

*U.S. DEPARTMENT OF COMMERCE
Office of Inspector General*



*NATIONAL INSTITUTE OF
STANDARDS AND TECHNOLOGY*

*Reporting of Performance Measures
Needs Improvement*

Final Audit Report No. FSD-14430/March 2002

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Office of Audits, Financial Statements Audits Division



UNITED STATES DEPARTMENT OF COMMERCE
The Inspector General
Washington, D.C. 20230

MAR 29 2002

MEMORANDUM FOR: Arden L. Bement, Jr.
Director
National Institute of Standards and Technology

FROM: Johnnie E. Frazier

SUBJECT: *Reporting of Performance Measures Needs Improvement*
Final Audit Report No. FSD-14430

This is our final report on our audit of selected performance measures used by the National Institute of Standards and Technology for reporting results of its programs. The performance measures reviewed relate to the Manufacturing Extension Partnership, the Laboratories, and the Advanced Technology Program. The performance measures assessed include the following: for MEP, increased sales attributed to MEP assistance; for the Laboratories, the number of technical publications produced; and for ATP, the cumulative number of technologies under commercialization and the cumulative number of patents filed. These performance measures were included in the Department's combined FY 2000 Annual Program Performance Report / FY 2002 Annual Performance Plan and its FY 2000 Accountability Report.

Our audit revealed a commitment on the part of NIST management to develop a comprehensive system for reporting program performance results. However, it also revealed that improvements are needed in certain areas. Specifically, we found that for the Manufacturing Extension Partnership (1) the process for verifying results needs to be strengthened and (2) the discussion of performance results needs additional explanations. We also found that for the Advanced Technology Program and NIST Laboratories (1) improvements in internal controls will ensure the accurate reporting of performance data and (2) clarification of terminology will improve the discussion of performance results.

We recognize that implementation of the Government Performance and Results Act of 1993 is an iterative process that will require continued attention from NIST management. Toward that end, we recommend that NIST take specific steps to strengthen internal controls for reporting performance data and clarify the discussion of results. By taking these actions, NIST will improve the credibility of performance results it reports to Congress and the public.

In responding to the draft report, NIST officials generally agreed with the recommendations contained in the draft report and stated that certain corrective actions have already been taken. In addition, NIST's response included additional information and clarifications related to the body of our report. In this report, we summarize NIST's comments, as well as provide the OIG response. The complete NIST response has been included as Appendix II.

Please provide your action plan addressing the recommendations for our concurrence within 60 days of this memorandum in accordance with Department Administrative Order (DAO) 213-5. The plan should be in the format of Exhibit 7 of the DAO. Should you have any questions regarding preparation of the action plans, please contact me at (202) 482-4661, or Thomas McCaughey, Director, Financial Statements Audits Division, at (202) 482-6044, within 10 days of the date of this report. We appreciate the cooperation and courtesies extended to us by NIST staff during the review.

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EXECUTIVE SUMMARY

The mission of the National Institute of Standards and Technology is to strengthen the U.S. economy and to improve the quality of life by working with industry to develop and apply technology, measurements, and standards. NIST's operations include (1) the Manufacturing Extension Partnership (MEP), which helps firms adopt new manufacturing and management technologies; (2) its measurement and standard laboratories, which develop and disseminate measurement techniques, reference data, test methods, and standards required by U.S. industry; and (3) the Advanced Technology Program (ATP), which stimulates the development of high-risk, broad-impact technologies.¹

NIST's performance plans and results and its financial information are incorporated in Department of Commerce reports, including the Annual Performance Plans and Annual Program Performance Reports submitted to meet the requirements of the Government Performance and Results Act of 1993 (GPRA) as well as the Department's annual Accountability Report. The Department's performance goals include the following NIST-related goals:

- Provide technical leadership for the nation's measurement and standards infrastructure and ensure the availability of essential reference data and measurement capabilities.
- Accelerate technological innovation and development of the new technologies that will underpin economic growth.
- Improve the technological capability, productivity, and competitiveness of small manufacturers.

NIST has implemented a comprehensive performance measurement approach, using a range of indicators to assess its progress in meeting its goals, such as output and outcome measures, peer reviews, and impact studies. It has reported on 15 performance measures, including (1) the number of technical publications produced, (2) cumulative number of technologies under commercialization,

¹ NIST manages the Baldrige National Quality Program to help U.S. businesses and other organizations improve the performance and quality of their operations by providing clear standards and benchmarks of quality. Also, NIST was responsible for the Critical Infrastructure Protection Grants Program to fund research to provide solutions to information security problems that are central to critical infrastructure; however, the performance goal and performance measure associated with this program have been discontinued. Performance measures for both of these programs were not included in the Department's Accountability Report and were not assessed during this review.

(3) cumulative number of patents filed, and (4) increased sales attributed to MEP assistance.² We limited our review of performance results to these four measures because they were reported on in both the Department of Commerce's combined *FY 2000 Annual Program Performance Report and FY 2002 Annual Program Performance Plan* and its *FY 2000 Accountability Report*.

Our audit objectives were to (1) assess NIST's collection and reporting of performance information in documents submitted to meet GPRA requirements and (2) determine whether internal controls are sufficient to ensure performance data are accurate, consistent, and reliable. In satisfying these objectives, we met with NIST officials to discuss the bureau's procedures for collecting and reporting performance information and assessed internal controls to determine whether they provided assurances that reported performance results were accurate, consistent, and reliable. We found:

- For the Manufacturing Extension Partnership program, there is an inconsistency between data collected for the performance measure reviewed and the performance goal it supports, reporting procedures need to be strengthened to ensure that the data is accurate, and the discussion of performance results needs additional explanations. To avoid a misleading presentation of performance results, management attention is needed. (See page 5.)
- For NIST laboratories, the number of technical publications produced was slightly misstated because certain results were improperly excluded. To ensure a more appropriate presentation of performance, additional explanations are needed in the discussion of this measure. (See page 12.)
- For the Advanced Technology Program, the cumulative number of patents filed was slightly misstated. To ensure a more effective presentation of performance for both the cumulative number of patents filed and cumulative number of technologies under commercialization, additional explanations need to be included in the discussion of these measures. (See page 15.)

We recommend that the NIST Director ensure that the following actions are taken:

- For MEP, strengthen the process for verifying results and clarify the discussion of performance results.

