

# **SAND REPORT**

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## **Review of Sandia National Laboratories - Albuquerque, New Mexico DOE/DP Critical Skills Development Programs FY04**

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**Review of**  
**Sandia National Laboratories — Albuquerque, New Mexico**

*DOE/DP Critical Skills Development*

**Programs FY04**

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**Abstract**

Sandia National Laboratories has developed a portfolio of programs to address the critical skills needs of the DP labs, as identified by the 1999 Chiles Commission Report. The goals are to attract and retain the best and the brightest students and transition them into Sandia – and DP Complex – employees. The US Department of Energy/Defense Programs University Partnerships funded ten laboratory critical skills development programs in FY04. This report provides a qualitative and quantitative evaluation of these programs and their status.

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## Summary

National security is the preeminent mission of Sandia National Laboratories (Sandia)<sup>1</sup>, a mission that requires a preeminent research and engineering staff. In this context, a portfolio of student programs is being implemented to identify and attract students for positions that are highly competitive. Students are recruited from the most talented and sought-after fields that are critical for Sandia's nuclear weapons mission. The programs are funded by the Department of Energy, Office of Defense Programs (DOE/DP) and address the critical skills needs recommended by the 1999 Chiles Commission Report. The post-secondary programs (Table 1) bring promising students to Sandia as interns—technical staff can identify promising research scientists, and students are introduced to Sandia as an employer of choice.

**Table 1: Overview of Post-Secondary Pipeline Programs<sup>2</sup>**

Program	Primary Academic Level	Start Date	Student Participants	Conversions to Staff-Total
College Cyber Defenders Institute (CCD)	Undergraduate	FY 01	FY 04: 17 Total: 47	13
Microsystems and Engineering Sciences Applications Institute (MESA)	Graduate	FY 01	FY 04: 46 Total: 67	14
Materials Science Research Institute (MSRI)	Undergraduate and Graduate	FY 02	FY 04: 6 Total: 9	1
National Collegiate Pulsed Power Research Institute (NCPPRI)	Undergraduate	FY 02	FY 04: 36 Total: 56	2
Engineering Sciences Institute (ESI)	Undergraduate	FY 03	FY 04: 59	2
Radiation Effects Sciences Research Institute (RESRI)	Undergraduate and Graduate	FY 04	FY 04: 4	1

The secondary programs (Table 2) are focused on encouraging students in the challenging academic preparation needed to work at Sandia, particularly in technicians' roles, and involve two high schools and a community college.

**Table 2: Overview of Secondary Pipeline Programs**

Program	Levels	Start Date	Student Participants	Conversions to Staff-Total
Advanced Manufacturing for Education (AME)	WMHS & AHS	FY 99	FY 04: 346	20
Photonics Academy	WMHS	FY 03	FY 04: 103	

<sup>1</sup> Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy under contract DE-AC04-94AL85000.

<sup>2</sup> For consistency, data each year are collected at the end of the academic year for high school programs and end of summer for other programs. FY=Fiscal Year and in this case corresponds to the relevant academic year and summer; for example, FY 04 corresponds to Academic Year 03/04 and summer 04.

## Critical Skills Program Highlights

In parallel with managing these programs, program staff collects information to review the programs against their goals. The information is provided to an outside reviewer for analysis and documentation. Highlights that were identified for FY 04 include:

### College-level Pipeline Programs

- As in past years, the challenging work that is possible at Sandia for an intern and the opportunity to work with people of the caliber of those at Sandia are primary draws for interns.
- Almost all 98%, interns saw Sandia as an employer of choice (EOC) after participating in the program, an increase of 25% from prior participation in the program.
- Technical staff members establish recruiting practices, recruit and supervise students. The number of staff members involved in the critical skills programs increased from 70 in FY 03 to 120 in FY 04.

Student survey responses to question about what they got from the program.

*...job experience and bragging rights  
A chance to work with world-class researchers  
The experience of working on cutting-edge research  
Chance to work on amazing projects.  
Resources, freedom and time to independently learn a topic that interests me  
Explore what career I would like to pursue  
Practical experience not often found in academia  
A well paying summer job with the opportunity to explore career choices  
Job-related experience, lasting friendships, good contacts, great knowledge, "Big picture view"  
Learning the importance of education in an environment like Sandia*

- To date, students have come from more than 40 schools. Recruiting often involves developing relationships with college and university researchers, and sometimes influencing school curricula to better expose students to the training needed by Sandia.
- The critical skills programs have begun producing technical staff—as of FY 04, 33 staff members have been converted from interns in the program.
- The critical skills programs had a return rate from FY 03 to FY 04 ranging from 35% to 81%, depending on the program.
- Student surveys show that the critical skills programs highlight Sandia as an attractive career option and influence students to focus their career plans to be in-line with work at Sandia.
- About one-third of interns in FY 04 represented minority ethnic backgrounds, and one-sixth were female.
- Internships are highly competitive, as indicated by GPA of 3.6 or higher for all programs.

### High School and Community College-level Pipeline Programs

- Focused programs are in place to encourage high school and community college students to pursue the advanced math and science training necessary to work at Sandia, especially in the technician pipeline.
- Students in high school or community college programs are able to apply for internships. To date, 20 interns have been converted to staff members.
- The high school model has proven itself flexible and transportable, and has been endorsed by national professional associations.
- The Photonics Academy has enabled a middle-school to PhD pipeline that prepares students for a career in a field of increasing demand at Sandia.

## Critical Skills Programs

Sandia National Laboratories<sup>3</sup> (Sandia) has developed a portfolio of student programs using Department of Energy, Office of Defense Programs (DOE/DP) funding to address the critical skills needs recommended by the 1999 Chiles Commission Report. In most cases, Sandia has stiff competition from other employers for these very talented students and the intern programs are a means of connecting with students before they enter the job market to influence them to consider pursuing a career at Sandia.

Technical staff members develop recruiting strategies, recruit students, identify appropriate student projects and supervise and mentor students. The critical skills programs bring promising students to Sandia, thus allowing technical staff to identify potential employees and students to learn about the benefits of working at Sandia. Sandia has also encouraged and supported active collaboration between two local high schools and the Albuquerque TVI, a community college, to develop and articulate the curricula leading to an AAS in advanced manufacturing and in photonics. These programs encourage students by providing a pathway to jobs at Sandia, address Sandia's need for technicians, and reduce the need for on-site training. Eight Sandia pipeline programs were funded in FY 2004 and are shown in Table 3.

**Table 3: SNL Pipeline Programs**

<b>Program</b>	<b>Primary Academic Level</b>	<b>Status</b>
College Cyber Defenders Institute (CCD)	Undergraduate	Initiated summer 01
Microsystems and Engineering Sciences Applications Institute (MESA)	Graduate	Initiated summer 01
Materials Science Research Institute (MSRI)	Undergraduate and Graduate	Initiated AY 01/02
National Collegiate Pulsed Power Research Institute (NCPRI)	Undergraduate and Faculty	Initiated AY 01/02
Engineering Sciences Institute (ESI)	Undergraduate	Initiated AY 03/04
Radiation Effects Sciences Research Institute (RESRI)	Undergraduate	Initiated AY 03/04
Advanced Manufacturing for Education: Advanced Technology Academy at West Mesa High School (ATA/WMHS) at Albuquerque High School (ATA/AHS)	High School	Pilot Implemented 1996.
Photonics Academy at West Mesa High School	High School	AY 02/03: 1 <sup>st</sup> year with students.

AY=Academic Year

In addition to focused intern programs, the critical skills program broadened efforts to expose students to Sandia in FY 04 by supporting a high school level program to encourage students in math—Go Figure. The critical skills program also sponsored 7 Computational Science Graduate Fellows (CSGF) and 3 Department of Homeland Security (DHS) Fellows who chose to do their practicum at Sandia. Fellows must choose a national laboratory in which to do their practicum, but their costs are borne by their program and they are brought in as visitors rather than employees, as are interns in the other programs.

<sup>3</sup> Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy under contract DE-AC04-94AL85000.

