September 2000

INDIAN TRUST FUNDS

Improvements Made in Acquisition of New Asset and Accounting System But Significant Risks Remain

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United States General Accounting Office
Washington, D.C. 20548

Accounting and Information
Management Division

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September 15, 2000

The Honorable Ben Nighthorse Campbell
Chairman
Committee on Indian Affairs
United States Senate

The Honorable Slade Gorton
Chairman, Subcommittee on Interior and Related Agencies
Committee on Appropriations
United States Senate

This report responds to your request that we evaluate the Department of the Interior's effort to acquire and develop its new Trust Asset and Accounting Management System (TAAMS). TAAMS is part of a broader Interior effort to address problems that have beset Indian trust management for many decades, including inadequate accounting and management information systems; backlogs in asset appraisals, ownership determination, and recordkeeping; and poor internal controls. TAAMS itself is being developed to address deficiencies in the recording, collecting, and accounting for revenues related to the department's management of about 54 million acres of Indian trust land.

In April and July of 1999, we reported[1] that Interior did not follow sound acquisition management practices in the early stages of the TAAMS effort and, as a result of its poor planning, it could not ensure that TAAMS would cost effectively meet trust management needs or adequately mitigate development risks. In more recent briefings to your offices, we reported that Interior was not following sound practices in conducting system and user acceptance tests for TAAMS. As agreed with your offices, we assessed (1) actions Interior has taken in response to our previous reviews and recommendations and (2) the business and technical risks and challenges still confronting Interior as it begins to deploy TAAMS.

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[1]*Indian Trust Funds: Interior Lacks Assurance That Trust Improvement Plan Will Be Effective* (GAO/AIMD-99-53, April 28, 1999) and *Indian Trust Funds: Challenges Facing Interior's Implementation of New Trust Asset and Accounting Management System* (GAO/T-AIMD-99-238, July 14, 1999).

Results in Brief

Interior is taking some positive actions to address several of the concerns raised in our 1999 reports as well as additional concerns raised in our subsequent briefings on TAAMS testing efforts. For example, Interior has adopted a generally accepted methodology for developing a project such as TAAMS and developed plans for mitigating risks, transitioning to the new system, and validating and maintaining the integrity of the system throughout its useful life. In addition, Interior has taken actions to strengthen its testing processes; for example, by expanding tests to assess how the system responds to unexpected conditions. Lastly, Interior is beginning to develop an information systems architecture for Indian trust management which is needed to ensure that trust fund and related systems are interoperable, function together efficiently, and are cost-effective over their life cycles.

These actions are good steps toward enhancing management of the TAAMS effort. However, there are a number of major business and technical challenges that still put the TAAMS effort at considerable risk. As to the business challenges, Interior has not yet completed actions designed to enhance overall trust fund management, including its efforts to revamp policies and procedures for the entire trust management cycle and to address long-standing internal control weaknesses. Both efforts could have a significant impact on TAAMS because they may require new features to be built into the system or current capabilities to be modified and, in turn, increase the risk of introducing new system defects. Fixing such defects late in the development effort can be very costly. The internal controls effort is also critical to ensuring the accuracy and completeness of TAAMS data on an ongoing basis. In addition, Interior has not reengineered the business processes that TAAMS is to support even though these processes were designed in a very different system environment. Without taking time now to examine and revise its business processes, Interior will not be able to maximize the benefits that can be gained from TAAMS and it may perpetuate outmoded ways of doing business.

On the technical side, there are actions underway to strengthen Interior's management of the TAAMS project, such as hiring a contractor to evaluate data integrity and the adoption of more disciplined testing processes. Nevertheless, there are challenging undertakings still ahead. For example, Interior needs to ensure that its contractor is following disciplined processes for developing and testing TAAMS. And, it needs to carefully manage the addition of new TAAMS requirements as new versions of the system are continually rolled out and tested. Moreover, without a detailed

information systems architecture to help guide the TAAMS effort, Interior will need to carefully ensure that TAAMS and other trust fund systems are compatible and in line with business needs.

We are making recommendations to Interior to address the business and technical risks we identified before undertaking the second phase of the TAAMS effort. This phase involves rolling out key trust asset and land management functions such as lease, contract, and permit management; billing and collection; accounts receivable; lease and contract payment distribution; and land resource management.

In its comments on a draft of this report, the Department of the Interior generally agreed with our assessment of the status of its efforts and of the continuing challenges during the remainder of the TAAMS initiative.

Background

The Secretary of the Interior is primarily responsible for administering the government's trust responsibilities to tribes and Indians, including managing about $3 billion in Indian trust funds and administering about 54 million acres of Indian trust lands. Management of the Indian trust funds and assets has long been characterized by inadequate accounting and information systems; untrained and inexperienced staff; backlogs in appraisals, ownership determinations, and recordkeeping; the lack of a master lease file and an accounts receivable system; inadequate written policies and procedures; and poor internal controls.

Interior's Effort to Address Long-Standing Problems

In 1998, Interior began undertaking a major effort to resolve these problems. This initiative now includes 11 projects. They are directed at such things as improving systems, enhancing the accuracy and completeness of Interior data regarding the ownership and lease of Indian lands, and correcting deficiencies with respect to records management, training, policy and procedures, and internal controls.