² NIST reported on 16 performance measures in the Department's combined *FY 2000 Annual Program Performance Report and FY 2002 Annual Performance Plan*. Only four of these measures were also included in the Department's *FY 2000 Accountability Report*.

- For NIST laboratories, strengthen internal controls to better ensure collection of accurate performance data and provide background information to clarify the discussion of the performance measure.
- For ATP, strengthen internal controls to ensure the reporting of accurate performance data and provide background information to clarify the discussion of performance results for the ATP performance measures.

In his March 25, 2002 response to our draft report, the Director of NIST stated that the bureau generally agrees with the recommendations contained in the draft report and that certain steps have already been taken to correct some of the findings and recommendations. These steps include

(1) revisions and additions to the text of performance reports, (2) implementation of process changes to improve data accuracy and reporting, and (3) exploration of ways to improve performance measurement and reporting systems. In the response, NIST takes issue with certain text within the draft report and provides some general observations about the appropriate level of scrutiny for reported performance results and on the timing of the audit report.

We commend NIST for the corrective actions already taken and are encouraged by the assurance of the Director of NIST that these issues will receive the highest level of attention. We feel that it is the responsibility of management to implement the internal controls to ensure the accuracy of reported information. As such, NIST should focus on correcting the deficiencies in internal controls that led to the reporting of inaccurate performance information. Also, NIST's response indicated that the timing of our report precluded additional corrective action during the last performance reporting cycle. However, we feel it is important to note that we provided our findings and preliminary recommendations to NIST personnel within the Office of Strategic Planning and Economic Analysis as early as September for the laboratories and ATP and as early as December for MEP.

The final report reflects NIST comments and observations contained within the NIST response. The complete response is attached to the report as Appendix II.

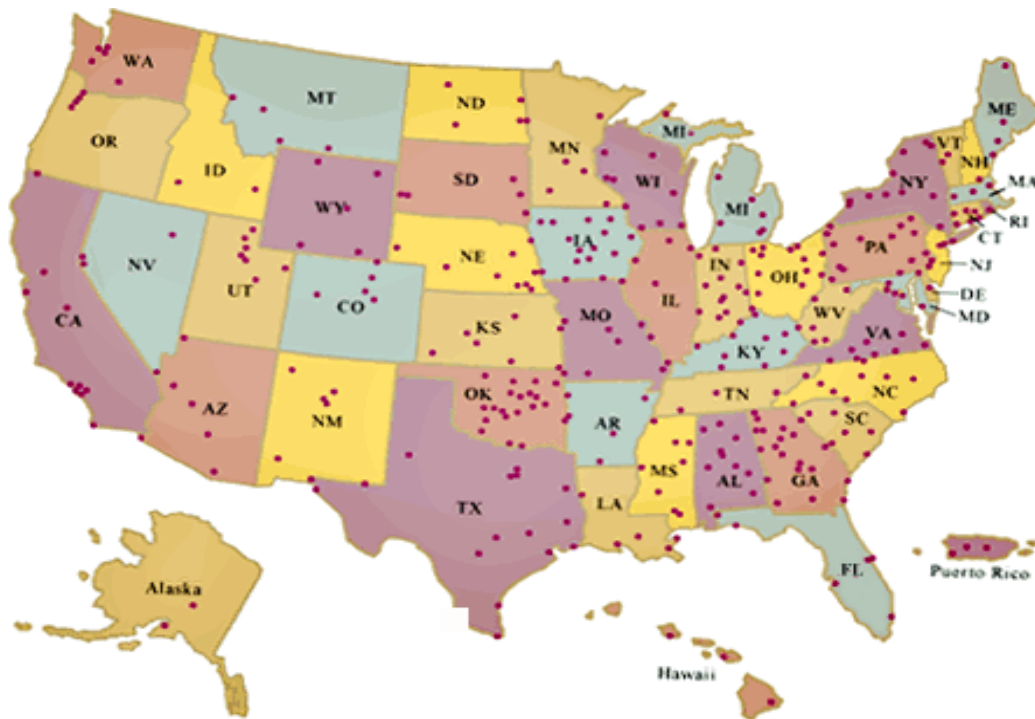
INTRODUCTION

This final report presents the results of our audit of NIST's procedures for collecting and reporting selected performance measurement data. Programs discussed include the Manufacturing Extension Partnership (MEP), NIST laboratories, and the Advanced Technology Program (ATP). NIST and the Department of Commerce report on the results of these programs and activities to meet the requirements of the Government Performance and Results Act of 1993 (GPRA) and the Chief Financial Officers Act of 1990 (CFO Act), as amended by the Government Management Reform Act of 1994 (GMRA).

GPRA was enacted to improve the effectiveness, efficiency, and accountability of federal programs by requiring federal agencies to set goals for program performance and to report on annual performance measured against stated goals. The Department's most recent efforts to comply with GPRA were combined in the Department's *FY 2000 Annual Program Performance Report and FY 2002 Annual Performance Plan* (APPR/APP). Performance results for NIST programs were also presented in the FY 2000 Accountability Report for the Department.

NIST is a bureau within the U.S. Department of Commerce's Technology Administration. Its mission is to develop and promote measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. In reporting on its programs in the Department's combined APPR/APP, NIST presented 15 performance measures. (For an overview of these performance measures see Appendix 1.) Four of these measures (technical publications produced, cumulative number of technologies commercialized, cumulative number of patents filed, and increased sales attributed to MEP assistance) were included in the Department's FY 2000 Accountability Report.

The purpose of MEP is to improve the competitiveness of the nation's smaller manufacturers by offering them access to the latest business practices and the technical information and expertise they need to improve their operations. Assistance is provided through a nationwide network of more than 400 locally managed technology extension centers and field offices serving all 50 states, the District of Columbia, and Puerto Rico. The performance goal within the Department's combined APPR/APP that pertains to this program is to "[i]mprove the technological capability, productivity, and competitiveness of small manufacturers."



Technology Extension Centers and Field Offices³

NIST's Laboratories, located in Gaithersburg, Maryland, and Boulder, Colorado, develop and disseminate measurement techniques, reference data, test methods, and standards required by U.S. industry. NIST researchers collaborate with private industry, academic institutions, and other government agencies. The performance goal within the Department's combined APPR/APP that pertains to this program is to "[p]rovide technical leadership for the nation's measurement and standards infrastructure and ensure the availability of essential reference data and measurement capabilities."

