

## **SUPPORTING STATEMENT FOR THE OCCUPATIONAL REQUIREMENTS SURVEY**

**OMB CONTROL NO. 1220-0189**

### **Part B. Collection of Information Employing Statistical Methods**

**For detailed technical materials on the sample allocation, selection, and estimation methods as well as other related statistical procedures see the BLS Handbook of Methods, BLS technical reports, and American Statistical Association (ASA) papers listed in the references section. The following is a brief summary of the primary statistical features of the Occupational Requirements Survey (ORS).**

The Occupational Requirements Survey (ORS) is a voluntary establishment survey that the Bureau of Labor Statistics (BLS) is conducting to collect information about the requirements of occupations in the U.S. economy, including physical demands; environmental conditions; education, training, and experience; as well as cognitive and mental demands. The Social Security Administration (SSA), one of several users of this occupational information, is funding the survey through an Interagency Agreement (IAA). Prior planning for the ORS involved several feasibility tests throughout Fiscal Years (FY) 2013 and 2014 and a three-year production wave beginning in FY2015. The BLS collected the ORS data for the three-year production wave using a two-stage stratified design with probability proportional to employment sampling at each stage. Under that design, occupations with low employment in the current economy had a smaller probability of selection resulting in an insufficient number of observations to publish the ORS estimates for these low employment occupations. In FY2018, the BLS began collecting the ORS data for a five-year production wave designed to improve the likelihood of publishing data for low employment occupations.

In late FY2023, the BLS sampled for the first year of the new wave, selecting samples using the methodology and design described in section 1a. Beginning August 2023, the BLS began collection of this first sample of the current wave. The BLS is amending this currently approved clearance to include an extension to the collection and processing time used to publish final ORS estimates in this current wave by distributing the samples across a longer period of time (i.e., longer than the initial five-year timeframe<sup>1</sup>). With the new production timeline, the BLS anticipates final estimates to be published approximately mid-FY2032. Note: preliminary estimates will continue to be published annually.

Sections 1-3 of this document describe the selection process of the ORS production samples, the collection process for the ORS data elements, and planned estimates to be produced. Section 4 of this document describes the efforts conducted by the BLS to prepare for this third wave of production of the ORS.

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<sup>1</sup> Initially, the BLS anticipated that the full five-year wave to be completed by July 2028 with final estimates published approximately mid-FY2029.

**1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection methods to be used. Data on the number of entities (e.g., establishments, state and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.**

### **1a. Universe**

The ORS measures constructs such as physical demands, environmental conditions, education, training and experience, as well as cognitive and mental demands. The ORS produces national-level estimates by occupation of percentages, means, percentiles, and modes of variables derived from measurements capturing information about the ORS constructs.

The frame for the ORS sample under this design is developed from several sources:

- The Occupational Employment and Wage Statistics (OEWS) sample [previously known as the Occupational Employment Statistics (OES) program] of establishments and occupations. The OEWS sample contains over one million establishments from private industry and state and local government.
- A modeled occupation frame created by the OEWS program. The OEWS uses the responding, private industry portion of their sample to predict occupational distributions for establishments not sampled and for non-responding OEWS private industry establishments.
- The Quarterly Contribution Reports (QCR) filed by employers subject to State Unemployment Insurance (UI) laws. The BLS receives the QCR for the Quarterly Census of Employment and Wages (QCEW) Program from the 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. The QCEW data, which are compiled each calendar quarter, provide a comprehensive business name and address file with employment, wage, detailed geography (i.e., county), and industry information at the six-digit North American Industry Classification System (NAICS) level.
- In many states, railroad establishments are not required to report to the state's UI office. The BLS obtains railroad establishment information from state partners that work directly with staff in the office of the OEWS.

The ORS universe includes all establishments in the 50 states and the District of Columbia with ownerships of state and local governments and private sector industries, excluding agriculture, forestry, and fishing (NAICS Sector 11) and private households (NAICS Subsector 814). The estimate of the current universe size, based on the most recent QCEW data, is about 10,400,000 establishments.

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Since the OEWS modeled frame only includes establishments in the private industry, separate sampling frames are created for the government sector (state and local combined) versus private industry.

- To create the private industry frame, data from the OEWS modeled frame are combined with the establishment-level data from the private-industry QCEW and railroad files to create lists of occupations at the establishment level. The modeled information is then supplemented with the collected OEWS sample of establishments and occupations to create the full private industry frame of occupations at an establishment level.
- The frame for state and local government is the government establishments from the QCEW.

All ORS production sampled establishments are interviewed at most once in a production wave. Prior to the fourth year of collection in the second wave, the annual sample size was 10,000 establishments. During the last two years of the second wave (year four and five of the five-year period), the sample size increased to 15,000 establishments as a result of downward trending response rates. See section 1b for more details.

With the start of the new wave in FY2023, the sample size was 15,000 establishments, following the same design as the last two years of the ORS second wave. However, a portion of the FY2024 sample is being reallocated for collection in a future sample year within this wave as the collection and production time of this wave is being extended with this clearance request. The anticipated sample size for each fiscal year of this clearance request is shown in Question 12 in Part A.

### **1b. Sample Size**

*Scope* – The ORS production frame is as defined above. The sampling design is a two-stage stratified random sample of establishments and occupations within selected establishments. With this clearance request, the BLS is extending the collection of the current wave from a prior five-year design wave (FY2013 to FY2028) to an estimated eight-year sample design (FY2023 to FY2031).