TAAMS is one of the 11 projects. TAAMS is expected to replace two legacy systems that are currently being used to manage Indian trust assets: the Land Records Information System (LRIS) and the Integrated Records Management System (IRMS). LRIS supports the land title function by providing land title-related information, such as ownership and encumbrances. It calculates ownership interests, in fractional and decimal forms, used by Interior for distribution of land revenue. IRMS supports the land resource management function and is primarily used at the agency

level for generating lease bills and for income and revenue distribution to Indian owners. It contains information on Indians, leases (for example, pasture, range, timber, mineral, and mining leases), land ownership, oil and gas royalties, and trust fund accounts.

According to Interior, the two mainframe-based systems are not integrated, have no electronic interfaces, and duplicate much of the same information (that is, information on ownership, land, and lease/encumbrances). Neither fully or adequately supports all of the activities of land title and resource management functions. And, in some regions, Interior has found that they are not even being used to support the leasing and distribution process.

The TAAMS strategy has evolved considerably since 1998. For example, Interior originally envisioned that LRIS functions would not be part of TAAMS. However, subsequent to its original improvement plan, Interior decided that they should be integrated into TAAMS. Also, Interior is making many more modifications to the commercial-off-the-shelf (COTS) software package supporting TAAMS than originally anticipated.

Rather than acquiring, modifying, owning, and operating the COTS system itself, Interior has hired a contractor to modify the system and to manage it. Under this approach, Interior will provide the contractor with the land and trust account data to be entered into the system and will perform its trust management functions by remotely accessing contractor-provided applications. At present, Interior expects to spend about $40 million on TAAMS through fiscal year 2001.

Figure 1 shows the functions now planned for TAAMS, along with TAAMS planned interaction with other Interior systems, and deployment dates. As noted in the figure, the land title functionality of TAAMS has already been deployed in one region.

Figure 1: TAAMS Functions, Interaction With Other Key Systems, and Deployment Dates
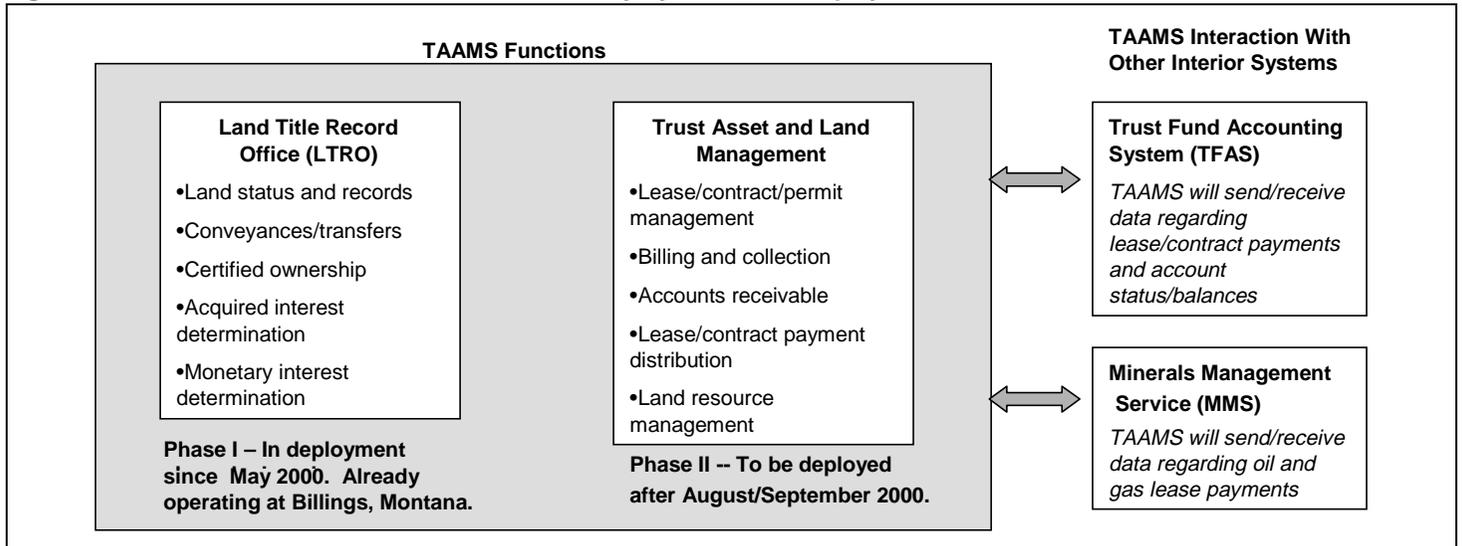
Although TAAMS has been deployed, as of August 31, 2000, Interior did not consider it to be the system of record.

Previous GAO Concerns

We began our assessment of TAAMS in July 1998 while Interior was in the process of specifying the system's functional requirements. At that time, we found that Interior was not following accepted practices that would (1) help ensure that TAAMS cost effectively met trust management needs and (2) reduce development risks. For example:

- Although Interior was acquiring information services and systems such as TAAMS and the Trust Funds Accounting System, at a cost of about $60 million, it had not defined an integrated architecture for Indian trust operations. Architectures are comprehensive plans that systematically and completely describe an organization's target business environment, both in logical (e.g., missions, business functions, and information flows) terms and technical (e.g., software, hardware, and communications) terms. The Clinger-Cohen Act requires the Chief Information Officer of each major federal agency to develop and maintain an information systems architecture. Previous GAO reviews have shown that, without a defined architecture, agencies are at risk of building and buying systems that are duplicative, incompatible, and unnecessarily costly to maintain and interface.