The ATP supports awards to accelerate commercialization of high-risk, broadly enabling technologies that promise significant economic benefits to the nation. The performance goal within the Department's combined APPR/APP that pertains to this program is to "[a]ccelerate technological innovation and development of the new technologies that will underpin future economic growth."

³ This map identifying the locations of Manufacturing Extension Partnership locations was obtained from <http://www.mep.nist.gov/locations1/index.html>.

To assess its efforts to achieve these goals, NIST uses a variety of measures. External peer reviews measure quality and technical merit, economic impact studies measure outcomes, the cumulative number of patents filed and cumulative number of technologies under commercialization measure intermediate outcomes, and key products and services measure outputs. NIST's intention is to use a comprehensive suite of measurement techniques to articulate its performance and accomplishments.

For information to effectively fulfill GPRA requirements and improve program results, the reported performance data must be reliable. GPRA requires that data verification and validation assure users, such as Congress and the Office of Management and Budget (OMB), of the reliability of the reported performance information.⁴ The General Accounting Office (GAO) defines verification as the "assessment of data completeness, accuracy, and consistency, and the related quality control practices" and validation as the "assessment of whether the data is appropriate for the performance measure."

OBJECTIVES, SCOPE, AND METHODOLOGY

The audit objectives were to (1) assess the collection and reporting of NIST performance information in documents submitted to meet GPRA reporting requirements and (2) determine whether NIST's internal controls are sufficient to ensure that performance data are accurate, consistent, and reliable. Determining whether NIST performance measures are the most appropriate for the bureau was not an audit objective.

Our methodology focused on performance measures included in the Department's efforts to satisfy GPRA and GMRA requirements and the bureau's efforts to ensure data quality and reliability. We conducted our review from July to December 2001. Procedures performed included interviewing NIST officials responsible for generating, maintaining, and reporting the performance data; identifying and testing internal controls surrounding the performance measures; assessing NIST's commitment to data reliability; and performing procedures to validate and verify performance data. We did not test the reliability of computer generated data. Our field work was conducted at the NIST headquarters in Gaithersburg, Maryland.

⁴ *Performance Plans: Selected Approaches for Verification and Validation of Agency Performance Information*, U.S. General Accounting Office, GAO/GGD-99-139, July 30, 1999.

We tested the internal controls established to ensure the reliability of reported results for the four performance measures reported on both the combined APPR/APP and the FY 2000 Accountability Report.

We tailored our audit procedures to the particular performance measure reviewed. For “number of technical publications produced,” we judgmentally selected 50 of 2,115 publications reported for FY 2000. For “cumulative number of technologies commercialized,” we randomly selected 10 of 122 technologies reported for FY 1999. For “cumulative number of patents filed,” we randomly selected 15 of 522 patents reported in FY 1999. We also performed cut-off tests to ensure data were reported in the correct period. For “increased sales attributed to MEP assistance,” we judgmentally selected 45 responses from surveys conducted for FY 1999 and the first two quarters of FY 2000.

Our audit was conducted in accordance with the *Government Auditing Standards*, issued by the Comptroller General of the United States, and was performed under the authority of the Inspector General Act of 1978, as amended, and Department Organization Order 10-13, dated May 22, 1980, as amended.

FINDINGS AND RECOMMENDATIONS

I. Performance Results for the Manufacturing Extension Partnership

Although we commend NIST for its efforts to measure outcomes, not merely outputs, for the Manufacturing and Extension Partnership (MEP), improvements and clarifications are needed in the reporting of performance results.

To support the assessment of MEP's performance goal to "improve the technological capability, productivity, and competitiveness of small manufacturers" in the Department's FY 2000 APPR/APP, NIST reports on three performance measures: "increased sales attributed to MEP assistance," "capital investment attributed to MEP assistance," and "cost savings attributed to MEP assistance." To collect the data for these three measures, NIST used a survey conducted by a third party.⁵ Assisted entities were asked a series of questions about the impact MEP assistance had on their operations. Survey questions relate to issues such as increased sales, new jobs, retained jobs, and cost savings.

We limited our review to the performance measure "increased sales attributed to MEP assistance," one of the four NIST measures reported in the Department's *FY 2000 Accountability Report*.⁶ For FY 1999, the last year in which results were reported, estimated increased sales attributed to MEP assistance were \$447 million. We reviewed the NIST spreadsheet containing responses for firms surveyed for FY 1999 and the first two quarters of FY 2000 and selected a judgmental sample of 45 responses. The 45 responses represent \$317,916,737 of \$874,410,733, or 36.4%, of total increased sales within the spreadsheet. Our review identified:

- inconsistency between the performance goal and performance measurement data,
- insufficient procedures in place to follow up on claimed results, and
- incomplete data and disclosures about the data.

⁵ The survey is conducted four times per year, with an attempt made to contact each client once per year. The survey can be completed through a phone interview or via an Interactive Voice Response system. Clients are selected for the survey based on when the company completed its first project with an MEP center in the previous year.

⁶ The Department's FY 2000 Accountability Report contains certain goals and performance measures that are considered critical to the Department. The report does not include all goals and measures included in the APPR/APP.

Because of the problems identified, the reported dollar value of sales increases claimed could not be verified. Furthermore, these problems with this measure are likely to adversely impact the other two measures reported for MEP because the data supporting these measures were collected using the same survey. NIST needs to ensure that performance information reported for MEP is verifiable and that the explanation of performance results is not misleading.

A. Efforts needed to ensure that MEP performance measurement indicators are consistent with MEP performance goals

The MEP performance goal is “improve the technological capability, productivity, and competitiveness of small manufacturers,” but the performance measurement data includes information about establishments other than small manufacturers. Using a broad performance measure (i.e., results for all clients assisted) to support the specific goal of assisting small manufacturers leads to a misleading presentation and discussion of performance results because the performance data collected contains information about the effect of MEP assistance on both small and large manufacturers, as well as nonmanufacturers. Thus, that information is inappropriate for determining the progress NIST is making in assisting small manufacturers.

This problem is due in part to the way NIST identifies a small manufacturer. NIST officials explained to us that they consider manufacturing facilities with 500 or fewer employees to be small manufacturers and that the “number of employees” is based on how many are located at a specific site, not the total number working for a firm. We found that this determination of size is inconsistent with the generally accepted definitions used by the Small Business Administration (SBA) and the National Association of Manufacturers (NAM), which establish the size of a firm by the number of employees company wide and generally limit the term “small firm” to companies with 500 or fewer total employees.

