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DOE Workforce Issue Paper

December 2000

Executive Summary

The DOE National Laboratories, with key missions in basic science, national security, energy resources, and environmental quality, have long been regarded as “one of the largest and most distinguished Laboratory systems in the world” and “a major component of the Nation’s infrastructure for maintaining US leadership in scientific discovery and knowledge generation.” However, the Labs are currently experiencing a number of critical challenges regarding their scientific and engineering workforce, and several key actions need to be taken for the Labs to remain “crown jewels” of the US scientific enterprise in the new economy.

Exciting work and a promising future are required to attract and retain employees with critical new skills. *The Department and Congress must reaffirm the importance of the DOE National Labs and the missions they serve. A renewed commitment is needed to invigorate the basic sciences and exploratory R&D that keep the Labs at the forefront of cutting-edge technology and thereby reenergize their workforce.*

Each Lab has experienced dramatic budget fluctuations, making strategic workforce planning extremely difficult. The resultant erratic hiring has made it impossible for the Labs to maintain a consistent presence on campus. *Continuous support for the missions and stable, multi-year budget commitments are required to allow the Labs to implement more effective strategic planning, attract more scientific talent, and improve recruiting relationships with top universities.*

Lab flexibility in personnel management has eroded through increased contractual restrictions in personnel management appendices to management contracts. *To remain competitive, the Labs need greater flexibility regarding compensation, benefits, and overall personnel management consistent with attracting and retaining top quality candidates.*

The pipeline feeding the Labs is drying up as smaller numbers of high tech grads support greatly increased demand for high tech workers. *Congress must recommit significant DOE funding for staff career development and training programs, education outreach, and student internship programs.* Increasing numbers of advanced degrees in science and engineering are awarded to foreign nationals and Asian Americans, both of whom may have reservations about working at the Labs. *A cautious and rational security policy must be crafted to allow the Labs to tap into the outstanding scientific and engineering talent pool in this country, including foreign nationals.*

The working atmosphere at the Labs has worsened with a drift towards compliance-based management. *The Department must emphasize performance over compliance, and reestablish the authority of the Laboratories and Contractors regarding best industrial practices.*

Introduction

At the beginning of the 21st Century, times are good in this country. The economy is still healthy, driven especially by productivity gains enabled by information technology and globalization. Unemployment is hovering around 4%, a 30-year low. With this situation comes an appreciation by employers that the talented people that make up their organizations are ever more important. Human capital has replaced traditional types of capital as the number one asset in which an institution needs to invest to secure its future.

But this is not merely a transitory circumstance based on current economic conditions. The Knowledge Era of today is so vastly different from the Industrial Era that preceded it that the economy and job market have been fundamentally and forever changed. Highly educated technical professionals, the mainstay of the knowledge economy, will be in high demand for the foreseeable future.

The DOE National Laboratories, with key missions in basic science, national security, energy resources, and environmental quality, have long been regarded as “one of the largest and most distinguished Laboratory systems in the world” and “a major component of the Nation’s infrastructure for maintaining US leadership in scientific discovery and knowledge generation.”¹ A special report to the President of the United States in June of 1999 confirmed that these Labs have “provided the nation with far-reaching advantages.”² The importance of the Labs’ basic research was recently highlighted by Harold Varmus, Nobel Laureate and past NIH Director, who called for a national commitment to a “balance of sciences” including the programs of the DOE Office of Science.³

However, the Labs are currently experiencing a number of critical challenges regarding their scientific and engineering workforce, and several key actions need to be taken for the Labs to remain “crown jewels”⁴ of the US scientific enterprise in this new environment. This report was prepared with the involvement of nearly all of the DOE Labs through a process described in Attachment 1. Although there are differences between individual Labs and between groups of Labs (e.g. National Security Labs vs. Science Labs), this report focuses on the high degree of commonality across the DOE Labs regarding workforce issues. Lab practices aimed at addressing these issues are captured in Attachment 7. Key recommendations for actions that go beyond what the Labs can do themselves are contained within the report sections listed below, and also summarized in the final section.