*Sample Stratification* – Both the private industry and government sector samples are stratified, however, the sample cells (i.e., strata) are defined differently for each sector and the input frames are separate.

Prior to the ORS third wave, for private industry, the ORS designated 200 six-digit Standard Occupational Classification (SOC) codes (occupations) with the lowest employment across all ownerships, based on the OEWS estimates, as rare and prioritized them for collection. However, this list of rare occupations did not contain any of the six-digit SOC codes that the SSA had designated as priority for their disability adjudication purposes. Thus, with the start of the third wave of the ORS, the BLS replaced the initial list of the “rare” occupations that the ORS prioritized during the second wave with the list of the 100 priority occupations that SSA requested for the third wave. Using this SSA-requested priority job list for the first stage of

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selection in private industry, based on data found in the modeled OEWS frame file, all private industry establishments are first identified as whether a “priority occupation” exists. Note: Not all SSA-requested priority occupations are prioritized for sampling because some occupations are sufficiently captured through the normal selection process.

Strata are then formed by the cross-classification of the predicted presence or absence of a “priority occupation” in the establishment, Census Region (Northeast, Southeast, Midwest, West), and aggregate industry (Education, Goods Producing, Health Care, Financial Activities, Service Providing), leading to forty strata.

Since the OEWS modeled frame does not include state and local government entities, priority occupation status does not apply to the government sector for the purposes of stratification. Thus, for the state and local government frame, sampling strata are formed by ten detailed industries.

*Sample Allocation* – The ORS must determine the number of units intended for each sample cell before it selects its establishment sample. The allocation process is run separately for each ownership sector (Private industry or Government sector).

The total ORS production wave will consist of approximately 75,000 establishments. The private portion of the wave is approximately 85% (estimated 63,750) and the state and local government portion is approximately 15% of the total (estimated 11,250). To produce estimates of job requirements for as many priority occupations as possible, a higher proportion of the total private industry sample size is allocated to the twenty “priority occupation” strata than to the twenty “non-priority occupation” strata. Establishment allocation to the cells within the “priority/non-priority” strata is proportional to the total employment within the cell. Establishment allocation to the sample cells for the state and local government sector are proportional to the total employment within the cell.

Note: The ORS began using an increased sample size from 10,000 to 15,000 for the two samples collected between August 2021 and July 2023, to mitigate the effect of pandemic non-response. The private portion of the sample remained approximately 85% (12,750) and the state and local government portion was approximately 15% of the total sample (2,250). The ORS used this increased sample size for the first year of the third wave. The current second year sample is 12,750 private and government establishments due to the planned reallocation of the 15% of the sampled units to a future collection year.

*Sample Selection* – Sample selection involves two stages: establishment selection and occupation selection.

- For private industry, both stages are completed before the ORS data is collected from a respondent, including private industry aircraft manufacturing establishments that are sampled, by chance, with the National Compensation Survey (NCS).
- For all sampled state and local government establishments, occupational selection is done after establishment contact.

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Note: There are occasional circumstances when a private industry establishment requires occupation selection after contact, which is due to the non-existence of an in-scope, predicted occupation at the identified establishment. For details on predicted occupation sampling, see “Evaluation of a Sample Design Based on Predicted Occupational Frame Data” report by McNulty and Yu (Attachment 1).

At the first stage of sample selection, all establishments are selected with probability proportional to employment size of the establishment.

For each private industry establishment, an occupational quote allocation is assigned based on establishment size, noting that there is one quote per SOC code, and the quote allocation can only be as large as the total number of distinct SOC codes.

The BLS acknowledges that some of the allocated quotes will not exist in the sampled establishment. This situation occurs because the occupational distribution information for each establishment is a prediction, or a best guess, of the occupations that exist in the establishment. Because of this, the BLS samples twice as many occupations as needed for each of the establishment size classes in the following manner:

- Up to four employees: Total number of distinct SOC codes
- Five – 49 employees: Up to eight SOC codes/quotes
- 50 – 249 employees: Up to 12 SOC codes/quotes
- 250+ employees: Up to 16 SOC codes/quotes

Within each selected establishment, the allocated occupations are selected based on the predicted occupational distribution in the following manner.

- In the twenty “non-priority” strata, the BLS selects all SOC codes/quotes using a systematic sampling strategy.
- In the twenty “priority” strata, if the selected establishment has only “priority” SOC codes, the BLS selects SOC codes/quotes with certainty or using a systematic sampling strategy in accordance with the quote allocation.
- In the twenty “priority” strata, if the selected establishment has a mix of “priority” and “non-priority” SOC codes, the BLS selects no more than two less the quote allocation from the “priority” SOC codes either with certainty or using a systematic sampling strategy, depending on the total number of “priority” SOC codes. The BLS selects the remaining quotes from the “non-priority” SOC codes using a systematic sampling strategy.

The selected occupations are ordered for each establishment. The field economist follows the order until the total number of quotes needed for the establishment size is identified and collected.