- Interior did not thoroughly analyze technical alternatives before choosing a vendor to provide the asset and land records management service. Specifically, it did not assess the desirability of satisfying its requirements by (1) modifying legacy systems, (2) acquiring a COTS product and using existing Interior infrastructure resources, (3) building a system that would provide the necessary capability, and (4) acquiring a service. The Clinger-Cohen Act of 1996 requires agencies to establish a process to assess the value and risks of information technology investments and set priorities for alternative projects.
- Interior did not perform a gap analysis in surveying the availability of COTS products. This analysis, which is an accepted practice, would systematically and quantitatively compare and contrast COTS products against Interior's requirements based on functional, technical, and cost differences.
- Interior did not require the contractor to demonstrate that the COTS system could work with Interior-provided data or that the system could interface with other Interior systems, which are also accepted practices.
- Interior did not develop a risk management plan to address the possibility that the new service would not meet performance or business requirements, be able to work with Interior systems, and/or be delivered on schedule and within budget.
- Interior did not prepare a realistic project schedule for TAAMS. Organizations following sound software acquisition practices would typically (1) identify the specific activities that must be performed to produce the various project deliverables, (2) identify and document dependencies, (3) estimate the amount of time needed to complete activities, and (4) analyze the activity sequences, durations, and resources requirements. By contrast, Interior used the Interior Secretary's stated expectation that all Indian trust fund-related improvements should occur within a 3-year period beginning in 1998 as the starting point for developing the TAAMS project schedule.

As Interior continued developing and testing TAAMS, we identified additional problems and briefed your staffs on our observations in January and May 2000. Namely, we found that there were serious flaws in the way

Interior was planning and conducting its system tests (which verify that a system satisfies functional requirements)[2] and its first set of user acceptance tests (which verify that the system operates correctly with operational hardware and meets user needs).[3] Without following disciplined testing processes, Interior could not ensure the successful implementation of TAAMS.

In particular, test plans were flawed because they were designed with the assumption that no errors would be found. They also did not include tests of invalid and unexpected conditions—known as boundary testing. This would include assessing whether TAAMS would accept and process data that are obviously erroneous, for example, future birth or death dates, invalid fractions, incorrectly formatted social security or taxpayer identification numbers, or tracts of land that contain "0" acres.

Furthermore, some obvious problems/defects that occurred as the tests were conducted were ignored because testers assumed that the unanticipated results were attributable to eccentricities or malfunctions of the computing platform rather than to defects in the system being tested. Also, even though the TAAMS contract requires TAAMS to comply with the Core Financial Management System Requirements issued by the Joint Financial Management Improvement Program (JFMIP), Interior did not use test processes already developed by JFMIP to certify compliance with these requirements. Lastly, test results were not thoroughly inspected and test defects were not effectively tracked.

Interior's contract and its oversight of the contractor contributed to some of these problems. For example, Interior did not require, and the contractor did not provide, adequate documentation showing what boundary condition tests had been conducted. In addition, the contract did not require the contractor to follow disciplined development and testing processes.

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[2]System testing may also stress the system in ways that may be unnoticed by the user but are critical to the proper functioning of the system. It is also designed to apply conditions, such as exchanging data with other systems, which are hard to duplicate through a user interface.

[3]This type of testing focuses on how the system handles typical scenarios or transactions rather than extreme conditions and generally assumes that system testing has been performed in an acceptable manner.

An independent verification and validation review of the system and user testing conducted for Interior by another contractor raised some of these same concerns and additional ones, such as noting that Interior had not yet tested whether the system would be able to handle the maximum user load or whether it could interface with Interior's trust fund accounting and minerals management systems.

In our April 1999 report and during our subsequent briefings, we made a number of recommendations to the Secretary of the Interior to address the weaknesses we identified. In particular, we recommended that Interior develop an information systems architecture for Indian trust operations; clearly define and validate functional requirements, security requirements, and data requirements for TAAMS; develop and implement an effective risk management plan; and ensure that all TAAMS project decisions are based on objective data and demonstrated project accomplishments, and are not schedule driven. To strengthen testing, our suggestions to Interior included tracking defects to determine whether TAAMS is becoming stable; performing additional boundary condition tests; thoroughly inspecting test results; ensuring that tests are planned with the assumption that errors will be found; and ensuring that tests plans clearly define expected results.

Scope and Methodology

In conducting our review, we reviewed TAAMS project documents, including the project implementation plan, requirements specifications, risk management plan, and test plan and procedures. We also observed selected development and testing activities, including user acceptance tests conducted in February and April 2000 and system acceptance tests conducted in July, September, and November 1999. We analyzed these plans and testing activities using generally accepted practices and criteria, such as the Software Engineering Institute's[4] Software Acquisition Capability Maturity Model and standards promulgated by the Institute of Electrical and Electronics Engineers. We also discussed Interior's efforts to develop, test, and implement TAAMS and deviations from accepted software acquisition and development practices with the TAAMS project manager, Interior's Chief Information Officer, and the TAAMS contractor.