- Exciting Future Required to Attract and Retain the Best and Brightest
- Serving Important Long-Term Missions Requires Continuous Commitment
- Flexibility in Compensation, Benefits, and Overall Personnel Management Needed at Labs
- Declining Human Resource Pipeline a Critical Issue
- Compliance-Driven Working Atmosphere Must Be Addressed

¹ For the reader who is not familiar with the DOE Lab system, please refer to *Strategic Laboratory Missions Plan*, Laboratory Operations Board, US Department of Energy, July 1996 (currently being updated) and see <http://home.doe.gov/people/peopnl.htm> for links to web sites for each Laboratory.

² Report of the President’s Foreign Intelligence Advisory Board, June 1999

³ Varmus, Harold, *Squeeze on Science*, Washington Post, October 4, 2000

⁴ The DOE Labs have been referred to with this term in a number of assessments, including for example, reference 2.

Exciting Future Required to Attract and Retain the Best and Brightest

The best and brightest scientists and engineers are motivated first and foremost by cutting-edge exciting work and the opportunity to make a significant contribution. A difficult challenge for the DOE Laboratories is the perception that some of the missions of these institutions are no longer important and do not offer a promising future.

The DOE Labs as a whole are having a difficult time retaining younger employees who provide critical new skills in areas such as computer science and thereby allow the Labs to shift their skills mix to meet today's mission requirements (See Attachment 2: FY00 Non-Retirement Attrition). We have anecdotal evidence that suggests many of these more mobile workers are leaving for positions in the private sector because they do not see a bright long-term future for the Labs. For some of the Labs, this is a dramatic change from a decade or so ago when attrition rates for technical staff in their 20s and early 30s were two to three times lower than they are today. Although retention difficulties should be expected in this hot economy, we cannot use industry norms as a valid basis for comparison. While high turnover rates are difficult to manage in the private sector, the programmatic impact of moderate (by industry standards) attrition at the national Laboratories is particularly difficult.

In some areas of DOE Lab research, reasonable turnover levels can be managed as an asset for refreshing skills. However, many of the long-term scientific research programs at the Labs support long-term national needs and therefore require long-term employment models. The intellectual risk required for cutting-edge scientific research is difficult to take without a long-term commitment of funding by the customer and of employment by the scientist. In many cases, the specialization of skills developed in the research programs is such that the cost of replacing even one key person is extremely high. In the weapons stockpile stewardship program, much of the knowledge about weapons designs resides within the experienced weapons designers, and it takes many years to train and develop new talent.

Questions about the future of the Labs also impact our ability to attract new graduates. Although formal acceptance rates have not been tracked consistently over time by all DOE Laboratories, recruiting professionals for the Labs report a noticeable decline in the level of interest on the part of students in considering the Labs as potential employers. The net effect of the difficulties of retaining younger employees and decreasing attractiveness to new graduates is an aging workforce at the Labs (See Attachment 3: FY00 Age Distribution). Even after accounting for differences in degree levels, the DOE Labs have a significantly smaller proportion of scientists and engineers under the age of forty than the US norm (26% vs 40%).

The Department and Congress must reaffirm the importance of the DOE National Labs and the missions they serve. A renewed commitment is needed to invigorate the basic sciences and exploratory R&D that keep the Labs at the forefront of cutting-edge technology and thereby reenergize their workforce. First rate facilities and equipment must be invested in and the work at the Labs must offer researchers the potential for national and international recognition. On campus, the Labs must foster a unique reputation for cutting-edge research, the best facilities and equipment, an environment in which scientific exchange and appropriate security restrictions go hand in hand, and the opportunity to contribute to the most challenging national and global problems over a long-term career.

Serving Important Long-Term Missions Requires Continuous Commitment

The Labs serve the country in extremely important and compelling missions. Yet, fluctuations in the support to these missions over the past decade have caused the Laboratories extreme difficulty in workforce planning for their long-term research and missions (See Attachment 4: Impact of Budget Fluctuations on Staffing). Uncertainty about the future caused by fluctuations in the commitment and in budgets allocated by Congress is exacerbated by delays in the Department's own budget process. Program managers at the Labs struggle to appropriately scope and plan their programs in the face of uncertain budgets. Although many of the Labs are attempting to use their internal budget allocation processes to buffer some of the erratic trends in funding, this is not an efficient long-term solution.