## **Goals and Objectives of Critical Skills Programs**

The critical skills programs are primarily concerned with attracting and retaining highly qualified people as Sandia employees in critical skills areas. Sandia also benefits when students with a positive personal and professional experience at Sandia move into the larger research community. The following objectives of the programs have been developed as a means of accomplishing the stated program goals.

### **Pipeline programs objectives that are integral to the program goal**

- Increase the pool of technical staff involved in DP pipeline programs
- Identify and recruit promising students in critical skills areas (CSA)
- Showcase Sandia as an attractive career option
- Retain qualified technical students in CSA both at Sandia and in the DP complex

The objectives have been further broken into the strategies and program elements used to accomplish the goals and objectives of the pipeline programs, as well as evaluation metrics (see the Program Matrix at the end of this section in Table 4). The program matrix is an evolving tool and is reviewed annually by program staff to ensure its relevancy to the program goals.

## **Information Collected**

In parallel with developing and coordinating these pipeline programs, program staff collects information to ascertain how the programs meet their goals. Program staff provides the information to an outside reviewer for analysis and documentation. During FY 2004, the following information was collected:

### **College-level Pipeline Programs**

- Demographic data on college-level interns.
- A survey instrument was provided to all interns, intern conversions to employees, Fellows participating in the program, and supervisors. Return of surveys was voluntary. The surveys, with aggregate responses, are included in Appendices 1 through 4.

### **High School-level Pipeline Programs**

- Aggregate demographic data on high school participants was provided by the ATA coordinators in each high school.
- High school and TVI students accepted into one of the limited number of Sandia internships are accepted into the MEST intern program. Data on interns in the MEST program was collected.

This report presents the results of information collection from the 2003/2004 academic year and summer 2004. This period closely corresponds to, and for the purposes of this report will be considered to be the same as, fiscal year 04 (FY 04—October 1, 2003 through September 30, 2004). For consistency each year, high school data should be collected for the end of the academic year (usually May) and Sandia intern data should be collected at the end of the summer (usually July or August).

**Table 4: Program Matrix for Critical Skills Programs**

Objective	Strategy	Program Elements	Evaluation Method
<p><b>Increase the Pool of Technical Staff in DP Pipeline Programs</b></p>	<p>Target &amp; recruit uninvolved tech staff in critical skills areas Maintain pool of involved technical staff</p>	<p>Presentations to recruit and inform staff Staff involvement as appropriate in pipeline programs (see below) Staff involvement in career development of interns Upper mgmt support/recognition for mentoring/conversions of interns</p>	<p>Trend Data: # of participating staff</p>
<p><b>Identify and Recruit Promising Students in Critical Skills Areas (CSA)</b></p>	<p>Identify CSA anticipated needs</p>	<p>Tech staff involvement Chiles Commission Report HR Staffing Plan</p>	<p>TREND DATA: # of interns, # who return, # who convert to FTE.  SURVEY OR INTERVIEW: Query supervisors as to promise of students.</p>
	<p>Identify and recruit promising candidates in CSA</p>	<p>Technical staff recommendations in relevant program areas Standard ranking indices for academic achievement (for example Gourman) Nationally recognized programs Technical staff contacts with universities referrals HR resumix</p>	
	<p>Choose students for participation that meet program criteria</p>	<p>Ensure program staff reviews resumes for eligible candidates Involve technical staff in review of resumes and choosing students for offers Manage process of review, making offers, and hiring using existing tools</p>	

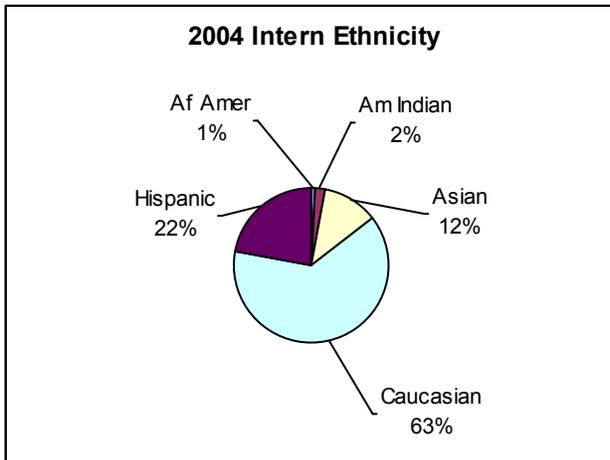
**Program Matrix continued**

<b>Objective</b>	<b>Strategy</b>	<b>Program Elements</b>	<b>Evaluation Method</b>
<b>Showcase Sandia as an attractive career option</b>	Ensure technical managers offer “real” work	Technical staff involvement	SURVEY OR INTERVIEW: Query students
	Treat students as professionals facing career choices. Provide broad-based overview of SNL Offer professional development at SNL	Technical SNL Speakers Mini-Institutes Tours of and talks about SNL Conference/travel Orientation Administrative support for flexibility in self-identifying future work Technical mentor Experienced students as role models (SNL Ambassador) Information on graduate programs and hiring tools Employee/staffing benefits information	
	Provide assistance with non-work related aspects of the program that support the work experience	Salary Relocation assistance Assistance in identifying housing Transportation assistance Social mentor for questions and support	
	Provide students with Albuquerque info	Existing SIP infrastructure Social mentor for questions and support	
<b>Retain qualified technical students in critical skills areas both at Sandia and in the DP complex</b>	Create a positive work experience at SNL Opportunities for career development through student & hiring programs Provide support in navigating the hiring process.	See Above Technical and social mentors discuss opportunities Information on graduate programs and hiring tools Accessible source of information for funding sources for school/work opportunities. Administrative support in pursuing the hiring process	TREND DATA: Trends in those students who return.  SURVEY OR INTERVIEW: Query supervisors and students about retention issues.

## Post-Secondary Critical Skills Programs

This section provides demographic information about the postsecondary students that participated in the critical skills programs as interns at Sandia as well as information on the perspectives of students and their supervisors on the programs.

### Student Demographics



The Sandia critical skills programs focus on recruiting well-qualified students in a specific critical skills area. Critical skills interns that have come to Sandia represent diverse ethnic backgrounds. About half (48%) of the student interns in FY 04 chose not to provide ethnicity information. Of those students who chose to provide information, about one-third represented a minority ethnic background and about 17% were female.

### Student Perceptions of the Critical Skills Programs

In FY 04 all students and supervisors of those students in the critical skills programs were asked to fill out a survey about their experience in the program. The complete responses from these sources are included in Appendices 1 through 4, and provide useful detail to program managers in reviewing their efforts for the coming year. *These reviews would also be useful to students accepted into the programs, to learn about the program, to gain a greater understanding of their opportunities at Sandia, and to obtain a sense of supervisors' reasons for participating in the programs.* The following provides an overview of the information that was developed from the surveys.

#### Survey Results--Students

Forty percent of the students at Sandia in the critical skills programs returned surveys at the end of summer 2004. This group includes of three subgroups. 66 interns from 32 schools and from 6 of the programs. Seven fellows who chose Sandia as the location of their fellowship practicum came from 5 schools. In addition, 5 interns that had converted to full-time employees also filled out surveys. Responses were consistent across the programs and are summarized here. Complete responses from interns are in Appendix 1, from fellows in Appendix 2, and from conversions to employees in Appendix 3.

**The critical skills programs support students in focusing their career plans and encourage students to see Sandia as an employer of choice (EOC).** Almost all (98% of those responding) considered Sandia to be an employer of choice after completing the internship, an increase from 78% prior to the internship. The most frequent reason given for Sandia not being considered an EOC is its location in Albuquerque. *This suggests the value in having recruiting materials sent to schools outside of New Mexico include some description of the attractions of the area.*

When asked whether the internship at Sandia has affected their future plans, by far most replied in the affirmative. The most frequent specific responses stated that the program affected their plans through focusing or reinforcing academic and career plans or in encouraging further education. Four or 5% of the respondents said it had no effect on their plans.

