

State of Arizona Office of the Auditor General

PERFORMANCE AUDIT

DISEASE CONTROL RESEARCH COMMISSION

**Report to the Arizona Legislature
By Douglas R. Norton
Auditor General
March 1998
Report Number 98-5**



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**STATE OF ARIZONA
OFFICE OF THE
AUDITOR GENERAL**

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March 12, 1998

Members of the Arizona Legislature

The Honorable Jane Dee Hull, Governor

Dr. Dawn Schroeder, Director
Arizona Disease Control Research Commission


Transmitted herewith is a report of the Auditor General, A Performance Audit of the Arizona Disease Control Research Commission. This report is in response to a May 27, 1997, resolution of the Joint Legislative Audit Committee. The performance audit was conducted as part of the Sunset review set forth in A.R.S. §§41-2951 through 41-2957.

The report addresses the potential for increasing the impact of Commission-supported research. The Commission has supported a wide variety of medical research, including projects that helped to develop new anti-cancer drugs, a new technique for examining blocked arteries, and a test to detect Parkinson's Disease. Because the Commission currently relies on tobacco tax money for nearly all its funding, it is limited to sponsoring tobacco-related research instead of the more varied projects it has sponsored in the past. However, even with this more narrow focus, the Commission can enhance its effectiveness by coordinating its efforts with the Department of Health Services and disseminating research results more widely. The report also addresses the need to improve recordkeeping regarding contract award decisions, and the change from cost reimbursement contracts to a more efficient contract type.

As outlined in its response, the Arizona Disease Control Research Commission agrees with all of the findings.

My staff and I will be pleased to discuss or clarify items in the report.

This report will be released to the public on March 13, 1998.

Sincerely,


Douglas R. Norton
Auditor General

Enclosure

SUMMARY

The Office of the Auditor General has conducted a performance audit and Sunset review of the Arizona Disease Control Research Commission (Commission), pursuant to a May 27, 1997, resolution of the Joint Legislative Audit Committee. This review was conducted as a part of the Sunset review set forth in Arizona Revised Statutes (A.R.S.) §§41-2951 through 41-2957.

The Commission's statutory purpose is to protect public health and safety by contracting with individuals and organizations to advance research into the causes and prevention of diseases, including new drug discovery and development. Historically, the nine-member Commission exercised these responsibilities by soliciting, selecting, and awarding contracts to public and private scientists studying a wide variety of medical topics. However, the Commission currently supports only research on the prevention and treatment of tobacco-related illnesses because tobacco sales tax revenues, its primary source of monies, are statutorily allotted for this purpose.

The Commission Performs a Valuable Function, but Its Impact Could Be Increased (See pages 7 through 11)

The Commission has contributed to the State by supporting a wide variety of tobacco-related research projects, some of which are unique to Arizona. Additionally, some Commission-sponsored projects have produced potentially important results. For example, the Commission has supported research to help develop new anti-cancer drugs. Other Commission-sponsored projects have developed new medical tests, including a noninvasive imaging technique for examining blocked arteries and a test to detect Parkinson's Disease.

Although the Commission provides benefits to the State, its impact is limited by factors that are both within and outside of its control. Specifically, the Commission does not identify tobacco research priorities in conjunction with the Department of Health Services. As a result, the State has no assurance that its major tobacco programs are working in concert. Additionally, the Commission could widen its impact by ensuring that public health professionals are routinely notified of potentially useful research results. This could be accomplished by more widely distributing the Commission's annual report, developing an Internet site, and sponsoring more meetings in which Commission-sponsored researchers present their results. In the future, the Commission should consider periodically convening a group of outside scientists to help evaluate its scientific direction.

The Commission's impact is also limited by statutory spending restrictions. The Commission's statutory mission suggests that it should be supporting research on a wide variety of medical concerns. However, the Commission's current primary source of funding, tobacco sales tax revenues, can be used only to support research on tobacco-related illnesses. The Commission and researchers have been heavily impacted by these restrictions. For example, only approximately 9 percent of the research projects that the Commission supported in fiscal year 1995 could clearly qualify for its support under the current tobacco sales tax restrictions. Some of the research topics that the Commission can no longer support include aspects of childhood diseases, Alzheimer's Disease, Parkinson's Disease, arthritis, diabetes, kidney diseases, and non-tobacco-related cancers.

The Commission's Contracting Practices Could Be Improved **(See pages 13 through 15)**

In addition to increasing its impact, the Commission could take steps to improve the way it contracts with researchers. The Commission uses a complex system to solicit, award, and manage contracts with researchers. Although the Commission appears to make appropriate contract selections, it does not fully document two out of three aspects of this process. In order to provide a higher level of assurance that its decisions are appropriate, the Commission should formally score the extent to which proposals are innovative or address issues of concern to Arizona and keep a written record summarizing its rationale for final selection.

The Commission could also use a more efficient form of contracting. The Commission currently signs cost-reimbursement contracts with its researchers. This type of contract is burdensome for the researchers and for the Commission. For example, it requires researchers to submit detailed invoices, which Commission staff must review prior to issuing payment. As a result, the State Procurement Code discourages the use of cost-reimbursement contracts and the State Procurement Office has recommended that the Commission use a less restrictive contracting system.

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INTRODUCTION AND BACKGROUND

The Office of the Auditor General has conducted a performance audit and Sunset review of the Arizona Disease Control Research Commission (Commission), pursuant to a May 27, 1997, resolution of the Joint Legislative Audit Committee. This audit was conducted as part of the Sunset review as set forth in Arizona Revised Statutes (A.R.S.) §§41-2951 through 41-2957.

Commission Responsibilities

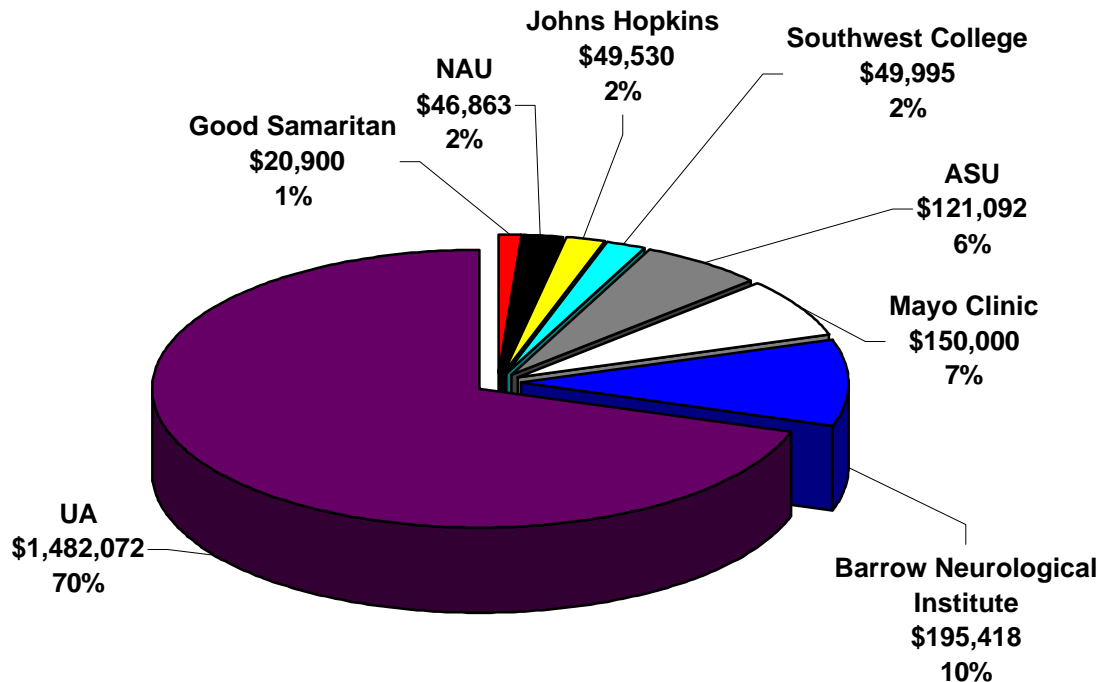
The Legislature created the Arizona Disease Control Research Commission in 1984 by issuing A.R.S. §§36-271 to 36-274. The Commission's purpose is to protect public health and safety by contracting with individuals and organizations to advance research into the causes and prevention of diseases, including new drug discovery and development.

