Methodologies and Data Sources Used in Determining the Landlord's Share of 2016 Calendar Year Net Returns for Non-Irrigated Cropland for the Agricultural Land Use-Values

The Department of Agricultural Economics, Kansas State University (KSU), in cooperation with the Division of Property Valuation (PVD), has developed the following procedures for determining the landlord's share of net income for non-irrigated cropland in Kansas following the guidelines set forth in K.S.A. 79-1476. The methodology and sources of data are outlined in this document.

K.S.A. 79-1476 requires that an 8-year average of landlord net returns be used by PVD in determining the agricultural land use-values. For the 2016 valuation year, the 8-year average is comprised of 2009 through 2016 calendar year data. KSU calculated landlord net returns for 2009, 2010, 2011, 2012, 2013, 2014, 2015, and 2016, according to directives issued by PVD. Thus, the 2016 calendar year data were added to the data series, and PVD excluded the oldest year of data to keep the 8-year average intact. The 2009-15 calendar year data, which were utilized in the previous year's valuation calculations, are documented and explained in previous editions of this text. This text edition documents the methodologies and data sources used to calculate the 2016 calendar year net returns, which were combined with the prior years' data to yield the 8-year average. The main components of the non-irrigated analysis explained in this text are the Kansas Soil Rating for Plant Growth (KS_SRPG), the crop mix, yields, prices, landlord's share of crops, landlord's share of expenses, production costs, management fee, and landlord's share of net income.

KANSAS SOIL RATING FOR PLANT GROWTH (KS_SRPG)

The 2016 calendar year net returns have been calculated by county using Kansas Soil Rating for Plant Growth (KS_SRPG) data as directed by PVD. The Natural Resource Conservation Service (NRCS) developed the Kansas Soil Rating for Plant Growth system to rank each soil mapping unit (soil type). For each county, the weighted average KS_SRPG was calculated using the KS_SRPG and the non-irrigated acreage by soil mapping unit. The weighted average KS_SRPG was used to index the KS_SRPG's by soil mapping unit. Thus, the average productivity or KS_SRPG in the county should correspond with an indexed value of 1.0. Actual acreage by soil mapping unit by county was provided by the Division of Property Valuation.

CROP MIX

A crop mix is the percentage of planted acres for each crop in a county relative to the total planted acres in a county. This method establishes the typical cropping practice in a county and weights each crop according to its importance. Only the crops comprising 5% or more of

total planted acres for a county are considered in the calculations. The crop mix percentages are used to weight gross income and production expenses. The percentages are the same for each soil mapping unit in a given county.

The crop mix calculations were completed for each county using the 2016 acreage data. The non-irrigated planted acres for all crops were provided by the United States Department of Agriculture's Farm Service Agency (FSA). The Method of Moving Averages methodology was then used to calculate the average crop mix percentages at the county level (Albright, Featherstone, and Cole). This method uses an 8-year average to generate the average crop mix percentages as directed by PVD. Specifically, once the annual 2016 crop mix was determined, the crop mix percentages for the previous seven years were determined using only the crops included in the 2016 annual crop mix. The 2016 calendar year net returns were based on a crop mix average for the years 2009-2016.

YIELDS

The source for the 2016 alfalfa yield data is NASS. All other crop yield information, from 2012 forward, is provided by the USDA RMA. Yields for all crops are based on planted acres (Yield / Acre = Crop Production ÷ Planted Acres), with the exception of alfalfa, which used harvested acres as the basis for calculating average yield per acre. The 8-Year Method of Moving Averages was used to calculate the average yield per acre for each crop at the county level (Albright, Featherstone, and Cole). This method uses an 8-year average to generate the average yields as directed by PVD. The 2016 calendar year net returns are based on a yield averages for the years 2009-2016.

