time (e.g. hard maple versus red oak). Consequently, a logical strategy in dealing with some refractory species (e.g. red oak) might be to reduce kiln residence time to the degree possible (e.g. by using a predryer or in air drying prior to the kiln, allowing more total lumber to be dried), and this is of course a possibility, but a complicating factor is that to accomplish this benefit, inventory (and associated carrying costs) increase substantially. The idea with the elements of this major section is to provide the analyst some insight with regard to the profit potential of various items such that this can be considered to achieve the best possible mix of items to be dried, and/or the practices contemplated for various items may be examined for improvement, A variety of measures of performance are considered as there is no single measure that always presents the most useful information.

Sub-Section: *GROSS MARGIN FOR ITEM CONSIDERED ON BASIS OF RAW MATERIAL COST ONLY- GROSS MARGIN FOR ITEM in $/MBF KILN DAYS* - This sub-section provides only one basic element of information regarding potential gross margins ($/MBF kiln day) on an *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variable basis calculated on the basis of raw material cost only. This item is the calculated variable "*GROSS MARGIN FOR ITEM in $/MBF KILN DAYS*" and the "*AVERAGE KILN DAYS REQUIRED FOR ITEM*" is also displayed for easy reference. This is the most simple and straight-forward measure of performance, representing the (raw material cost basis only) gross margin per 4/4 equivalent MBF kiln day. Assuming all other elements are more or less equal (or at least reasonably similar) this provides a simple, easy to understand, quick and dirty insight in sorting the best from the worst. A reminder, as is noted for this variable, is that caution is needed in interpreting this item as it increases with any practice (e.g. predrying) that reduces kiln residence time; however the associated costs for those practices are not included here. Generally in using the model this will be a variable used in initial runs in sorting the possible items to be dried, and/or as a "flag" in identifying items where practices will likely need modification.

Sub-Section: *GROSS MARGIN FOR ITEM CONSIDERED ON BASIS OF RAW MATERIAL COST ONLY - ITEM GROSS MARGIN $/MBF DAY - ALL DRYING DAYS (i.e. KILN, PREDRYER & AIR DAYS)* - This sub-section provides more information regarding potential gross margins ($/MBF) considering all drying (or "in-process") days, including air dry, predryer and kiln time, on an *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variable basis, also calculated on the basis of raw material cost only. This item is the calculated variable "*ITEM GROSS MARGIN $/MBF ALL DRYING DAYS (i.e. KILN, PREDRYER & AIR DAYS)*" and the "*AVERAGE TOTAL DRYING DAYS REQUIRED FOR ITEM*" is also displayed for easy reference. This is slightly more complicated than simply considering on the basis of "kiln days" (only) but is still a simple and straight-forward measure of performance, representing the (raw material cost basis only) gross margin per 4/4 equivalent MBF for all drying days. As before, assuming all other elements are more or less equal (or at least reasonably similar) this provides a simple, easy to understand, quick and dirty insight in sorting the best from the worst. A reminder, as is noted for this variable, is that caution is needed in interpreting this item as it decreases with any practice

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(e.g. air drying and predrying) that might be undertaken to reduce kiln residence time, but which has the concomitant effect of increasing total drying time. For example, in an effort to increase the gross margin per 4/4 equivalent MBF kiln day by use of prior air drying or using the predryer, this would increase the total days held in drying that would drive down the potential gross margins ($/MBF) considering all drying (or "in-process") days. As before, associated inventory carrying costs are not included here. As with the prior variable "*GROSS MARGIN FOR ITEM in $/MBF KILN DAYS*" this will likely be important in using the model where this will be a variable used in initial runs in sorting the possible items to be dried, in particular in looking at what might be "flagged" as unusual in some way in identifying items where practices will likely need modification in some preliminary or first-level "what-if" analysis. For example, initial runs in looking at dead-green red oak into the kiln might likely show that to be unattractive due to very low "*GROSS MARGIN FOR ITEM in $/MBF KILN DAYS*" projections, a subsequent run reducing kiln time and increasing predryer and/or air drying may show considerable improvement in "*GROSS MARGIN FOR ITEM in $/MBF KILN DAYS*" projections, with the next step being to examine if it might also promise to be acceptable and worth further consideration on the basis of what is shown in "*ITEM GROSS MARGIN $/MBF ALL DRYING DAYS (i.e. KILN, PREDRYER & AIR DAYS)*". If that is not the case, then it may be appropriate to consider if other alternatives might appear more attractive.

Sub-Section: *GROSS MARGIN FOR ITEM - RAW MATERIAL & DRYING WORKING CAPITAL COSTS* - This sub-section provides the most complete information regarding potential gross margins ($/MBF) of all drying (or "in-process") days, including air dry, predryer and kiln time, on an *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variable basis, and also considering the cost of carrying inventory in addition to the basis of raw material cost. This item includes the calculated variable "*ITEM GROSS MARGIN $/MBF DAY - ALL DRYING DAYS (i.e. KILN, PREDRYER & AIR DAYS)*" and again it reflects the "*AVERAGE TOTAL DRYING DAYS REQUIRED FOR ITEM*" also displayed. Another calculated variable is "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" which also provides some added insight regarding the potential returns associated with inventory "investment" in the item. As before, assuming all other elements are more or less equal (or at least reasonably similar) this provides a simple, easy to understand, and more complete insight in sorting the best from the worst on the basis of in-process variables. The difference here is that interest carrying costs are also included within the estimation. The added calculation of "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" expresses this gross margin as a percentage of input value. What this means is that the item gross margin $/MBF per 4/4 equivalent MBF is expressed as a percentage of the green lumber input cost and this percentage is then adjusted to an annualized level (i.e. it is adjusted based on the possible turns of the inventory item based on the days held in drying). This takes the consideration beyond the $/MBF basis considered here (and in prior variables) and translates it into a percentage value related to investment in in-process inventory, that is a somewhat different insight which should be of interest. In particular it might be interesting to note how the annualized percentage returns stand out for certain items.

Sub-Section: *ANNUALIZED OVERALL GROSS MARGIN FOR ITEM TO ITEM OVERALL COMPARISON* - This sub-section provides the most complete information as "*GROSS MARGIN FOR ITEM - RAW MATERIAL & ALL WORKING CAPITAL COSTS*" regarding potential gross margins ($/MBF) of all drying (or "in-process") days and all days held after drying, on an *ITEM*

(e.g. SPECIES/SIZE) TO BE DRIED variable basis, considering the cost of carrying inventory in addition to the basis of raw material cost. This item includes the calculated variable "*ITEM GROSS MARGIN $/MBF DAY - ALL DAYS HELD (i.e. HELD IN DRYING AND DRY)*" and it reflects the "*AVERAGE TOTAL DAYS REQUIRED FOR ITEM (DRYING AND HELD AFTER DRYING)*" for reference. Another calculated variable is "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" which is similar to the same named variable "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" in the prior sub-section but which also now includes the dry lumber inventory carrying costs. This now provides the most complete and holistic insight regarding the potential returns associated with combined total (in-process and dry lumber) inventory "investment" in the item. As before, assuming all other elements are more or less equal (or at least reasonably similar) this provides a simple, easy to understand, and more complete insight in sorting the best from the worst on the basis of in-process variables. The difference here is that all interest carrying costs (including for dry lumber) are also included within the estimation. The added calculation of "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" expresses this gross margin as a percentage of input value (still on green price). What this means is that the item gross margin $/MBF per 4/4 equivalent MBF is expressed as a percentage of the green lumber input cost and this percentage is then adjusted to an annualized level (i.e. it is adjusted based on the possible turns of the inventory item based on the days held in drying and days held as dry lumber inventory). This takes the consideration beyond the $/MBF day basis considered here (and in prior variables) and translates it into a percentage value related to investment in in-process inventory, that is a somewhat different insight of interest. As a final addition, this section also provides the entry "*$/MBF GROSS MARGIN FOR ITEM (considers RM & Working Capital Interest Costs)*" that was calculated earlier. This last calculation is a simple gross margin calculation on a $/MBF basis without regard to a time component (i.e. the most simple and basic calculation) that is provided for comparison with the calculations on a $/MBF day basis. This sub-section is the most complicated (and most complete) sub-set of items, in item by item comparisons. It is best used after careful consideration that the estimations of all aspects (e.g. various times in drying, time held in dry condition, etc.) are reasonable and realistic.