Because of spending restrictions on tobacco sales tax revenues, which currently provide Commission revenues, the Commission's research efforts since mid-1997 have been limited to tobacco-related diseases in Arizona. According to former Surgeon General C. Everett Koop, smoking is the single most avoidable cause of death in American society. It has been shown to contribute greatly to deaths from heart disease, lung disease, and cancer. In fact, the most recent Arizona Department of Health Services mortality figures show that 16.8 percent of all deaths in Arizona are attributable to smoking. Examples of Commission-sponsored tobacco-related research projects include studies on drugs that may block nicotine's addictive effects and how passive smoke exposes infants to increased rates of illness.

In order to implement its statutory mission, the Commission annually solicits research proposals from individuals, universities, and private institutions using a competitive process. Proposals are first evaluated by out-of-state experts and then subsequently reviewed by commissioner subcommittees who re-score, evaluate, and award one- to three-year contracts to persons or groups conducting research projects within the State of Arizona. The Commission typically accepts 24 to 30 percent of the research proposals submitted. During fiscal year 1996-1997, the Commission managed approximately 80 contracts at an awarded value of approximately \$3 million for basic scientific research, clinical trials, behavioral studies, and other research. The majority of these contracts, and 70 percent of the total monies, were awarded to researchers at the University of Arizona, and the remaining contracts were divided among seven other institutions (see Figure 1, page 2).

Figure 1

**Arizona Disease Control Research Commission
Contracts Awarded
Year Ended June 30, 1997**



Source: Auditor General staff summary of Arizona Disease Control Research Commission 1995-1996 Annual Report.

Staffing and Organization

The Commission is composed of nine commissioners, appointed by the Governor for three-year terms, with three commissioners each from the general public, the medical community, and the scientific research community. Although the Commission is an independent agency, the Director of the Arizona Department of Health Services acts as its ex officio chairman. In addition, an executive director, appointed by the Commission, oversees three full-time equivalent (FTE) employees who handle administrative and fiscal management of contracts.

Budget Information

The Commission currently receives 5 percent of the statewide tobacco sales tax revenues, which totaled approximately \$5 million in fiscal year 1996-1997. These revenues are deposited into the Health Research Fund for the Commission's use in contracting for research in the prevention and treatment of tobacco-related disease and addiction. According to its Executive Director, the Commission maintains a fund balance sufficient to ensure it can pay all of its contracts, although contract language allows termination of research contracts if monies are unavailable. Of the \$12.3 million fund balance for the year ending June 30, 1997, \$7.1 million was slated for this purpose. The Commission plans to decrease the fund balance by increasing future contract awards.

In addition to tobacco tax revenues, \$2 million in lottery money could be made available to the Commission from a 1996 voter initiative in support of medical research. However, the Commission has not yet received any lottery revenues because lottery sales have declined. In fact, the Joint Legislative Budget Committee forecasts only limited lottery money for the Commission in fiscal year 1999, and is uncertain of the availability of such money in future years, because other budgetary commitments have a higher statutory priority than health research.

Overall, the Commission reports dedicating approximately \$2 million for research contracts in fiscal year 1995-1996 and approximately \$3 million in 1996-1997. The Commission spent about 4 percent of its total tobacco sales tax revenue this year on administrative costs. Table 1 (see page 4) summarizes the Commission's actual revenues and expenditures for fiscal years 1995, 1996, and 1997.

Audit Scope and Methodology

This audit focused on the Commission's ability to fulfill its statutory role and appropriately award state monies for research that can improve the health of Arizona's citizens. To evaluate the appropriateness of the Commission's practices for making contract awards, the audit team reviewed the Commission's request for proposals process, compared outside scientists' evaluations of proposals to actual awards, and evaluated its methodology and criteria for awarding contracts. Specifically, auditors compared and examined a judgmental sample of 40 proposals from fiscal year 1996-1997 and 3 completed contracts. Auditors also reviewed the resumes of 9 of the Commission's outside scientists to assess the assignment, evaluation, and processing of research proposals. In addition, a combination of other methods was employed in the audit, including:

- Reviewing the Commission's previous Sunset review from the House Health and Senate Health Welfare and Aging Committee of Reference in 1993;

Table 1
Disease Control Research Commission
Statement of Revenues, Expenditures, and Other Changes in Fund Balance
Years Ended June 30, 1995, 1996, and 1997
(Unaudited)

| | 1995 | 1996 | 1997 |
|--|-------------------|--------------------|----------------------------------|
| Revenues: | | | |
| State General Fund appropriations ¹ | \$2,604,300 | \$1,572,400 | \$ 1,423,300 |
| Tobacco sales taxes | | 7,721,256 | 6,020,416 |
| Interest on investments | | 682,737 | 459,765 |
| Other | | 246 | |
| Total revenues | <u>2,604,300</u> | <u>9,976,639</u> | <u>7,903,481</u> |
| Expenditures: | | | |
| Personal services | 97,942 | 110,097 | 117,195 |
| Employee related | 23,083 | 25,773 | 26,233 |
| Professional and outside services ² | 3,385,252 | 1,849,426 | 3,009,078 |
| Travel, in-state | 3,367 | 4,536 | 4,161 |
| Aid to individuals | | | 1,670 |
| Other operating | <u>29,639</u> | <u>37,046</u> | <u>36,398</u> |
| Total expenditures | <u>3,539,283</u> | <u>2,026,878</u> | <u>3,194,735</u> |
| Reversions to State General Fund | <u>12,099</u> | <u>273</u> | <u>604,805</u> ³ |
| Total expenditures and reversions to State General Fund | <u>3,551,382</u> | <u>2,027,151</u> | <u>3,799,540</u> |
| Excess of revenues over (under) expenditures and re-versions to State General Fund | (947,082) | 7,949,488 | 4,103,941 |
| Fund balance, beginning of year | <u>1,180,596</u> | <u>233,514</u> | <u>8,183,002</u> |
| Fund balance, end of year | <u>\$ 233,514</u> | <u>\$8,183,002</u> | <u>\$12,286,943</u> ⁴ |

¹ Beginning in fiscal year 1996, new research contracts were supported by Tobacco Tax and Health Care Fund monies instead of a General Fund appropriation. However, contracts were traditionally granted on a 3-year cycle; therefore, the Commission received General Fund appropriations for fiscal years 1995, 1996, and 1997 to complete the existing contracts. The Commission did not receive a General Fund appropriation in fiscal year 1998.