- Up to four employees: Total number of distinct SOC codes
- Five – 49 employees: Up to four SOC codes/quotes
- 50 – 249 employees: Up to six SOC codes/quotes
- 250+ employees: Up to eight SOC codes/quotes

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For the government portion of the sample, jobs are selected in each sampled establishment during the collection phase. The probability of a job being selected within this segment of the ORS sample is proportionate to its employment within the establishment. The number of jobs selected in an establishment ranges as follows:

- Up to four employees: Total number of distinct SOC codes
- Five – 49 employees: Up to four SOC codes/quotes
- 50 – 249 employees: Up to six SOC codes/quotes
- 250+ employees: Up to eight SOC codes/quotes

Sample weights are assigned to each of the selected establishments and jobs in the sample to represent the entire frame. Units selected as certainty are self-representing and carry a sample weight of one. The sample weight for the non-certainty units is the inverse of the probability of selection. For additional details on this sample design first introduced in the second wave, see the “Evaluation of a Sample Design Based on Predicted Occupational Frame Data” report by McNulty and Yu (Attachment 1).

### **2. Describe the procedures for the collection of information including:**

- **Statistical methodology for stratification and sample selection,**
- **Estimation procedure,**
- **Degree of accuracy needed for the purpose described in the justification,**
- **Unusual problems requiring specialized sampling procedures, and**
- **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

#### **2a. Sample Design**

The design plan for the ORS second wave used a five-year collection period with final estimates published after all five annual samples had been collected. Starting with the ORS third wave, the BLS anticipates fielding eight annual samples with final estimates published upon collection of all sample years. Additionally, preliminary estimates are produced annually depending on the ability of estimates to meet all the BLS confidentiality and reliability requirements and SSA interagency agreement guidelines. The third wave is not expected to be distributed evenly over a five-year period; instead, the wave is expected to follow an estimated eight-year period design of approximately 75,000 establishments with varying sample sizes for each annual collection year. The first year of the third wave had a 15,000 establishments sample size, and the second year of the third wave will have a 12,750 establishments sample size, as those non-collected sample units are shifted to a later collection sample year. Moving forward, the number of establishments per year may change, but no establishment will be collected more than once per production wave.

#### **2b. Estimation Procedure**

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The ORS production plan is to produce estimates as described in the formulas below. Computation of these estimates includes weighting the data at both the unit (establishment and occupation/job) and the item (the individual ORS data element) level. The two types of adjustments for non-response include an adjustment for establishment refusal to participate in the survey and an adjustment for respondent refusal to provide data for a particular job. The final weights include the initial sample weights, adjustments to the initial sample weights, two types of adjustments for non-response, and benchmarking. The initial sample weight for a job in a particular establishment is a product of the inverse of the probability of selecting a particular establishment within its stratum and the inverse of the probability of selecting a particular job within the selected establishment. Adjustments to the initial weights are performed when data are collected for more or less than the sampled establishment, which is based on a significant non-economic increase or decrease in the establishment's total employment at collection versus at sampling. Collection differences may occur due to establishment mergers, splits, or the inability of respondents to provide the requested data for the sampled establishment. Note: Weights may also be adjusted when there is inaccuracy in the predicted occupational distribution information for the sampled establishment, which results in a different job selection process, probability sampling of occupations (PSO), being employed. For details on PSO job selection, see the ORS Chapter in the BLS Handbook of Methods (See Attachment 5).

Benchmarking, or post-stratification, is the process of adjusting the weight of each establishment in the survey to match the distribution of employment by detailed industry, geographic area, establishment size, and major occupation group at the reference period. Because the sample of establishments is selected from a frame that is approximately two years old by the time the data is used in estimation and sample weights reflect employment when selected, the benchmark process updates that weight based on current employment.

The ORS calculates percentages, means, percentiles, and modes for the ORS data elements for the nation as a whole by occupations defined by the SOC system. The ORS uses a six-digit SOC code resulting in the potential of data for 844 SOC codes. Before estimates of characteristics are released, they are first screened for reliability and to ensure that they do not violate the BLS confidentiality pledge. A promise is made to each private industry respondent that the BLS will not release its reported data to the public in a manner that would allow others to identify the establishment, firm, or enterprise. The same pledge of confidentiality is granted to government sector respondents who request it.

### Calculating Estimates

The ORS estimates are defined in two dimensions. A set of conditions describes the domains, and a separate set of conditions describes the characteristics. Domain conditions may include specific occupations, occupational groups, worker characteristics, and geographic region. Characteristics conditions depend on the ORS data elements, such as prior work experience or the required number of hours a worker must stand in a typical day. Each characteristic is calculated for each domain. If a quote meets the domain condition for a particular estimate, the  $X_{ig}$  value in the formulas below is 1; otherwise, it is 0. Likewise, if a quote meets the

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characteristic condition for a particular estimate, the  $Z_{ig}$  value in the formulas below is 1; otherwise, it is 0. The final quote weight ensures that each quote used in estimation represents the appropriate number of workers from the sampling frame.

Estimates that use the mean or percentile formulas require an additional quantity for estimation,  $Q_{ig}$ , the value of the variable corresponding to this quantity. For more information, see “Estimation Considerations for the Occupational Requirements Survey” by Rhein (see Attachment 2).

Estimation Formulas (All estimates use quote-level records, where quote represents the selected workers within a sampled establishment job.)