For Labs that use campus recruiting for a large portion of their new hires, there is an added difficulty associated with the timing of the budget uncertainties. The uncertainty well into each fiscal year of what the final budget numbers will be makes it impossible for the DOE Labs to match the optimum timing of job offers to new grads. As the Labs wait for the budgets to firm up, high tech companies commit lucrative offers to the best candidates. With an aggregate unemployment rate for scientists and engineers at a mere 1.2% and various studies showing up to 350,000 high-tech positions unfilled nationwide, competition for the top new high tech grads is fierce. Although each of the Labs targets a small number of schools for its recruiting efforts, highly unstable budgets have translated into erratic hiring trends which have contributed to an overall inconsistent presence on the campuses of top universities (See Attachment 5: Hiring Trends). A recent study by Brecker and Merryman found that consistent campus presence is a key factor for recruiting success in today's environment. Fluctuating budgets also impact our collaborative R&D with universities, another point of leverage in the competition for new talent.

A clear message of commitment to the missions of the Labs would help restore a sense of pride and excitement about the work of the Laboratories. For example, a five-year budget plan for the Department's programs could be developed as has already been requested by the Appropriations Committees.⁵ In addition, the Department must commit to a more stable and rapid internal budget allocation process. Continuous support for the missions and stable, multi-year budget commitments are required to underscore the national importance of the DOE Labs' work, and to allow them to implement more effective strategic planning, attract more scientific talent, and improve recruiting relationships with top universities.

⁵ PL-106-65 National Defense Authorization Act for Fiscal Year 2000

Flexibility in Compensation, Benefits, and Overall Personnel Management Needed at Labs

In this tight Labor market, private sector companies have the flexibility to ratchet up the total compensation package that they offer to current and prospective employees to remain competitive for the best talent. In stark contrast, the DOE national Laboratories have had numerous constraints placed on their compensation and benefit offerings in recent years. For most Labs, a voluminous statement of contractual requirements for personnel management, often called “Appendix A,” prescribes in contractual language all of the limits and restrictions on each Lab’s practices. With the DOE local operations offices responsible for interpretation of the contract and DOE Headquarters often having a role as well, some of the Labs are caught in a slow, cumbersome process of requesting exceptions which prevents the Labs from the quick action required in the new competitive job market.⁶

One example of a situation in which additional flexibility is especially needed is the Labs which are particularly at risk because of their proximity to high-tech industry corridors. Housing costs in these areas require added flexibility with relocation packages and housing allowances, in addition to salaries that are competitive with “dot coms.” Another area in which flexibility is required is in staffing Information Technology (IT) positions. The demand for these professionals so far exceeds their supply that compensation norms must often be exceeded to be competitive for the best talent.

The total compensation packages offered by the Labs are generally not competitive with the best that industry has to offer. By DOE Order, most of the Labs are held to salary distributions around the 50th percentile, and employee benefits are no greater than 4% above industry averages. Many of the Labs must get the approval of their local DOE office to offer salaries above a mid-range number. For example, one Lab requires DOE approval for any salary action that would result in a salary above \$80,000. Offering “average” salaries and “average” benefits is not an appropriate strategy for attracting and retaining the “best and brightest.” In addition, private companies typically offer greater total compensation through stock options, large performance-based bonuses, and other profit and equity sharing mechanisms (See Attachment 6: Case Studies).

However, employment candidates look at the entire package of compensation and benefits, plus additional qualitative attributes, when deciding whether or not to join or stay with a company. Many private sector companies work diligently to provide their employees with perks such as on-site child care centers, and tuition reimbursement which give employees the clear message that they are valued and their workplace satisfaction and productivity are important. Many of the Labs are adopting different strategies that emphasize challenging important work in addition to compensation and traditional benefits, and are experimenting with new benefits offerings and increases in current compensation and benefits (See Attachment 7: Lab Best-Practices). However, the Labs are not having the degree of success with these programs that they would like. Many of

⁶ One of twelve recommendations in the 1999 Report of the Commission on Maintaining US Nuclear Weapon Expertise (Chiles Commission Report) was “Provide contractors with greatly expanded latitude and flexibility in personnel matters.”

the programs are new, most are un-funded, and nearly all require protracted negotiations with the Department for initial approval.