The ability of the internship to show students that Sandia is an attractive employer is important given the competition for talented students. A large part of the interns have had experience at organizations that could be considered a competitor with Sandia for hiring potential employees—40% of the interns and 70% of the fellows. When asked what makes Sandia an EOC, it is clear that students are attracted to challenging work and to the caliber of people with whom they are able to work at Sandia. Most frequent responses include: (Students were able to provide multiple choices.)

- Challenging, interesting, and cutting edge research (the most frequent response—from 71% of respondents)
- Flexible research opportunities—from 41% of respondents
- Working with the people at Sandia—from 32% of respondents
- Working on areas that are important to the nation— from 30% of respondents

**The internship is a clearly positive experience for interns.** Students gave the internship a high ranking on the overall experience and the importance of the program in their career. Rankings were based on a scale of 1 to 5 with 5 being extremely important.

**Table 5: Average Ranking of Program by Students**

	<b>Total Respondents</b>	<b>Average for overall experience</b>	<b>Average for importance to career development</b>
<b>Interns</b>	66	4.7	4.7
<b>Fellows</b>	7	4.7	4.3
<b>Conversions</b>	5	4.2	4.6

Most of the students indicated that the program had given them an opportunity to learn about the career options at Sandia, primarily through introducing them to people in different parts of the organization who have talked about their work or through tours. According to respondents, the greatest strengths of the program include:

- The opportunity to do challenging/interesting work contributing to Sandia's research program—58%
- Working with the people at Sandia—36%
- Being treated as a responsible adult—32%
- Working on state of the art equipment—32%
- Putting classroom theory into workplace use—29%
- Receiving flexible research opportunities—28%

Students were also asked to describe strengths and weaknesses with the intern programs. The breadth of suggestions by students precludes listing them here, although all are listed in the appendices. *These comments are thoughtful reflections on what has been really good and on specific areas that could be improved and warrant review by program staff.*

### **Supervisors Perspectives on the Critical Skills Programs**

Thirteen supervisors of interns in the critical skills programs responded to the survey of supervisors.

**All of the supervisors see the intern program as positive.** The average ranking of the group for the program was 4.6 out of a possible 5 (5 is excellent). When asked what was most valuable to them about the critical skills programs, the most frequent responses were:

- Introducing Sandia and well-qualified potential employees (69%)
- Getting work done (46%).
- Developing/maintaining a research relationship with the interns' universities (31%)
- Receiving the technical focus (for interns) that the program provides (23%)

The survey with specific responses is shown in Appendix 4.

## College Cyber Defenders (CCD) Institute

**Table 6: CCD Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
04	17 (7R**)	11	14	3		15	1	3.6	1
03	16 (7R**)	9	13	3		14	2	3.6	6
02	20 (10R**)	13	14	6	2	17	1	3.7	6
01	16	9	11	5	1	13		3.7	

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

\*\*R shows the number of students returning from the previous year.

### CCD Recruiting

(Recruiting information taken from 2002 report.) The College Cyber Defenders (CCD) Institute is focused on a critical skills need in which there is a national shortage of trained people and for which there are no formal university programs. Program technical staff identified the schools that have academic cyber security expertise or interest and that are working in areas of interest to Sandia. Technical staff members have focused their recruiting efforts on four schools—encouraging them to develop a cyber security program and/or related course work: New Mexico Tech, University of Illinois at Urbana-Champaign, University of Colorado at Boulder, and Texas A&M. Staff members recruit students for the program by contacting university chairs and professors of targeted schools, visiting the schools, meeting with students, and encouraging qualified students to submit intern applications to the CCD Institute through the Sandia Student Intern Program (SIP). CCD program staff review student applications from the entire student pool (not just those from schools which they targeted).

### CCD Objectives

**Objective: Increase the pool of technical staff in DP pipeline programs.**

In FY 04, eight technical staff members recruited, supervised and mentored interns.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

Seventeen students with an average GPA of 3.6 from 11 different schools were brought to Sandia as interns. Seven of these students were returning and 10 were new to the program.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option and influence students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

Of the 16 interns in FY 03, 6 were converted to staff, and 7 returned as interns in FY 04, for a total retention of 81%. One student converted from the CCD intern program to staff in FY 04.

## Microsystems & Engineering Sciences (MESA) Institute

**Table 7: MESA Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
<b>04</b>	46 (15**)	23	36	10		28	12	3.6	10
<b>03</b>	25 (6R**)	19	16	9		1	24	3.7	2
<b>02</b>	16 (16R**)	15	12	4		4	12	3.7	2
<b>01</b>	16	15	12	4		4	12	3.7	

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

\*\*R shows the number of students returning from the previous year.

### **MESA Recruiting**

(Recruiting information taken from 2002 report.) The MESA Institute recruiting efforts focus on professors with whom Sandia wants to collaborate because of their expertise. Technical staff identify a professor and if that professor has a promising student, then the two develop a proposal for research that is appropriate for the student that supports the professor's work, and that benefits Sandia's research program, and submit the proposal for review for funding. In FY 2002 the MESA Institute initiated a Strategic University Partners Program that includes three universities that have research programs complementing Sandia's Microsystems research program: University of Michigan, University of Colorado, and Georgia Tech. Most of the program's recruiting efforts are expected to be focused on professors at strategic universities, with remaining intern slots open to any professor that meets program objectives. Early efforts focused on graduate students. As Table 7 indicates, the program has also begun to focus on encouraging undergraduates to pursue graduate degrees.

### **MESA Objectives**

**Objective: Increase the pool of technical staff in DP pipeline programs.**

In FY 04, 15 technical supervisors and 15 technical managers were involved in recruiting and mentoring interns.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

This program increased by 84% from FY 2003 to FY 2004, from 25 to 46 interns. These interns came from 23 schools and had an average GPA of 3.6.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option that influences students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

There were 10 conversions from intern to Sandia technical staff from this program in FY 04. Two-thirds (68%) of the interns from 2003 were either converted to an employee in 2003, or returned as an intern in 2004.

## Materials Science Research Institute (MSRI)

**Table 8: MSRI Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
<b>04</b>	6 (2R**)	2	2	4		6		3.7	
<b>03</b>	4	2	1	3		3		3.7	1
<b>02</b>	1	1	1				1	3.8	

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

\*\*R shows the number of students returning from the previous year.

### MSRI Recruiting

(Recruiting information taken from 2003 report) Recruiting for the MSRI program is staff-driven. The MSRI program identifies promising students in materials science research by developing and maintaining close ties with the broader materials science research community, particularly at those universities that are doing cutting edge work in areas of interest to Sandia. The initial focus is on those universities that are already identified as lab partners and, in particular, the subset of universities working in materials science. Sandia researchers develop long-term relationships with university professors who, in turn, identify promising students interested in this research area. A student's presence at Sandia over time also allows Sandia to identify promising employees.

### MSRI Objectives

**Objective: Increase the pool of technical staff in DP pipeline programs.**

In FY 04, three supervisors and three managers were involved in the program.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

In FY 04, six interns with an average GPA of 3.7 were recruited, representing an increase of 50% in interns participating in the program.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option that influences students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

In FY 04, two interns returned from FY 03. One had been converted to an employee in FY 03, producing a retention rate of 75% from FY 03.

## National Collegiate Pulsed Power Research Institute (NCPPRI)

**Table 9: NCPPRI Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
<b>04</b>	36 (6R**)	22	27	9	5	28	3	3.7	1
<b>03</b>	20 (2R**)	13	13	7		15	3	3.7	1
<b>02</b>	8	4	7	1		7	1	3.6	

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

\*\*R shows the number of students returning from the previous year.

### **NCPPRI Program News**

(Recruiting information taken from 2003 report) NCPPRI was implemented in 2002 and is an informal program in the research area of z-pinch physics and pulse power. The program focuses on identifying talented students in their junior or senior year of undergraduate school and encouraging them to pursue further study leading to a PhD in the field. Identifying students at this level allows interested students to more directly focus and direct their studies in the research areas important to Sandia. Recruiting for the program is carried out by the technical staff in the Pulse Power department as they are most aware of the universities and the professors at those universities, doing the work relevant to Sandia's research interests. As shown in Table 9, in FY 04, the program also began identifying promising high school students for its technician's pipeline. These students are coming out of the ATA for Photonics (described later).