In order to account for summer fallow in cropping practices, a fallow factor was applied to the wheat yields in the western 2/3 of the state. Using RMA data, the Method of Moving Average (2009-2016) percentages of continuously cropped and summer fallowed wheat were calculated for each county. The average continuous crop wheat yield was multiplied by the percentage of continuously cropped acres, and the average summer fallow wheat yield was multiplied by one-half of the percentage of the summer fallow wheat acreage. These two products were then summed to create a county average wheat yield weighted for fallow practices common to that county. A summer fallow factor was applied to the wheat yields for the counties in NASS Crop Reporting Districts 10-60. This adjustment recognizes that agricultural landowners in much of the state are not able to produce a crop annually due to the lack of rainfall. Many owners produce a crop once in two years, or two out of three years, etc.

Soil Mapping Unit Yields

K.S.A. 79-1476 dictates that agricultural land will be valued for agricultural purposes based on its inherent capability to produce. In other words, the best soils in a county utilize above average yields, and conversely, the relatively poorer soils in a county will have their Agricultural Use Values determined using yields which are below the county average.

The KS_SRPG system utilizes the county average yields in the calculations. The indexing system accounts for the differences in productivity across the various soil types. This system indexes landlord gross income rather than the average yields by soil type, which will be

explained later and is illustrated in the appendix. Mathematically, the results are the same whether indexing gross income or indexing average yields. This result occurs because of multiplication rules which state that (1*2)*3 is identical to (2*3)*1. Thus, indexing landlord gross income results in the same LNI as indexing yields using the KS_SRPG system.

PRICES

NASS collects the average monthly price paid to farmers for wheat, grain sorghum, corn, soybeans, alfalfa, and sunflowers at the state level. These are the prices received by farmers, and therefore, reflect any dockage or adjustment for quality or moisture content. Further, for each of these crops, NASS collects the percentage of the total crop sold during each month. The monthly prices were weighted with the percentage of the crop sold during the corresponding month. The sum of these weighted monthly prices is the weighted annual price for each crop. The state prices for wheat, grain sorghum, corn, and soybeans were entered into the Grain_seasonalscash.xls spreadsheet, developed at Kansas State University to use basis adjustments to calculate prices received on a crop reporting district level. As NASS no longer publishes prices at the crop reporting district level, an alternative source for this information was utilized for the 2010-15 calendar years, as directed by PVD.

The Method of Moving Average methodology was used to calculate price for the 2016 calendar year net returns. For these net returns, the average price for 2009-2016 was utilized in the calculations. Again, this weighted price reflects the average actual price paid to landowners and is weighted to reflect the time of the year the majority of the crop was sold. The prices for wheat, grain sorghum, corn, and soybeans are specific to each crop reporting district. Alfalfa and sunflower prices are statewide averages for the 8-year period.

LANDLORD'S SHARE OF CROP

K.S.A. 79-1476 requires that the share of net income normally received by the landlord shall be used as the basis for determining agricultural income. Thus, the landlord's share of the crop is defined as the most frequently occurring arrangement for a county. The Agricultural Land Use Survey Center (ALUSC) in the Department of Agricultural Economics, Kansas State University, conducted a lease arrangement survey, the 2016 Non-Irrigated Farm Lease Arrangement Survey, collecting information on the 2015 calendar year. During 2016, this information was compiled at the NASS Crop Reporting District level. From this information, a 1/3 crop share for the landlord was determined to be the most frequently occurring lease arrangement in all counties in all districts, except districts NC-40 and NE-70. The most frequently occurring lease arrangement in the counties of those districts was 40% crop share for the landlord. Therefore, this landlord share was used in NC-40 and NE-70.

LANDLORD'S SHARE OF EXPENSES

The 2016 Non-Irrigated Farm Lease Arrangement Survey conducted by the ALUSC is

also the source for the landlord's share of expenses. Using the nine NASS Crop Reporting Districts as homogeneous regions, average expense shares were calculated for the various categories for a single crop share. For example, in NW-10 the landlord's share of the crop was 1/3. Thus, the average share of expenses was calculated using only the surveys with a 1/3 crop share for the landlord. Subsequently, all other survey information from that district was excluded from the analysis. Once a crop share for the landlord was established for a district, only the surveys with the corresponding crop share from that district were analyzed.