The calculated variable in this major section being discussed (i.e. *GROSS MARGINS ON AN ITEM BASIS IN $/MBF DAYS (4/4 equiv.) IN KILN, PREDRYER, AIR DRYING and DRY DAYS*) provide a wide array of information regarding potential gross margins on an *ITEM (e.g. SPECIES/SIZE) TO BE DRIED* variable basis in ways that as noted allows some measure of reasonable direct comparison. The interpretation of these data within a drying application being modeled can be complicated, as it is often not strictly a "black versus white" consideration, but having various shades of gray that need to be interpreted by the analyst. The most logical way to do this is after first reviewing the next major section "*KEY INFORMATION SUMMARY*" and then proceeding in a logical iterative approach of consideration. Unless the individuals involved in doing the kiln feasibility study have considerable experience with kiln drying (and sometimes even when they do) it is frequently the case within the very preliminary planning phases of kiln feasibility studies there will be a imbalance in assumptions regarding kiln capacity and/or kiln operation assumptions, relative to the assumptions regarding the total volume of lumber to be dried. It is not uncommon to see initial assumptions for required kiln capacity may be 50% more or 35% less than what is needed on the basis of volume of lumber to be dried and operating assumptions. For this reason, it makes most sense to first review the major section "*KEY*

INFORMATION SUMMARY" and then to proceed to consider the items within an appropriate context. In terms of example, if it was known that initial assumptions have an imbalance of kiln capacity where effective capacity would need to be gained, reduction in lost productive time would help, but also reducing kiln residence time might be appropriate solutions, the effect of air drying to reduce kiln time could be considered in an iterative process of change, realizing that expanding the amount of lumber dried is at the expense of building more in-process inventory. Also it might be appropriate to consider if items should be removed or reduced in volume. The various summaries can give some indication of likely relative contributions of alternative items. A few things must be kept in mind when considering the data presented within the context of these variables – the calculated gross margin does not necessarily represent a "profit" for the various items in any kind of a final or absolute form, as the only costs considered at this point are raw material (i.e. green lumber purchase) and working capital requirements – this allows comparison (and some relative ranking) of items, however there will be other costs to consider, and for this reason a gross margin should not be considered as "adequate" simply because it is positive. If custom drying is to be considered as an item or items within the mix, there needs to be some caution in interpretation. For example, in the case of custom drying green price and working capital costs are essentially "zero", therefore they cannot usefully be compared to company owned products in variables such as "*ITEM GROSS MARGIN (RM & WC COSTS) AS % INPUT VALUE ANNUALIZED*" that look at returns relative to green lumber value, however examination of an appropriate variable such as *"$/MBF GROSS MARGIN FOR ITEM (considers RM & Working Capital Interest Costs)*" can lead to logical conclusions. Something to keep in mind is that activities that use resources in drying relatively low-return items (in custom drying or the company's own low-margin lumber) precludes the use of resources being devoted to drying items that offer promise a greater return. Alternately the logic that there is available excess capacity to devote to low margin items presumes that level of investment is logical, so incremental analysis may be appropriate. Something that should be obvious but is often overlooked in some companies is that internal competition among the different profit centers to appear relatively better than their peers should be monitored as to not allow it to adversely affect the organization's overall performance – sadly that is often not the case. What this means is, within the analysis, the assumptions used must be realistic if the analysis is to be appropriate and effective. The green price, dry price and all other price and cost assumptions should be realistic for the organization and its circumstances, not some fiction to benefit one department or another in transfer pricing. It is not uncommon to see that where this is ignored, excellent opportunities for dry kiln investments might be ignored, or investments might be made on false assumptions that can never be realized in reality.

Major Section: *KEY INFORMATION SUMMARY* – This section brings together some prior calculated overall summary information and some important capacity calculations that provide a "flag" where significant imbalances might exist between equipment and volume/process assumptions.

MBF TOTAL INPUT VOLUME of ALL ITEMS (INPUT GREEN LUMBER TOTAL VOLUME)
TOTAL $ VALUE (i.e. "COST") of ALL INPUT GREEN LUMBER
AVERAGE $/MBF FOR GREEN LUMBER (weighted average value)
TOTAL $ VALUE (i.e. "POTENTIAL REVENUE" after downfall) of ALL DRIED LUMBER

AVERAGE $/MBF FOR DRY LUMBER (weighted value, includes downfall adjustments)
TOTAL GROSS MARGIN (all items) CONSIDERING RAW MATERIAL COST ONLY
ANNUAL AVERAGE GREEN LUMBER IN-PROCESS INVENTORY VALUE
ANNUAL AVERAGE DRY LUMBER INVENTORY VALUE
AVERAGE COMBINED GREEN IN-PROCESS AND DRY LUMBER INVENTORY VALUE
TOTAL GROSS MARGIN (all items) CONSIDERING RM AND APPROX WC COST - the
variable column displayed for these rows all display values which are calculated (and explained)
prior in various areas, brought together here for a summary review, or are simply a straight-
forward calculated percentage of overall volume, value or average as labeled.

% OF TOTAL EFFECTIVE KILN CAPACITY REQUIRED BY ALL ITEMS COMBINED
% OF NOMINAL KILN CAPACITY REQUIRED BY ALL ITEMS COMBINED
% OF TOTAL EFFECTIVE PREDRYER CAPACITY REQUIRED BY ALL ITEMS COMBINED
% OF NOMINAL PREDRYER CAPACITY REQUIRED BY ALL ITEMS COMBINED - the
variable column displayed for these rows are calculated and totaled prior, but first displayed for
review here in a way that is difficult to overlook (or avoid) as a summary review of capacity use.
Ideally the percentage of effective kiln and predryer capacity that is used should be close to
100%, and it logically must be less than 100%. Any excess beyond 100% means that
assumptions are simply not realistic and need to be adjusted as appropriate. In contrast, a very
low percentage of capacity use would imply that investment in kilns and/or predryer capacity is
well beyond projected needs. Differences between effective and nominal capacity give a good
indication overall of the aggregate effect of assumptions with regard to downtime, load/unload
constraints, etc.. As noted prior, first and often subsequent review of this "*KEY INFORMATION
SUMMARY*" section often prompts some changes in assumptions.

Sub-Section: *SUPPLIMENTAL DRY LUMBER VOLUME INFORMATION SUMMARY* - This
sub-section provides supplemental information translating green lumber basis calculation to a
dry lumber basis of average price and dry lumber volume (after shrinkage).

MBF TOTAL INPUT VOLUME of ALL ITEMS (INPUT GREEN LUMBER TOTAL VOLUME)
WEIGHTED AVERAGE % OF GREEN LUMBER LOST DUE TO SHRINKAGE
TOTAL MBF OF LUMBER ANNUALLY LOST TO SHRINKAGE
MBF TOTAL DRY LUMBER OUTPUT VOLUME (MBF VOLUME IF TALLY AS DRY)
NOMINAL WEIGHTED AVERAGE SELLING PRICE $/MBF DRY TALLY - the variable column
displayed for these rows are straight-forward. As noted, the dry lumber output volume with the
grade downfall adjusted price reflects the projected revenue on an actual dry volume and dry
lumber selling price. However, this may be functionally represented to the same result by using
the green lumber volume with the price reflected on a green MBF basis, and that is the way it is
done in the model. The advantage to using this functional representation to the same result (by
using the green lumber volume with the price reflected on a green MBF basis) is that volumes
are constant throughout the model permitting apples versus apples comparisons in calculations.
Consequently, to retain simplicity, the relationship is explained here, but all further references to
board foot volumes and per board foot costs and values which follow in the model are always on
a board foot green input basis.

Major Section: *MANUFACTURING COST DATA*
This section provides for input of labor requirements (in "*PAYROLL DATA*" section), variable costs other than raw material costs (in "*OTHER VARIABLE MANUFACTURING COSTS*" section), and operating fixed costs.

PAYROLL DATA - This section provides for entry of production labor/payroll data, and performs summary calculations.

Average # of production employees used 1st shift
Average # of production employees used 2nd shift
Average # of production employees used 3rd shift
Average # of production employees used 4th shift – these cells are for entry of the number of employees for each of up to 4 shifts. In most cases this would be on a full time equivalent (fte) or decimal fraction of fte.

AVERAGE # OF EMPLOYEES, ALL SHIFTS COMBINED - this calculated cell sums the entries for the number of employees on shifts to a combined total.

Average # of days (not including overtime) an employee works per year
Average base hourly wage of production employees
Fringe benefits for production employees as a % of base hourly wage
Overtime premium for production employees as a % of base hourly wage
Fringe benefits for overtime hours a % of the overtime hourly wage
Normal # of paid hours per shift (not including overtime)
Average # of overtime hours per employee per month – these cells are for the entry of items such as days worked per year, base wages, etc. – all in a straight-forward fashion. Where there is variability (e.g. employees at different pay scales) a weighted average would be an appropriate entry.

AVERAGE # OF OVERTIME HOURS PER EMPLOYEE PER YEAR- this cell is calculated from data entered above.

Average # of days temporary employees are used per month – this cell is for a straight-forward entry. It is separate from above inputs as different fringe benefits etc. might likely apply, among other things.
TOTAL # OF DAYS TEMPORARY EMPLOYEES USED PER YEAR- this cell is calculated from data entered above.

Average number of temporary employees used per day when employed
Total temporary employee hourly wage rate with fringe benefits included – these cells are for straight-forward entries. Again, these are separate from above inputs as different fringe benefits etc. might likely apply, among other things.

SUMMARY OF ESTIMATED ANNUAL LABOR COSTS FIRST FULL YEAR
ANNUAL PAYROLL BREAKDOWN
 BASE WAGES
FRINGE BENEFITS
OVERTIME WAGES
OVERTIME FRINGE
TEMPORARY WAGES
TOTAL PAYROLL
LABOR $/MBF LUMBER DRIED - the calculated cells in these rows provide total sums and percentage breakdowns as appropriate. The key calculation of "*LABOR $/MBF LUMBER DRIED*" will be used in financial analysis later.

OTHER VARIABLE COSTS PER MILLION BOARD FEET OF (GREEN INPUT) LUMBER DRIED IN FIRST FULL YEAR - This section provides for entry of variable cost data associated with production, other than raw material and production labor costs. All costs are to be recorded in dollars per MILLION board feet of lumber dried ($/MMBF). Over time it has been found that this is generally an easier way for most people to think of these costs, as compared to a dollars per thousand board feet of lumber ($/MBF) basis. Part of this is because some of these costs might be quite small numbers (often ignored) on a $/MBF basis, and part of this is because some of these costs are more frequently "considered" in terms of how the might occur for payment (e.g. electricity) in billing on a periodic basis. Where this occurs, many people are more used to thinking of these costs in terms of dollars per month (or year) of normal production (or a cost occurring once or twice a year in terms of some maintenance activities). Where costs might seem too low for many people to wish to consider on a $/MBF basis, they generally have demonstrated to better recognize the importance on a $/MMBF basis, and they are fairly easily estimated in that fashion. Some key variable costs are included for consideration in entry, and a number of "other" lines where the costs can be labeled as desired (and of course any of the labeled costs could be relabeled).