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[4]The Software Engineering Institute is recognized for its experience in software development and acquisition processes. It has also developed methods and models that can be used to define disciplined processes and determine whether an organization has implemented them.

In addition, we reviewed documents related to Interior's efforts to establish policies and procedures and adequate internal controls related to trust management, including Interior's original and revised improvement plan,[5] as well as documentation on current trust policies and procedures and internal controls. We also interviewed the Policies and Procedures Project Manager, the Internal Controls Project Manager, and other responsible Interior officials to ascertain their perspective of the status of Interior's trust management improvement efforts. We compared Interior's planned improvement actions for internal controls with GAO's *Standards for Internal Control in the Federal Government* and the Office of Management and Budget's Circular A-123, revised, *Management Accountability and Control*. We also compared Interior's work on internal system controls for TAAMS to the methodology included in GAO's *Federal Information Systems Control Audit Manual* and guidance issued by the National Institute of Standards and Technology.

We conducted our work at the Department of the Interior, its Office of the Special Trustee, and its Bureau of Indian Affairs (BIA), in both Washington, D.C., and in Billings, Montana, and at the TAAMS contractor's facilities in Dallas, Texas, from June 1999 through May 2000 in accordance with generally accepted government auditing standards.

We provided a draft of this report to Department of the Interior officials for their review and comment. We also received several technical comments from BIA's Chief Information Officer. Interior's agency comments are reprinted in appendix I to this report and we have incorporated changes as appropriate.

Interior Has Taken Positive Actions to Strengthen Management of the TAAMS Effort

Interior has taken actions since our 1999 reports to address some of our previous concerns and has begun taking critical steps necessary to instill processes, practices, and discipline needed to successfully guide the TAAMS effort. Overall, officials responsible for TAAMS have begun to recognize the importance of following disciplined system acquisition, development, and testing processes, which include developing thorough and realistic plans and schedules, following structured approaches to

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[5]*Trust Management Improvement Project: High Level Implementation Plan* (U.S. Department of the Interior, July 1998) and *Trust Management Improvement Project: High Level Implementation Plan* (U.S. Department of Interior, Revised and Updated February 29, 2000).

determining requirements and conducting tests, and independently assessing work being performed on the system. This recognition is important. Without disciplined approaches to software development and acquisition, agencies can easily fall prey to ad hoc and chaotic processes that subject projects to continuing risks of cost overruns, poor quality software, and schedule delays. However, taking needed improvement steps can be difficult in organizations that are inexperienced in development and acquisition and where few processes are defined.

Over the past year, Interior has adopted a life cycle model for TAAMS. Life cycle programs define expectations for managing information technology investments from conception, development, and deployment through maintenance and support. Interior has adopted an "evolutionary prototyping" life cycle model for its TAAMS effort, under which the system is designed, modified, and tested in increments to identify and address user needs. Prototypes are refined as many times as necessary to achieve the desired functionality needed by users. This particular life cycle model has been adopted and accepted, but effective adoption of this model requires organizations to carefully manage associated risks such as unrealistic schedule and budget expectations and poor user feedback—tasks which Interior has not carried out adequately in the past for TAAMS.

Also, as noted in table 1, Interior has developed several plans and policies key to enhancing TAAMS management, including a project management plan, risk management plan, general operating policies, transition management plan, quality assurance plan, configuration management plan and data management plan. These plans generally conform to industry practice. While these plans should have been developed before TAAMS was initiated to reduce the risks associated with major acquisitions, they can still help Interior to better manage the effort, measure the progress, and validate and maintain system and data integrity. In addition, they can provide an example of the discipline and structure needed to guide future information technology acquisitions.

Table 1: Key Policies/Plans Developed for the TAAMS Project

Policy/plan	Definition	Importance to system success
Project management plan	Defines work to be performed, establishes necessary commitments, assigns responsibilities, establishes schedules, and performance measures.	Documented project plans help organizations to define realistic time frames and identify responsibilities for key tasks, deliverables, and resources. They provide the yardstick by which to measure the progress of an effort.
Risk management plan	Identifies, assesses, and documents risks associated with cost, resource, schedule, and technical aspects of the project and determines the procedures that will be used to manage those risks.	Provides a disciplined means to predict and mitigate risks, such as the risk that the system will not (1) meet performance and business requirements, (2) work with other systems belonging to the organization and/or (3) be delivered on schedule and within budget.
General operating policies	Provides general background information on the system including a summary of issues that the system intends to correct. It also provides the operational policies governing the management of system.	Provides a framework for the project and helps to identify which management processes will be used.
Transition/deployment management plan	Provides a blueprint for the transition to and deployment of a new system.	Provides the foundation that is used to develop detailed transition and management planning, including planning for the implementation of individual system components. Also provides a guide for carrying out the activities required for installation and operation of the system.
Quality assurance plan	Defines processes for reviewing and auditing the software products and activities to ensure that they comply with the applicable processes, standards, and procedures and providing staff and managers with results of their reviews and audits.	Ensures that the system complies with applicable processes, standards, and procedures. Reduces the risk of software process and product standards not being met and, in turn, the risk that the system will cost more and take longer to develop than necessary.
Configuration management plan	Defines the process to be used for establishing product baselines and systematically controlling changes made to those baselines.	Enables organizations to establish and maintain the integrity of the system throughout its life cycle. Prevents organizations from producing and using inconsistent product versions and creating operational problems.
Data management plan	Defines the implementation effort and actions required for long-term management of data. Describes how Interior will monitor contractor operations related to data.	Conveys the data management strategy to locations that will be affected by the new system and facilitates the planning of data management activities such as data conversion.