Although survey responses for FY 1999 and the first half of FY 2000 were predominately from companies with 500 or fewer total employees at the site assisted, we identified responses from many clients sampled that did not fit the profile of small manufacturer as defined by SBA and NAM. Our judgmental sample of 45 responses contained at least two Fortune 500 clients with \$8 million in claimed increased sales, and four additional clients exceeded MEP’s own definition of “small firm.” In fact, 256 of the 5,429 total responses, or approximately 5% of the clients responding to the MEP survey, claimed more than 500 employees at the facility assisted. Although not included in our judgmental sample, we noted that numerous additional Fortune 500 companies had received MEP assistance. By using a definition of small manufacturer which departs from the generally accepted definition, NIST diminishes the reliability of the data submitted in support of its performance goal.

We also identified several clients -- such as community colleges, government agencies, and other non-manufacturers -- that did not appear to meet the generally understood definition of small manufacturer. Again, including data submitted by such entities under a performance measure which is expected to relate to small manufacturers diminishes the reliability of that data as a mechanism for tracking progress toward the goal of assisting small manufacturers.

B. Management should strengthen procedures for confirming reliability of claimed results

The actual dollar amounts claimed for “increased sales attributed to MEP assistance” cannot be verified. The annual survey provides MEP with information about the impact of its assistance using several major business indicators, including sales. During our review, we detected several errors in the collected data and believe these errors would have been detected and corrected, had the responses of assisted clients been more thoroughly assessed for accuracy of reported amounts.

For our sample, we selected 45 client responses from FY 1999 reported results and FY 2000 collected data. We followed up with MEP centers on 11 of the 45 responses to assess the reliability of claimed results and the effectiveness of following up on questionable responses. These 11 were selected because our initial review of these responses raised concern about the reasonableness of claimed results. We found that 4 of the responses had incorrect data that should have been identified and corrected: \$10 million in increased sales claimed by one client was “projected sales;” another claim of \$10 million should have been \$1 million; one claim of \$25 million should have been \$2.5 million, and a claim of \$25 more likely should have been \$25,000. Of these incorrect amounts, \$22.5 million was incorrectly reported for FY 1999; the remainder needs to be corrected before FY 2000 results are reported.

As part of our review, we examined the largest claimed result by a MEP client for FY 2000, which was \$39 million in increased sales. MEP staff examined this particular sales impact when the independent surveying firm provided it and at that time the Center confirmed the impact. However, during our review, we obtained independent data indicating that the claimed results were too high (i.e., we found that the claimed increase in sales attributable to MEP assistance was potentially equal to total sales for the client). The Center that served this client stated that the claimed impact still seemed reasonable. When we asked what steps were taken to confirm the client’s stated impact, we were told that this assessment of reasonableness was based on its relationship with the client and conversations with client management. When the Center could not provide any additional support to corroborate the reported results, we requested that the client be contacted again to confirm the reported results, but NIST declined to do so, citing its concern about the confidentiality of the data and its indirect relationship with

the client. We believe that given the presence of information that contradicted claimed results and the high dollar value of the item involved, NIST should either have performed additional follow up to verify the claimed results or removed the results from the total reported.

For several of the client responses, we found that headquarters had requested the Centers to follow up on reported results and the Centers had reported back that there were no problems with the data. However, as a result of limited follow-up that we performed based on our concerns, we identified inaccurate amounts that had not been caught and corrected. We also found that the Centers have not been provided with sufficient guidance as to the procedures to be performed in testing the reasonableness of the data.

In the Department's combined APPR/APP and the FY 2000 Accountability Report, the verification procedure for determining "increased sales attributed to MEP assistance" includes a "review by NIST Director's Office." We asked NIST to provide more specific information about this process. We were told that the procedure is for headquarters to request MEP Centers to confirm increased sales of more than \$5 million attributed to MEP assistance. In addition, we were told that in certain instances, Centers were also asked to look into situations involving potential inconsistencies in data (e.g., increased sales but no increase in employment). We were told that in some instances, these procedures had resulted in corrections to the data. However, these communications between headquarters and MEP representatives, which first took place in January 2000, are usually performed through e-mail, and the procedures are not formally documented.

The data errors identified in our review demonstrate that current procedures are not adequate in preventing or detecting significant errors in reported results. As such, we believe the procedures to ensure the accuracy of data need to be strengthened and documented and the Centers should be given specific guidance on how to follow-up on reported results.

C. Action needed to address issues of data completeness and disclosures

The response rate for the MEP survey was 62.9% for 1999, the last year reported. Of those responses, 6.4% of clients responding to the survey indicated they had increased sales as a result of MEP assistance, but did not quantify a dollar amount. However, in departmental documents where MEP performance results are reported, there is no disclosure as to the response rate or the percentage of firms that claimed increased sales but did not quantify results. Thus, the reported dollar amounts attributed to MEP assistance need to be properly annotated.

The response rate and the percentage of firms that report increased sales without quantifying results should be disclosed. By the same token, providing only the dollar amounts claimed and not the number of clients claiming increased sales does not completely articulate program results. Inclusion of additional information could support NIST's claim that the dollar value reported is conservative. A supplemental performance measure to report would be the "percentage of clients attributing increased sales to MEP assistance."

Also, the reported results for "increased sales attributed to MEP assistance" would be more appropriately entitled "estimated increased sales attributed to MEP assistance." When we explained to NIST officials the inaccuracies we had identified in the data submitted on increased sales, we were told that the numbers were not intended to be precise because they were estimates that provided an "indicator of success" not a precise "measure." This, however, is not made clear in NIST's discussion of results in the APPR/APP and the FY 2000 Accountability Report. The APPR/APP states that "In FY 2000, MEP significantly improved the process by which it evaluates clients' performance by updating its survey instrument and collection methods. Improvements to the survey design and implementation process have made it more likely that a larger number of surveyed clients will be able to provide high-quality, quantifiable results to interview questions" (emphasis added).

NIST should indicate how much confidence readers should place in the reported results. Complete disclosures would enhance the usefulness of reported performance results, and better inform the reader about the extent of confidence that should be placed in the dollar amounts claimed.