The variable "*PROJECTED MMBF OF LUMBER TO BE DRIED IN FIRST FULL YEAR WAS >>>* " simply reminds the analyst of the calculated total (displayed prior).

Electricity
Kiln Maintenance/Repair
Predryer Maintenance/Repair
Boiler Maintenance/Repair
Rolling Stock Maintenance/Repair
Yard Maintenance/Repair
Other Maintenance/Repair
Stickers
Bolsters
Pile Covers
Boiler Chemicals
Energy
Fuel for Rolling Stock
Other variable cost #1 (re-label here or specify in column "G")

Other variable cost #2 (re-label here or specify in column "G")
Other variable cost #3 (re-label here or specify in column "G")
All other variable costs in $/MMBF - All appropriate variable costs for inclusion are to be recorded in dollars per MILLION board feet of lumber produced ($/MMBF) in the cells in column C. Any variables can be re-labeled as desired, but the basis under which costs are to be recorded, in dollars per MILLION board feet of lumber produced ($/MMBF) should not be changed. For entries made in any of the "other" categories of variable cost entries, a companion cell in column G is for explanation of what is represented in that cost item. A companion column E translates entries in column C from a $/MMBF to a $/MBF basis.

TOTAL OTHER VARIABLE COST $/MMBF - the calculated cell in this rows provides a total sum of the variable costs entered on a $/MMBF lumber basis. The calculated "*TOTAL OTHER VARIABLE COST $/MMBF*" will be used in financial analysis later.

OPERATING FIXED COSTS FOR FIRST FULL YEAR - This section provides for entry of fixed costs data associated with the operation. It includes total non-production labor costs (e.g. office and management) and all fixed costs EXCEPT any loan payments (interest and/or principal) and depreciation are not to be entered here (they will be dealt with later in the model). All costs are to be recorded in dollars per year.

Insurance
Property Taxes
Security
Accounting/Legal
Office/Administrative Salary & Benefits (office & management)
Other variable cost #1 (re-label here or specify in column "E")
Other variable cost #2 (re-label here or specify in column "E")
Other variable cost #3 (re-label here or specify in column "E")
All other fixed costs in $/year - All appropriate fixed costs for inclusion are to be recorded in total dollars per year. Any variables can be re-labeled as desired, but the basis under which costs are to be recorded (i.e. in dollars per year) should not be changed and it should be remembered any loan payments (interest and/or principal) and depreciation are not to be entered here (they will be dealt with later in the model). For entries made in any of the "other" categories of fixed cost entries, a companion cell in column E is for explanation of what is represented in that cost item if the "*other variable cost*" heading is not relabeled.

TOTAL FIXED COSTS $/YEAR - the calculated cell in this rows provides a total sum of the fixed costs entered on a $/year basis. The calculated "*TOTAL FIXED COSTS $/YEAR*" will be used in financial analysis later.

Major Section: *SUMMARY OF INPUTS INTO ANALYSIS FOR PERIOD # 2 (FIRST FULL YEAR)* This apparently small but important major section marks the divide between the production and other operational estimates made in the first half of the model, and uses these as a foundation to provide for key inputs into the latter half of the model for the financial analyses. This major section is shown in its entirety below, including a column of CALCULATED items (which appear in column C in the spreadsheet), and the column of ENTRY items (which appear

in column E in the spreadsheet) are used to make actual base entries into the model for the first full year of the analysis (i.e. period #2). The reason behind this apparent duplication between the two columns is to allow for easy breakage of the link (and also for easy connection) between the first half of the model with its production and other operational estimates, and the financial analyses in the second half of the model. In its base form, the cell for the CALCULATED item (which appears in column C in the spreadsheet) is linked by being address which is the contents of the corresponding cell in the column for the ENTRY item (which appear in column E in the spreadsheet). As long as this linkage is maintained (i.e. as long as a cell in the ENTRY column contains the address of the corresponding cell in the CALCULATED column), all estimates which appear in the CALCULATED items' column will be reflected directly as items in the ENTRY column and then go as an entry into further calculations. In most cases this is the way the user would wish for the model to perform, however, there are exceptions. Consider for example that some basic heuristic analyses might be desired - for examples, it might be desired to examine "what if?" for what the effect may be on financial feasibility if raw material costs were to be increased across all species considered by some percentage, or if production were to be similarly adjusted (raised or lowered by some percentage across all species), or that different considerations might be desired in variable or fixed costs, or inventories. Without some easy mechanism for change, this would require the analyst to go into the first half of the model, make a considerable array of changes (and then probably have to go back to those areas (after completion) to change them back to the original estimates after the heuristic analyses have been completed). The additional ENTRY column in this section permits making the desired changes directly into the ENTRY column as an overall change (that would result from a number of small component changes), and to accomplish that in a very quick and direct fashion, while showing directly (in side-by-side comparison) how much the entry compares to (or is changed from) the prior calculated values. This area appears as follows as an example:

SUMMARY OF INPUTS INTO ANALYSIS FOR PERIOD # 2 (FIRST FULL YEAR)
(NOTE: Items initially set under column for "entry" (E) are relative address of items which are under listed under column for "calculated" (C), which were calculated from prior inputs.
Items within the "entry" column (E) are the items which will be used to define entries for the first full year of operations - changes made in prior assumptions to this point will be reflected in the "calculated" column.
If any adjustments to first full year (period #2) are desired (e.g. to perform "what-if" queries) they can be directly within the "entry" column (E) without changing the key (prior) initial assumptions, by simply typing in the assumption, breaking the cell link.
You may check to see if the link is established by moving the mouse to the cell in the entry column (E), and left-clicking the cell - the corresponding cell in the "calculated" column (C) will appear (e.g. =C334) if the link is made, or this may be entered to re-establish the link.

	CALCULATED	e>> (see note above) ENTRY
TOTAL MBF VOLUME of LUMBER DRIED (INPUT GREEN LUMBER TOTAL VOLUME)	*4,990*	*4,990*
AVERAGE $/MBF FOR GREEN LUMBER (weighted average value)	*$881.66*	*$881.66*
AVERAGE $/MBF FOR DRY LUMBER (weighted value, includes downfall adjustments)	*$1,087.12*	*$1,087.12*
ANNUAL AVERAGE GREEN LUMBER IN-PROCESS INVENTORY VALUE	*$375,110*	*N/A*
AVERAGE GREEN LUMBER IN-PROCESS INVENTORY (as a % of green lumber value)	*8.53%*	*8.53%*
ANNUAL AVERAGE DRY LUMBER INVENTORY VALUE	*$151,916*	*N/A*
AVERAGE DRY LUMBER IN-PROCESS INVENTORY (as a % of dry lumber value)	*2.80%*	*2.80%*
AVERAGE LABOR VARIABLE COSTS $/MBF LUMBER DRIED	*$42.24*	*$42.24*
TOTAL OTHER VARIABLE COST $/MBF	*$20.20*	*$20.20*
TOTAL FIXED COST $/YR (not to include P&I on loan or depreciation)	*$92,700*	*$92,700*

The entry inputs in the *SUMMARY OF INPUTS INTO ANALYSIS FOR PERIOD # 2 (FIRST FULL YEAR)* will be used directly as the period #2 (first full year) inputs into the financial analysis section of the model. Different period inputs for each year of a 20 year analysis will be created in a following section based on percentage change entries as related to the first full year

data that are entered. The key variables considered row by row in both a calculated and user specified entries within the "*SUMMARY OF INPUTS INTO ANALYSIS FOR PERIOD # 2 (FIRST FULL YEAR)*" section of the model are as follows:

TOTAL MBF VOLUME of LUMBER DRIED (INPUT GREEN LUMBER TOTAL VOLUME)
AVERAGE $/MBF FOR GREEN LUMBER (weighted average value)
AVERAGE $/MBF FOR DRY LUMBER (weighted value, includes downfall adjustments)
AVERAGE LABOR VARIABLE COSTS $/MBF LUMBER DRIED
TOTAL OTHER VARIABLE COST $/MBF
TOTAL FIXED COST $/YEAR (not to include P&I on loan or depreciation) – are all items taken directly from the section titled "*KEY INFORMATION SUMMARY*" and have been explained prior. The entries for "*AVERAGE GREEN LUMBER IN-PROCESS INVENTORY (as a % of green lumber value)*" and "*AVERAGE DRY LUMBER IN-PROCESS INVENTORY (as a % of dry lumber value)*" is simply a display of what was calculated prior and displayed within the CALCULATED column and does not have a corresponding cell in the ENTRY column as the entry will be recalculated using an input explained below to transform this into a percentage.

AVERAGE GREEN LUMBER IN-PROCESS INVENTORY (as a % of green lumber value) – this simply expresses the in-process (green) lumber inventory as a percentage of the estimated total raw material costs. The percentage expression if unchanged (i.e. if kept at 100%) will relate in-process inventory values directly to increasing (or otherwise changing) lumber costs in their (first full year) established "normal" relationship - and as costs increase, with the percentage change, inventory will commensurately increase. Additionally the percentage allows for easy and more logical adjustments to inventory for unusual circumstances. For example, in the first year, as a startup period, inventory requirements will not be at a full level of production, but probably should be higher than would be expected based on the reduced percentage of production, due to the inefficiency of start-up – the percentage adjustment is designed to make that relatively easy for such adjustments without side-channel calculations.

AVERAGE DRY LUMBER IN-PROCESS INVENTORY (as a % of dry lumber value) – this is a calculated value that simply expresses the dry lumber inventory as a percentage of the estimated total value of production of dry lumber. The percentage expression if unchanged (i.e. if kept at 100%) will relate dry lumber inventory values directly to increasing (or otherwise changing) dry lumber values in their (first full year) established "normal" relationship, and as values increase, with the percentage change, inventory will commensurately increase. Additionally the percentage allows for easy and more logical adjustments to inventory for unusual circumstances such as the startup year.