1. Percentage of workers with characteristic: Percentage of workers with a given characteristic out of all workers in the domain. These percentages will be calculated for categorical elements (e.g., type of degree required), including those elements measuring duration levels defined by SSA categories (e.g., Seldom, Frequently).

$$\frac{\left[ \sum_{i=1}^I \sum_{g=1}^{G_i} \text{OccFW}_{ig} \cdot X_{ig} \cdot Z_{ig} \right]}{\left[ \sum_{i=1}^I \sum_{g=1}^{G_i} \text{OccFW}_{ig} \cdot X_{ig} \right]} \cdot 100$$

**Estimation Formula Notation**

- $i$  = Establishment
- $g$  = Occupation within establishment  $i$
- $I$  = Total number of establishments
- $G_i$  = Total number of quotes selected in establishment  $i$
- $X_{ig}$  = 1 if quote  $ig$  meets the condition set in the domain (denominator) condition  
= 0 otherwise
- $Z_{ig}$  = 1 if quote  $ig$  meets the condition set in the characteristic condition  
= 0 otherwise
- $\text{OccFW}_{ig}$  = Final quote weight for occupation  $g$  in establishment  $i$

To calculate the percentage of workers with a given characteristic out of all workers in the domain, add the final quote weights across only those quotes that meet the domain (denominator) condition and characteristic condition. Then divide that number by the sum of the final quote weights across quotes that meet the domain (denominator) condition. Multiply the final quotient by 100 to yield a percentage.

2. Mean: Average value of a quantity for a characteristic. These estimates would be calculated for continuous data elements, including those elements measuring duration numerically.



$$\frac{\left[ \sum_{i=1}^I \sum_{g=1}^{G_i} \text{OccFW}_{ig} \cdot X_{ig} \cdot Z_{ig} \cdot Q_{ig} \right]}{\left[ \sum_{i=1}^I \sum_{g=1}^{G_i} \text{OccFW}_{ig} \cdot X_{ig} \cdot Z_{ig} \right]}$$

**Estimation Formula Notation**

- $i$  = Establishment
- $g$  = Occupation within establishment  $i$
- $I$  = Total number of establishments in the survey
- $G_i$  = Total number of quotes in establishment  $i$
- $X_{ig}$  = 1 if quote  $ig$  meets the condition set in the domain condition  
= 0 otherwise
- $Z_{ig}$  = 1 if quote  $ig$  meets the condition set in the characteristic condition  
= 0 otherwise
- $\text{OccFW}_{ig}$  = Final quote weight for occupation  $g$  in establishment  $i$
- $Q_{ig}$  = Value of a quantity for a quote  $g$  in establishment  $i$

To calculate the average value of a quantity for a characteristic, multiply the final quote weight and the value of the quantity for those quotes that meet the domain (denominator) condition and characteristic condition; add these values across all contributing quotes to create the numerator. Divide this number by the sum of the final quote weights across only those quotes that meet the domain (denominator) condition and characteristic condition.

3. Percentiles: Value of a quantity at given percentile. These estimates would be calculated for continuous data elements, including those elements measuring duration numerically.

The  $p$ -th percentile is the value  $Q_{ig}$  such that

- the sum of final quote weights ( $\text{OccFW}_{ig}$ ) across quotes with a value less than  $Q_{ig}$  is less than  $p$  percent of all final quote weights, and
- the sum of final quote weights ( $\text{OccFW}_{ig}$ ) across quotes with a value more than  $Q_{ig}$  is less than  $(100-p)$  percent of all final quote weights.

It is possible that there are no specific quotes  $ig$  for which *both* of these properties hold. This occurs when there exists a quote for which the  $\text{OccFW}_{ig}$  of records whose value is less than  $Q_{ig}$  equals  $p$  percent of all final quote weights. In this situation, the  $p$ -th percentile is the average of  $Q_{ig}$  and the value on the record with the next *lowest* value. The  $Q_{ig}$  values must be sorted in ascending order.

Include only quotes that meet the domain condition and the characteristic condition – i.e., where:

$$X_{ig} \times Z_{ig} = 1.$$

**Estimation Formula Notation**

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- $i$  = Establishment
- $g$  = Occupation within establishment  $i$
- $X_{ig}$  = 1 if quote  $ig$  meets the condition set in the domain condition  
= 0 otherwise
- $Z_{ig}$  = 1 if quote  $ig$  meets the condition set in the characteristic condition  
= 0 otherwise
- $OccFW_{ig}$  = Final quote weight for occupation  $g$  in establishment  $i$
- $Q_{ig}$  = Value of a quantity for a specific characteristic for occupation  $g$  in establishment  $i$

4. **Modes:** The category with the largest weighted employment from among all possible categories of a characteristic. These estimates will be identified for all categorical elements (e.g., type of degree required) among the appropriate categories (e.g., bachelor's degree, master's degree).

### 2c. Reliability

#### Measuring the Quality of the Estimates

The two basic sources of error in the survey estimates are bias and variance. Bias is the amount by which estimates systematically do not reflect the true characteristics of the entire population. Many of the components of bias can be categorized as either response or non-response bias.

Response bias occurs when respondents' answers systematically differ in the same direction from the correct values. For example, this situation occurs when respondents incorrectly indicate "no" to a certain ORS element's presence when that ORS element actually existed. Another example may occur when, in providing the requested ORS data elements, the respondent focuses only on how the selected worker performs the duties of a position, rather than what is required by the position. Response bias can be measured by using a re-interview survey. Properly designed and implemented, this can also indicate where improvements are needed and how to make these improvements. The ORS data will be reviewed for adherence to the ORS collection procedures using a multi-stage review strategy. Approximately five percent of the sampled establishments will be re-contacted to confirm the accuracy of coding for selected data elements. The remaining ORS data will either be reviewed in total or for selected data elements by an independent reviewer. All establishments in the sample will be eligible for one and only one type of non-statistical review, in other words a responding establishment may be re-contacted at most once for an additional review. Additionally, all establishments will be reviewed for statistical validity to ensure the accuracy of the sample weight with the data that was collected.