Interior also acted to strengthen processes for user acceptance tests that were carried out in April 2000 in response to observations we made during previous system and user acceptance tests. For example, Interior involved land title officers from offices outside its Billings, Montana, office—a TAAMS prototype site—to review TAAMS functionality and develop the test plan. Involving these officers was important since their needs can

differ from the Billings land title officer's needs. Interior also performed additional boundary condition testing on the land title functions of TAAMS, such as assessing whether the system would accept future dates and entries on tracts with "0" acres. In some cases, the application responded in the expected manner while in others, it did not. Interior officials indicated to us that they planned to make additional adjustments to the system to address the problems we identified during boundary condition tests.

Lastly, Interior is now undertaking an effort to develop an information systems architecture for Indian trust fund management. As of April 2000, Interior had developed a detailed work plan, outlining the tasks and milestones for completing nine phases of its architecture; appointed an architecture project manager; and defined resource requirements, including all the bureau/office staffing, contracting and other costs for the duration of the project. Interior expects to complete the architecture by August 2001.

Major Challenges and Risks Still Need to Be Addressed

If effectively implemented, Interior's planned actions over the past year will substantially enhance management over the TAAMS effort. However, there are a number of major business and technical challenges that still put TAAMS at considerable risk. Some of these relate to actions not yet taken by Interior to enhance overall trust fund management. On the business side, for example, Interior has not reengineered business processes which TAAMS is being designed to support even though these processes use an older and a very different system environment. Until it does so, Interior will not be able to maximize the benefits that can be gained from TAAMS, and it may perpetuate outmoded ways of doing business.

Also, Interior needs to clean up thousands of inaccurate, incomplete, and/or outdated trust fund records before converting the data for TAAMS. Yet it has only a few months left to do so before the planned implementation of phase I of TAAMS. Further, Interior has not established needed policies or procedures or adequate internal controls related to trust fund management. Policies and procedures would cover activities ranging from the way leasing and grazing agreements are awarded to the way Indian estates are probated. Internal controls would help strengthen management and accountability over a wide range of trust fund operations, such as cash management, records management, disbursements, and data processing. Both the policy and procedures and internal controls efforts could significantly affect TAAMS since they may require new, costly features to be built into the system or current capabilities to be modified.

Also, the internal controls are critical to prevent future trust fund data problems.

On the technical side, there are actions underway to strengthen Interior's management of the TAAMS project, but challenging undertakings still lie ahead. For example, Interior needs to ensure that its contractor is following disciplined processes for developing and testing TAAMS. And, it needs to carefully manage the addition of new TAAMS requirements as prototypes are rolled out and tested. Moreover, until Interior has a complete information systems architecture, it will continue to face the risk of spending more money and time than necessary to ensure that TAAMS and other trust fund systems are compatible with each other and in line with business needs.

Each of these challenges is discussed in more detail below.

1. **Reengineering business processes.** To maximize the success of a new system acquisition, organizations should consider the redesign of long-standing and ineffective business processes. As we noted in our executive guide on financial management,[6] leading finance organizations have found that productivity gains typically result from more efficient processes, not from simply automating old processes. Moreover, the Clinger-Cohen Act of 1996 requires agencies to analyze the missions of the agency and, based on the analysis, revise mission-related and administrative processes, as appropriate, before making significant investments in information technology used to support those missions.

   The need to reengineer is especially critical with trust asset management operations: Interior is moving from a mainframe, batch-oriented, non-integrated system environment to a client-server, real-time, integrated environment. Such changes demand rethinking old ways of doing business. For example, (1) Interior may now need to redefine the duties of some staff currently responsible for keying data into trust systems since TAAMS combines the functionality of IRMS and LRIS, (2) processes requiring data to be transmitted from field offices to area offices may be eliminated since data can now be input into TAAMS by field offices directly, and (3) approval processes may be

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[6]*Executive Guide: Creating Value Through World-class Financial Management* (GAO/AIMD-99-45, Exposure Draft, August 1999).

revamped since transaction approval can be immediately reflected in TAAMS. Without taking time now to reexamine and revise its business processes, Interior will not be able to maximize the benefits that can be gained from TAAMS and may perpetuate outmoded ways of doing business.

2. **Ensuring data integrity.** The accuracy, availability, and completeness of trust fund records has been a long-standing problem and one which several of Interior's projects are focused on. Tens of thousands of records on trust fund accounts, for example, contain incorrect addresses for the account holders or lack social security or taxpayer identification numbers. Also, data on land title and resource management is inconsistent in terms of completeness and availability. Not only does Interior need to ensure that records are accurate, up-to-date, and complete before converting to TAAMS, it needs to maintain data integrity over the useful life of the system.

Interior has begun addressing both challenges. First, a project management decision has been made to delay the implementation of TAAMS at any site other than Billings, Montana, until that site has developed an acceptable data conversion plan. Second, it has hired a contractor to analyze TAAMS' data once the system is deployed to ensure accuracy and completeness. Interior expects that, as a result of both actions, data in TAAMS will eventually be at least 95 percent accurate.[7] To achieve this rate of accuracy, Interior will need to ensure that it can clean up the tens of thousands of trust fund records in time for TAAMS deployment this fall. Also, as discussed below, adequate internal controls are essential to the ongoing success of TAAMS.

