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Accounting and Information  
Management Division

June 16, 1998

The Honorable Byron L. Dorgan  
United States Senate

The Honorable Jim Kolbe  
Chairman, Subcommittee on Treasury,  
Postal Service and General Government  
Committee on Appropriations  
House of Representatives

The Honorable Steny Hoyer  
Ranking Minority Member  
Subcommittee on Treasury,  
Postal Service and General Government  
Committee on Appropriations  
House of Representatives

Subject: GAO Views on Year 2000 Testing Metrics

This letter responds to your request for GAO's (1) views on requiring federal departments and agencies to report certain Year 2000 testing metrics and (2) ideas about other such metrics that should be reported.

We share your concerns regarding federal agencies' responsiveness to the Year 2000 computing crisis and agree that testing is a critical component of the Year 2000 conversion and replacement process. We further agree that to be effective, Year 2000 testing should be conducted in a structured and disciplined fashion. To this end, we plan to issue this month a draft Year 2000 testing guide<sup>1</sup> that defines a managed, five-phase model for Year 2000 testing and specifies key processes that are hallmarks of a mature and rigorous testing

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<sup>1</sup>This testing guide is the latest in a series of guidance we have issued addressing the Year 2000 Problem. See, Year 2000 Computing Crisis: An Assessment Guide (GAO/AIMD-10.1.14, September 1997), first issued as an exposure draft in February 1997 and Year 2000 Computing Crisis: Business Continuity and Contingency Planning (GAO/AIMD-10.1.19, March 1998, Exposure Draft).

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program. Embedded within each phase of our test model and defined explicitly in key processes under these phases are best practices aimed at (1) defining metrics for measuring test progress and results, (2) collecting data on these metrics, (3) reporting these data, as appropriate, to various management levels, and (4) overseeing and controlling the testing process using these data. The draft guide will also provide examples of metrics that are intended to provide management with timely visibility into test planning, execution, and results.

The specific metrics cited in your letter (that is, total number of date-related decisions in the software that have been modified and the number of these decisions that have been tested along with an explanation of the risk associated with the untested decisions) are examples of test coverage indicators or metrics. Test coverage is a measure of the date-dependent software, which can be expressed in various ways (such as lines of code, executable statements, objects, logic branches, logic paths, and units of data) that has been tested in relation to the system's total date-dependent software. Other categories include:

- test completeness indicators, such as date-related conditions tested/untested (for example, the last day of 1999, the first day of 2000, the first business day of 2000, the first seven-digit date field in 2000, and the last day of February 2000) and types of tests conducted (for example, software unit, system performance, system security, and system regression);
- test readiness indicators (for example, completion of test plans and completion of test data);
- test schedule indicators (for example, met/unmet milestones and schedule changes); and
- test results indicators (for example, number of defects discovered (categorized by severity) versus number expected).

There are no generally accepted standards—in government or the private sector—for testing indicators or metrics, either for testing in general or for Year 2000 in particular. As a result, the specific mix and reporting frequency of these indicators or metrics will appropriately vary among organizations. Moreover, organizations are likely to tailor the reporting format they use to the management level reviewing them. What remains constant, however, is this: Management must be kept apprised of the status and results of testing activities, and the organization must collect and report metrics which reliably convey this information.

As you have recognized, the cost of Year 2000 testing is substantial, estimated to be consuming between 50 and 70 percent of Year 2000 conversion time and resources. However, disciplined test management, including the collection and

reporting of metrics, is not an expansion of these test activities. Rather, it is part of an effective testing process. If an agency is already collecting coverage metrics and using them to manage its testing efforts, it may not take any significant additional effort to also report these to OMB in summary form. If an agency is not collecting and using coverage metrics, it should not be arduous to explain forthrightly to OMB the standards it uses to ensure that testing is complete and thorough, and the measures that it uses to track progress against those standards.

Please contact me at (202) 512-6412 or Randy Hite at (202) 512-6256, if you or your staff have any questions concerning this letter. We can also be reached by e-mail at *stillmanr.aimd@gao.gov* and *hiter.aimd@gao.gov*, respectively.

A handwritten signature in black ink, appearing to read "Rona B. Stillman". The signature is fluid and cursive, with a large initial "R" and "S".

Dr. Rona B. Stillman  
Chief Scientist for Computers  
and Telecommunications



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