Non-response bias is the amount by which estimates obtained do not properly reflect the characteristics of non-respondents. This bias occurs when non-responding establishments have the ORS element data that are different from those of responding establishments. Another BLS establishment-based program, the NCS, has analyzed the extent of non-response bias using administrative data from the survey frame. The results from this analysis are documented in the

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2006 ASA Proceedings of Survey Research Methods Section (See Attachment 3). A follow-up study from 2008 is also listed in the references (See Attachment 4). Details regarding adjustment for non-response are provided in Section 3 below. These studies provide knowledge that can be incorporated into the ORS. See Section 3c for more information about non-response studies.

Another source of error in the estimates is sampling variance. Sampling variance is a measure of the variation among estimates from different samples using the same sample design. Sampling variance for the ORS data is calculated using a technique called balanced repeated replication. For national estimates, this is done by forming different re-groupings of half of the sample units. For each half-sample, a "replicate" estimate is computed with the same formula as the regular or "full-sample" estimate, except that the final weights are adjusted. If a unit is in the half-sample, its weight is multiplied by  $(2-k)$ ; if not, its weight is multiplied by  $k$ . For all ORS estimates,  $k = 0.5$ , so the multipliers will be 1.5 and 0.5. Sampling variance computed using this approach is the sum of the squared difference between each replicate estimate and the full sample estimate averaged over the number of replicates and adjusted by the factor of  $1/(1-k)^2$  to account for the adjustment to the final weights. This approach is similar to that used in the NCS. For more details, see the ORS Chapter of the BLS Handbook of Methods (See Attachment 5).

The goal of the ORS is to generate estimates for as many six-digit SOC codes as possible, given the sample size and the BLS requirement to protect respondent confidentiality and produce accurate estimates. Additional estimates for aggregate SOC codes will be generated if they are supported by the data.

While declining response rates impact the data quality, the ORS program is evaluating the impact of nonresponse on estimate reliability. Standard errors are calculated from all usable data (collected and imputed) and are included in the publication criteria. Imputation rates have slightly increased, particularly for duration estimates, due to nonresponse. Increased nonresponse reduces the available donor pool, which negatively impacts estimate quality and cannot be discerned from the published standard errors. Estimates with imputation rates above a predefined threshold are deemed unreliable and not published.

## **2d. Data Collection Cycles**

The ORS third wave data collection began in August 2023. The BLS conducts the ORS as a national survey composed of approximately 75,000 establishments. Approximately 15 percent of these establishments will be selected from state and local government, and the remainder of the sample will be selected from private industry. The new collection design will span approximately 96 months, with a portion of the total sample assigned each year (twelve months) and complete estimates produced at the conclusion of the total estimated eight-year design. The portion of the total sample assigned for each year may vary from year to year within the estimated eight-year design, for example, 15,000 for first year of the third wave and 12,750 for the second year of the third wave. Limited preliminary estimates will be produced on an annual basis for estimates that meet all the BLS confidentiality and SSA interagency agreement guidelines.

**3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.**

There are two types of non-response for the ORS: total establishment non-response and partial non-response, with the latter occurring at the occupation or data element level. The assumption for all non-response adjustments is that non-respondents are similar to respondents.

To adjust for establishment or occupation non-response, weights of responding units or occupations that are deemed similar will be adjusted appropriately. Establishments are considered similar if they are in the same "priority/non-priority" strata, ownership, and two-digit NAICS code. If there are not sufficient data at this level, then a broader level of aggregation is considered. For partial non-response at the ORS element level, the ORS computes the estimates that include a replacement value imputed based on information provided by establishments with similar characteristics.

For the ORS, the un-weighted establishment response rates for the complete second wave that ended collection in July 2023 was 55%. At the occupation level, the un-weighted response rate for the entire second wave was 77%.

**3a. Maximize Response Rates**

To maximize the response rate for this survey, field economists initially refine addresses ensuring contact with the appropriate employer. Then, employers are mailed or emailed a letter explaining the importance of the survey and the need for voluntary cooperation. The letter also includes the BLS' pledge of confidentiality. A field economist calls the establishment after the package is sent to attempt to enroll them into the survey. Non-respondents and establishments that are reluctant to participate are re-contacted by field economists as needed. Additionally, respondents are offered a variety of methods, including personal visit, telephone, fax, and email, through which they can provide data. As a result of collection under the COVID-19 pandemic, the BLS recently added video collection as an option for the respondents to provide the ORS data.

Response rates have been trending down for many years across government surveys. The sample increase under the five-year design was expected only to maintain a sufficient level of data for estimation. The increased sample size used during the fourth sample of the second wave yielded approximately 27% more usable establishments compared to the prior year. With the start of the second year of the third wave of ORS, a portion of the sample was reallocated to a future collection year. This reallocation is not expected to impact response rates.

**3b. Non-Response Adjustment**

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As with other surveys, the ORS experiences a certain level of non-response. To adjust for the non-respondents, the ORS divides the non-response into two groups, 1) unit non-respondents and 2) item non-respondents. Unit non-respondents are the establishments (or occupations) for which no ORS data was collected, whereas item non-respondents are the establishments that report only a portion of the requested ORS data elements for the selected occupations.