3. **Establishing internal controls.** A strong system of internal controls is key to maintaining data and system integrity on an ongoing basis. Internal controls comprise the plans, methods, and procedures used to meet an organization's missions, goals, and objectives. They serve as the first line of defense in safeguarding assets and preventing and detecting errors and fraud. However, reviews conducted over the past 15 years by us, Interior's Inspector General, and independent

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[7]The TAAMS Data Management Plan establishes a preconversion goal of 95 percent "good data." This means that data quality reports will identify no more than five errors per 100 records. This is a cumulative error condition covering all critical data items and record relationships. The post conversion data cleanup goal is to obtain a 98.5-percent good data rate on data within TAAMS.

accounting firms have found that there are serious financial management and internal control problems permeating every aspect of the trust management spectrum. As a result, Interior lacks reasonable assurance that its trust operations are effective, efficient, and in compliance with applicable laws; that its financial reporting to trust account holders and the Congress is reliable; and that trust assets are adequately safeguarded.

Interior has made some progress in resolving its internal control weaknesses. For example, it has identified and catalogued audit findings and recommendations related to weaknesses and mapped them to current improvement efforts. And it has selected an approach for developing the methodology that will be used by its new Risk Management Program Office to monitor internal controls. However, its overall progress has been slow. For example, Interior originally expected to map identified weaknesses to current improvement efforts by October 31, 1998, but it did not complete this until April 30, 2000. It originally expected to be able to complete the project and establish continuing quality assurance by June 30, 1999. Now, however, it does not expect to do this until December 2000.

Many of the internal controls now being reviewed by Interior—such as segregation of duties, supervisory review, system security, and project payment management—relate to requirements that should have been defined early in the TAAMS effort. Because they were not defined early by Interior, TAAMS was developed based on the current control environment, long known to be inadequate. As a result, like the policies and procedures effort, Interior may have to modify TAAMS after deployment to accommodate new controls, thereby increasing development risks and costs. Also, until adequate internal controls are in place to ensure the accuracy, availability, and completeness of trust fund data, Interior will not be able to fully ensure the integrity of TAAMS on an ongoing basis.

4. **Establishing policies and procedures for trust fund operations.** According to Interior, proper management of Indian trust assets has been hampered by a lack of comprehensive, consistent, up-to-date regulations, policies, and procedures covering the entire trust business cycle, from management of trust assets to distribution of trust income. Interior also maintains that contemporary federal environmental protection statutes have placed agencies with little direct previous experience in managing Indian trust resources in the position of

significantly affecting the use and disposition of Indian trust resources. According to Interior, this has resulted in program gaps and divergent practices, and a corresponding inability to ensure that consistent, sound policies and procedures are applied across the department.

Some progress has recently been made on this issue. For example, in August 1999, Interior assigned responsibility for a policies and procedures improvement project to an official with experience in developing and implementing policies and procedures in the federal government. In addition, Interior has reviewed four sets of BIA regulations—on leasing, grazing, probate, and funds held in trust—and drafted proposed revisions. However, like the internal controls effort, Interior's overall progress in addressing this issue has been fairly limited. In 1998, Interior envisioned publishing by September 30, 2000, new and revised policies and procedures in all trust management areas where they are needed. Now, however, it does not expect to accomplish this until June 30, 2004. The Policy and Procedures project office was not fully staffed until July 2000, almost 2 years after Interior began its policies and procedures initiative. We found that Interior's slow progress in establishing internal controls and policies and procedures was partly attributable to the effort not getting priority attention from senior Interior managers. Such attention is needed to help build consensus among disparate stakeholders across the department and to ensure that the projects are adequately staffed and supported.

Interior officials have explained that initially the scope of this project was greatly underestimated and that their revised plans provide for a more thorough review of the conduct of trust functions. Nevertheless, these delays pose a significant risk for TAAMS. Certain business rules cannot be defined until the policies and procedures effort has resolved questions such as whether to record known defective documents and whether to distribute income to owners who don't have a trust relationship with the federal government. The business rules that result from such policy and procedures decisions may require modification to TAAMS. Any rework of this nature bears the risk of introducing new defects into the system.

5. **Developing TAAMS without a complete architecture.** Not having a complete information systems architecture to guide TAAMS and other projects under its improvement effort will continue to be a major challenge for Interior. Architectures enable organizations to know their portfolio of desired systems and to develop a clear understanding of

how these systems will collectively support and carry out business objectives. Moreover, they help ensure that systems are interoperable, function together efficiently, and are cost-effective over their life cycles. As noted previously, major federal agencies are required under the Clinger-Cohen Act to develop and maintain information systems architectures.

While the absence of an architecture does not guarantee the failure of TAAMS or other system modernization efforts, it does greatly increase the risk that Interior will spend more money and time than necessary to ensure that its systems are compatible with each other and in line with business needs. As a result, Interior will need to take extra precautions to ensure that TAAMS can work effectively with other trust fund systems and with Interior's existing information technology infrastructure. In February 2000, Interior recognized that this would be a challenging task since TAAMS and the two systems with which it is supposed to interface—TFAS and MMS—had different owners, different software vendors, and different program objectives. It also recognized that its plan to purchase two off-the-shelf systems independently (TAAMS and TFAS) and interface them with an existing system (MMS) had inherent difficulties from its inception.