We attribute the issues described above to shortcomings in the bureau's current internal controls. OMB Circular A-123 (Revised), *Management Accountability and Control*, defines managerial controls as organization policies and procedures used by agencies to reasonably ensure that reliable and timely information is obtained, maintained, reported, and used for decision making. GAO standards for internal control states that control activities need to ensure that all transactions are completely and accurately reported.

Currently, the dollar value of claimed performance results cannot be fully verified and NIST needs to fully disclose how much reliance can be ascribed to the reported supporting data.

D. Recommendations

We recommend that the NIST Director:

- (1) Ensure that NIST's reporting of performance results for the Manufacturing Extension Partnership is revised to provide a better match between the stated goal and the reported performance measurement data,
- (2) Strengthen and document internal controls to ensure that reported data is credible, and
- (3) Clarify the discussion of performance results for the program to fully disclose the completeness and accuracy of the data reliability issues.

E. NIST Response

In his response, the Director of NIST stated that the bureau generally agrees with the recommendations contained in the draft report and that certain corrective actions have already been taken. The response indicates NIST disagreement with the report's characterization of the relationship between goal and related performance measures, expressed concern over the use and interpretation of a specific client example within the report, and suggested supplementary information about the MEP surveying system. NIST states that its measures are appropriate because 95% of clients surveyed were small establishments with fewer than 500 employees and that these clients accounted for 93% of attributed sales impacts. NIST also took issue with the report's reference to independent data that claimed results were too high, raising questions about the age and accuracy of the publicly available information cited. In addition, NIST officials disagreed with the comment that they had declined to contact the client again to confirm the reported results.

Nevertheless, NIST agrees that enhanced data verification procedures could improve the accuracy of reported data. NIST also wanted the discussion of the MEP survey clarified within the report.

F. OIG Comments

While we commend NIST for the corrective actions that have already been taken, continued management attention is necessary to address the issues identified within this finding. Also, after carefully considering NIST's comments and reassessing our original conclusions, we must reaffirm our recommendations. Specifically, to avoid the appearance of providing misleading performance results, NIST should consider eliminating claimed results for firms that are not small manufactures, clearly

articulate which percentage of claimed results do not come from small manufacturers, or modify the goal to recognize that NIST efforts are not exclusively linked to small manufacturers.

With respect to NIST's concern with the example cited within the report, we continue to feel that NIST had not adequately substantiated the claimed impact of \$39 million in increased sales for one of MEP's clients. We requested that the client be contacted again to confirm the amount of increased sales. Instead, NIST referred us to the state and regional MEP centers. Unfortunately, their representatives had not seen any financial information to support the increased sales and could not provide us with sufficient assurance that the increased sales were reasonable. Our identification of other instances in which reportedly "confirmed results" turned out to be inaccurate, as well as potentially conflicting publicly-available data for this client, provides support for reexamining the client's claim or excluding the claim from the reported results. Finally, NIST's statement that we were seeking "base sales" is not accurate. At meetings with NIST representatives during the fieldwork, we explained that NIST's original interpretation of our request was not correct, and we reiterated our need for confirmation of "increased sales," not "base sales."

And finally, it should be noted that we modified the final report to reflect that the MEP survey is not conducted via a mailed paper survey.

II. Performance Results for NIST Laboratories

We found that improvements are needed in NIST's reporting of "technical publications produced." This is one of six performance measures in the Department's combined APPR/APP to support the bureau's performance goal "to provide technical leadership for the Nation's measurement and standards infrastructure and ensure the availability of essential reference data and measurement capabilities."⁷ The measure is also included in the Department's FY 2000 Accountability Report. Specifically, we found (1) changes in the presentation of the data should be made and (2) internal controls for the measure need to be strengthened and documented. We have been informed that corrective action has already been initiated.

A. Clarification of terminology used in reporting performance information is needed

For the measure "technical publications produced," reporting could be strengthened to make the performance data more precise and meaningful. NIST uses the term "publications," but many of the "publications" reported under this measure are manuscripts prepared by NIST laboratories staff and are not necessarily published in journals. The reported number actually represents manuscripts that have met internal NIST quality standards and are available to be published. Only a percentage of these manuscripts have actually been included in scientific journals.

NIST should report its performance using a measure or appropriate disclosures that differentiates between manuscripts approved and those printed in scientific journals. Otherwise, the measure should be renamed accordingly, for example, "technical articles available for publication."

⁷ Measures for the NIST laboratories' performance goal include quality assessment and performance evaluation using peer review, economic impact studies, standard reference materials available, standard reference data titles available, number of items calibrated, and technical publications produced.

B. Management should ensure that controls are in place to guarantee collection of all relevant data

The performance measure “technical publications produced” did not include all performance data in both FY 1999 and FY 2000 because publications from JILA were not included.⁸ As a result, 103 technical publications in FY 1999 and 115 technical publications in FY 2000 missed inclusion. This omission occurred because reconciliations had not been performed between data submitted by units and total results. Reported results for FY 1999 and FY 2000 were 2,030 and 2,115, respectively, when they should have been 2140 and 2230. Also, for FY 1999, 7 technical publications from Boulder were excluded from reported results because information was not submitted in time to be included. The exclusions resulted in differences between actual and reported results of 5.1% for FY 1999 and 5.2% for FY 2000.

C. Efforts are needed to strengthen documentation supporting claimed performance results

In our review of supporting documentation for technical publications produced, we found that NIST lacked documentation to substantiate some of the claimed results. OMB Circular A-123 (Revised), Section II, *Establishing Management Controls*, states that the “documentation for transactions, management controls, and other significant events must be clear and readily available for examination.”

The bureau reported 2,115 technical publications produced for FY 2000. Our review of the supporting documentation, which consists of an approval form for each (“full”) technical review of a manuscript, maintained by the Electronic Information and Publications Program, revealed that for 6 of 35 (17%) of the items we tested, approval forms were not maintained in the files.⁹ An additional 3 manuscripts (5%) of the sample were lacking the signature of the Editorial Review Board Chair on the approval forms. Without approval forms or final approval signatures, we could not confirm that the publications had successfully completed the review process that make them eligible for inclusion in this number.

⁸ At JILA, NIST employees participate in joint research with the University of Colorado. JILA publications reported by NIST, include only those manuscripts in which a NIST employee is identified as an author.

⁹ From our sample of 60 publications, we traced 35 items from the database to supporting documentation; for the other 25 items, we ensured there was a entry for approval forms on file.