The unit (establishment or occupation) non-response is treated using a Non-Response Adjustment Factor (NRAF). Within each sampling cell, NRAFs are calculated based on the weighted ratio of the number of viable, i.e., in-scope and sampled, establishments to the number of usable, i.e., provided any data, respondents in the sample cell. Item non-response is adjusted using item imputation.

### **3c. Non-Response Bias Research**

Prior research was done to assess whether non-respondents to the NCS differ systematically in some important respect from respondents and would thus bias the NCS estimates. Details of this study are described in the two papers by Ponikowski, McNulty, and Crockett referenced in Section 2c (See Attachments 3 and 4). These studies provided knowledge that can be incorporated into future ORS non-response bias research.

The BLS also analyzed survey response rates from the Pre-Production test of the ORS sample at the establishment, occupational quote, and item (i.e., individual data element) levels. The data was analyzed using un-weighted response rates, and response rates weighted by the sample weight at each level of detail. Results from the Pre-Production test are detailed in the paper by Yu, Ponikowski, and McNulty (see Attachment 6). In a continued effort to monitor response rates at the establishment, occupation, and item levels, the BLS will run the same non-response analysis at the conclusion of each production sample.

The BLS plans to review the response rates in aggregate and by available auxiliary variables such as industry, occupation, geography (Census and BLS data collection regions), and establishment size. The BLS will use the results from the analysis to identify the auxiliary variables that are most likely to contribute significantly to bias reduction. This research is expected to continue through 2025. Once these variables are identified they will be used in the data processing system to reduce potential nonresponse bias.

**4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.**

Various tests have been completed both prior to the start and throughout the collection of ORS production samples. Field testing focused on developing procedures, protocols, and collection

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aids. These testing phases were analyzed primarily using qualitative techniques but showed that this survey was operationally feasible. Survey design testing was also conducted to ensure that we have the best possible sample design to meet the needs of the ORS. Data review processes and validation techniques were also analyzed to ensure quality data can be produced.

### **4a. Tests of Collection Procedures**

The timeline below is an overview of past and current testing of collection procedures.

**Fiscal Year 2012** – The BLS signed an interagency agreement with the SSA to design, develop, and conduct a series of tests using the NCS platform. The purpose was to assess the feasibility of using the NCS to accurately and reliably capture data relevant to the SSA’s disability program. The resulting initiative—the ORS—was launched to capture data elements new to the NCS using the NCS survey platform.

**Fiscal Year 2013** – The BLS completed three initial phases of ORS testing: a Proof-Of-Concept Test, a Collection Protocol Development Test, and a Broad Scale Test of various protocols. Results from this testing indicated that it is feasible for the BLS to collect data relevant to the SSA’s disability program using the NCS platform. Details on these collection tests are documented in the “Testing the Collection of Occupational Requirements Data” report found in the 2013 ASA Papers and Proceedings (see Attachment 7).

The results of Phase 1’s Proof-Of-Concept Test suggested that the BLS’ approach is viable. Additional information on this test and the lessons learned are available in the “Occupational Requirement Survey, Phase 1 Summary Report, Fiscal Year 2013” (see Attachment 8).

Phase 2’s Collection Protocol Development Test evaluated ORS collection protocols and aids. The results of Phase 2 testing, which can be found in the “Occupational Requirement Survey, Phase 2 Summary Report, Fiscal Year 2013” (see Attachment 9), demonstrated the effectiveness of the revised materials and procedures and the continued viability of the BLS collection of data relevant to the SSA’s disability program.

Phase 3’s Broad Scale Testing was designed to show whether the ORS field economists, from across the country, could collect all of the ORS data elements in addition to wages and leveling information in a uniform and efficient manner. The Phase 3 testing demonstrated the effectiveness of the revised materials and procedures and the continued viability of the BLS collection of data relevant to the SSA’s disability program. The details of this test and the results are further documented in the “Occupational Requirement Survey, Phase 3 Summary Report, Fiscal Year 2013” (see Attachment 10).

**Fiscal Year 2014** – The BLS completed six feasibility tests to refine the ORS methodology. In general, the results from these tests confirmed the BLS’ viability at collecting data relevant to the ORS and demonstrated the effectiveness of the revised materials and procedures tested. More detailed information on these feasibility tests as well as key findings can be found in the

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“Occupational Requirement Survey, Consolidated Feasibility Tests Summary Report, Fiscal Year 2014” (see Attachment 11).

**Fiscal Year 2015** – The Pre-Production test was designed to test all survey activities by mirroring production procedures, processes, and protocols as closely as possible. Every normal production activity associated with each of the BLS’ product lines was conducted during Pre-Production testing. More detailed information on the Pre-Production test can be found in the “The Occupational Requirements Survey: estimates from preproduction testing” (see Attachment 12).

In FY2015, the ORS production sample units were selected using a two-stage stratified design with probability proportional to employment sampling at each stage. The total ORS production sample in the first year was 4,250 establishments and 10,000 establishments for the next two years. For more details on this design see paper by Ferguson and McNulty on “Occupational Requirements Survey Sample Design” (Attachment 13).

The BLS also conducted a job observation test during the summer of 2015 to provide validation for the ORS physical elements by comparing the data collected during the Pre-Production test to those collected through direct job observation, which is more typical among small scale studies of job tasks. More details and results from this test can be found in the paper titled “Occupational Requirements Survey Job Observation Report” (see Attachment 14).