6. **Defining and managing TAAMS requirements.** To help ensure successful acquisition of software-intensive service, information technology experts recommend that organizations establish and maintain a common and unambiguous definition of requirements (e.g., performance, function, help desk operations, data characteristics, security, etc.) among the acquisition team, the service users, and the contractor. The requirements must be consistent with one another, verifiable, and traceable to higher-level business or functional requirements. As noted in our previous report, poorly defined, vague, or conflicting requirements can result in a service which does not meet business needs or which cannot be delivered on schedule and within budget.

When it first undertook the TAAMS effort, Interior did not follow a sound process for defining requirements. For example, in April 1999, we reported that Interior did not define high-level functional requirements for projects contained in its improvement plan to help guide requirements development processes for each of the individual projects. It also did not define some specific requirements relating to security, data management, and conflicts of interest for TAAMS. Since

then, Interior has enhanced and strengthened processes for defining requirements for TAAMS, principally by following the new life cycle methodology. However, a risk associated with this approach is that requirements are (1) defined iteratively rather than before development begins and (2) defined by users alone rather than through a more formal process involving users as well as business managers and key documents such as the information systems architecture and a concept of operations, which describes overall quantitative and qualitative system characteristics. This introduces the possibility that important requirements will not be defined until late in development and/or the possibility of "feature creep," that is, users add more requirements than are necessary as they react to protoypes.

Also, as noted earlier, Interior has not yet dealt with some important policy and procedures questions that should have been addressed early in development. For example, it has not yet determined how to distribute income received on tracts of land which have "mixed ownership"[8] even though its field offices apply different rules to this situation. It has also not decided how the system should handle official records that contain data known to be erroneous.[9] As we stressed in our April 1999 report, poorly defined, vague, or conflicting requirements can result in a service which does not meet business needs or which cannot be delivered on schedule and within budget. As

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[8]According to Interior officials, some interests in some trust lands are not trust interests. These ownership interests are not considered "trust interests" because the interest is classified as a "fee-simple" interest. This situation can occur, for example, when non-Indians marry Indians and inherit interests in trust land when their spouses die or when a trust owner elects to convert a trust interest, with Interior approval, to a fee-simple interest. BIA lacks a written policy on whether income generated through BIA efforts on mixed-ownership land should be distributed to all owners (trust and fee-simple) or only to trust owners.

[9]For example, according to Interior officials, the probate process, which determines what amounts of a deceased Indian's land ownership interests should be conveyed to which heirs, sometimes produces an obviously erroneous conveyance document. That is, the conveyance document may actually show an amount of ownership interest being conveyed that is different from the amount that had actually been owned. In such a case, the land title system user will notice this discrepancy when the document is to be entered into the TAAMS database, and must at that point either (1) enter the obviously erroneous data into TAAMS because it is contained on an "official" conveyance document and then request a corrected conveyance document from the probate authority or (2) forgo entering the data from this official document, return it to the probate authority, and await a corrected document. BIA Land Title officials have told us that this situation occurs with some frequency and in the absence of a business rule, may be handled inconsistently at different BIA offices.

a result, it will be essential for Interior to promptly resolve the policy and procedures issues and then define the corresponding business rules surrounding TAAMS and carefully manage requirements as new versions are rolled out.

7. **Ensuring that plans and processes needed to successfully develop TAAMS are followed.** While Interior has started establishing plans and processes needed to successfully develop and implement TAAMS, it is unclear whether these tools can be effectively implemented. Moreover, even if Interior does successfully implement disciplined processes, it will still need assurance that its contractor is following disciplined processes. To date, an independent assessment of whether the TAAMS contractor is doing so has not been made.

Interior has requested the TAAMS contractor to follow "ISO 9000" standards[10] relating to system testing to the greatest extent possible when performing its internal tests. These standards are recognized worldwide as a measure of an organization's ability to produce quality products and can provide a useful benchmark to measure a contractor's performance.

However, because Interior has only asked the contractor to use the ISO standards related to testing, this does not provide assurance that the contractor will follow other processes that are critical to successful development such as configuration management, risk management, and requirements definition. Moreover, Interior has not yet taken steps to independently assess its own software development and acquisition capabilities. Organizations following best practices conduct such assessments periodically, using accepted methodologies, such as the Capability Maturity Models developed by Carnegie Mellon's Software Engineering Institute. Such methodologies enable organizations to assess whether they have the necessary process discipline in place to repeat earlier successes on similar projects and to form specific improvement plans.

In April 1999, after reviewing the Bureau of Land Management's (BLM) efforts to develop and deploy its Automated Land and Mineral Record

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[10]The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies from some 130 countries. ISO 9000 standards provide a framework for quality management and quality assurance.

System, we recommended that Interior obtain an independent assessment of BLM's systems acquisition capabilities, and ensure that it uses sound system acquisition processes.[11] Interior agreed that it needed to do this and to implement our recommendation.