### **NCPPRI Objectives**

**Objective: Increase the pool of technical staff in DP pipeline programs.**

In FY 04 9 supervisors and 10 managers were involved with interns in the program.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

In FY 04, the program had 36 interns with an average GPA of 3.7. This represents an increase of 80% in the number of interns from 20 in FY 03.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option that influences students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

One intern has been converted to technical staff member in the second year of the program. Of the FY 03 interns, one was converted to staff in FY 03, and 6 returned as interns, producing a retention rate of 35%.

## Engineering Sciences Institute (ESI)

**Table 10: ESI Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
<b>04</b>	59	17	44	15		44	4	3.6	2

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

### ESI Program News

The Engineering Sciences Institute (ESI) is concerned with identifying, developing and retaining a diverse pool of candidates in the engineering sciences disciplines that have been prioritized by the needs of Sandia's Strategic Business Units. ESI targets vocational schools, undergraduate and graduate schools to attract the best and the brightest engineering students in the areas of experimental sciences and computational mechanics and electrical engineering. Undergraduate students are encouraged to pursue graduate studies and to align their thesis with mission-critical research needs. Students at technical institutes are encouraged to pursue internships and baccalaureate degrees.

### ESI Objectives

**Objective: Increase the pool of technical staff in DP pipeline programs.**

Fifty-six staff members were involved with the ESI interns as supervisors or managers.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

Fifty-nine students from 17 schools participated in ESI in FY 04.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option and influencing students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

The program just completed its first year and has already converted two interns to Sandia employees.

## Radiation Effects Sciences Research Institute (RESRI)

**Table 11: RESRI Student Participants**

Year*	# Enrolled	# Schools	Gender		Degree Level			Avg GPA	Converted to Staff
			M	F	HS	AS/BS	Grad/PhD		
04	4	2	3	1		3	1	1	

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

### RESRI Program News

Sandia's critical capability in Radiation Effects Sciences (RES) provides the technical means to assess the performance of nuclear weapons in severe radiation environments, which is a critical skill supporting the nations Stockpile Stewardship mission. The Radiation Effects Sciences Research Institute (RESRI) was formed in FY 04 to attract and develop college graduates with the skills needed to support experimental and computational activities. Sandia is suffering a loss of staff in this area and will continue to do so as the staff ages and impending retirements occur. In FY 04, the program focused on those universities with which Sandia researchers have already collaborated and, in particular, that have former Sandians as faculty members. In FY 05 the program intends to collaborate with a larger group of universities. The institute is designed to attract undergraduate and graduate students for internships and summer positions. It also helps sponsor graduate theses (Master's and Doctoral level) in radiation effects sciences. Finally, the institute is intended to foster strong contacts with faculty at students' universities to support both research needs and the pool of potential future students.

### RESRI Objectives

**Objective: Increase the pool of technical staff in DP pipeline programs.**

Four members of Sandia staff were involved in supervising or managing the RESRI interns in FY 04.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

Four students were recruited in the first year of the program.

**Objective: Showcase Sandia as an attractive career option.**

The exit survey shows that the critical skills programs are highlighting Sandia as an attractive career option and influencing students to change or focus their career plans to be more in-line with Sandia's work.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

The program just completed its first year, but has already converted one intern to Sandia staff.

## Secondary Critical Skills Programs—Advanced Technology Academies

There are advanced technology academies (ATA) in manufacturing and in photonics. Two high schools have a manufacturing ATA, West Mesa High School (WMHS) and Albuquerque High School (AHS). WMHS is also the home of the Photonics Academy. All of the ATA build on the same model, a model that has been endorsed by NACFAM (the National Coalition for Advanced Manufacturing) as innovative and an effective pilot for the entire nation.

**Table 12: AY 04 High School Students in the ATA Pipeline**

<b>Academic Year</b>	<b>Combined Freshman</b>	<b>Combined Sophomore</b>	<b>Combined Junior</b>	<b>Combined Senior</b>	<b>TOTAL</b>
<b>Manufacturing</b>	31	82	123	110	346
<b>Photonics</b>	38	18	26	21	103

Academic Year goes from September of 2003 to May of 2004.  
Combined includes WMHS and AHS students

The Albuquerque Technical Vocational Institute (TVI—a community college) has been working closely with the high schools and with Sandia to develop a curriculum that is articulated with those at the high schools and that will prepare students either to enter the workforce or to continue to further education. Students graduate from TVI with an AAS in advanced manufacturing or photonics.

Students in the advanced manufacturing academies at the high schools and at TVI are eligible to apply for internships at Sandia National Laboratories. Students that are accepted are made interns in the MEST Program, which accepts applications from students from all schools that meet their qualifications. The interns that are part of the pipeline are shown in Table 13 below.

**Table 13: Sandia MEST Interns**

<b>Year*</b>	<b># Interns</b>	<b>Gender</b>		<b>Schools</b>					<b>Avg GPA</b>	<b>Converted to Staff</b>
		<b>M</b>	<b>F</b>	<b>WMHS</b>	<b>AHS</b>	<b>TVI</b>	<b>Other CC</b>	<b>UNM</b>		
<b>04</b>	27 (9R**)	22	5	1		20			3.5	10
<b>03</b>	25 (13R**)	18	7			18	2	1	3.6	7
<b>02</b>	19 (7R**)	12	7	1	1	11	2	1	3.6	1
<b>01</b>	15	11	4	1	1	10			3.6	2

\*04 corresponds to Academic Year 03/04 and summer 04 and to FY 04.

\*\*R shows the number of students returning from the previous year.

Only positive non-zero numbers are used. Therefore, blanks (no data) are not included in sums or averages.

## ATA—Manufacturing

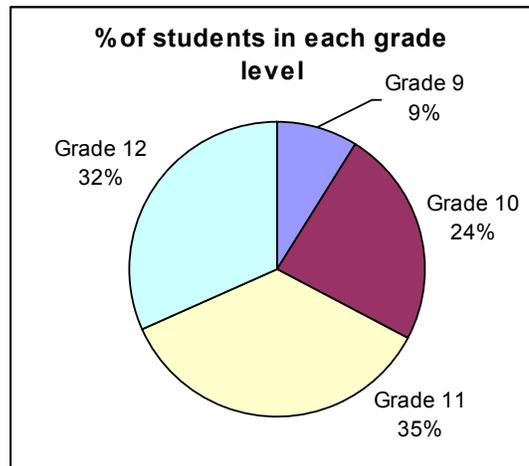
Table 14: ATA—Manufacturing

Academic Year	Freshman	Sophomore	Junior	Senior	Classes at TVI	To TVI as students	Sandia Summer Interns
03-04	31	82	123	110	unknown	unknown	unknown
02-03	67	145	26	25		7	5
01-02	124	49	30	15	34	8 to date	2
00-01	0	15	20	16			

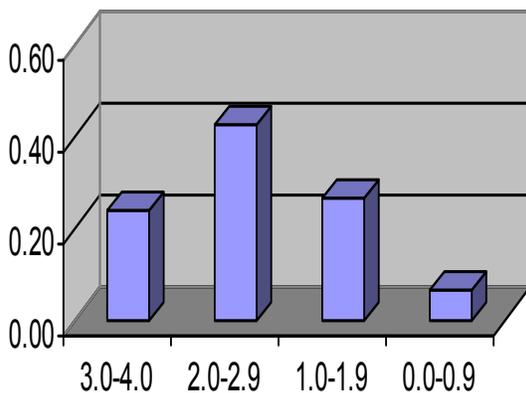
N.B.: Academic Year goes from September of first year shown to May of second year shown.