A way to eliminate this problem would be for NIST to reconcile the database for approved manuscripts with the files maintained by the Electronic Information and Publications Program. Such reconciliation would ensure that reported results from the database are supported by appropriate documentation. We were told that subsequent to our review, the office responsible for reporting on this performance measure has taken corrective action to ensure that documentation is maintained to support reported results and that the appropriate reconciliations are performed.

D. Recommendations

We recommend that the NIST Director:

- (1) Make the necessary disclosures and appropriate changes in the presentation of this performance measure; and
- (2) Ensure that internal controls for the performance measure “technical publications produced” be strengthened and documented, including establishing procedures for maintenance of supporting documentation and the reconciliation of performance data.

E. NIST Response

In his response, the Director of NIST stated that the bureau generally agrees with the recommendations contained in the draft report and that certain corrective actions have already been taken. In its comments related to the finding on laboratories, NIST clarifies the documentation procedures for technical publications, stating that only initial manuscripts undergo a (“full”) technical review. NIST questioned the value of reconciling the paper files with the electronic database and stated that the database is the most accurate count of manuscripts for publication. Finally, NIST wanted the report to clarify that it was the Editorial Review Board Chair’s signature that was missing from the approval forms.

F. OIG Comments

We have modified the report to reflect NIST’s comments. Also, we maintain that reconciliations between the paper files and electronic database can help ensure the reported results are consistent with supporting data. However, we recognize that there are other internal controls that NIST can implement to meet the intent of the recommendation. Also, because the chair person is the final authorizing official for the release of the publication, we believe this signature is important because it demonstrates that the concerns of the editorial review board have been addressed.

III. Performance Results for the Advanced Technology Program

We found that improvements are needed in NIST's reporting of "cumulative patents filed" and "cumulative technologies under commercialization." Specifically, we found that (1) internal controls for the measure "cumulative patents filed" need to be strengthened and documented and (2) changes in presentation and additional disclosures should be made for both measures.

A. Management needs to ensure that internal controls are strengthened and documented

We found that the "cumulative number of patents filed" for FY 1998 and FY 1999, the most recent results reported, were slightly overstated in the Department's FY 2000 Accountability Report and its combined APPR/APP. Controls should be implemented to prevent such instances from occurring in the future.

The results were overstated by 9 in both FY 1998 and FY 1999 because copyrights, not just patents, were incorrectly reported in performance results. Reported results should have been 516 for FY 1998 and 607 for FY 1999. We believe the improper inclusion of copyrights in the total would have been avoided had desk procedures been in place, including a thorough managerial review, to specify what should or should not be included in reported results.

To prevent such problems from recurring, NIST should (1) establish documented procedures that clarify which data should be included in reported results and (2) implement reconciliation procedures between the database and supporting documentation.

B. Action is necessary to strengthen review procedures for reported results

FY 1998 results of "cumulative number of patents filed" were reported incorrectly in NIST's FY 1999 Financial Statements and the subsequent GPRA documents. Actual results were overstated by 70, or 13.2 percent. Instead of reporting 530, NIST reported 600 because target results were reported as actual results and the error went undetected during the review process prior to publication.¹⁰

Because bureau procedures did not identify this incorrect reporting, it was carried forward for 2 years. Although we have not identified other instances of this problem, it is imperative that procedures be put

¹⁰ The number reported in the FY 1999 and FY 2000 Accountability Reports, FY 1999 APPR, and FY2001 APP.

in place to ensure that incorrect data are not included in published reports and that errors are not carried forward.

C. NIST needs to strengthen the reporting of performance results

When performance results are reported on an annual basis, NIST should establish a closer link between results reported and resources used. For the performance measures “cumulative number of patents filed” and “cumulative number of technologies under commercialization,” NIST provided a multi-year cumulative result, instead of an annual result to compare with its annual budget. The current presentation does not provide an effective presentation of the relationship between performance results and the resources used to achieve them.

Incremental increases for these performance measures can be determined by comparing the prior-year results with current-year results; however, in the APPR/APP, resources are given on a yearly basis not a cumulative basis. If cumulative results continue to be reported, then cumulative ATP expenditures, not just the ATP annual budget, should be reported also.

D. Recommendations

We recommend that the NIST Director:

- (1) Ensure that internal controls for documenting the cumulative number of patents filed be strengthened and documented; and
- (2) Make the necessary disclosures for “cumulative patents filed” and “cumulative technologies under commercialization” to ensure an improved presentation of the relationship between performance results and the resources used to achieve them.

E. NIST Response

In his response, the Director of NIST stated that the bureau generally agrees with the recommendations contained in the draft report and that certain corrective actions have already been taken. NIST’s response to this finding centered on the appropriate level of precision needed for performance data and questioned whether additional scrutiny, as recommended by our office, was needed.

F. OIG Comments

We commend NIST for actions it has already implemented to respond to the recommendations in the draft report. We believe it is important to note that any discrepancies in the data, regardless of the materiality, are good indicators that internal controls should be improved.

APPENDIX I

Performance Goal 1: Provide technical leadership for the nation's measurement and standards infrastructure and ensure the availability of essential reference data and measurement capabilities. (NIST Laboratories)

NIST Performance Measure	FY 2000 Accountability Report	FY 2000 Annual Program Performance Report & FY 2002 Annual Performance Plan	FY 2001 Annual Performance Plan
Quality assessment and performance evaluation using peer review		√	√
Economic impact studies		√	√
Standard reference materials available		√	√
Standard reference data titles available		√	√
Number of items calibrated		√	√
Technical publications produced	√	√	√

Performance Goal 2: Accelerate technological innovation and development of new technologies that underpin future economic growth. (Advanced Technology Program)

NIST Performance Measure	FY 2000 Accountability Report	FY 2000 Annual Program Performance Report & FY 2002 Annual Performance Plan	FY 2001 Annual Performance Plan
Economic impact studies		√	√
Cumulative number of technologies under commercialization	√	√	√
Cumulative number of technical publications		√	√
Cumulative number of patents filed	√	√	√

Performance Goal 3: Improve the technological capability, productivity, and competitiveness of small manufacturers. (Manufacturing Extension Partnership)

NIST Performance Measure	FY 2000 Accountability Report	FY 2000 Annual Program Performance Report & FY 2002 Annual Performance Plan	FY 2001 Annual Performance Plan
Increased sales attributed to MEP assistance	√	√	√