Major Section: *PERIOD INPUTS INTO ECONOMIC MODEL* – This section is where the majority of production assumption entries are made into the model. The data for period #2 (the first full year) are shown as a volume of production, a dollar value or a percentage as appropriate for the variable, and these are the same data which were reflected for entry within the ENTRY column as explained above. For the first period (most likely a partial production year due to the start-up) and for the year-periods #3 through #20, entry is required for each of the eight items for the 19 periods other than period #2, the first full year (i.e. year #1 and years #3-20). In each case the entry is made as a percentage value of the entry for year # 2).

TOTAL MBF VOLUME of LUMBER DRIED (INPUT GREEN LUMBER TOTAL VOLUME)
AVERAGE $/MBF FOR GREEN LUMBER (weighted average value)
AVERAGE $/MBF FOR DRY LUMBER (weighted value, includes downfall adjustments)
AVERAGE GREEN LUMBER IN-PROCESS INVENTORY (as a % of green lumber value)
AVERAGE DRY LUMBER IN-PROCESS INVENTORY (as a % of dry lumber value)
AVERAGE LABOR VARIABLE COSTS $/MBF LUMBER DRIED
TOTAL OTHER VARIABLE COST $/MBF
TOTAL FIXED COST $/YEAR (not to include P&I on loan or depreciation) – these cells are for straight-forward entries. In many (perhaps most) cases the total production "*TOTAL MBF VOLUME of LUMBER DRIED (INPUT GREEN LUMBER TOTAL VOLUME)*" will be significantly below normal for the first (partial) year, then may be unchanged for periods following year #2. The other variables might be expected to change. It is fairly easy to create a formula in any cell following year #3 where the variable may be increased by a percentage basis from the prior period, and then copy that formula to cells representing the following year (an example would be provided in the sample data in the model starting in year #4 for any of the variables other than inventory. (This is shown as an example in several rows.)

Sub-Section: *KEY PRODUCTION DATA FOR ENTRY INTO MODEL* – This section is where the production assumption entries which were made above are transformed into data that are directly entered into the model. The data for period #2 (the first full year) are of course unchanged from the first entries made in the ENTRY column, except that entries for "*AVERAGE GREEN LUMBER IN-PROCESS INVENTORY (as a % of green lumber value)*" and for "*AVERAGE DRY LUMBER IN-PROCESS INVENTORY (as a % of dry lumber value)*" which were "entered" as a percentage value are now transformed by calculations into dollar values representing (respectively) "*ANNUAL AVERAGE GREEN LUMBER IN-PROCESS INVENTORY VALUE*" and "*ANNUAL AVERAGE DRY LUMBER INVENTORY VALUE*" for all 20 of the year-periods. The other variables are simply transformed into the appropriate number (representing lumber volume dried) and dollar values for all other variables, for the first period (partial year start-up) and for the year-periods #3 through #20.

TOTAL MBF VOLUME of LUMBER DRIED (INPUT GREEN LUMBER TOTAL VOLUME)
AVERAGE $/MBF FOR GREEN LUMBER (weighted average value)
AVERAGE $/MBF FOR DRY LUMBER (weighted value, includes downfall adjustments)
ANNUAL AVERAGE GREEN LUMBER IN-PROCESS INVENTORY VALUE
ANNUAL AVERAGE DRY LUMBER INVENTORY VALUE
TOTAL ANNUAL PRODUCTION LABOR COST
TOTAL ANNUAL OTHER VARIABLE COST
TOTAL FIXED COST $/YEAR (not to include P&I on loan or depreciation) – all variables explained earlier and no entries are required in any columns, all data are calculated from prior inputs.

Major Section: *CAPITAL INVESTMENTS AND SIMPLIFIED ESTIMATION OF DEPRECIATION* – This major section is where investment assumptions and depreciation assumptions (for tax purposes) are entered into the model. The model is designed to "automatically" (or most routinely) accommodate what should be most common in its effects on

taxes. The model estimates depreciation for investments in the different property classes using the Modified Accelerated Cost Recovery System (MACRS) General Depreciation System (GDS) system with the 200% Declining Balance (DB) and half-year convention. A detailed discussion of property class assignment is well beyond this manual, but in simplification, the following should be suitable for use as a starting point in initial pre-feasibility runs ONLY (i.e. until you have better information). Generally you may wish to do your first trial runs with basic assumptions where you assign building structures (but not kilns) as 20 year property; land improvements as 15 year property; over-the-road tractor units as 3 year property; trucks, forklifts, office equipment (including computers) and cars as 5 year property; and the vast majority of equipment, including virtually all production equipment (that is including kilns) should probably be assumed to be 7 year property. A common mistake in class assignment in preliminary analyses is where someone looks at a kiln, "sees" it as being like a structure and assumes it should be depreciated as a building. Caution should also be noted in class assignment for boilers, which if very large may have special depreciation rules. (Note: For detailed information on this see Internal Revenue Service Publication 946 including information regarding what property class applies to different types of property, and the associated recovery periods for those classes (which are imbedded into the model)). As noted in explanation within the model, the total INITIAL investment in each of the different property classes is simply entered in column C as appropriate to use this (relatively standard) form of depreciation within the analysis. In each case the entry made in column C is calculated as a percentage of total investment in column D. If it is preferred to use another form of depreciation for analysis (i.e. other than the MACRS GDS system with the 200% DB and half-year convention, entries may be ignored (i.e. change the entry to a value of "0" or zero) in all six of the "# Year Recovery GDS (MACRS) Property" cells below, but non-depreciable property and working capital should both still be recorded where it is indicated they belong.

INVESTMENT AND DEPRECIATION INFORMATION (label only)
Total in MACRS year category GDS System 200% (label only)
3 Year Recovery GDS (MACRS) Property
5 Year Recovery GDS (MACRS) Property
7 Year Recovery GDS (MACRS) Property
10 Year Recovery GDS (MACRS) Property
15 Year Recovery GDS (MACRS) Property
20 Year Recovery GDS (MACRS) Property
Non-Depreciable (e.g. land) – make dollar entry as appropriate (in column C) for investment in each property class.

TOTAL INITIAL INVESTMENT (except working capital) >>> this is a calculated total of the above entries.

Initial Working Capital – requires a dollar value entry for initial working capital. Immediately below this row, in column F is a number that has a label to its left in the spreadsheet model as: "*NOTE: THE ANALYSIS ENTERED ABOVE ESTIMATED LOG $ LUMBER INVENTORY FOR PERIOD #2 AS BEING >>>*" this value is the estimated first full year value of log and lumber inventory. It is reasonable to assume that the value presented should probably represent a lower end assumption for required working capital.

Immediately following this input section is a display section with a header label indicating *ASSUMED % DEPRECIATION TAKEN IN PERIOD (first yr in service = year #1, second year in service = year #2, etc.)*
Then a breakdown label "*PROPERTY TYPE*" and the following rows:
3 YEAR RECOVERY GDS (MACRS) PROPERTY
5 YEAR RECOVERY GDS (MACRS) PROPERTY
7 YEAR RECOVERY GDS (MACRS) PROPERTY
10 YEAR RECOVERY GDS (MACRS) PROPERTY
15 YEAR RECOVERY GDS (MACRS) PROPERTY
20 YEAR RECOVERY GDS (MACRS) PROPERTY – within this section, no entry is required. What is displayed is the percentage of the value of the associated class of property that is taken as depreciation in each of the year-periods. In each case, the number of periods (years) over which depreciation is actually taken exceeds the nominal years in that class name by one period. This is because using the half-year convention, a half-year of depreciation is taken for the first and last years. The percentages which are entered in the various year categories are the percentages which are actually used in the calculation of depreciation for items entered into the depreciation section. By investigation of how these cells are used in calculations to obtain total depreciation in each year, someone who is a reasonably capable spreadsheet user with some reasonable knowledge of the topical area may quickly ascertain that if they might wish to make alterations to the model to suit their particular circumstance; that would be fairly easy to accomplish if was desired to "fine-tune" the model for a specific application.

Major Section for Summary and Entry: "*TOTAL VALUE OF DEPRECIATION ENTERED INTO MODEL FOR YEAR*" is a section heading label, and has a cell immediately below which labels "*DEPRECIATION VALUES FOR YEAR*" followed by cells representing the years' numbers in the row. The next row, labeled: "*INITIAL INVESTMENT GDS (MACRS) PROPERTY ACQUIRED YEAR #1*" - contains automatic entries that have been calculated as depreciation entries for each year, based upon entries that have been made for investments in each of the MACRS property classes. This is calculated by taking the investment value assigned to each property class, and then multiplying it by the percentage (expressed as a decimal fraction) for the period, then adding these values for each of the depreciation classes. These automatic entries apply for investments made in the initial period only, within the standard entry cells, as described above. Two following rows are labeled as:

Other Depreciation in Year (optional entry)
Other Depreciation in Year (optional entry) – are rows for other entries which may be used as appropriate, if desired, and:

TOTAL DEPRECIATION IN YEAR – which simply provides a summation of the depreciation entries made in the three rows above, including the summation of all MACRS class entries (year by year) and in the two "other" rows.