### Enrollment

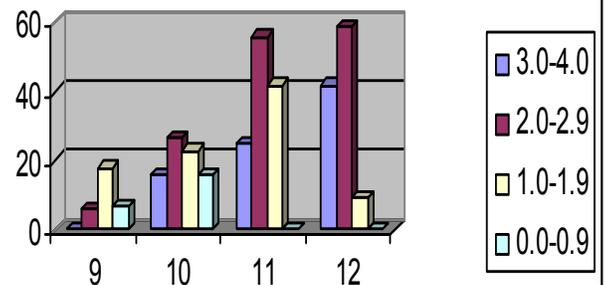
In FY 04, there were 346 high school students involved in an advanced technology academy in advanced manufacturing. This represents an increase of 83 students from the previous year. Two-thirds of those students were in grades 11 or 12.



### % of all students by GPA range



### # of students by grade level in average GPA groupings

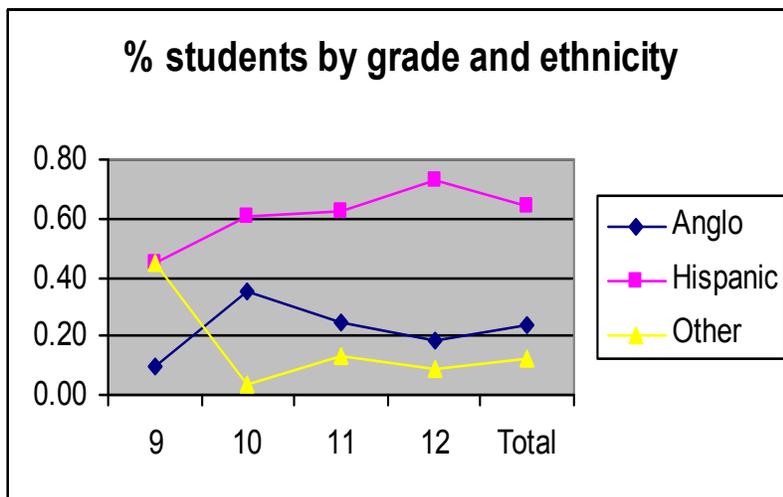
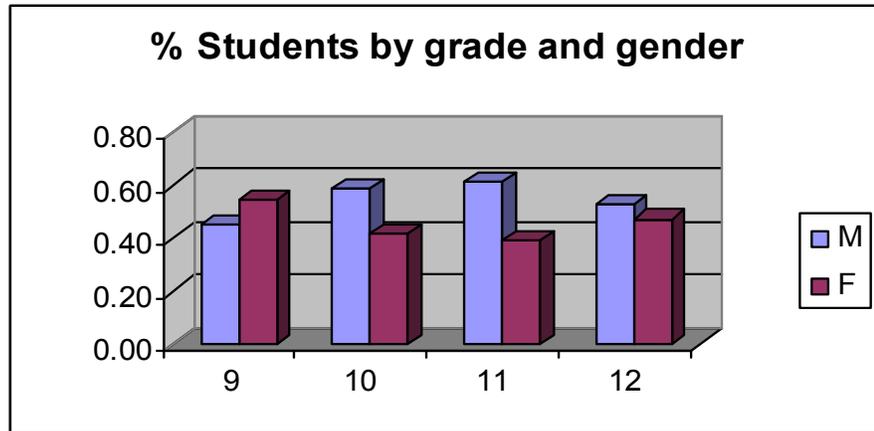


### GPA

Most (67%) of the students in the ATA for manufacturing have a grade point average of 2.0 or higher. The higher grade levels are more likely to have higher GPAs.

### Gender

The percentage of female students pursuing the advanced manufacturing ATA curriculum was 44% in the 03/04 school year. This percentage was roughly similar across all grades except 9<sup>th</sup>, where there were slightly more females than males (55% to 45%).



### Ethnicity

In the upper grade levels (10, 11, 12) about two-thirds of the students are Hispanic, a quarter to a third are Anglo. The 9<sup>th</sup> grade students show a different set of groupings, with 45% being Hispanic, and 45% in the “other” category, a category that has been small (about 10% or less) in the past. To what extent this is due to a smaller cohort of 9<sup>th</sup> graders and to what extent this represents a change may warrant more examination for next year.

ATA for Manufacturing Objectives

**Objective: Increase the pool of technical staff in DP Pipeline Program**

Technical staff are involved in curriculum development and in mentoring MESA interns.

**Objective: Identify and recruit promising students in Critical Skills areas**

The ATA for manufacturing had 346 high school students at two schools during AY 2003/04.

**Objective: Showcase Sandia as an attractive career option**

Although no new information was gathered about this aspect, interviews in past years with students suggest that the program has caused students to see Sandia as a potential employer, and has encouraged them to pursue the challenging academic preparation necessary to become an employee.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex**

Ten employees in the advanced manufacturing area have come out of the pipeline program to date.

## Photonics Academy

Table 15: ATA—Photonics Student Participants

	Freshman	Sophomore	Junior	Senior	Total	Interns
AY 2003/04	38	18	26	21	103	unknown
AY 2002/03	0	2	5	7	14	3

### Photonics Academy Program News

Photonics technology has been predicted by the National Academies of Science and Engineering to be the next major technology to drive the economy, to improve our quality of life, and to have a demand for skilled labor that far outstrips supply.<sup>4</sup> Optics and photonics technology also corresponds to a critical skills need for Sandia. There are five organizations within Sandia that have an interest in the students graduating from the Photonics Academy:

- Photonics & Microfabrication
- MESA Microfabrication
- Laser, Optics & Remote Sensing
- Firing Set & Optic Engineering
- Semiconductor Material & Device Science

### Photonics Academy Objectives

**Objective: Increase the pool of technical staff in DP pipeline programs.**

Technical staff are involved in identifying staff and training needs and in curriculum development for the photonics academy.

**Objective: Identify and recruit promising students in areas of critical skills needs.**

In its second year, 103 high school students participated in the photonics academy at WMHS.

**Objective: Showcase Sandia as an attractive career option.**

Insufficient data this year.

**Objective: Retain qualified technical students in critical skills areas both at Sandia and in the DP complex.**

Insufficient data this year.

<sup>4</sup> National Academies of Science and Engineering. Commission on Physical Sciences, Mathematics, and Applications. *Harnessing Light, Optical Science and Engineering for the 21<sup>st</sup> Century*. 1998.

## Appendices

- Appendix 1: Intern Survey Information
- Appendix 2: Fellows Survey Information
- Appendix 3: Conversions to Employee Survey Responses
- Appendix 4: Supervisor's Survey Information
- Appendix 5: ATA--Manufacturing Data
- Appendix 6: ATA--Photonics

## Appendix 1: Intern Survey Information

### Critical Skills Programs Survey 04 Interns—Responses (66 interns responded)

Numbers in parentheses show number of responses for that choice by intern program. Comments have been combined without distinguishing between programs and are shown in italics as they were received.