² Professional and outside services expenditures were incurred for research contracts. The expenditures decreased during fiscal year 1996 when support changed from a General Fund appropriation to tobacco sales taxes. Also, the focus of the contracts switched to tobacco-related research and few former contractors were eligible for monies.

³ Amount is available for expenditure during fiscal year 1998 for any claims arising from contractual relations that have not been paid because a vendor failed to file during fiscal year 1997. The Commission anticipates that such claims will be made and most of the amount will be expended.

⁴ The Commission's policy is to maintain a fund balance sufficient to meet current contractual obligations until their completion. Of the June 30, 1997, fund balance, \$7.1 million is designated for this purpose. The remaining June 30, 1997, unreserved, undesignated fund balance is a result of spending restrictions placed on tobacco tax revenues during the first year of availability. The Commission plans to decrease the fund balance by increasing future contract awards.

Source: The Uniform Statewide Accounting System *Revenues and Expenditures by Fund, Program, Organization, and Object and Trial Balance by Fund* reports, and the *State of Arizona Appropriations Report* for the years ended June 30, 1995, 1996, and 1997.

- Interviewing eight of nine Commissioners, the ex officio Chairman of the Commission, the Commission's Executive Director, and remaining staff members;
- Observing the two regularly scheduled Commission meetings held during the course of the audit and reviewing Commission meeting minutes from 1995-1997, as well as attending the Commission's annual proposal writing workshop;
- Interviewing officials from California, Nebraska, and Massachusetts who operate similar research funding programs and obtaining information from five national-level organizations (National Institutes of Health, National Science Foundation, American Association of Cancer Research, American Federation of Medical Research, and the Alzheimer's Association); and
- Interviewing officials from the three Arizona universities, including ten researchers with current or past Commission contracts.

This report presents two findings and recommendations concerning the Commission's impact on public health, its ability to fulfill its statutory mission, and its management of research awards and contracts.

This audit was conducted in accordance with governmental auditing standards.

The Auditor General and staff express appreciation to the Arizona Disease Control Research Commissioners, the Executive Director, and Commission staff for their cooperation and assistance throughout the audit.

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FINDING I

THE COMMISSION PERFORMS A VALUABLE FUNCTION, BUT ITS IMPACT COULD BE INCREASED

Although the Disease Control Research Commission performs a valuable function, its impact could be increased. The Commission supports a variety of tobacco-related research, including projects unique to Arizona. Some of this work has resulted in potentially important medical discoveries. However, the Commission's impact is limited by a lack of public health priorities, lack of awareness of its research results, and tobacco sales tax spending restrictions.

The Commission Provides a Valuable Service

The Commission has contributed to the State by supporting a wide variety of medical research projects, including research on concerns unique to Arizona. Some of these projects have resulted in potentially important medical advances.

The Commission supports a wide range of tobacco-related research, including topics of particular concern to Arizona—The Commission has supported a wide variety of research projects. For example, the Commission supported approximately 80 projects during 1996-1997 on topics ranging from genetics' role in tobacco-related cancer to the effectiveness of acupuncture in stop-smoking programs. A complete list of these projects is located in the Appendix (see pages a-i through a-vii). Some of these projects address topics of particular concern to Arizona. For example, the Commission is currently supporting research on the use of tobacco among the population of the Gila River Pima-Maricopa Indian Community. The Commission fills an important niche by funding research on such local issues, which may be too specialized to successfully compete for funding from national organizations.

The Commission has supported projects with important outcomes—In addition to studying concerns specific to Arizona, some individual Commission-funded projects have resulted in potentially important medical advances. For example, the Commission has supported:

- **Cancer-related projects**, which helped to develop a statewide skin cancer registry, uncover evidence that taking Vitamin A may reduce the chances of developing skin cancer;

and develop a new drug with the potential to kill tumors by depriving them of the blood they need to survive;

- **Development of medical techniques**, including a new noninvasive imaging technique for examining blocked arteries which has fewer potential fatal side effects than the technique currently used and a new test to detect Parkinson's Disease; and
- **Pediatric research**, which found that a drug currently used to treat seizures in infants and small children may interfere with their development.

The Commission's Impact Could Be Increased

Although the Commission performs a valuable function, its impact is limited by a variety of factors. First, there is no mechanism to ensure that the Commission considers statewide tobacco program priorities when selecting which projects it will support. Additionally, some key public health professionals do not routinely learn of potentially useful research results. Finally, the Commission cannot fully meet its statutory mission because its activities are limited by tobacco sales tax spending restrictions. To assess and continuously improve its impact in the future, the Commission should consider periodically soliciting input from outside scientists.

The Commission does not explicitly consider statewide priorities—Although the Commission funds some notable projects, it could increase its impact by encouraging researchers to submit proposals that are consistent with the State's current tobacco control policy. The Department of Health Services' Arizona Tobacco Education and Prevention Program has already developed some draft goals and priorities for addressing tobacco use in the State. For example, the Program focused its efforts on children, pregnant women, and their partners in 1996-1997. However, the Commission was not involved in the development of these priorities and does not encourage researchers to submit proposals consistent with those goals.

Other states develop decision-making mechanisms to ensure that their tobacco research programs reflect state health department and other key stakeholders' priorities. For example, California's tobacco research program identifies key research priorities and funds only scientific research consistent with these priorities. These priority areas are identified annually, sometimes by the State Legislature. For example, the California State Legislature directed the program to primarily support applied research on tobacco use with an emphasis on youth and young adults during fiscal year 1996-1997. As a result, the California program funded scientific studies on topics such as the role of peer pressure and cigarette advertising on youth's tobacco use. Similarly, Nebraska's tobacco research program follows draft priority areas developed by its state public health department.

Some public health professionals are unfamiliar with Commission-supported research results—In addition to developing statewide priorities, the Commission could also increase its impact by taking steps to ensure more public health professionals are made aware of its research results. Many Commission-supported researchers already report their results in professional journals. For example, Commission-supported researchers published over 90 articles between 1994 and 1996. The majority of these articles were in journals, which require that submissions pass scientific reviews before publication. Additionally, the Commission prepares an annual report summarizing individual projects, which is provided to the Governor, the Legislature, and others upon request.

However, some people who could use the information resulting from Commission-supported research are not routinely notified of its results. For example, even public health professionals in the Department of Health Services were not aware that the Commission supported research on the effectiveness of the nicotine patch. Such information could have been used to design more effective stop-smoking programs. Therefore, the Commission should consider additional methods to more widely distribute research results. For example, the Commission could:

- **More widely distribute its annual report**—California’s tobacco research program distributes its annual report to a wider audience, including local professionals who run stop-smoking programs and school-based tobacco use prevention programs;
- **Develop an Internet site**—A Commissioner suggested that the Commission could develop an Internet Web site where research results could be posted. California’s tobacco research program already has a similar program. Commission staff reports that it is currently moving toward developing such a site but may need to hire outside assistance to build and maintain it; and
- **Hold symposiums where researchers present their results**—Both California and Nebraska hold symposium meetings where researchers present their results to other researchers, state public health officials, and others. The Commission has experimented with a limited symposium in the past, when some Commission-supported researchers presented their results at a workshop in 1996. The Commission could increase its impact by inviting public health professionals to attend similar workshop sessions in the future. Alternatively, the Commission could work with other organizations, such as a private foundation, which already hold similar meetings.