There are what should be obvious (and what might not be immediately obvious) ways of using the optional entry rows. What should be an obvious way to use the rows "*Other Depreciation in Year (optional entry)*" would be to separately calculate the depreciation (using any method that

might be desired) and to make a direct dollar value entry into each year as appropriate. This would (of course) be something that could be done regardless of what type of depreciation someone might want to use and regardless of the year the property is placed in service. Another perhaps not so obvious way in which the entry rows for "Other Depreciation in Year (optional entry)" would be for later investments to be made in the period of analysis using depreciation with the (standard) MACRS depreciation system. In terms of example, it is likely most of the 7 year property class property should physically last for the twenty year period of the analysis; however, some of it could be replaced, and with almost certainty, some of the 5 year property class property will not be expected to physically last for the twenty year period of the analysis and some of it will almost certainly need to be replaced; so assume as an example, that investments in both 5 and 7 year class property might be made in year 11 to replace worn out equipment, and that the analyst desires to use the (standard) MACRS depreciation system. That kind of an entry is actually very easy to make. To do this, the person using the model would simply FIRST enter the investment information for the later (year 11) investment as if it was an initial investment - in this example, the appropriate assumed investments for year 11 would be entered as values in the MACRS entry section, and this should be done BEFORE any initial investment data are entered (NO OTHER INVESTMENT DATA REPRESENTING INITIAL INVESTMENTS SHOULD BE IN THE CELLS), and it should be done using the nominal value that is expected for the investment at that time in the future. In doing this, the model will generate the appropriate depreciation values to be taken year by year beginning at the time the new property is purchased and placed in service in the future (in this example year #11) – BUT – what should represent the value for that depreciation in year #11 is actually shown in the row titled "*INITIAL INVESTMENT GDS (MACRS) PROPERTY ACQUIRED YEAR #1*" in year #1, and the value for year #12 is shown in year #2, and so on. All the user needs to do to put these into the appropriate place is to use the spreadsheet to "COPY" these values "AS A VALUE" into the years where they belong. To do this use the COPY command to copy the string of numbers, and then (beginning in the appropriate cell on a following row for "*Other Depreciation in Year (optional entry)*" do a PASTE SPECIAL and indicate you are doing it (the PASTE SPECIAL) as a VALUE. Once the appropriate values for the future investments are in their appropriate places in the "other" rows, the user can then simply enter all the appropriate data for all classes of property for the initial investment. For someone with a little spreadsheet experience this is quite easy to understand, and it may be hard to remember times past when they themselves didn't understand the differences between "cut" and "copy" or between the copying of formulas or values – for other users, the following is suggested: before you try this, SAVE your spreadsheet. Then try to perform the operations as explained – as a reminder, you want to do the future investments first, before any entries are made for the present. Use the future investment values as the entry, and the results will appear in the row titled "*INITIAL INVESTMENT GDS (MACRS) PROPERTY ACQUIRED YEAR #1*" as explained earlier. Then simply highlight the appropriate string of cells (e.g. it should have values in cells representing years #1 to #8 if 7 year property is considered and use the command to "COPY" the highlighted area. Then put you cursor on the cell (e.g. in year #11 in one of the "*Other Depreciation in Year (optional entry)*" rows – BUT – DO NOT simply do a command to "PASTE" – what you want to do is a command called "PASTE SPECIAL" and then you will have a number of items to select from in terms of what you want to paste the information as, and the one you want to chose is "VALUES". If at first you don't succeed, do an "EDIT" and the "Undo Paste" and try again – if you screw something up, no harm done, that is why you saved the spreadsheet (just in case), and you can get back to

where you were prior by closing or exiting without saving (no harm done). This is not too difficult to learn, even for a relative beginner.

As indicted prior the summation row "*TOTAL DEPRECIATION IN YEAR*" will provide a summation of the three rows above, including the initial investment with MACRS and the two "other" rows. Obviously a user could insert additional rows if needed and adjust the summation, or with most spreadsheets, if the inserted rows are between rows above (e.g. between the two "other" rows) the spreadsheet should automatically adjust the summation function for the "*TOTAL DEPRECIATION IN YEAR*" row.

Sub-Section for Entry of Choice: "*METHOD FOR HANDLING EXCESS DEPRECIATION IN YEAR*" Within this section the user will make a selection for treatment of "excess depreciation". Excess depreciation exists in a circumstance in which the depreciation that may be taken in the year exceeds the net income before depreciation and tax. In this case, if the full measure of depreciation were taken, this would cause a before-tax loss to occur, with the amount of excess depreciation being equal to the amount of before tax loss due to taking depreciation. Since depreciation is an expense you "pay to yourself" - its purpose being simply to shield some allowed portion of revenue from tax to allow for the recovery of the cost of depreciable investment in before-tax dollars – too much "depreciation expense" in a year can result in a circumstance wherein there is "excess depreciation", or simply the allowance for depreciation exceeds the net income before depreciation and tax. If this is ignored, it is simply an opportunity lost, and the loss can be significant as it equals a contribution to after-tax net cash flow equal to the amount of excess depreciation multiplied by the tax rate. Excess depreciation can and does occur in businesses that have considerable potential for success – said differently – a circumstance where a before-tax "loss" occurs due to depreciation does not necessarily imply a serious problem. This can (and does) occur with some degree of frequency and is particularly common in circumstances wherein the depreciation expense in early years (or the startup year) may be relatively high (as it frequently is) and net income before depreciation and tax may be relatively low (as it frequently is). An example of a very common circumstance where this occurs is in a short (less than 12 month) start-up year where production is low and costs may be relatively high, and this can carry over into the following year. Consequently three choices are made available to deal with any excess depreciation, they are:

Choice #1: "*Excess depreciation for the year (that is depreciation in excess of taxable income) is to be "lost" without carryovers or adjustments.*" Or…
Choice #2: "*Excess depreciation for the year to be carried over to the next year.*" Or…
Choice #3: "*Excess depreciation for the year to be treated equivalent to being a reduction in taxable income for a related operation in the same year.*"

The user selects which of these three options is desired by entering the number of the choice (i.e. enter the number 1, 2 or 3) within the entry cell in Column C as shown in example where option #2 is chosen:
e>>   Enter #1, 2 or 3 for Excess Depreciation Treatment Choice >>>>>   2
The two rows immediately following "flag" the user as to the selection, as in example:
"*NOTE: The number you have entered in the cell above reflects the excess depreciation treatment below, if this is not correct, make another choice, 1, 2 or 3*" then in the following row:

"*NOTE: THIS IS SELECTION FOR TREATMENT>>>>>*" followed by   "*Excess depreciation for the year to be carried over to the next year.*" In the event something other than one of the three selection numbers is chosen, this final message will be "*SELECT THE DESIRED METHOD FOR HANDLING EXCESS DEPRECIATION IN YEAR BY SELECTING NUMBER OF CHOICE, 1, 2 OR 3*" instead of a description of one of the three selections.

How any excess depreciation will be handled will be based on which of the three choices is selected, explained as follows:

Choice #1: "*Excess depreciation for the year (that is depreciation in excess of taxable income) is to be "lost" without carryovers or adjustments.*" This is an <u>extremely</u> conservative choice in which the potential benefit of any excess depreciation will be assumed to permanently be lost.

Choice #2: "*Excess depreciation for the year to be carried over to the next year.*" This is a very logical choice for what might be considered in planning for what is essentially a "stand-alone" operation, or for an operation which may be an expansion to a much smaller existing operation, or to an existing operation that does not have significant income subject to tax. In this choice any excess depreciation in a given year will be "carried-over" to the following year reflecting an increase by that amount for the depreciation expense in the following year. This carry-over will keep going in accumulation until the depreciation is used.

Choice #3: "*Excess depreciation for the year to be treated equivalent to being a reduction in taxable income for a related operation in the same year.*" This is a very logical choice for what might be considered in planning for what is essentially an "add-on" operation, or for an operation which may be an expansion to a large existing operation or to an existing operation that does have significant income subject to tax. In this choice it is assumed that any excess depreciation in a given year will be used to reduce income before tax in another part of the larger operation, having the same net affect on the operation as a whole as if the depreciation expense was taken in that year within the feasibility analysis. This is accomplished by multiplying the excess depreciation by the tax rate (on income) and adding that to the operational after tax net cash flow in an adjusting entry.

Major Section: "*CAPITAL INVESTMENT SUMMARY*" – this is a major summary and entry section. Immediately below the heading label, a cell indicates (*NOTE: All standard Year #1 investments, including year #1 working capital, are entered automatically. Total investments in all other years (if any) must be manually entered*). This relates only to the next row of data for the investments in all years #1 though #20. As this implies, the entry for Year #1 (in Column C) is automatic and any other entries (i.e. for years #2 through #20, as an example if additional 5 or 7 year equipment were to be purchased in year #11) those entries need to be made manually. Except for these entries representing investments in year #2 through #20 (if any), all entries in this section are in column C.

INVESTMENT IN YEAR (manually enter investments after year #1 only) – as indicated prior, for year #1 (column C) an entry is automatically created based upon the standard investment entries including the summation of all MACRS class entries and initial working capital. For investments in all other years the entry for that total investment should be made directly in the column for the appropriate year. If additional investments (other than the standard MACRS class entries and initial working capital) are to be made for year #1, the value of those additional investments should be added to the formula in column C. To do this, simply edit the cell formula, enter a plus

sign (+) to the formula and then enter the value (e.g., the formula in the cell is the addition of two cells, edit this formula to reflect to add the other investment in the year not reflected in the other two cells in the formula by adding either another cell reference or a number).

TOTAL INVESTMENTS ALL YEARS – as indicated, this is a simple (non-discounted) summation of all investments in all years recorded in the prior row.

NPV TOTAL INVESTMENT IN EACH YEAR – this is the prior row of *INVESTMENT IN YEAR* with each investment discounted to the equivalent Net Present Value (NPV) for that year's investment (based on the discount rate of the cost of capital which will be entered by the user later in program, and as that discount interest rate may be changed by the user these and other value will change). Where there are investments made after year #1, this value will be different than the value for *TOTAL INVESTMENTS ALL YEARS*, reflecting the effect of discounting future investments.