#### Background

1. Degree Level
  - a. High School (6)
  - c. AS, BA, BS (36)
  - d. MA, MS, MBA (10)
  - e. PhD, MD (14)
2. Academic Field:
3. School: Respondents attended 30 schools of higher education and 2 high schools
4. Intern Program:
  - a. CCD (8)
  - b. ESI (27)
  - c. MESA (11)
  - d. MSRI (3)
  - e. NCPPI (9)
  - f. RESRI (2)
5. Prior to this internship, I (circle all that apply)
  - a. Have never had an internship or co-op (23)
  - b. Have had an internship or co-op before at Sandia (22)
  - c. Have had an internship or co-op before at another national laboratory (5)
  - d. Have had an internship or co-op before at a university (11)
  - e. Have had an internship or co-op before in the private sector (17)

#### Future Plans

6. Has being an intern at Sandia changed your future plans? (Circle all that apply)
  - a. No, it has had no effect (2)
  - b. Yes, it has reinforced my plans (30)
  - c. Yes, helped me to focus my career objectives (36)
  - d. Yes, changed my career focus to the area related to my work in at Sandia (8)
  - e. Yes, changed my career focus to the area related to other work at Sandia (3)
  - f. Yes, changed my career focus to an area unrelated to work at Sandia (1)
  - g. Yes, encouraged me to pursue further education (19)
  - h. Other: (no comments)

#### Sandia as an Employer of Choice (an employer that you would prefer or choose)

7. Would you have considered Sandia as an employer of choice before being an intern at Sandia?
  - a. Yes (53)
  - b. No, why? (13)
    - Didn't know about it.*
    - Would not have known much about Sandia National Laboratories.*
    - Didn't really know everything that Sandia National Laboratories did.*
    - Government = bad reputation / lazy.*
    - Before being an intern I had no idea what Sandia or Albuquerque was like.*
    - Location*
    - Never heard of it*
    - Didn't know enough about it.*
    - I didn't know what Sandia was*
    - Didn't really want to leave in New Mexico*
    - I didn't know what Sandia was*
    - Just never thought about it before*

8. Would you consider Sandia as an employer of choice now that you have been an intern?  
 Yes (64)  
 No (2)
9. If you consider Sandia as an employer of choice, what aspects make it so? (Circle up to 3.)
- a. Flexible research opportunities (26)
  - b. Work on areas that are important to the nation (20)
  - c. Challenging and interesting work (51)
  - d. Work with the people at Sandia (22)
  - e. Work on state of the art equipment (13)
  - f. Stable funding (11)
  - g. Work on long-term research programs (4)
  - h. The ability to work independently (16)
  - i. Financial support for further education (14)
  - j. The Professional work environment (13)
  - k. Job-related benefits (14)
  - l. Location in Albuquerque (11)
  - m. Other:  
*My manager Tim Boyle is great.*  
*International work.*
10. If you do not consider Sandia to be an employer of choice, what are the reasons? (Circle up to 3)
- a. Large Size of Sandia (1)
  - b. Research Conducted at Sandia (0)
  - c. Sandia Bureaucracy/Paperwork (2)
  - d. Location in Albuquerque (5)
  - e. Personal, unrelated to Sandia (2)
  - f. Other (no comments)

#### **Intern Experience**

11. Please rank your overall experience in this internship program:  
 Average Ranking 4.67 out of possible 5
12. Please rank the importance of this program to you in career development  
 Average Ranking 4.73 out of possible 5
13. This program has given me an opportunity to learn about the range of career options at Sandia.  
 (Check all that apply)
- a. Not at all (4)
  - b. Has introduced me, individually or in a group, to people in different organizations who have talked about their work (58)
  - c. Has provided tours of Sandia's research areas (29)
  - d. Has provided me with other ways to learn about different research programs, such as:  
*Own initiative with other managers*
14. What are the greatest strengths of this intern program from your perspective? (Circle up to 3.)
- a. Flexible research opportunities (17)
  - b. The opportunity to do challenging and interesting work that contributes to Sandia's research program (42)
  - c. Work with the people at Sandia (26)
  - d. Presence of someone to talk with about my field or career options (16)
  - e. Work on state of the art equipment (19)
  - f. The ability to work independently (11)
  - g. Being treated like a responsible adult (23)
  - h. Financial support for further education (13)
  - i. Putting classroom theory into workplace use (23)
  - j. Other:  
*Work on national security problems to protect the US*  
*Resources*

15. What are the weaknesses or problems with the program (up to three) from your perspective?  
(37 commented)

*Lack of courses (i.e. programming classes); some people I worked with were on vacation.*

*Yr. Round students "lumped" together with summer students.*

*Limited exposure to the other projects.*

*Hierarchy; working with people that are not responsible.*

*Social activities to meet others.*

*Summer program is short, hard to finish projects.*

*Long design to production lead times.*

*Returning student paper work is cumbersome.*

*Was unaware of the programs going on here.*

*Time is too short, need more than a summer.*

*Not enough intern activities, or sign ups are for too few people.*

*None*

*Should have more tours of Sandia's research areas.*

*Too relaxed sometimes.*

*Lack of paid sick leave, etc.*

*I believe that your selection process needs to be revamped because from what I gather GPA is the most important thing even though GPA's can be deceptive.*

*Not getting paid for days that Sandia is closed; It is not up to us to work on not, if they are closed we don't get paid anything. (i.e. Christmas shutdown, not paid for two whole weeks).*

*Do not like Albuquerque.*

*Leaving things up to the departments separate from SIP.*

*Benefits need to be more plentiful.*

*Help with arranging housing (I didn't get any)*

*Too much paperwork/bureaucracy*

*Students are not kept busy, and spend a good amount of time trying to find something to do.*

*My project was not defined from the beginning, making it very difficult to develop a good solution.*

*The slowness of processing clearances.*

*Computer support and logistics was somewhat slow*

*Needs more organized intern social activities*

*At times there is down time*

*Lack of organization on part of SIP*

*The difficulty to receive a clearance*

*It is tough to do the symposium presentations in such a short time frame, as I've seen with other interns.*

*Sometimes there isn't enough work to keep my busy.*

*Not being able to set up a project prior to arrival at Sandia*

*1) Mentors give students project/assignments that are way about their heads, (2)*

*Many students are given work that they can't comprehend*

*No organized intern activities outside of work (aside from the hike that was cancelled)*

*(1) No scheduled weekend activities to bond interns or experience New Mexico, (2)*

*Lack of communication or coordination by Vicki Brown*

*(1) It took a relatively long time to get familiar with information and software needed to begin work on my project*

*Housing (see comments)*

*It would have been cool if there was more interaction between interns within the center, social events or something of the sort?*

16. What have you gotten from the program that you would not have gotten if you had not been in the program? (49 commented)

*Worthwhile job experience and bragging rights.*

*Experience.*

*I have grew up a lot professionally due to the responsibilities of my job.*

*Experience working on an independent project.*

*Exposure to people and facilities at SNL.*

*Career decision; skills.*

*A chance to work with world-class researchers.*

*I've had the opportunity to see the scope of research at Sandia and how it is conducted.*

*Opportunity to meet Sandia employees and other interns.*

*Real world experience before I make a job choice.*

*The experience of working on cutting-edge research.*

*Chance to work on amazing projects.*

*Opportunity to work on projects in production.*

*A well-paying job that advances my knowledge in my field.*

*Resources, freedom and time to independently learn a topic that interests me.*

*Some stability to built a future that most won't get.*

*Exposure to different fields in Nuclear Engineering, networking, career focus.*

*Explore what career I would like to pursue.*

*Experience in the field of study.*

*Experience of working in a government laboratory.*

*Money, knowledge.*

*Exposure to what National Labs are really about.*

*The program has allowed me to attend school and work.*

*The overall experience.*

*A chance to live somewhere new and be introduced to new research areas that are only here.*

*Exposure to a professional work environment.*

*Experience in software development in a real world setting.*

*I have gotten the opportunity to show my strengths, and my capabilities of working hard.*

*The experience of meeting such people.*

*Familiarity with new software/programs.*

*A chance to use a 4.5 teraflop supercomputer, knowledge about fluids*

*Practical experience not often found in academia*

*The opportunity to be in a research/lab environment, projects, hands-on work*

*Professional Environment*

*Working with some the brightest individuals in their respected fields.*

*Further career opportunities*

*The experience in the workplace*

*Job-related experience, lasting friendships, good contacts, great knowledge, "Big picture view"*

*Learning the importance of education in an environment like Sandia*

*A well paying summer job with the opportunity to explore career choices.*

*A feel that my classes are real/useful*

*Knowledge or real world uses for the science/math that we are taught in school.*

*The ability to apply theory from school to practical problems.*

*Excellent work environment, great pay*

*Inside look at R&D jobs*

*It provided an excellent look at working as a mathematician in an industrial setting.*

*Good engineering experience with state of the art facilities and brilliant people.*

*A good understanding of the way things work at Sandia.*

17. Please use the section below, or the back of this page, to write any additional thoughts about or suggestions for improving the intern program in which you participated.  
(14 commented)

*During the program we look for programming courses that the interns could take; none were available; more courses in various areas should be available.*