**Fiscal Year 2016 to 2020** – The ORS program completed collection of the three sample groups from the first production wave in the summer of 2018. During FY2017 and FY2018, three tests of data collection methods were conducted. The first test continued the BLS work to validate the ORS data and methodology. It was a larger scale version the FY2015 Job Observation test, and it focused on ORS elements and occupations that are amenable to testing by observation. Research results from both observation tests are summarized in the [“Observational collection compared to critical task threshold interview collection in the Occupational Requirements Survey”](#) article on the [www.bls.gov](http://www.bls.gov) website.

Data for the second test was collected between September and November 2017 and focused on a comprehensive set of questions on the mental/cognitive demands for a job. Earlier cognitive data collection questions did not yield data that would meet the SSA’s needs for adjudication and were discontinued in August 2017, after OMB approval was received on 4/28/2017. New questions were designed and tested on a limited basis through the BLS Office of Survey Methods Research (OSMR) generic Clearance 1220-0141 in the first half of 2017. The outcome of the test was a revised set of mental/cognitive demand questions and response answers incorporated into the ORS.

The final test was the FY2018 Occupational Selection test. The primary goal of this test was to evaluate the new occupational quote selection described in section 1 above and the impact of this change on training and collection procedures. The test included a range of establishments in order to accurately refine data collection procedures and provide insights for field economist

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training. This test was conducted over a six-week period in the spring of 2018. The data and lessons learned from this test were used to develop comprehensive instructions and training tools for the BLS Field Economists to be used in the collection of all sample groups under wave two of the ORS.

**Fiscal Year 2021 to 2022** – The ORS program tested third wave changes identified by the SSA. The BLS tested these proposed changes in three consecutive phases: focus groups, a structured cognitive test, and a field test. The overall goal of testing was to determine the feasibility of producing new or modified occupational requirements before these measurements are introduced for wide-scale collection in the third wave. The BLS used this testing to identify critical issues with the proposed changes and potential clarifications of measurement objectives, as well as to refine future survey collection procedures and best practices. More detailed information and results of the third wave testing can be found in the “Occupational Requirements Survey, Third Wave Testing Report.” (See Attachment 20).

**Fiscal Year 2023 to 2026** – Although there are currently no specific tests planned for FYs 2023 to 2026, requesting hours for testing during this period is consistent with continual survey improvement and a standard practice for the BLS. The BLS is currently analyzing current procedures and data for the Public Work Area element to ensure estimates are valuable to stakeholders. Evaluation of our measurement objectives and publication goals is an important aspect of the BLS mission to provide meaningful estimates to the SSA and the data user community. This work is in an exploratory stage. BLS will submit a non-substantive request to OMB if there are changes to be made to the Public Work Area element.

### **4b. Tests of Survey Design Processes**

#### Sample Design Options

To further ensure the BLS met the needs of the ORS by producing statistically valid and high-quality data, testing on possible sample design options was also conducted. In FY2013, the BLS began work to evaluate sample design options for the ORS by reviewing the sample designs used for the NCS. More details on this initial sample design testing are available in the November 2013 Federal Committee on Statistical Methodology (FCSM) Proceedings, “Sample Design Considerations for the Occupational Requirements Survey” (see Attachment 15). This research continued into FY2014 and expanded to look at other BLS surveys, including the OEWS and Survey of Occupational Injuries and Illnesses (SOII). Since the ORS would be collected by trained field economists who also collect the NCS data, potential coordination with the NCS sample design was a key factor of consideration. As a result, four basic categories of the ORS survey designs were identified to allow for different potential levels of coordination with the NCS. These design options are documented in the American Statistical Association (ASA) 2014 Papers and Proceedings titled “Occupational Requirement Survey, Sample Design Evaluation” by Ferguson et al (see Attachment 16).



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While desirable for the ORS sample design to be integrated with the NCS, it was unclear whether the NCS sample design would meet the goals of the ORS. After various testing on the four basic categories of the ORS survey designs, the BLS determined that the Independent Survey Design was the optimal design option for the first production wave. This design, as demonstrated through the first wave production, met the requirements of being able to produce reliable estimates for ORS data elements; however, it did not meet the needs of the SSA in terms of its ability to produce reliable estimates for the ORS data elements for the vast majority of SOC codes.

To improve the balance of the number of observations (quotes) sampled across all occupations and increase the publication rate across a greater number of occupations while maintaining current resource levels, in FY2017 the BLS began additional research into alternative sample design options for the ORS. Extensive research, including simulating hypothetical samples, analyzing sample allocations, and estimating the predicted number of observations per occupation per hypothetical sample, was completed for each option prior to coming to a final design. The options studied included:

1. Modify the current ORS industry sample allocations but maintain the remaining design features.
2. Modify the ORS industry sample allocations and PSO procedures but maintain the remaining design features.
3. Construct sample from subsamples that each target a specific group of occupations.
4. Target the ORS sample to pairs of low employment occupations.
5. Two-phase stratified sampling to target specific occupations of interest.
6. Multiple frames stratified sampling to target specific occupations of interest.
7. Two-stage stratified sampling to target rare occupations.
  - Description: The sampling design for the five-year private industry sample is a two-stage stratified sample of private industry establishments and occupations within selected establishments. Strata are formed by the cross-classification of the predicted presence/absence of a “rare occupation” in the establishment, Census Region (Northeast, Southeast, Midwest, West), and aggregate industry (Education, Goods Producing, Health Care, Financial Activities, Service Providing), leading to forty strata. For the purposes of sample selection, a “rare occupation” is defined as one of the 200 six-digit SOCs with the lowest May 2017 OEWS employment, across all ownerships.
  - Observations: This design limits oversampling of higher employment occupations by allocating more sample in occupations that would have a lower probability of selection under a probability proportional to occupational employment.