NPV TOTAL INVESTMENTS ALL YEARS– as indicated, this is the summation of all investments in all years recorded in the prior row. Where there may be investments made after year #1, this value will then (assuming any positive discount rate) be different than the value for *TOTAL INVESTMENTS ALL YEARS,* reflecting the effect of discounting future investments.
TOTAL DEPRECIATION ALL YEARS - as indicated, this is a simple (non-discounted) summation of all depreciation recorded for all investments in all years

INITIAL WORKING CAPITAL – this value was entered prior by user

NON-DEPRECIABLE ASSETS – this value was entered prior by user

Estimated Salvage Value of Non-Depreciable Assets – the user enters what the estimated salvage value will be off all non-depreciable asset investments that were entered prior as non-depreciable asset investments (e.g. land) considered with respect to what they could be sold for at the end of the 20 year analysis period (the difference in value would be subject to capital gains tax in the analysis)

RESIDUAL "BOOK" VALUE OF DEPRECIABLE ASSETS – this is a calculated value which expresses the difference (residual value) between investments made in depreciable assets compared to the depreciation which is taken in the 20 year analysis.

Estimated Salvage Value of Depreciable Assets - this entry value is made by the user estimating the value of all depreciable assets at the end of the 20 year analysis period. In many circumstances equipment might have some value for continued use (or for sale) long after the equipment has been depreciated to a "zero" book value (this difference in value of estimated salvage value as compared to book value would be subject to capital gains tax in the analysis).

ASSETS SUBJECT TO CAPITAL GAINS TAX – this is a calculated value which sums the calculated value of assets that would be subject to capital gains tax at the end of the 20 year analysis. This value will automatically be considered within the analysis; it will be treated as an

inflow subject to capital gains tax for purposes of the analysis in providing a closure for the difference of actual values versus the book values.

Corporate tax rate as a % of income and *Capital Gains Tax Rate* – call for entries in the respective cells in column C to be used in the analysis. Regarding the corporate tax rate on income, the combined tax rates (e.g. federal and state) need to be considered and incorporated into the analysis. This is simplified to having the blended tax on net income expressed as a single percentage versus using rate tables or some other complicated lookup schema, which should be suitable for pre-feasibility analyses. A problem with tables is the vain hope they could ever adequately be kept, and the complication of dealing with a considerable number of states. Balance this with the consideration that even if that was structured into a complicated model – how this might change in the future is simply a guess. An additional complication which will be mentioned later deals with how tax (and also depreciation) is to be considered for periods where a loss may occur. Regarding the capital gains tax – this is also of course a guess – the principal effect is largely for residual value different from book at then end of the analysis period, and the effect is likely minor regardless, except perhaps in circumstances where enormous increases might occur in value over the analysis period (e.g. land with some potential future value that is very high). These simplified entries have been demonstrated to be straight-forward and suitable over a few years now for the use for which the model was designed. Greater detail can be accomplished if desired by direct entry in later rows as appropriate.

Major Section - *LOAN INFORMATION (AMOUNT, INTEREST, MINIMUM P&I, ETC.)* – this is the section where basic long-term loan estimates will be made (i.e. for a "primary" loan). For purposes of simplicity (and more important clarity) within initial pre-feasibility analyses, the model deals with a single assumption regarding a long term loan in dealing with a major lender as a source of debt capital. The simplified assumption is that principal and interest are recovered in equivalent end of period payments at the end of each year – as approximate equivalence on the calculated effective annual interest rate. It is well recognized that in most circumstances new ventures of any size will typically have a menu array of debt financing through various programs which can ultimately be quite confusing to an average person in terms of overall effect – the simplification here has over the years been demonstrated to be very suitable for it's purpose of use in pre-feasibility analyses, with the complicating elements more thoroughly dealt with in the actual financials of the business plan. If it is desirable to add precision and sophistication to the preliminary model (e.g. in later runs) the user has the option of directly entering both interest and principal repayments into the model (for anything in addition to the "primary" loan) representing whatever blend of debt financing might be required. These entries are made in following rows in the major section "*FINANCIAL SUMMARY ANALYSIS*" in the rows titled "*Additional other interest expense that is NOT part of the primary loan considered above*" and "*Additional other principal expense that is NOT part of the primary loan considered above*" respectively. If the analyst wishes to make use of these entries, it is suggested that explanatory documentation of what is being considered should be represented somewhere, either via additional rows inserted into the model or via attachments of some type.

Original Loan – this is simply the user entry of the principal amount of the loan.

Nominal interest rate per year – this is the user entry of the nominal interest rate (before period compounding) of the loan.

 # Compounding periods/yr – this is the user entry of the annual compounding periods – usually this is "defined" in the rate quote (e.g. monthly would be "12", quarterly would be "4" etc.).
EFFECTIVE ANNUAL INTEREST RATE – the nominal interest rate of the loan as quoted on a nominal rate per-annum basis will commonly be compounded at some rate (e.g. monthly), whereby the nominal rate will be divided by the number of compounding periods in the year, and then interest will compound each period to the calculated effective annual interest rate. This *EFFECTIVE ANNUAL INTEREST RATE* will be used as the annual interest rate in the calculation. As an example, with 12% annual interest compounded monthly, the nominal rate per annum is12%, but the loan is really on the basis of 1% interest each month with compounding, so the nominal 12% per annum in the example would really be the same as 12.6825% as an effective annual rate.

Period of Loan (years) - this is the user entry of the term of the loan – usually this would be less than the 20 year period of the analysis, and it should not typically be more.

REQUIRED P&I PAYMENT/YEAR (annual payment estimate) – this is the estimated equivalent end of year annual loan payment (P&I) that would retire the loan within the term at the effective interest rate specified. Specific breakdown of components will be shown later where appropriate.

Major Section - *FINANCIAL SUMMARY ANALYSIS* – as implied in the title, this is a major overall summary section based on preceding items and associated calculations. The majority of these rows are self-explanatory in the title labels or headings, consequently amplification and explanation are only desirable or necessary for a few items.

 TOTAL MBF LUMBER TO BE DRIED (Green Lumber Input)
REVENUE FROM NORMAL DRYING OPERATIONS
VARIABLE RAW MATERIAL COST (Purchased green lumber)
VARIABLE LABOR COST
OTHER VARIABLE COST - are all self-explanatory in title heading.

GROSS MARGIN in $ (operational revenues - variable cost) – gross margin may be defined somewhat differently in various areas, hence the definition used here is (intentionally) virtually defined within the heading as representing the difference between total operational revenues and total variable costs for the period expressed in a total dollar amount. Other programs used in industry (e.g. the GRADEYIELD program) calculate this defined gross margin on a $/MBF basis by grades and species in basic contribution to profitability analyses and this is something which most in industry (particularly within the hardwood industry) have become familiar.

GROSS MARGIN as % of REVENUE FROM OPERATIONS – this is simply the same gross margin as above expressed as a percentage of revenue from operations.

other net revenue subject to normal tax – as implied this would be used for entry of any other net revenue (i.e. revenue minus cost) which would be subject to normal tax rates (i.e. not subject to

capital gains tax). Such required entries might be expected to be unusual at best in most cases, and some thought might be required to even imagine a circumstance where such an entry might be appropriate. One example of such an entry could be net revenue from the reselling of some logs (e.g. veneer logs) at a profit, where it would be desired to establish an entry separate from simply reflecting a reduced log cost for logs retained and sawn.

TOTAL REVENUE
TOTAL VARIABLE COST
TOTAL FIXED COSTS *(except loan)*
INTEREST ON LOAN- are all self-explanatory in title heading.

Additional other interest expense that is NOT part of the primary loan considered above – this row is used for direct entry of any additional interest expenses (in any or all periods) if some other type of debt is to be used in addition to the main or "primary" loan.

NET PROFIT BEFORE DEPRECIATION & TAX - is self-explanatory in title heading.

STANDARD DEPRECIATION FOR YEAR – this amount is the total depreciation expense for the year as originally calculated before the potential effects of any carryovers.

DEPRECIATION CARRYOVER FROM PRIOR YEAR (if selection 2) if Choice #2: "*Excess depreciation for the year to be carried over to the next year.*" has been selected earlier in the spreadsheet, then any excess depreciation in a given year will be automatically "carried-over" to the following year and entered in this row in the following year.

TOTAL DEPRECIATION EXPENSE AVAILABLE – This is the sum of "*STANDARD DEPRECIATION FOR YEAR*" and "*DEPRECIATION CARRYOVER FROM PRIOR YEAR (if selection 2)*" this reflects the total depreciation expense available in the year. If the total depreciation expense cannot be used, the carry-over will keep going in accumulation until the depreciation is used.

"EXCESS" DEPRECIATION FOR YEAR (in excess of profit) - this simply identifies the total excess depreciation expense for the year in comparing "*NET PROFIT BEFORE DEPRECIATION & TAX* with *TOTAL DEPRECIATION EXPENSE AVAILABLE*" this is displayed for reference regardless if the excess amount will be subject to adjustment if selection 2 or 3 is chosen, or not. In this way, if selection #1 is chosen, then this provides an indication of what is being "lost" as a possible depreciation expense.

EXCESS DEPRECIATION ADJUSTMENT (if selection 2 or 3) - if selection 2 or 3 is chosen, and there is excess depreciation, this amount of excess depreciation will be adjusted to either carry-over or equivalence value.

DESIGNATED DEPRECIATION FOR YEAR - this simply identifies the total depreciation expense for the year. If selection 2 or 3 is chosen, any excess depreciation will have been adjusted to either carry-over or equivalence value. Consequently, the size of the depreciation expense is limited to a maximum of the net income before depreciation and tax. As a result the

taxable income will not be reduced below a "zero" value (i.e. it will not be reduced to the point of becoming a loss) as a result of excess depreciation expense. This does not mean a loss cannot occur in the selection 2 or 3 choices, simply it means that it will not occur due to excess depreciation. If the other option of selection 1 is chosen no adjustment is made and the full amount of the "*STANDARD DEPRECIATION FOR YEAR*" is applied.