Commission’s impact also limited by spending restrictions—The Commission’s impact is also limited by tobacco sales tax spending restrictions. Prior to fiscal year 1996, the Commission supported research on a broad range of medical issues. However, between fiscal years 1996 and 1997, the Legislature phased out the Commission’s General Fund appropriation, and in its place, authorized the Commission to administer 5 percent of the State’s tobacco

sales tax revenues. However, a voter initiative allotted these revenues for research into the prevention and treatment of tobacco-related illnesses. In addition, although the Commission was later statutorily authorized to receive a portion of lottery sales revenues, which would allow it to support general medical research, the Joint Legislative Budget Committee projects these monies will not be available in the foreseeable future. As a result, the Commission was forced to phase out its support of general medical research and currently supports only tobacco-related research.

The Commission and researchers have been heavily impacted by its switch from general medical research to a more narrow focus on tobacco-related issues. For example, only approximately 9 percent of the research projects that the Commission supported in fiscal year 1995 could clearly qualify for support under the current tobacco sales tax spending restrictions. Some of the research topics that can no longer be supported include aspects of childhood diseases, Alzheimer's Disease, Parkinson's Disease, arthritis, diabetes, kidney diseases, and non-tobacco-related cancers. A telephone survey of researchers in these and other fields now ineligible for Commission support found that at least some have discontinued their research, while others have found support elsewhere or narrowed their research to tobacco-related matters in order to meet the new restrictions.

The Commission's statutory mission is not limited to supporting tobacco-related research. According to Laws 1994, Ch. 82, §6 and Laws 1984, Ch. 353, §1, respectively, the Commission's purpose is to "protect the public health and safety" and to improve "the health of the people of this state by providing a means of funding research into the causes, treatments, and cures of disease." However, tobacco sales tax revenues, the Commission's primary current source of monies, can statutorily be spent only on the prevention and treatment of tobacco-related illnesses.

Regular review by a panel of experts could help the Commission evaluate its future impact—Research funding organizations such as the Commission have identified few tools to assess the impact and future direction of their work. Because these agencies fund the kinds of research where a negative result may still add to scientific knowledge; for example, finding that a drug is not effective against cancer, it is difficult to evaluate their impact. As a result, the Commission could benefit from regularly convening a group of outside researchers to help assess its future scientific direction and impact. The National Science Foundation and the National Institutes of Health are developing similar processes that will bring groups of outside scientists together approximately every three to five years to qualitatively evaluate the scientific direction of their total body of research. The Commission reports that it would cost approximately \$200 per day per panel member plus travel and lodging to convene such a panel. Therefore, if five panel members met for five days, it would likely cost less than \$15,000 total. The Commission indicates that it currently has monies available to cover such costs. The panel's advice could help the Commission ensure that the approximately \$3 million in annual grant expenditures is used as effectively as possible.

Recommendations

1. The Commission should identify tobacco-related research priorities in conjunction with the Department of Health Services.
2. The Commission should better disseminate the results of the research it supports by more widely distributing its annual report, possibly developing an Internet site, and holding research result symposiums.
3. The Commission should consider periodically convening a panel of outside scientists to evaluate and help determine the future scientific direction of the research it supports, and should then act on the panel's recommendations.

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FINDING II

THE COMMISSION'S CONTRACTING PRACTICES COULD BE IMPROVED

Although the Commission appears to award research contracts appropriately, it does not keep adequate records regarding its decisions, and it uses an inefficient form of contracting. To meet its statutory mission, the Commission employs a complex system of evaluating research proposals and then contracting with researchers. It does not, however, keep sufficient documentation to explain its decisions regarding proposals. Additionally, the Commission uses time-consuming cost-reimbursement contracts instead of the simpler contracts most state agencies use.

Background

The Commission uses a three-phase review system to evaluate and award cost-reimbursement contracts to researchers. Responses to the Commission's annual request for proposals first receive an evaluation by out-of-state experts in the appropriate field of study, and then undergo a second evaluation by a Commission subcommittee and a third by the entire Commission. The evaluators use criteria established by the Commission: scientific merit, tobacco relatedness, regional interest, and innovation or fresh viewpoint. At each stage, evaluators review any previous evaluators' scores before assigning their own scores. In 1997, the Commission evaluated 108 proposals using this process and made 30 new research contract awards.

Once contracts are awarded, Commission staff monitor contractor progress, review and reimburse contractor expenditures, examine budget revisions, and maintain voluminous records of contract-related activity. Commission staff reimburse contractors for allowable research expenses quarterly after validating them against the approved project budget and supporting documents. In addition, the Executive Director reviews quarterly and annual progress reports to ensure contract requirements are satisfied.

Commission Decisions Not Fully Documented

The Commission does not fully document its contract decisions for two of the three phases of its award process. Other organizations with similar research goals provide short summaries explaining award decisions. Adjustments to current evaluation procedures and Com-

missioner rounds of scoring would correct documentation gaps and provide justifications for contract decisions.

While the Commission awards appear to be appropriate, the Commission does not record its rationale for decisions. Currently, the Commission lacks written guidelines, policies, or procedures for the Commissioner level re-scoring and evaluation of second- and third-round proposals, even though it does require such procedures of first-round expert reviewers. Additionally, the Commission formally scores only two of its four decision criteria, scientific merit and tobacco relatedness. Thus, the Commission awards contracts to proposals with lower scores than some rejected proposals, based on an informal assessment of regional interest or innovation. For example, one proposal was awarded Commission monies even though its final numeric score placed it in the bottom 25 percent of all proposals received in fiscal year 1996-1997. Finally, the Commission does not keep adequate records of its discussions, either in the second-round subcommittee review or in its final award meeting.

In contrast, national organizations like the National Institutes of Health and the National Science Foundation provide review panels with clear written instructions and the panels prepare short summaries of the decision rationale for each proposal reviewed. Similarly, an Arizona interagency committee developed a model in 1996 designed to make state contracts easier to handle and award. The model includes a formal committee review process that explains important policies and procedures, as well as providing instructions for reviewers. In this process, a selection committee reviews each proposal against defined criteria, and provides formal documentation from committee discussions that records and explains the group's majority recommendation.

Commission Uses Inefficient Form of Contracting

The Commission uses cost-reimbursement contracts, which require constant staff oversight and invoice reviews in order to reimburse costs allowable within the contract terms. Although the Commission chose this type of contract to retain control over expenditures, use of such a restrictive form of contracting is rare among Arizona agencies and is unnecessary, given the low risk associated with the Commission's contracts.

Cost-reimbursement contracts require substantial work on the part of the contractor as well as Commission staff. Currently, each contractor submits a quarterly request for reimbursement that includes copies of invoices and a progress report on the research. Commission staff compare each expenditure against a detailed project budget to determine whether it is eligible for reimbursement, and check the reimbursement request for mathematical errors to ensure listed amounts match those on the supporting invoices and other records. Detailed annual project budgets are negotiated at the time of the contract award and during each year of the three-year contract period.