After reviewing the results of each of the above design approaches, option 7 yielded the most promising results to reach the goal of publishing estimates for a broader number of SOC codes. This design also has the potential to save time for both the Field Economist as well as the respondent by reducing the number of establishments for which the selection of occupations is completed during collection. Additionally, in FY2021, this option was retested using the priority

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list of occupations provided by the SSA to ensure this methodology would still yield the best results for the third wave of collection.

### Data Review and Validation Processes

The BLS has developed a variety of review methods to ensure data of quality are collected and coded. These methods include data review and validation processes and are available in more detail in the 2014 ASA Papers and Proceedings under the title “Validation in the Occupational Requirements Survey: Analysis of Approaches” by Smyth (see Attachment 17).

The ORS Data Review Process is designed to create the processes, procedures, tools, and systems to check the micro-data as they come in from the field. This encompasses ensuring data integrity, furthering staff development, and ensuring high quality data for use in producing survey tabulations or estimates for validation. The review process is designed to increase the efficiency of review tools, build knowledge of patterns and relationships in the data, develop expectations for reviewing the micro-data, help refine procedures, aid in analysis of the data, and set expectations for validation of tabulations or future estimates.

To further ensure the accuracy of the data, the ORS Validation Process focuses on aggregated tabulations of weighted data as opposed to individual data. This entails a separate but related set of activities from data review. The goal of the validation process is to review the estimates and declare them Fit-For-Use (FFU), or ready for use in publication and dissemination, as well as confirming that our methodological processes (estimation, imputation, publication and confidentiality criteria, and weighting) are working as intended. Validation processes include investigating any anomalous estimates, handling them via suppressions or correction, explaining them, documenting the outcomes, and communicating the changes to inform any up/down-stream processes. All results of validation are documented and archived for future reference, if necessary.

Overall, the ORS poses review and validation challenges for the BLS because of the unique nature of the data being collected. In order to better understand the occupational requirements data, the BLS engaged in a contract with Dr. Michael Handel, a subject matter expert. From the fall of 2014 through January 2015, Dr. Handel reviewed and analyzed literature related to the reliability and validity of occupational requirements data. At the conclusion of his work, Dr. Handel provided the BLS with the recommendations below with the understanding that the ORS is complex in nature, and there is no “one size fits all” approach for testing reliability and validity of the data items:

- The development of a strategic documentation to guide methodological research.
- An evaluation on the existence of “gold standard” benchmarks for methods of data collection and for data elements.
- For data elements without any gold standards, multiple approaches may be used.
- Measures of agreement for the ORS data should consist of assessing data agreement within method, as opposed to across methods. Because there are many characteristics of the interview that may cause variability (e.g., characteristics of the respondent, length of

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interview, characteristics of the job and establishment, identity of the field economist/field office), it would be significant to use debriefs with the field economists to identify the key characteristics of the interview to focus on for measures of reliability.

- Consideration should be given to variation caused by errors in coding occupations.

The BLS management agreed with the recommendations provided by Dr. Handel. As a result, the BLS began a review initiative in FY2015 including the development of a methodological guide, evaluation of “gold standard” benchmarks for data collection, and testing of inter-rater reliability (see “Occupational Requirements Survey Job Observation Report,” Attachment 14 for additional information). More detailed information on Dr. Handel’s proposals is explained in an Executive Summary paper titled “Methodological Issues Related to ORS Data Collection” by Dr. Handel (see Attachment 18). These recommendations, as well as refinements of the ORS manual, the data review process, and the validation techniques developed to date ensured the ORS products are quality occupational data in the areas of vocational preparation, mental-cognitive and physical demands, and environmental conditions.

Throughout the testing stages as well as the first wave of production for the ORS, the BLS conducted various calibration activities. As stated in a paper by Mockovak, Yu & Earp, calibration training is a type of refresher training that compares interviewer performance against predetermined standards to assess rating accuracy, inter-rater reliability, and other measures of performance. In addition to those described in this paper, the BLS conducts calibration exercises to test staff understanding and adherence to problematic concepts. Most recently, in FY2018, calibration activities focused on SOC coding to better ensure the accuracy and consistency across all National and Regional Office staff that are involved in collection, coding and/or review of the ORS microdata. Information obtained during the various calibration activities is used to enhance procedural guidance as well as training materials. Additional information is available in the “Using Calibration Training to Assess the Quality of Interviewer Performance,” ASA Papers and Proceedings (see Attachment 19).

## 5. Statistical Contacts

**Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze person(s) who will actually collect and/or analyze the information for the agency.**

Xingyou Zhang, Chief, Statistical Methods Group of the Office of Compensation and Working Conditions (OCWC), is responsible for the statistical aspects of the ORS production. Xingyou Zhang can be reached on 202-691-6082. The BLS seeks consultation with other outside experts on an as-needed basis.

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