CALCULATED TAXABLE INCOME – is self-explanatory, representing revenue minus expenses. This will be a negative number (reflecting a loss) if expenses exceed revenues, unless the difference can be (and is) accounted for in adjustments to depreciation expense taken in the year in which case it will have a minimum "zero" value.

CALCULATED TAX ON INCOME FROM OPERATIONS AND OTHER REVENUE - is self-explanatory, consisting of the taxable income multiplied by the percentage tax rate which was entered earlier for "*Corporate tax rate as a % of income*". If "*CALCULATED TAXABLE INCOME*" has a negative (or zero) value, the calculated tax will be assigned a "zero" value. *adjustments to normal tax liabilities (e.g. credits, etc.)* – is self-explanatory, simply allowing for special manual adjustments, such as for tax credits.

TAX ON INCOME FROM OPERATIONS AND OTHER REVENUE – is simply "*CALCULATED TAX ON INCOME FROM OPERATIONS AND OTHER REVENUE*" considered along with the entry of "*adjustments to normal tax liabilities (e.g. credits, etc.)*" if adjustments are made. *(operational) AFTER TAX PROFIT (LOSS)* – is self-explanatory, simply the taxable income minus tax (with adjustments)

(operational) AFTER TAX NET CASH FLOW (ATNCF) – is "*(operational) AFTER TAX PROFIT (LOSS)*" with the "*DESIGNATED DEPRECIATION FOR YEAR*" added to it. Since the depreciation was in actuality an expense the operation paid to itself, this expense represents a cash flow into versus out-of the operation and is available for other uses. If the effect of an adjustment to deal with excess depreciation is not fully understood, it may be noted that the effect of having excess depreciation will not directly affect the value of "*(operational) AFTER TAX NET CASH FLOW (ATNCF)*". The excess depreciation reduces the "*CALCULATED TAXABLE INCOME*" to a negative value (which is not subject to additional tax) then when the (larger) depreciation value including the excess is added back to the "*(operational) AFTER TAX PROFIT (LOSS)*" the "*(operational) AFTER TAX NET CASH FLOW (ATNCF)*" will assume the same value. However, since an opportunity to shield other taxable income from tax was foregone by not doing the adjustment, this would preclude using that for reduction of tax in the future (in the case of a carry-over) or from assuming that benefit for another part of the company. *EXCESS DEPRECIATION ADJUSTMENT TO ATNCF (if selection 3)* – is selection 3 is chosen for dealing with excess depreciation – i.e. "*Excess depreciation for the year to be treated equivalent to being a reduction in taxable income for a related operation in the same year.*" - this is what might be considered in planning for essentially an "add-on" operation, or to an existing operation with significant income subject to tax. This represents that adjustment for excess depreciation in a given year being used to reduce income before tax in another part of the larger operation, having the same net affect on the operation as a whole as if the depreciation expense was taken in that year within the feasibility analysis. This is accomplished by

multiplying the excess depreciation by the tax rate (on income) and adding that to the operational after tax net cash flow in an adjusting entry.

ADJUSTED (operational) AFTER TAX NET CASH FLOW (ATNCF) – this is simply the "*(operational) AFTER TAX NET CASH FLOW (ATNCF)*" with the "*EXCESS DEPRECIATION ADJUSTMENT TO ATNCF (if selection 3)*" adjustment (if any) included.

other revenue NOT subject to capital gains tax (AUTO FOR YEAR 20) - this allows for inclusion of any net revenue for the period that is not subject tax in any year, but the primary need for this row is the analysis adjustment wherein the model assumes that inventory and assets are "sold" in year 20, and the residual book value of depreciable assets, and the basis values of inventory and non-depreciable assets are essentially treated as revenues but not subject to tax. This is automatically handled for year 20 in the end of the analysis.

other net revenue subject to capital gains tax (AUTO FOR YEAR 20) - this allows for inclusion of any net revenue for any year that will be subject capital gains tax in that year, but the primary need for this row is the analysis adjustment wherein the model assumes that inventory and assets are "sold" in year 20, and the appreciated fraction of value of non-depreciable assets and inventory is subject to capital gains tax. This is automatically handled for year 20 in the end of the analysis.

CAPITAL GAINS TAX - this is simply the calculated value in multiplication of "*other net revenue subject to capital gains tax (AUTO FOR YEAR 20)*" by the value assigned prior to "*Capital Gains Tax Rate*".

AFTER TAX NET CASH FLOW (ATNCF) FOR YEAR – this is simply the calculated value for "*ADJUSTED (operational) AFTER TAX NET CASH FLOW (ATNCF)*" with all other adjusting entries included representing the final value of the "*AFTER TAX NET CASH FLOW (ATNCF) FOR YEAR*" calculated prior to principal repayments on the loan.

MINIMUM LOAN PRINCIPAL REPAYMENT – this is the fraction of the annualized main or "primary" loan P&I annuity that is attributable to representing principal for the year on the original loan.

Additional loan principal repayment – this allows for early repayment of principal on the main or "primary" loan in excess of the required fraction of principal within the annualized loan P&I annuity that is attributable to representing principal for the year on the original loan. If any such payments are made, the P&I fractions within subsequent annuity payments will be automatically readjusted with the annuity held constant, resulting in either early retirement of the loan or a smaller than projected final payment.

Additional other principal expense that is NOT part of the primary loan considered above – this row is used for direct entry of any additional principal expenses (in any or all periods) if some other type of debt is to be used in addition to the main or "primary" loan.

Any Other Net Direct Additions or (Subtractions) to ATNCF – this allows a final adjustment directly to the after tax net cash flow. This would likely be a very unusual adjusting entry, as typically additions would be accomplished prior as "*other revenue NOT subject to capital gains tax*" or as "*other net revenue subject to capital gains tax*" as virtual "catch-alls" for final additions reflecting also in the final after tax net cash flow as appropriate. The case of a subtraction to ATNCF to reduce the net addition to retained earnings would be more likely (but still unusual for an analysis of this type).

NET ADDITION (SUBTRACTION) TO RETAINED EARNINGS IN YEAR – this is simply the "*AFTER TAX NET CASH FLOW (ATNCF) FOR YEAR*" less any principal repayments on loan and any other adjusting entries. The number can assume a negative value which represents an outflow from retained earnings. In terms of example, a required principal repayment on the loan that is in excess of the "*AFTER TAX NET CASH FLOW (ATNCF) FOR YEAR*" will drive this number to negativity and define an appropriate reduction to retained earnings.

CUMULATIVE RETAINED EARNINGS – is self-explanatory, simply the "*NET ADDITION (SUBTRACTION) TO RETAINED EARNINGS IN YEAR*" applied to the existing (prior) value for "*CUMULATIVE RETAINED EARNINGS*" at the start of year (or end of prior year) or to "0" in the first year.

Minor Section: *SUMMARY OF LOAN INFORMATION* – this simple section provides a summary of the main or "primary" loan in a combined format just below the prior section "*FINANCIAL SUMMARY ANALYSIS*". Experience has shown that lenders tend to greatly appreciate having this comprehensive simple summary in this location.

BEGINNING PRINCIPAL DUE
MINIMUM PRINCIPAL REPAYMENT (in year end payment)
ADDITIONAL PRINCIPAL REPAYMENT (in year end payment)
ENDING PRINCIPAL DUE
INTEREST PAYMENTS (in year end payment) - are all self-explanatory in title heading.

Major Section: *SUMMARIES AND FINAL REQUIRED ENTRY FOR CALCULATION OF NET PRESENT VALUE (NPV) & INTERNAL RATE OF RETURN (IRR) & NON-DISCOUNTED CUMULATIVE SUMMARY OF THE AFTER TAX NET CASH FLOWS* – this major section has four sub-sections including one sub-section representing a raw summary presentation and equivalence calculations and in the other three sub-sections providing some overall summaries which can give the analyst insight indicative of the potential overall financial performance of the operation as a whole for the full twenty year analysis period, or fraction thereof.

Sub-Section: *STREAM OF EQUIVALENT PRESENT VALUE OF INVESTMENT OUTFLOWS AND THE AFTER TAX NET CASH FLOW INFLOWS EACH YEAR (INCLUDING RESULTS OF YEAR 20 DIVESTURE)* – this sub-section simply brings in one single row in a logical format (for spreadsheet financial use) the *EQUIVALENT NPV OUTFLOW OF INVESTMENTS IN ALL YEARS* (expressed as a "time zero" negative cash flow in Column B) and the end-of-year equivalent after tax net cash flows for the full 20 years of the analysis in Column C through Column V . Where investments may be made at other times in addition to the beginning of the

analysis (i.e. in later years) any such investments are discounted to an equivalent "time zero". This figure is reduced by a discounted value of the initial cash in excess of inventory to represent an appropriate equivalent present value of that amount recovered at the end of year 20 (versus nominal value) to reflect a reasonable approximation of the opportunity cost in holding that cash. These data will be used in subsequent calculations and are available to the analyst and others for review.

Sub-Section: *OTHER SUMMARIES AND FINAL REQUIRED ENTRY FOR CALCULATION OF NPV AND IRR OF THE AFTER TAX NET CASH FLOWS* – all items in this sub-section in Column D are calculated, or simply presented again for summary, except for the selection of a discount rate "*Cost Of Capital to use as "i" in NPV Calculation*" to be entered by the analyst/user.