Because they require such extensive paperwork, cost-reimbursement contracts are not gen-

erally considered to be in the best interests of the State. In fact, they are considered a contract of last resort, and as a result, special permission from the State Procurement Administrator is required to use them. Although the Commission received the required approval in 1996, State Procurement Office staff conducted a review during the audit and recommended that the Commission change to a different form of contracting.

The Commission's contracts do not carry a level of risk that would justify the use of cost-reimbursement contracts. Nearly 80 percent of its contract awards go to Arizona's three state universities, where contract support offices review expenditures and ensure researchers meet all contractual requirements. Since 1992, only two researchers have failed to complete research as required by their contracts, and in both cases, routine annual Commission oversight discovered and addressed the problem. Further, other agencies that provide research funding, including the National Science Foundation and the National Institutes of Health, do not use the burdensome cost reimbursement form of contracting.

Other forms of contracting can provide effective control over contract expenditures. For example, fixed price contracts and grants can include an annual budget review that would allow sufficient control over spending, without requiring the heavy administrative burden of examining invoices and other records quarterly. In a less restrictive type of contract, the contractor would still be responsible for carrying out the contracted work while staying within the negotiated budget. Similarly, these forms of contracting have the advantage of placing the burden of accountability on the contractor, as well as reducing unnecessary paperwork for the Commission and the contractor.

Recommendations

1. The Commission could strengthen its award process by:
 - Adding a formal score for the two criteria currently not scored: 1) regional interest issues, and 2) innovative or fresh ideas concerning Arizona-specific medical problems; and
 - Including a written record that provides a consensus summary for each proposal scored.
2. The Commission, in consultation with the Arizona Department of Administration State Procurement Office Administrator, should develop and implement a system of less restrictive contracting, which would benefit the State and the Commission.

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SUNSET FACTORS

In accordance with A.R.S. §41-2954, the Legislature should consider the following 12 factors in determining whether the Arizona Disease Control Research Commission should be continued or terminated.

1. Objective and purpose in establishing the Commission.

The Legislature established the Disease Control Research Commission (Commission) in 1984 to protect the public health and safety by funding research into the causes, treatments, and cures of disease. To carry out this responsibility, a ten-member board is empowered by A.R.S. §36-273(A)(1) to:

“. . . Contract with individuals, organizations, corporations and institutions, public or private, in this state for any projects or services that, in the commission’s determination, may advance research into the causes, the epidemiology and diagnosis, the formulation of cures, the medically accepted treatment or the prevention of diseases including new drug discovery and development.”

2. The effectiveness with which the Commission has met its objectives and purposes and the efficiency with which the Commission has operated.

Although our review found that the Commission is generally effective and efficient, it can make some improvements. The Commission may be able to further improve its efficiency by entering into less restrictive contracts with researchers. This would reduce burdens on contractors and free Commission staff for other tasks while still maintaining public accountability (see Finding II, pages 13 through 15).

In addition, spending limitations prevent the Commission from fully meeting its statutory purpose. Although the Commission’s statutory mandate is to fund a wide variety of medical research, it cannot do so because it is primarily supported by tobacco sales tax revenues, which can be used only to support research into the prevention and treatment of tobacco-related diseases (see Finding I, pages 7 through 11).

3. The extent to which the Commission has operated within the public interest.

Although it is very difficult to assess the impact of research-funding organizations such as the Commission, it appears that the Commission has generally operated in the public interest. For example, the Commission has funded some notable research

projects on cancer, medical technology, and pediatric medicine, among others. However, to ensure it continues to operate in the public interest in the future, the Commission should consider periodically convening a group of outside scientists to evaluate its scientific direction and impact. As noted in Finding I (see pages 7 through 11), such a panel, as a cost of less than \$15,000, would help ensure the millions spent annually on grants are used to the greatest effect.

Additionally, the Commission reports that it has served the public's economic interest by funding research projects that employ citizens and also sometimes bring new dollars into the State. For example, Commission-sponsored researchers often hire a variety of support staff varying from research technicians to data entry clerks. Likewise, some researchers are able to use results from Commission-supported work to pursue additional research grants from public and private organizations outside of Arizona. For example, one researcher reported receiving a \$3.7 million grant from the National Institutes of Health based directly on Commission-supported work.

4. The extent to which rules and regulations promulgated by the Commission are consistent with the legislative mandate.

The Commission has not adopted any rules, which is consistent with its statutes.

5. The extent to which the Agency has encouraged input from the public before promulgating its rules and regulations and the extent to which it has informed the public as to its actions and their expected impact on the public.

The Commission encourages public input regarding its actions by holding regularly scheduled public meetings. Although the general public rarely attends these meetings, the agendas regularly include an opportunity for people to speak. As discussed in Sunset Factor 4, the Commission has not adopted any rules.

6. The extent to which the Commission has been able to investigate and resolve complaints that are within its jurisdiction.

The Commission is not a regulatory agency and, therefore, does not receive or resolve any complaints as a part of its mission. However, it does receive and respond to occasional complaints about its operations. For example, the Commission reports that it received two formal, written complaints about its operations during 1996. Both complaints dealt with the research contract procurement process. The Commission appears to have responded appropriately and in a timely manner to both complaints.

7. **The extent to which the Attorney General or any other applicable agency of State government has the authority to prosecute actions under the enabling legislation.**

The Commission is not a regulatory agency and, therefore, does not prosecute actions.

8. **The extent to which the Commission has addressed deficiencies in its enabling statutes which prevent it from fulfilling its statutory mandate.**

The Commission has requested legislation to improve its ability to fulfill its mandate. For example, 1994 legislation changed commissioners' terms, made it easier to call Commission meetings, and changed the way the Commission receives monies. Similarly, 1996 legislation allowed the Commission to invest monies with the State Treasurer.

9. **The extent to which changes are necessary in the laws of the Commission to adequately comply with the factors listed in the Sunset Factors.**

We did not identify any changes needed in the laws of the Commission.

10. **The extent to which termination of the Commission would significantly harm the public health, safety, or welfare.**

Termination of the Commission would have some impact on public health, safety, and welfare. However, the extent of this impact is unclear because it is very difficult to assess the impact of scientific research. The Commission has funded some research projects that benefit the general public. For example, Commission support is helping to develop important anti-cancer drugs. If the Commission ceased to exist, the researchers whom it currently supports could either discontinue their work or find support from other sources, among other options. After the change to tobacco funding, some researchers who were no longer eligible for Commission contracts discontinued the work the Commission previously supported, while other researchers found support elsewhere or changed their focus to meet the new requirements.

Additionally, the Commission reports that its termination may especially harm young Arizona researchers and others who find it difficult to qualify for federal funding without first establishing a record of other research projects through programs such as the Commission's.

11. **The extent to which the level of regulation exercised by the Commission is appropriate and whether less or more stringent levels of regulation would be appropriate.**

This Sunset factor does not apply as the Commission is not a regulatory agency.

12. **The extent to which the Commission has used private contractors in the performance of its duties and how effective use of private contractors could be accomplished.**

The Commission's primary function is to contract with government, university, and private researchers. Additionally, Commission staff consists of only four full-time-equivalent employees and the Commission routinely employs private contractors to perform many internal functions. For example, the Commission hires out-of-state scientists to review applications for research contracts.