*It has been a pleasure.*

*Give prospective interns an idea about how much corporate training will take; this will help them better plan their research time.*

*Wonderful program with an excellent group to work with.*

*The CCD is a great program.*

*The ability to work where I want to work for my life.*

*I don't know if it would be at all possible, but if at least get paid something for the days Sandia is closed because it was up to me, I would work; Two weeks is a lot of time to not get paid; Just a suggestion.*

*If mentors had projects planned out ahead of time and clearly defined for students so they know exactly what was expected of them, it would prevent wasting time trying to figure out what to do.*

*Have student's projects completely defined before they get here so the mentor won't have to try and keep one step ahead when they obviously have a busy work schedule too.*

*I feel that the intern program should offer more scholarships to all the students for financial support.*

*My manager has been great with organizing all of us into different areas. The 9100 seminars were also good, but it might be good to start doing them earlier in the summer. We definitely need some type of socials organized for the interns to meet, just for our center would be great because it'd be smaller.*

*The speaker forums and student seminars were a very good part of the experience.*

*I enjoy my internship here. There are so many people to learn from, and so many opportunities to learn more. It is valuable to know these things and how a large company like this works, even just in college.*

*The work was great and the learning experience phenomenal. However, outside of the work environment there were no activities to bond interns or explore the area we are living in.*

*The SIP sent out a list of people in Albuquerque that were willing to rent out rooms in their homes to student interns, and this is where I found my living arrangements. The living situation turned out to be horrible, the people were filthy, and tried to encourage their views and morals on us. It is probably not possible to check on each person, but it would be nice.*

## Appendix 2: Fellows Survey Information

### Critical Skills Programs Survey 04 Fellows—Responses (7 Fellows responded)

Numbers in parentheses show number of responses for that choice by intern program. Comments have been combined without distinguishing between programs and are shown in italics as they were received.

#### Background

1. Degree Level
  - a. AS, BA, BS (2)
  - b. PhD, MD (5)
2. Academic Field:
3. School: Respondents attended 5 schools of higher education
4. Programs: CSGF and DHS
5. Prior to this internship, I (circle all that apply)
  - a. Have never had an internship or co-op (1)
  - b. Have had an internship or co-op before at Sandia (2)
  - c. Have had an internship or co-op before at another national laboratory (50)
  - d. Have had an internship or co-op before at a university (2)
  - e. Have had an internship or co-op before in the private sector (3)

#### Future Plans

6. Has being an intern at Sandia changed your future plans? (Circle all that apply)
  - a. No, it has had no effect (2)
  - b. Yes, it has reinforced my plans (1)
  - c. Yes, helped me to focus my career objectives (3)
  - d. Yes, changed my career focus to the area related to my work in at Sandia (1)
  - e. Yes, changed my career focus to the area related to other work at Sandia (0)
  - f. Yes, changed my career focus to an area unrelated to work at Sandia (0)
  - g. Yes, encouraged me to pursue further education (1)
  - h. Other: *Yes, I will consider working at lab now.*

#### Sandia as an Employer of Choice (an employer that you would prefer or choose)

7. Would you have considered Sandia as an employer of choice before being an intern at Sandia?
  - a. Yes (4)
  - b. No, why? (3)  
*Because I thought government employees got paid poorly.*  
*Don't really like New Mexico.*  
*No knowledge*
8. Would you consider Sandia as an employer of choice now that you have been an intern?
  - a. Yes (6)
  - b. No (1)
9. If you consider Sandia as an employer of choice, what aspects make it so? (Circle up to 3.)
  - a. Flexible research opportunities (4)
  - b. Work on areas that are important to the nation (2)
  - c. Challenging and interesting work (1)
  - d. Work with the people at Sandia (1)
  - e. Work on state of the art equipment (2)
  - f. Stable funding (3)
  - g. Work on long-term research programs (2)
  - h. The ability to work independently (2)
  - i. Financial support for further education (0)
  - j. The Professional work environment (0)
  - k. Job-related benefits (1)
  - l. Location in Albuquerque (2)
  - m. Other: *Pay same as private sector.*

10. If you do not consider Sandia to be an employer of choice, what are the reasons? (Circle up to 3)
- a. Large Size of Sandia (0)
  - b. Research Conducted at Sandia (0)
  - c. Sandia Bureaucracy/Paperwork (1)
  - d. Location in Albuquerque (1)
  - e. Personal, unrelated to Sandia (0)
  - f. Other (no comments)

**Intern Experience**

11. Please rank your overall experience in this internship program:  
Average Ranking 4.7 out of possible 5
12. Please rank the importance of this program to you in career development  
Average Ranking 4.3 out of possible 5
13. This program has given me an opportunity to learn about the range of career options at Sandia. (Check all that apply)
- a. Not at all (1)
  - b. Has introduced me, individually or in a group, to people in different organizations who have talked about their work (6)
  - c. Has provided tours of Sandia's research areas (2)
  - d. Has provided me with other ways to learn about different research programs, such as:  
*Seminars about work at Sandia (CSRI, 9100)*  
*Summer showed me some other programs.*  
*Seminars and presentations.*
14. What are the greatest strengths of this intern program from your perspective? (Circle up to 3.)
- a. Flexible research opportunities (3)
  - b. The opportunity to do challenging and interesting work that contributes to Sandia's research program (3)
  - c. Work with the people at Sandia (0)
  - d. Presence of someone to talk with about my field or career options (2)
  - e. Work on state of the art equipment (3)
  - f. The ability to work independently (4)
  - g. Being treated like a responsible adult (1)
  - h. Financial support for further education (0)
  - i. Putting classroom theory into workplace use (1)
  - j. Other: no comments
15. What are the weaknesses or problems with the program (up to three) from your perspective?  
(2 commented)
- My work really needed a clearance. Not having a clearance severely detracted from interaction with others in 9100.*  
*None really, would do again.*
16. What have you gotten from the program that you would not have gotten if you had not been in the program?  
(3 commented)
- An internship opportunity.*  
*First hand experience of areas of research.*  
*I am working on an interesting project that I would not have otherwise known about.*
17. Please use the section below, or the back of this page, to write any additional thoughts about or suggestions for improving the intern program in which you participated.  
(1 commented)
- Develop a procedure for getting clearances for CSGF fellows. This would have greatly improved my experience at Sandia.*

## Appendix 3: Conversions to Employee Survey Information

### Pipeline Programs Survey 04 Conversions to SNL Employees—Responses (5 responded)

#### Background

1. Degree Received
  - a. HS (2)
  - b. AS, BS, BA (2)
  - c. MS, MA, MBA (1)
2. In which Intern Program did you participate: MESA (3) MEST (2)
3. What role has the internship played in helping you in career planning and development? (Circle all that apply)
  - a. It reinforced my desire to be a SNL employee. (4)
  - b. It helped me to focus my career objectives because I want to work at Sandia. (2)
  - c. I was not thinking about SNL as an employer of choice before the internship. (1)
  - d. I didn't really know anything about Sandia before the internship. (0)
  - e. The internship has encouraged me to pursue further education in areas of interest to Sandia's research program. (3)
  - f. The internship had no effect on my career planning and development. (0)
  - g. Other: no comments

#### Sandia as an Employer of Choice (an employer that you would prefer or choose)

4. Would you have considered Sandia as an employer of choice before being an intern at Sandia?
  - a. Yes (5)
  - b. No (0)
5. What aspects make Sandia an employer of choice? (Circle up to 3.)
  - a. Flexible research opportunities. (1)
  - b. Work on areas that are important to the nation. (3)
  - c. Challenging and interesting work. (4)
  - d. Work with the people at Sandia. (1)
  - e. Work on state of the art equipment. (1)
  - f. Stable funding. (1)
  - g. Work on long-term research programs. (0)
  - h. The ability to work independently. (1)
  - i. Financial support for further education. (2)
  - j. Other: no comments
6. What aspects make Sandia less than desirable to you as an employer? No comments