Capital investment attributed to MEP assistance		√	√
Cost savings attributed to MEP assistance		√	

Performance Goal 4: Assist U.S. businesses and other organizations to continuously improve their productivity, efficiency, and customer satisfaction by adopting quality and performance improvement practices. (Baldrige National Quality Program)

NIST Performance Measure	FY 2000 Accountability Report	FY 2000 Annual Program Performance Report & FY 2002 Annual Performance Plan	FY 2001 Annual Performance Plan
Number of applications per year to MBNQA and Baldrige-based State and local quality awards		√	√
Number of Baldrige Criteria mailed by BNQP and by Baldrige-based State and local quality programs		√	√

Performance Goal 5: Protect the national information infrastructure. (Critical Infrastructure Protection Grants Program) *

NIST Performance Measure	FY 2000 Accountability Report	FY 2000 Annual Program Performance Report & FY 2002 Annual Performance Plan	FY 2001 Annual Performance Plan
Activity milestones related to program establishment		√	√

* This performance goal and its supporting performance measure have been discontinued.



MAR 25 2002

MEMORANDUM FOR Larry B. Gross
Acting Assistant Inspector General for Auditing

From: Arden L. Bement, Jr. *Arden L. Bement, Jr.*
Director

Subject: Response to Draft Audit Report No. FSD-14430, Reporting of Performance Measures Needs Improvement

This is in response to your memorandum and draft report dated February 22, 2002, regarding your office's audit of selected performance measures used by the National Institute of Standards and Technology (NIST) for reporting results of its programs. Thank you for the opportunity to review and comment on this draft.

As you point out in your report, NIST is strongly committed to evaluating its programs and effectively communicating its impacts. We appreciate the careful review of this subset of NIST's performance measures, and we believe that the audit process and your findings will further strengthen NIST's evaluation system. I want to assure you that these issues will receive the highest level of attention.

NIST generally agrees with the recommendations outlined in your report. In fact, we have already taken steps to correct some of the findings and recommendations. These steps include revisions and additions to the text of performance reports to clarify the meaning of measures, the discussions of performance results, and the completeness and accuracy of the data. We have also implemented process changes to improve data accuracy and reporting. We are also exploring additional ways to improve its performance measurement and reporting systems; more changes are anticipated, especially in the next cycle of performance reporting. These ongoing and planned changes will be described in NIST's response to your final audit report.

We would, however, like to make several points of clarification while the report is in draft form. To this end, the attached document contains NIST's specific comments on each major section of your report. I recognize that these comments are somewhat detailed; they are intended to clarify or point out possible areas of disagreement. In addition to these specific comments, also included in the attachment are a few general observations for your consideration.

Again, thank you very much for the opportunity to comment on this draft. We look forward to working with you to improve our performance evaluation system. Please contact Albert Conerly at (301) 975-4050 should you have questions about this response.

Attachment



ATTACHMENT: SPECIFIC COMMENTS AND GENERAL OBSERVATIONS

Section I: Performance Results for the Manufacturing Extension Partnership (pp. 5-10)

The information provided below points out two instances of disagreement or concern with your findings regarding the MEP program; also included is some supplementary information on MEP's surveying procedures that we hope will be helpful. MEP has in place a well-developed performance evaluation system that allows the program to report outcome-oriented, quantitative, annual performance indicators, and to utilize this information to better manage its programs. Please consider the following issues in your draft report:

Characterization of the relationship between goal and reported measures.

NIST does not support the characterization of the relationship between MEP's overarching goal and the performance measures reported (Finding A, pp. 6-7). The draft report states: "efforts [are] needed to ensure that MEP performance measurement indicators are consistent with the MEP performance goals" (p. 6). The report contends that MEP's performance goal statement (that the program improves the technological capability, productivity, and competitiveness of small manufacturers) does not correspond to the performance measures provided because these measures may contain results from large manufacturers and "nonmanufacturers." The report also states that this inconsistency is deemed "misleading" and "inappropriate."

NIST agrees that it is very important to clearly articulate a link between performance goals and supporting performance indicators. In fact, to avoid any unintended confusion, NIST has already made changes to clarify the measures in its performance reports. However, NIST does not support the suggestion that the reported measures are somehow misleading or inappropriate to the goal of MEP because a very small percentage of clients are not manufacturing establishments with fewer than 500 employees. Overwhelmingly, clients served are small manufacturing establishments. Based on all clients surveyed in recent quarters, the average size of an MEP-served client is 160 employees. More than 65% of clients surveyed had fewer than 100 employees. Data reported on the impacts of MEP services are predominantly attributable to small manufacturers – approximately 95% of the clients served by MEP Centers were small establishments with fewer than 500 employees; these clients accounted for approximately 93% of the attributed sales impacts. It is important to keep in mind that the MEP program is a federal-state partnership, and the resources provided by each funding partner to a Center are focused on improving the productivity, economic competitiveness, and technological capabilities of the local manufacturing base, particularly small manufacturers. On some occasions, Centers may serve larger establishments based on their assessment of the unique needs of the manufacturing base. Serving a firm with 550 employees, or even a large firm that works with a Center to improve the productivity of small firms in its supply chain, still supports the objective of the MEP program.

Concern about use and interpretation of specific client impact example.

NIST agrees that enhanced data verification procedures could improve the accuracy of reported MEP data. However, we disagree with your statement indicating that a client impact of \$39 million was too high.

The report states that “[the audit team] obtained independent data indicating that the claimed results were too high.” We understand that the data referred to was publicly available total sales data, the reliability and age of which are unknown. The report continues: “We requested that NIST contact this client again to confirm the reported results, but NIST declined to do so, citing confidentiality of data concerns and its limited relationship with the client.” This statement is not accurate from NIST’s perspective. First, prior to the audit, MEP staff closely examined this particular sales impact when the independent surveying firm first provided it. MEP staff contacted the Center that had served that client, requesting a review of the sales result. The Center confirmed the impact, citing a long engagement with the client, among other factors. In addition, during the audit, MEP staff put the IG team in contact with the Center that served this client. The national MEP program does not confirm individual survey results directly with clients; MEP funds are provided to Centers, and MEP must respect that grant relationship when it requests information. The NIST Counsel concluded that given the nature of the grant relationship between NIST and the MEP Centers, there is no legal basis for NIST to demand information from individual Center clients. Further, the information of which the audit team was seeking confirmation was the client’s base sales, not another confirmation of its increased sales attributed to MEP assistance. “Base sales” is not one of the data elements collected through the confidential client survey.