Agency Response

9 March 1998

Douglas R. Norton, CPA
Auditor General, State of Arizona
2910 North 44th Street, Suite 410
Phoenix, Arizona 85018

Dear Sir:

The Arizona Disease Control Research Commission has reviewed and discussed the Performance Audit Report prepared by the Auditor General's Office. In accordance with Joint Legislative Audit Committee procedures, the Commission response, to each of the recommendations made, follows:

Recommendation 1 (page 11): The Commission should identify tobacco-related research priorities in conjunction with the Department of Health Services.

The finding of the Auditor General is agreed to and the audit recommendation will be implemented. The Commission is currently funding research which specifically addresses the educational priorities of the Department of Health Services (DHS) including projects relating to the effects of advertising on youth and the effects of smoking on pregnant women and young children. The Commission is aware of the DHS target populations and has specific categories in its Request for Proposals to address these areas. However the Commission agrees that an open dialogue to discuss the DHS priorities and perhaps the priorities of other state agencies like the Arizona Health Care Cost Containment System (AHCCCS) that also receives a substantial share of the Tobacco Tax revenues would be appropriate. The priorities could then be reflected in the Commission annual Request for Proposals. However, the Commission opposes limiting the scope of funded research only to projects consistent with DHS priorities.

Recommendation 2 (page 11): The Commission should better disseminate the results of the research it supports by more widely distributing the annual report, possibly developing an Internet site, and holding research symposiums.

The finding of the Auditor General is agreed to and the audit recommendation will be implemented. The Commission has experimented with ways to disseminate information in the past, realizing that the greatest benefit accrues first to the scientific community through peer reviewed publications and presentations at scientific meetings. The Commissioners have already begun to discuss ways of making members of the scientific community and the general public more aware of the work of the Commission. In addition to the suggestions given by the audit team, the Commission has discussed a newsletter and perhaps holding joint meetings with other organizations, like the Flinn Foundation, that also fund medical research in the state.

Recommendation 3 (page 11): The Commission should consider periodically convening a panel of outside scientists to evaluate and help determine the future scientific direction of the research it supports and should then act on the panel's recommendation.

The finding of the Auditor General is agreed to and the audit recommendation will be implemented. It is not an easy matter to evaluate a research program and as discussed in the report a set of audit measures is not readily available even from national sources. Members of the Commission, more than half of who are researchers themselves, agree that the most effective use of outside panels of experts is in providing future direction for a research effort. This method has been used only once before in Commission history; it proved to be very effective. It may well be appropriate to plan specific intervals, for example, every 3-5 years, to convene such a panel. The Commission is currently considering such action.

Recommendation 1 (page 15): The Commission could strengthen its award process by:

- ***Adding a formal score for the two criteria currently not scored: 1) regional interest issues, and 2) innovative or fresh ideas concerning Arizona-specific medical problems; and***
- ***Including a written record that provides a consensus summary for each proposal scored.***

The finding of the Auditor General is agreed to and a different method of dealing with the finding will be implemented. The Commission agrees that additional documentation of the awards process would strengthen the process. Adding supplemental scores may not provide the information requested. Our National Peer Reviewer Panel takes innovation into consideration and factors that issue into its Scientific Merit Score. This issue is specifically addressed in many of the written comments provided by the panelists. The Commissioners also take this factor into consideration when evaluating the Scientific Merit of the proposals. It would be more appropriate to document the regional and innovation issues in the consensus summary when they specifically affect the outcome of the Commission award decision. The Commission will discuss how best to document the award proceedings with the State Procurement Office Administrator and its Assistant Attorney General prior to implementing a new procedure.

Recommendation 2 (page 15): The Commission, in consultation with the Arizona Department of Administration State Procurement Office Administrator, should develop and implement a system of less restrictive contracting, which would benefit the State and the Commission.

The finding of the Auditor General is agreed to and the audit recommendation will be implemented. The Commission agrees that the contracting method used is restrictive and should be reevaluated. A variety of contracting options will be discussed and a suitable system will be developed and implemented.

The Commission wishes to thank the Audit Team for making the extra effort to understand the workings of the Commission, for being considerate of other Commission priorities and deadlines, and for keeping the staff and Commissioners informed of their progress.

Submitted on Behalf of the Commission

Dawn C. Schroeder, D.D.S., M.A.
Executive Director

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Appendix

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Appendix
Continuing Contracts
Unrestricted Medical Research
1995-96 Year Two

| Researcher | Project Name | Contract Award Amount |
|--|---|------------------------------|
| Appleton, M.D., Christopher Mayo Clinic Scottsdale | <i>Experimental Determinants of Transmitral and Pulmonary Venous Flow During Atrial Contraction</i> | \$26,382 |
| Berg, M.D., Robert Arizona State University | <i>Regulation of Programmed Cell Death in Human Cancer Cells</i> | \$29,964 |
| Burt, Ph.D., Janis M. University of Arizona | <i>Vascular Smooth Muscle Dysfunction Early in Atherogenesis</i> | \$26,400 |
| Fernandez, Ph.D., Marie Luz University of Arizona | <i>Vitamin C and Cardiovascular Disease Risk</i> | \$26,378 |
| Going, Ph.D., Scott B. University of Arizona | <i>Metabolism of High Density Lipoprotein Cholesterol in Postmenopausal Women</i> | \$24,515 |
| Thomas, Ph.D., Katherine T. Arizona State University | <i>Body Mass, Total And Regional Fat Response of Gynoid Woman to 8 Weeks of Exercise</i> | \$26,398 |
| Braun, Ph.D., Eldon J. University of Arizona | <i>Kidney Stone Formation with an Emphasis on the Formation of Uric Acid Containing Stones</i> | \$26,400 |
| Flores, M.D., Carlos A. University of Arizona | <i>Dietary Carnitine Gastrointestinal Metabolism During Development</i> | \$22,879 |
| Garewal, M.D., Ph.D., Harinder University of Arizona | <i>Antioxidant Vitamins for the Secondary Prevention of Cardiovascular Disease</i> | \$24,400 |
| McCloskey, Ph.D., Laura A. University of Arizona | <i>Violence and Substance Use in Hispanic and Anglo Youth</i> | \$27,407 |
| Ampel, M.D., Neil M. University of Arizona | <i>Cytokine in Human Coccidioidomycosis</i> | \$21,596 |
| Marchalonis, Ph.D., John J. University of Arizona | <i>Analysis of Autoantibodies to T-Cell Receptors in Rheumatoid Arthritis</i> | \$121,851 |
| Posner, Ph.D., Richard G. Northern Arizona University | <i>Development of Strategies to Inhibit Allergic Responses</i> | \$26,210 |
| Akporiaye, Ph.D., Emmanuel University of Arizona | <i>Analysis of Tumor-Rejection Responses Using a Retrievable Matrix of Tumor Implantation</i> | \$30,000 |
| Moore, Ph.D., Ana L. Arizona State University | <i>Carotenofluorophores: Imaging Agents for Diagnosis of Neoplastic Disease</i> | \$29,195 |