PRODUCTION COSTS

The production costs per acre were taken from three sources: 2013 Input Cost Survey of custom applicators and coops, KDA/ALUSC *Kansas Custom Rates 2016* publication, the 2016 Non-Irrigated Farm Lease Survey, and the Kansas State University Farm Management Guides. Costs for years in which a survey was not conducted were indexed using the NASS QuickStats Database Agricultural Outlook Prices Paid by Farmers.

Fertilizer, herbicide, insecticide, and seed costs were taken from the 2013 Input Cost Survey of custom applicators and coops. Costs for the predominant crops in each NASS Crop Reporting District were gathered for the 2013 calendar year with this survey.

Fertilizer, herbicide, and insecticide application costs, harvesting costs, and grain hauling charges were taken from the *Kansas Custom Rates 2016* publication

Gas-fuel-oil, machinery repair, and lime costs were taken from the Farm Management Guides, 2016. The Department of Agricultural Economics, KSU, publishes these crop budgets annually.

The same summer fallow factor that was applied to the county average wheat yields was applied to the production costs for wheat to account for summer fallow practices common to a county. Once again, wheat was the only crop adjusted for the counties in NASS Crop Reporting Districts 10-60. Additionally, herbicide costs for the summer fallow acres were collected with the 2013 Input Cost Survey. Total production costs were applied to the cropped acres, while herbicide and application costs were applied to the fallow acres in this analysis.

MANAGEMENT FEE

A management fee was calculated to account for the costs associated with business and managerial decisions. The fee is 10% of the weighted landlord gross income, which is consistent with the current rates charged by farm management and consulting firms in Kansas. The 10% fee was verified by ten firms and is supported by Kansas State University management fee surveys conducted in 2013, 2009, 2005, 2002, 1998, 1994, and a 1990 survey that investigated farm management practices and fees in Kansas.

GOVERNMENT PROGRAM PAYMENTS

The Division of Property Valuation directed KSU to exclude any government program payment data from the 2016 non-irrigated landlord net return calculations.

LANDLORD'S SHARE OF NET INCOME

Net Returns by Soil Mapping Unit

The landlord's share of net income was determined by combining the previously explained factors into a system of equations. PVD directed that the 2016 calendar year landlord net returns for non-irrigated land be calculated by soil mapping unit using the KS_SRPG data. The KS_SRPG data for each soil mapping unit were indexed based on the weighted average KS_SRPG, as previously discussed. The average landlord gross income by crop for the county was calculated by multiplying the average yields, prices, and landlord's crop share together. This average landlord gross income was then weighted by the crop mix percentage for each crop, which produced the landlord's weighted gross income for each crop. These weighted crop values were summed to arrive at the landlord's weighted gross income for the county. The county weighted landlord gross income was then indexed using the indexed KS_SRPG values for each soil type within a county. Thus, each soil mapping unit has a gross income, from which the average production costs, which are also weighted by the crop mix, and a 10% management fee are deducted to arrive at the 2016 calendar year net returns by soil mapping unit.

APPENDIX:

Included in the appendix are the 2016 calendar year landlord net return calculations for a sample county. The tables illustrate the procedures and data sources for each factor used to calculate the landlord net returns for the 2016 calendar year by soil mapping unit. These data represent only one year of the statutorily required 8-year average. Specifically, the following items are included in this appendix:

- Kansas Agricultural Statistics' Crop Reporting District Map
- Soil Mapping Unit Land Analysis: 2016
- Crop Mix Calculations, 2016
- Average Yield Calculations for use in KS_SRPG calculations, 2016
- Monthly Crop Prices Received by Farmers, 2016
- Annual Crop Prices Received by Farmers, 2009-2016
- Landlord's Share of Production Cost Calculations, 2016