Conclusions

Interior is taking significant actions to strengthen TAAMS management and it has begun to recognize the value of following disciplined processes in developing and testing the system. But much remains to be done before Interior moves on to the second phase of TAAMS (which involves developing and deploying a range of trust asset functions beyond land title functions, including lease/contract/permit management, billing and collection, accounts receivable, lease/contract payment distribution, and land resource management functions) in order to help ensure that TAAMS will operate efficiently and effectively.

Interior needs to ensure that the new processes and policies it has established for developing and testing TAAMS are carefully adhered to. Otherwise, TAAMS may well fail to meet current cost, schedule, and performance goals. In addition, Interior needs to address larger business challenges—developing effective policies and procedures for trust fund management and addressing long-standing internal controls weaknesses—that directly impact TAAMS and more importantly, the business processes to be administered through TAAMS. Until these issues are addressed, data inaccuracies will continue to plague the trust management process—whether or not TAAMS is deployed. Further, the longer these efforts take to complete, the costlier and riskier modifications to TAAMS are likely to be. And finally, Interior needs to take time now to reexamine and reengineer business processes. Such efforts could facilitate other initiatives integral to strengthening trust fund management, such as defining policies and procedures and controls. Moreover, without rethinking old ways of doing business, Interior may well find that TAAMS will be limited in optimizing trust fund operations.

Recommendations

To ensure that TAAMS is fully aligned with trust management needs and that Interior's use of the system is optimized, we recommend that the

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[11]*Land Management Systems: Major Software Development Does Not Meet BLM's Business Needs* (GAO/AIMD-99-135, April 30, 1999).

Secretary of the Interior direct the Assistant Secretary for Indian Affairs to work with the Special Trustee for American Indians to do the following before phase II of TAAMS.

- Examine and revise business processes supported by TAAMS.
- Properly develop and implement data conversion plans.
- Evaluate and revise policies, procedures, and internal controls relating to TAAMS; ensure that top trust fund managers across the department participate in this effort; and ensure that any needed modifications to TAAMS are made and tested.

To facilitate Interior's adoption of disciplined software and acquisition processes, we recommend that the Secretary of the Interior direct the Chief Information Officer to do the following before phase II of TAAMS.

- Evaluate existing software development and acquisition processes against the Capability Maturity Models developed for these activities by the Software Engineering Institute; implement disciplined processes where they are lacking; and regularly assess progress in this regard.
- Ensure that contractors used by Interior to develop software systems have implemented disciplined software development processes.
- Define and manage the requirements that TAAMS should meet using accepted processes. Once the requirements have been adequately defined, perform a gap analysis to assess whether TAAMS is capable of providing the necessary functionality and what modifications, if any, are necessary to address Interior's needs. If modifications are needed, then Interior should develop the cost, schedule, and performance impacts of making those modifications.

To ensure that TAAMS can properly interoperate with other trust fund systems, we reiterate our recommendation to the Secretary to develop an information systems technology architecture for trust fund operations. In the interim, we recommend that the Secretary direct the Chief Information Officer to (1) perform an analysis of the infrastructure necessary to support the TAAMS application and ensure its adequacy and (2) ensure that TAAMS can interface with TFAS and MMS systems.

Agency Comments

We provided a draft of this report to Department of the Interior officials for their review and comment. In their response, Interior officials did not comment on our recommendations, but stated that they generally agreed with our assessment of the status of Interior efforts on the TAAMS project

and of the continuing challenges they face during the remainder of this initiative.

We are sending copies of this report to Senator Daniel K. Inouye, Vice Chairman, Senate Committee on Indian Affairs and to Senator Robert C. Byrd, Senator Joseph I. Lieberman, Senator Ted Stevens, Senator Fred Thompson, Representative Dan Burton, Representative George Miller, Representative David Obey, Representative Henry A. Waxman, Representative C.W. Bill Young, and Representative Don Young, in their capacities as Chairmen or Ranking Minority Members of Senate and House Committees. We are also sending copies of this report to the Honorable Jacob J. Lew, Director of the Office of Management and Budget; the Honorable Bruce Babbitt, Secretary of the Interior; and other interested congressional committees and Members of Congress. Copies will be made available to others upon request.

If you have questions regarding this report, please contact me or Mike Koury, Assistant Director, at (202) 512-9508. Other key contributors to this report include Wendy Albert, Naba Barkakati, Cristina Chaplain, Charles Norfleet, and Maria Zacharias.

Keith A. Rhodes
Chief Technologist

Comments From the Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

AUG 18 2000

Mr. Jeffrey C. Steinhoff
Assistant Comptroller General
General Accounting Office
441 G Street, NW
Washington, DC 20548

Subject: Draft GAO Report - "INDIAN TRUST FUNDS:
            Improvements Made to Strengthen Management of New
            Asset and Accounting System But Significant Risks Remain"
            (B-284142)

Dear Mr. Steinhoff:

Thank you for the opportunity to review your draft report. We are pleased by your recognition of our progress with the development and implementation of a business system designed to aid in the management of Indian trust funds and assets.

In general, we agree with the GAO's overall assessment of the significant progress Interior has made, as well as the continuing challenges we face during the remainder of this initiative. Many of these challenges, as well as others, have been included in our revision to the High Level Implementation Plan published February 29, 2000.

The GAO has provided valuable insight, guidance and direction during the past year, and your cooperative efforts during this period are recognized by the Department. We look forward to commenting on your final report.

Sincerely,

John Berry
Assistant Secretary
Policy, Management and Budget

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