Appendix
Continuing Contracts
Unrestricted Medical Research
1995-96 Year Two
(Concl'd)

| Researcher | Project Name | Contract Award Amount |
|---|---|------------------------------|
| Pettit, Ph.D., George R. Arizona State University | <i>Discovery and Development of New Anticancer Drugs</i> | \$429,515 |
| Powis, D.Phil., Garth University of Arizona | <i>Arizona Cancer Center Multidisciplinary Research Program</i> | \$680,661 |
| Scheck, Ph.D., Adrienne C. St. Joseph's Hospital, Phoenix | <i>Identification of Genes Associated with BCNU/Resistance in Human Malignant Gliomas</i> | \$24,032 |
| Weinert, Ph.D., Ted A. University of Arizona | <i>Checkpoint Genes and Genomic Instabilities</i> | \$26,396 |
| Wilson, Ph.D., Jean M. University of Arizona | <i>Membrane Dynamics in Colon Carcinoma Cells</i> | \$26,151 |
| Heidenreich, M.D., Randall A. University of Arizona | <i>Galactose-1-Phosphate Uridyltransferase Gene Regulation</i> | \$29,931 |
| Johnson, M.D., Mary I. University of Arizona | <i>Anticonvulsant (Phenobarbital) Effects on the Developing Nervous System: An In Vitro Model</i> | \$19,543 |
| Kappen, Ph.D., Claudia Mayo Clinic, Scottsdale | <i>Analysis of Transgenic Mice Expressing the Precursor Protein of Alzheimer's Disease B-Amyloid</i> | \$26,392 |
| Kurth, M.D., Ph.D., Janice H. St. Joseph's Hospital, Phoenix | <i>Genomic Localization of the Cavernous Malformation Gene</i> | \$21,967 |
| Bloom, M.D., John W. University of Arizona | <i>Development of a Recombinant Glucocorticoid Receptor with Constitutive Activity-Potential Therapy for Asthma</i> | \$29,147 |
| Rider, M.D., Evelyn D. University of Arizona | <i>Pulmonary Surfactant Degradation in Newborn Rabbit Lung Lysosomes In Vivo</i> | \$27,330 |

**Appendix
Continuing Contracts
Tobacco-Related Research
1995-96 Year One**

| Researcher | Project Name | Contract Award Amount |
|--|---|------------------------------|
| Heimark, Ph.D., Ronald L. University of Arizona | <i>Smoking and Pericytes: Their Roles in Angiogenesis</i> | \$29,707 |
| Jacobs, Ph.D., Bertram L. Arizona State University | <i>Regulation of Programmed Cell Death in Human Cancer Cells</i> | \$30,000 |
| Larkey, Ph.D., Linda University of Arizona | <i>Curbing the Trend of Tobacco Related Cancer Deaths: Identifying Factors Influencing Late Presentation of Symptomatic Hispanics</i> | \$29,300 |
| Nelson, Ph.D., Mark A. University of Arizona | <i>Functional and Clinical Evaluation of the p-16 Protein in Melanoma and Human Lung Cancers</i> | \$29,361 |
| Payne, Ph.D., Claire M. University of Arizona | <i>Evaluation of a Novel Biomarker for Individuals at Risk for Colon Cancer: Resistance to Apoptosis</i> | \$30,000 |
| Yamamura, Ph.D., Henry I. University of Arizona | <i>Tobacco, Cancer Pain and Opioids: Determination of the Ligand Binding Domains of the Human Delta Opioid Receptor</i> | \$29,700 |
| Drumm, Ph.D., Denise A. St. Joseph's Hospital, Phoenix | <i>Glycemia, Subarachnoid Hemorrhage, Neurobehavioral Outcome in Smokers, Passive Smokers and Nonsmokers</i> | \$24,793 |
| Fernandez, Ph.D., Maria Luz University of Arizona | <i>Cardiovascular Disease Risk Reduction by Dietary Fiber</i> | \$29,700 |
| Gamble, Ph.D., Debra (Taken over by: Kay, Ph.D., Marguerite M.B.) University of Arizona | <i>Aging, Free Radicals and Nutritional Interventions</i> | \$30,000 |
| Massia, Ph.D., Stephen P. University of Arizona | <i>Underlying Mechanisms for Tenascin-Stimulated Smooth Muscle Cell Migration in Response to Vascular Injury</i> | \$27,995 |
| Morkin, M.D., Eugene University of Arizona | <i>Actions of Diiodothyropropionic Acid in Heart Failure: Pharmacology and Cardiac Biochemistry</i> | \$91,785 |
| Rogulski, Ph.D., Michel M. University of Arizona | <i>Interactive Three-Dimensional Display for Evaluation of Coronary Artery Disease</i> | \$29,954 |
| Slepian, M.D., Marvin J. University of Arizona | <i>The Role of Beta-3 Integrin Expression in Arterial Smooth Muscle Cell Migration Following Injury</i> | \$29,645 |
| Stopeck, M.D., Alison University of Arizona | <i>Genetically-Modified Endothelial Cells in Vascular Biology</i> | \$28,424 |

Appendix
Continuing Contracts
Tobacco-Related Research
1995-96 Year One
(Concl'd)

| Researcher | Project Name | Contract Award Amount |
|--|---|------------------------------|
| Wang, Ph.D., Yi Ran University of Arizona | <i>Apolipoprotein A-I Gene Promoter: Functional Change in a Common Point Mutation</i> | \$29,729 |
| Bloedel, M.D., Ph.D., James St. Joseph's Hospital, Phoenix | <i>Genetic Engineering of Receptors for Nicotene</i> | \$30,000 |
| French, Ph.D., Edward D. University of Arizona | <i>Marijuana, Nicotine and Dopamine Reward Systems: A Unifying Hypothesis of Dependence</i> | \$27,429 |
| Lynch, Ph.D., Ronald M. University of Arizona | <i>Regulation of Insulin Secretion from Individual Beta Cells</i> | \$29,902 |
| Lee, Ph.D., Nancy A. Mayo Clinic, Scottsdale | <i>Transgenic Mouse Models of Asthma and Other Inflammatory Diseases</i> | \$30,000 |
| Lien, Ph.D., M.D., Y. Howard University of Arizona | <i>Gene Therapy in Carbonic Anhydrase II Deficient Mice: Role of Carbonic Anhydrase in CO₂ Exchange and Acid-Base Homeostasis</i> | \$30,000 |
| Martin, Ph.D., Arnold R. University of Arizona | <i>New Antitubercular Agents: Prodrugs and Isosteres of Isoniazid and Pyrazinamide</i> | \$29,470 |
| Ahmad, Ph.D., Nafees University of Arizona | <i>Influence of Tobacco Smoking on the Molecular Mechanisms of HIV-1 Transmission from Mother to Infant</i> | \$30,000 |
| Castro, Ph.D., Felipe G. Arizona State University | <i>The Evaluation of Peer health Worker Model: Is it Effective in Preventing Cigarette Smoking in Promoting Women's and Children's Preventative Health Care</i> | \$29,938 |
| Galgiani, M.D., John G. University of Arizona | <i>Structure of a Protein Antigen from Cryptococcus Neoformans</i> | \$30,000 |
| Graves, Ph.D., Joseph L. Arizona State University, West | <i>Comparative Genetics and Biology of Aging II: Selection Studies and Resistance to Toxic Compounds</i> | \$29,700 |
| Lorton, Ph.D., Dianne Sun Health Research Institute | <i>Neuroamine Involvement in the Progression of Experimental Arthritis</i> | \$29,677 |