Supplementary information about MEP’s surveying system.

NIST believes that the description of MEP’s surveying procedures could be clarified in the report. On page 5, the report indicates that MEP uses “a survey conducted by a third party. Assisted entities were sent an extensive questionnaire asking about the impact MEP assistance had on their operations . . .” This implies that the MEP survey is conducted via a mailed paper survey, which is not the case. Please consider the following supplementary information:

Market Facts, a subsidiary of Aegis Group PLC, a leading U.S.-based full service global market research company, conducts the survey for MEP. Market Facts uses the most modern surveying technologies. The survey utilizes Computer Assisted Telephone Interviewing (CATI) survey procedures that include scripting of each question to ensure comparability from interviewer to interviewer and from MEP customer to MEP customer. In addition, interviewers are trained before each survey to review procedures, questions, terms, definitions, and the purpose and goals of the survey. MEP and Market Facts staff conduct regular monitoring of the interviews.

In addition to completing the survey through a phone interview, clients have the option of completing the survey via an Interactive Voice Response (IVR) system that exactly follows the CATI telephone script. A small number of surveys were completed in Spanish and in Cantonese. Starting in the next survey period, Market Facts will make available to clients an Internet-based version of the survey that will parallel the current survey and questions. The survey asks 20 questions in all and takes, on average, 10-12 minutes to complete.

Section II: Performance Results for NIST Laboratories (pp. 11-13)

Clarification of documentation procedures.

Finding C (p. 12) indicates that NIST lacks the proper documentation for certain paper records. We believe that some clarification is needed regarding NIST’s procedures and the required

documentation for items that appear in NIST's publications database. Paper documentation only appears for manuscripts that undergo a normal ("full") technical review. For some items in the database, a paper form is not produced and is not necessary. An author may notify NIST's Office of Information Services by e-mail or telephone if a document qualifies for noting in the database (for example, if a manuscript is based on material previously approved by one of the NIST Editorial Review Boards, or is being published in a second place, or was approved by another authority, such as the Department of Commerce).

In general, the paper review forms are a convenient record of the document approval process. However, because considerable information becomes available after the paper review forms are completed, signed, and filed, NIST considers the electronic database the most current, accurate, and complete reflection of our technical information. The paper records are maintained only three years by regulation, yet information on a particular manuscript or published document may continue to be added. For example, if a published document should become superseded, that information might be available, and added to the database, sometime after the manuscript approval portion of the life cycle—perhaps years later.

Additional information about required approval signatures.

Also related to Finding C (p. 12), the report states: "3 manuscripts (5%) of the sample were lacking the required signatures on the approval forms. Without approval forms or final approval signatures, we could not confirm that the publications had successfully completed the review process that make[s] them eligible for inclusion in this number." To the best of our knowledge, the three "unsigned" approval sheets contained all required signatures except for that of the Editorial Review Board Chair, whose proxy signature was inadvertently omitted before filing.

Possible clarification in footnote.

The footnote that accompanies Finding B (p. 12) should be clarified. The second sentence should read: "JILA publications reported by NIST include only those manuscripts in which a NIST employee is identified as an author." Also, please note throughout the report that the correct and complete name for the joint institute with the University of Colorado is "JILA," not the "Joint Institute for Laboratory Astrophysics."

Section III: Performance Results for the Advanced Technology Program (pp. 14-15)

NIST has no specific comments regarding your recommendations for the Advanced Technology Program; although, the "general observations" section below includes some comments about ATP's performance measures. As noted at the start of this letter, NIST already has implemented changes to respond to several of your recommendations. These, as well as future actions, will be taken and will be detailed in NIST's Action Plan (in response to your final report).

General Observations

Consideration needed of the appropriate level of scrutiny for reported performance data.

While NIST generally agrees with your recommendations, several of the findings suggest that it may be worthwhile to explicitly consider the review standards for an audit of this nature. For

example, in the review of two of the ATP's performance measures, the audit team found that in FYs 1998 and 1999 ATP's cumulative patent count was overstated by 9 out of 525 and 616 respectively, a difference of about 1.5%. The report states that: "controls should be implemented to prevent such instances from occurring in the future." While these findings offer value to NIST in that they ensure that results are slightly more accurate than previously reported, we believe that a legitimate question remains about the standards for accuracy and the usefulness of seeking out and rectifying such a minor variance. All of the information reported requires extensive data collection from ATP-funded companies. Unlike a company's financial information, it does not flow automatically from the standard documentation of transactions. Moreover, this indicator is one of several used to illustrate intermediate outcomes. It is unclear what materiality level is appropriate for these types of indicators of programmatic performance.

It is possible that other Department Bureaus also are confronting similar issues about the appropriate level of precision for reported performance indicators (relative to the collection efforts and intended uses). Perhaps this is an issue that the IG's Office could discuss with Department and Bureau staff responsible for collecting and reporting performance information.

Timing of performance audits could improve effectiveness and accelerate implementation.

In order to be most effective, audits of Bureau performance data should be completed in advance of Department of Commerce budget and performance reporting cycles. NIST was able to modify its FY 2001 performance documents, and the changes made certainly address several of the findings that appear in your draft report. However, these adjustments were rushed, implemented very late in the reporting cycle, and were based on a verbal summary of audit findings and recommendations, which, while appreciated and useful, did not supply the detail of the draft audit report. Additional changes to NIST's submissions to Departmental performance reports will not be implemented until the FY 2002 reporting cycle (early 2003). Had NIST received the IG's report sooner, as originally outlined in the audit plan presented in early July 2001, consideration of other changes to the GPRA submission may have been given.

Other Specific Comments

Regarding Appendix 1, it is somewhat confusing to list the FY 2000 Accountability Report, the FY 2000 APPR/FY2002 APP, and then the FY 2001 APP. Is this intended to be the FY 2001 APPR/FY 2003 APP? If not, then the list of MEP measures is incorrect; the measure "cost savings attributed to MEP assistance" did not appear in the FY 2001 APP.

In the Executive Summary (p.i), the text indicates that NIST reports on 16 performance measures; on page 1, the text says that NIST presents 15 measures. The current DOC GPRA document has 15 measures for NIST.