TOTAL INITIAL INVESTMENT INCLUDING WORKING CAPITAL APPROXIMATE NET PRESENT VALUE OF INVESTMENTS IN ALL YEARS – are simply items calculated and presented earlier included here for review summary

PRESENT VALUE OF INITIAL WORKING CAPITAL LESS INITIAL INVENTORY – this considers the opportunity cost associated with holding cash. The residual of working capital in excess of initial inventory is deemed to represent the required minimum cash on hand for operations. This value is "recovered" by the analysis at the end of year # 20 (at the end of the analysis), however its discounted value is calculated to represent the opportunity cost associated with holding that amount for use as working capital.

Cost Of Capital to use as "i" in NPV Calculation – this is the user selected discount rate that will be used in all discounting in the analysis, including within the calculation of the Net Present Value of the After Tax Net Cash Flow. It is also used as the initial trial rate in the Internal Rate of Return calculation. The entry here should reflect the company's expected return in the operation (the "i" used in this cost of capital entry should not simply represent the interest rate paid on debt).

PRESENT VALUE OF ATNCF NET CASH FLOW (ATNCF PV) – this is the Present Value of the After Tax Net Cash Flow values for years #1 through #20 inclusive, discounted to an equivalent "time zero" value using the assigned interest rate "i" as a cost of capital in discounting. This is a simple Present Value of the After Tax Net Cash Flows in the years as indicated. It is not adjusted to reflect the equivalent "time zero" cash outflows representative of the investments in the operation.

SUM OF DEPRECIATION (TOTAL FOR YEARS 1-20) – this is self-explanatory, a simple (non-discounted) summation of the applicable scheduled depreciation (i.e. the "*DESIGNATED DEPRECIATION EXPENSE FOR YEAR*") over the term of the analysis.

Sub-Section: *CALCULATION OF NET PRESENT VALUE (NPV) AND INTERNAL RATE OF RETURN (IRR) OF THE AFTER TAX NET CASH FLOWS* – this section contains the overall approximation of the financial performance of the operation using discounted returns to consider the effects of non-gratuitous use of capital. Paying greater attention to these measures of

performance as compared to non-discounted methods (e.g. approximate Payback years) is suggested.

APPROXIMATE FINAL NPV OF AFTER TAX NET CASH FLOW – The results of the Net Present Value analysis compares the cash outflows in investment (in equivalent "time zero" value) to the discounted After Tax Net cash Flows over the twenty year analysis period. The effect of discounting (using the user specified "*Cost Of Capital to use as "i" in NPV Calculation*") to convert these future dollars into their "time zero" equivalent allows for direct comparison of the cash outflows and the cash inflows. As a basic decision criteria to be used by the analyst, a positive Net Present Value is considered to be acceptable or "good" – this means the investment is recovered with the appropriate return of "interest" as required in the specified cost of capital. In contrast a negative Net Present Value is considered to be unacceptable or "bad" – this means the investment is not recovered with the appropriate return of "interest" as required in the specified cost of capital. It IS possible to have an operation that is profitable and has positive ATNCF overall, but has a negative Net Present Value because the performance is not sufficient to meet the required interest rate specified by the cost of capital. It may be noted that reductions in the interest rate *"i"* will have the effect of increasing the NPV of the ATNCF, while increase will have the opposite effect.

APPROXIMATE INTERNAL RATE OF RETURN (INVESTMENT & ATNCF) – the approximate Internal Rate of Return of the operation in analysis of the investment and ATNCF dollar outflow/inflow is included for analysts who prefer that measure of performance (which is favored by some primarily in the engineering community). The calculation of IRR in this case essentially is an iterative process in finding the interest rate *"i"* that will set the NPV exactly equal to zero. Generally regarding the decision criteria in use of IRR, if the IRR exceeds the operation's specified cost of capital (the interest rate *"i"*), that is favorable – this assumes a single IRR value. One caution in use of the IRR as compared to the NPV measure, in the event of sign changes in the ATNCF stream (e.g. alternation of the stream from one or more years each within a sequence of changing signs, such as a stream, that is negative-positive-negative, or, positive-negative-positive) will result in multiple internal rates of return with much more complicated decision criteria for interpretation.

Sub-Section: *SIMPLIFIED NON-DISCOUNTED ESTIMATES OF THE TIME-FRAME REQUIRED TO RECOVER INVESTMENT* – this sub-section is for the analyst (or more likely their supervisor or associate) who simply cannot live without their "Payback Analysis". A "Payback" is not itself calculated precisely to the fraction of a period – however casual examination will quickly show the year in which "Payback" occurs, where the cumulative ATNCF equals investment.

CUMULATIVE AFTER TAX NET CASH FLOW (Cumulative ATNCF)
CUMULATIVE ATNCF AS % of TOTAL INITIAL INVESTMENT
CUMULATIVE ATNCF AS % of NPV INVESTMENTS ALL YEARS - are all self-explanatory in title heading.

Major Section: *SUPPLIMENTAL CASH FLOW TABLE (FOR ADDITIONAL ESTIMATES REGARDING THE AFFECTS OF THE TIMING OF CASH INFLOWS AND OUTFLOWS AND*

POTENTIAL LOSS DUE TO BAD DEBTS) – this section provides some information regarding cash-flows for the operation, primarily useful in looking at a more coarse idea of the cash-flow situation given the limitation of full year periods. This should not be considered an acceptable substitute for more detailed cash flow forecasting (e.g. quarterly and monthly) as the business plan is further developed.

INITIAL WORKING CAPITAL INVESTMENT – this is an automatic entry from prior user specification.

Percent Annual Sales Revenue Received in Next Year
Percent of Annual Raw Material Purchases Paid in Next Period
Percent of Period Variable Manufacturing Costs Paid in Next Period
Percent of Sales Revenue Lost Due to Bad Debts, etc. - are all self-explanatory in title heading – it must be remembered in all estimations that the period being considered is one year, hence the fraction of total payments and receipts lagged to the next period should likely be a fairly small percentage fraction of the total value.

BEGINNING CASH (beginning of year)
RECEIVABLES FROM OPERATIONS DUE IN YEAR AND OTHER REVENUE
INVESTMENT IN LOG & LUMBER INVENTORY
PAYMENT FOR RAW MATERIAL PURCHASES DUE IN YEAR
PAYMENT FOR OTHER VARIABLE COSTS DUE IN YEAR
PAYMENTS FOR FIXED COSTS
LOSS DUE TO BAD DEBTS
TAX PAYMENTS ON INCOME AND CAPITAL GAINS
other cash in (or out) AUTOMATIC FOR YEAR 20
PRINCIPAL & INTEREST REPAYMENT
ESTIMATED ENDING CASH (end of year) - are all self-explanatory in title heading and all are calculated values except for the optional adjusting entry for other cash in or out.
As further indicated in explanatory notes for this section: For end of year 20 at end of analysis, there are automatic entries that are made in "*other cash in (or out) AUTOMATIC FOR YEAR 20*" which will reflect (for purposes of "bookkeeping in the analysis) the selling off inventory, divesture of assets and normal collections and payments that would be expected to occur after the end of operations. In almost all circumstances the ending cash value in the *SUPPLIMENTAL CASH FLOW TABLE - ESTMATED ENDING CASH*" table will not equal the Cumulative ATNCF or the Cumulative Retained Earnings. This difference compared to ATNCF is because the model calculates ATNCF as before principal payment of loan. The difference in the ending cash "*ESTIMATED ENDING CASH*" in this table and the "*Cumulative Retained Earnings*" where both include the payment of Principal on Loan, is due to the "*ESTIMATED ENDING CASH*" also reflecting the "lags" in payments/receipts and loss due to bad debt. It should be noted that within this model the estimates which are entered in the cash flow table regarding lags in receipts and payments are only considered within the cash flow table "*SUPPLIMENTAL CASH FLOW TABLE*" and none of these are automatically entered in the model, further, estimates which are entered above regarding Lost Due to Bad Debts are also only considered within the cash flow table "*SUPPLIMENTAL CASH FLOW TABLE*" and none of are automatically entered in the model. If any of these type of adjustment entries are required for

loss due to bad debts these should be manually entered in the model above, within the section "*FINANCIAL SUMMARY ANALYSIS*" (e.g. as a negative entry in "other net revenue subject to normal tax" to reflect a reduction in before tax dollars)

NOTE ON PRINTING THE MODEL OUTPUT:

When the user is ready to print the output of the spreadsheet model, it is prudent to remember that, in addition to the small entry flag column, there is a fairly wide column for the labeling of variables in a row, and then 20 columns are used to represent each year of the 20 year period of the model (or for other variable entries), and a summary column in some areas of the spreadsheet that also may or may not be of interest in a printed output. If an attempt is made to print most or all of the model columns within a standard "portrait" orientation – the results will be very tiny and likely wholly illegible output. However, the full 20 year model period can be printed in a very legible format by printing in a landscape mode (i.e. across the page) using at least a legal-sized sheet (i.e. 8 ½ inches by 14 inches) using a typical laser printer. The more the left and right margins may be reduced, the better the results will appear. If only a standard letter-sized sheet (i.e. 8 ½ inches by 11 inches) is used when printing in a landscape mode, using a typical laser printer, then very small but still reasonably legible type will result if the full 20 year model is printed. It should be remembered that the model is in excess of 500 rows in length; consequently a considerable number of pages will be generated when printing results in the landscape mode. In terms of example, if ½ inch left and right margins are used along with more standard margins on the top and bottom, then a minimum of 8 to 9 pages of output would likely result, with the number increasing as desired page-breaks may be inserted. Because of this, it is strongly suggested that the print preview feature be used to ensure that page breaks can be checked and inserted if they do not occur in logical places for the desired output. Depending on what the printed output may be used for, if what is represented in the extreme right columns may not be required (or even desired) then printing to less than the full 20 years of the model (i.e. not printing out up to column V or beyond) reduces the constraints and limitations on printing.