Appendix
New Contract Awards
Tobacco Related Research
Beginning in Fiscal Year 1997

| Researcher | Project Name | Contract Award Amount |
|--|--|------------------------------|
| Alberts, M.D., David S. University of Arizona | <i>A Study of Genetic Alterations and Recurrence in Colorectal Polyps Associated with Smoking</i> | \$115,330 |
| Baldwin, Ph.D., Ann L. University of Arizona | <i>What Cellular Mechanisms are Responsible for Histamine-induced Alterations in Microvascular Permeability?</i> | \$46,861 |
| Bier, M.S., N.D., L. Ac., Ian Southwest College of Naturopathic Medicine | <i>Acupuncture in Smoking Cessation: A Randomized, Placebo-Controlled Trial</i> | \$49,995 |
| Carter, Ph.D., Dean E. University of Arizona | <i>Synergism Between Smoking and Arsenic Exposure in Lung Injury</i> | \$120,417 |
| Consroe, Ph.D., Paul University of Arizona | <i>Antiemetic Drug Development for Cancer Treatment</i> | \$49,522 |
| Davis, Ph.D., Mary C. Arizona State University | <i>The Effects of Smoking and Oral Contraceptive Use on Physiological Stress Response in Young Women</i> | \$43,264 |
| Davis, Ph.D., Thomas P. University of Arizona | <i>Determination of the Role of Neutral Endopeptidase in the Development of Small Lung Cancer</i> | \$45,884 |
| DeLuca, Ph.D., Dominick University of Arizona | <i>Organ Culture Approaches for Transplantation of Human Stem Cells</i> | \$50,000 |
| Dyer, Ph.D., Cheryl A. Northern Arizona University | <i>The Effect of Nicotine on Ovarian Steroid Hormone Production</i> | \$46,863 |
| Flink, Ph.D., Irwin L. University of Arizona | <i>Cardiac Cell-Cycle Progression and Terminal Differentiation</i> | \$39,507 |
| Friedman, Ph.D., Richard L. University of Arizona | <i>Identification and Characterization of M. Tuberculosis Genes Involved in Survival Within Macrophages</i> | \$50,000 |
| Gervay, Ph.D., Jacquelyn University of Arizona | <i>The Synthesis of Glycoside Sulfones as Potential Cancer Therapeutics</i> | \$29,212 |

**Appendix
New Contract Awards
Tobacco Related Research
Beginning in Fiscal Year 1997
(Cont'd)**

| Researcher | Project Name | Contract Award Amount |
|--|---|------------------------------|
| Giuliano, Ph.D., Anna R. University of Arizona | <i>Effects of Smoking on Persistent HPV Infection Among Reproductive Age Women</i> | \$149,538 |
| Gmitro, Ph.D., Arthur F. University of Arizona | <i>A Fiber-Optic Confocal Microscope for In Vivo Imaging</i> | \$50,000 |
| Habib, M.D., Michael P. University of Arizona | <i>The Effects of Oral Micronutrient Antioxidants on Exhaled Ethane in Cigarette Smokers</i> | \$38,052 |
| Heiserman, M.D., Ph.D., Joseph Barrow Neurological Institute | <i>Clinical Utility of High Performance Gradient Carotid MR Angiography</i> | \$46,115 |
| Lee, Ph.D., James J. Mayo Clinic, Scottsdale | <i>Tumor Surveillance and Regression: Assessments of Immune Reactions Mediated by Eosinophils</i> | \$50,000 |
| Lukas, Ph.D., Ronald J. Barrow Neurological Institute | <i>Molecular Basis for Nicotine Dependence</i> | \$149,303 |
| Macia, Ph.D., Narciso F. Arizona State University | <i>Noninvasive Measurement of Respiratory Resistance</i> | \$29,946 |
| Malan, Ph.D., M.D., T. Philip University of Arizona | <i>Role of c-fos in the Regulation of Neuropathic Pain</i> | \$46,609 |
| McDonald, Ph.D., M.D., John A. Mayo Clinic, Scottsdale | <i>Molecular Genetic Analysis of Fibronectin Binding Integrins</i> | \$50,000 |
| McQueen, Ph.D., Charlene A. University of Arizona | <i>Genetic Variation in N-acetyltransferase and the Development Toxicity of Aromatic Amines</i> | \$46,346 |
| Miller, M.D., Hugh S. University of Arizona | <i>Reduction in Tobacco Use among Adolescents Participating in an Incentive Based Prenatal Care Program</i> | \$90,944 |
| Pajor, Ph.D., Ana M. University of Arizona | <i>Cloning and Expression of a Renal Na/nucleoside Contranporter</i> | \$33,359 |

**Appendix
New Contract Awards
Tobacco Related Research
Beginning in Fiscal Year 1997
(Concl'd)**

| Researcher | Project Name | Contract Award Amount |
|---|---|------------------------------|
| Peng, Ph.D., Yeh-Shan University of Arizona | <i>Effect of Increased Fruit and Vegetable Intake on Plasma Carotenoid Levels and Oxidative DNA Damage in Smokers</i> | \$50,000 |
| Pomeroy, Ph.D., Kimball O. Good Samaritan Regional Medical Center | <i>Effects of Smokeless Tobacco on Semen Quality</i> | \$20,920 |
| Racowsky, Ph.D., Catherine University of Arizona | <i>Investigation of the Mechanisms Underlying the Deleterious Effect of Cigarette Smoking on Human Fertility</i> | \$48,571 |
| Remers, Ph.D., William A. University of Arizona | <i>Design of Non-Cross Resistant Agents for Lung Cancer</i> | \$84,147 |
| Romagnolo, Ph.D., Donato University of Arizona | <i>Influences of Tobacco Derivatives on Regulation of Expression of the Breast and Ovarian Cancer Susceptibility Gene BRCA-1</i> | \$49,500 |
| Rose, Ph.D., Seth D. Arizona State University | <i>Chemotherapy by Contravention of Oncogenesis in Smoking-Induced Lung Cancer</i> | \$47,882 |
| Santosham, M.D., Mathuram Johns Hopkins University | <i>Assessment of Tobacco Use and Exposure in Children, Youth, and Childbearing Women in the Gila River Pima-Maricopa Indian Community</i> | \$49,530 |
| Sherrill, Ph.D., Duane University of Arizona | <i>Assessment of Genetic Markers Associated with Development of COPD</i> | \$46,412 |
| Taetle, M.D., Raymond University of Arizona | <i>Transgenic Models for Leukemia and Myelodysplasia (Preleukemia)</i> | \$32,757 |
| Wright, Ph.D., Anne L. University of Arizona | <i>Passive Smoke Exposure, Immunologic Function and Lower Respiratory Tract Illnesses In Infancy</i> | \$119,152 |
| Wu, Ph.D., Chuanyue Mayo Clinic, Scottsdale | <i>Roles of Integrins in Fibronectin Matrix Assembly</i> | \$50,000 |
| Yool, Ph.D., Andrea J. University of Arizona | <i>Influence of Nicotine on Glucose-sensitive Neurons of the Hypothalamus</i> | \$49,952 |

Source: Arizona Disease Control Research Commission 1995-96 Annual Report.