#### Intern Experience

7. Please rank your overall experience in this internship program: average=4.2 out of possible 5
8. Please rank the importance of this program to you in career development: average= 4.6 out of possible 5
9. This program gave me an opportunity to learn about the range of career options at Sandia. (Check all that apply)
  - a. Not at all. (2)
  - b. Introduced me, individually or in a group, to people in different organizations who have talked about their work. (2)
  - c. Provided tours of Sandia's research areas. (0)
  - d. Provided me with other ways to learn about different research programs, such as:  
*On-line research*  
*Job fair*

10. What are the greatest strengths of this intern program from your perspective? (Circle up to 3.)
- a. Flexible research opportunities. (2)
  - b. The opportunity to do challenging and interesting work that contributes to Sandia's research program. (0)
  - c. Work with the people at Sandia. (2)
  - d. Presence of someone to talk with about my field or career options. (0)
  - e. Work on state of the art equipment. (3)
  - f. The ability to work independently. (0)
  - g. Being treated like a responsible adult. (2)
  - h. Financial support for further education. (2)
  - i. Other:  
*Flex schedule for school*
11. What are the weaknesses or problems with the program (up to three) from your perspective?  
1 commented  
*The number of required activities, while they were useful, sometimes required too much time; more leeway in choosing which to go to would have been useful to me.*
12. What have you gotten from the program that you would not have gotten if you had not been in the program? 3 commented  
*Real-world experience in my field where I was given real responsibility  
3.0 GPA or higher; school is a priority  
The experience and knowledge of how Sandia works and researches*
13. Please use the section below, or the back of this page, to write any additional thoughts about or suggestions for improving the intern program in which you participated. none commented

## Appendix 4: Supervisors Survey Information

### Critical Skills Intern Programs 04 Supervisor Questionnaire—13 Responded

#### Background

1. What critical skills program are you involved in?
  - a. ESI (7)
  - b. CCD (1)
  - c. Not listed (5)
2. What degree level are your current interns?
  - a. HS (1)
  - b. AS, BS, BA (11)
  - c. PhD (2)

#### Involvement in internship program

3. What are the most important criteria for choosing an intern? (Circle all that apply)
  - a. Educational level and completed coursework (9)
  - b. Academic training and work experience (9)
  - c. GPA (9)
  - d. Comments/other: (8 commented)  
*All are important as is the work ethic*  
*Willingness to work hard/work outside*  
*Ability to work with minimal supervision, also a clearance is very valuable*  
*Interested in subject material*  
*One of my interns started AP as a 10<sup>th</sup> grader and will be a junior in college*  
*Attitude, enthusiasm for assigned work*  
*Interested in the type of work we do in 9125*  
*It is also very important to make sure the intern understands the nature of the work, and the requirements of the job. Once the intern understands these aspects of the job, it is important to make sure the job is a good match for the student's interests..*
4. What is most valuable to you about the critical skills intern program? (Circle all that apply, if one of the elements was most important, please put a star by that element)
  - a. Introducing Sandia and well-qualified potential employees (9)
  - b. Financial support in bringing interns into my research program (1)
  - c. Getting work done (6)
  - d. Developing/maintaining a research relationship with the intern's university (4)
  - e. The technical focus that the program provides (3)
  - f. Administrative support in locating and hiring interns (1)
  - g. Comments/other: none commented
5. Please rank your overall experience in this internship program:  
Average Rank 4.6 out of possible 5
6. Would you hire your intern (assuming appropriate qualifications) to be a member of the technical staff?
  - a. Yes ( )
  - b. Too soon to tell ( )
  - c. No ( )
7. Please use the space below or the back of this page to write any additional thoughts about or suggestions for improving the intern program in which you participated.  
*It has been difficult with the recent DOE initiative to not grant clearance to students under 18 years of age. With this policy, I cannot give students as much help as I would like, since they can not come and go as they wish.*  
*Program Provides Opportunities for Students and is well organized.*  
*The type of work I have available for summer interns is basic Bachelor of Science level engineering. Therefore, it is not strongly reflective of how a student would perform if he/she were some day hired as a member of the technical staff. However, I believe that*

*my interns have gotten something more than just a paycheck and that I have gotten valuable assistance in supporting my programs.*

*I'm not sure which exact intern program I participated in, but based on my experience I saw a definite lack of communication with the supervisors before the interns started their summer work.*

*Details such as who is responsible for different aspects of the students work environment were either poorly communicated or not communicated at all. My admin and I spent a lot of time trying to figure how who is responsible for computers, phones, office furniture, office supplies, computer accounts, etc. A short, single page document with responsibilities, contacts, and a schedule would be a significant improvement.*

*The computerized hiring program could be easier to use.*

**Appendix 5: ATA—Manufacturing Data**

Data provided by Program Staff

AHS & WMHS--ATA Advanced Manufacturing

Mike Stanton / Tom Daly

FY04

<b>Enrollment</b>		
Grades	# Enrolled	Gender
9	31	17F, 14M
10	82	34F, 48M
11	123	48F, 75M
12	110	52F, 58M
<b>Total</b>	<b>346</b>	

<b>GPA</b>					
Grades	3.0-4.0	2.0-2.9	1.0-1.9	0.0-0.9	<b>Total</b>
9	0 F, 0 M	5 F, 1 M	10 F, 8 M	2 F, 5 M	31
10	6 F, 10 M	12 F, 15 M	9 F, 14 M	7 F, 9 M	82
11	8 F, 17 M	20 F, 36 M	20 F, 22 M	0 F, 0 M	123
12	19 F, 23 M	29 F, 30 M	4 F, 5 M	0 F, 0 M	110

<b>Ethnicity</b>				
Grades	Anglo	Hispanic	Other	TOTAL
9	3	14	14	31
10	29	50	3	82
11	30	77	16	123
12	20	80	10	110
				346

**NOTES:**

Additional information that would be useful:

Withdrawals from program (number and reasons for withdrawal)

Interns, by grade, at SNL or other (number and where)

Students, by grade, in non-HS classes related to ATA (number and where: TVI, UNM, etc.)

Students employed in ATA-related job (number and where: SNL, etc.)

List of professional development opportunities for teachers/administrators (and number who participate)

Teachers (number and type: metal working, computer, etc.)

Administrators (number and type)

**Appendix 6: ATA—Photonics**

Data provided by Program Staff

WMHS--Photonics

Tom Daly

FY04

<b>Enrollment</b>		
<b>Grades</b>	<b># Enrolled</b>	<b>Gender</b>
9	38	18F, 20M
10	18	7F, 11M
11	26	9F, 17M
12	21	9F, 12M
<b>Total</b>	103	

<b>GPA</b>					
<b>Grades</b>	<b>3.0-4.0</b>	<b>2.0-2.9</b>	<b>1.0-1.9</b>	<b>0.0-0.9</b>	<b>Total</b>
9	17 F, 14 M	1 F, 6 M	0 F, 0 M	0 F, 0 M	16--20
10	6 F, 7 M	1 F, 4 M	0 F, 0 M	0 F, 0 M	7--11
11	6 F, 8 M	3 F, 5 M	0 F, 4 M	0 F, 0 M	9--17
12	7 F, 7 M	2 F, 5 M	0 F, 0 M	0 F, 0 M	9--12

<b>Ethnicity</b>				
<b>Grades</b>	<b>Anglo</b>	<b>Hispanic</b>	<b>Other</b>	<b>TOTAL</b>
9	8--9	9--11	0--1	18--20
10	2--3	5--8	0--0	7--11
11	2--5	5--11	2--1	9--17
12	14--19	25--39	2--2	41--60
				103

NOTES:

**Additional information that would be useful:**

Withdrawals from program (number and reasons for withdrawal)

Interns, by grade, at SNL or other (number and where)

Students, by grade, in non-HS classes related to ATA (number and where: TVI, UNM, etc.)

Students employed in ATA-related job (number and where: SNL, etc.)

List of professional development opportunities for teachers/administrators (and number who participate)

Teachers (number and type: metal working, computer, etc.)

Administrators (number and type)