To remain competitive, the Labs need greater flexibility regarding compensation, benefits, and overall personnel management. A streamlined substitute for the current Appendix A needs to be designed that spells out general concepts and principles regarding compensation and benefits programs consistent with attracting and retaining top quality candidates. At a detailed level, the Labs need the flexibility to manage and implement their own programs, taking into account best business practices, issues of affordability, and their unique competitive challenges. Against a backdrop of stable budgets, the Labs need the flexibility to apply innovative tools such as separation incentives, retention and signing bonuses, cafeteria-style benefits, etc. This would allow the Labs to manage their demographics strategically.

Declining Human Resource Pipeline a Critical Issue

Demographers refer to the period of time between 1965 and 1980 as the “birth dearth.” Primarily driven by a significant number of women entering the workforce and the advent of birth control options, this phenomenon is in part responsible for the tight Labor market of the past 7 to 10 years. The following table dramatically represents the impact of this decline in the United States birthrate on the size of the pool of available workers.

GROUP	BIRTH YEARS	TOTAL BIRTHS
Traditionalists	Before 1946	54 Million
Baby Boomers	1946-1964	78 Million
Generation X	1965-1980	48 Million
Echo Boomers	1981-1995	72 Million

Like much of industry, the DOE Labs will have difficulty recruiting and retaining members of “Generation X” – there are simply not enough workers to go around. While the size of the Echo Boom generation might indicate that this is a temporary issue, the demographics of this group, particularly in terms of ethnic diversity, make attracting and retaining Echo Boomers to science and engineering an important future challenge for the Laboratories.⁷

Many of the Labs are implementing innovative educational outreach and school-to-work programs to address the pipeline issue (See again Attachment 7). Although the Labs have been investing in these types of programs, direct funding for internships, training, and education programs has been cut to essentially zero. Congress must recommit significant DOE funding for staff career development and training programs, education outreach, and student internship programs in recognition of the workforce crisis developing at the

⁷ For an excellent assessment of the future need for and challenge of full participation by all ethnic and gender groups in S&T, please see *Ensuring a Strong US Scientific, Technical, and Engineering Workforce in the 21st Century*, National Science and Technology Council, April 2000

Labs, and for the long-term health of the country's economy which is stimulated by basic research.

An added difficulty for the Labs with security requirements is that a large and increasing portion of science and engineering graduates are non-US citizens. Nation-wide, over one third of science and engineering graduate students, and 10-15% of faculty are foreign nationals. And, increasing percentages of the US citizens studying science and engineering are Asian Americans (See Attachment 8: Science and Engineering Graduates by Ethnicity and Citizenship). The visibility of security issues at the Labs has raised concerns about potential workplace hostility toward Asian Americans. Some might extrapolate that the environment is not friendly to ethnic differences more generally, and this puts at risk the ethnic diversity dimension of the best and brightest workforce.

In today's world of increasing globalization, seemingly simple and obvious solutions to the pipeline issue which may involve increased security measures can have far-reaching impacts on the ability of the Labs to perform their missions. For those Labs with requirements to protect classified information, a cautious and rational security policy must be crafted to allow them to tap into the outstanding scientific and engineering talent pool in this country, including foreign nationals. It is important to determine under what circumstances it is appropriate to have foreign nationals on staff, when it makes more sense to enter into distant collaborative relationships with foreign nationals, and when the programmatic security needs are so great that no foreign national involvement can be permitted. For the longer term, we must work to increase the attractiveness of careers in science and engineering to U.S. citizens.

Compliance-Driven Working Atmosphere Must Be Addressed

The working atmosphere in the DOE Laboratories has worsened in recent years. Already mentioned above are the increased questioning of the importance of the missions and programs of the Labs, and constraints on scientific openness and freedom. In addition, heavy bureaucratic micro-management is creating a culture of cumbersome compliance and lack of trust. Polygraphs, travel restrictions, cuts to Laboratory Directed Research and Development (LDRD), negative publicity, increases in security requirements, these all contribute to a sense of burden and discomfort which impacts these institutions at every level, including impacts on the productivity of the individual researcher. Recent situations in which an incident at a single Lab has resulted in far reaching policy changes that affect all of the Labs are a point of contention. These policy changes often take the form of increased requirements that carry added costs for the Labs and restrict the ability of the Labs to do great science.

While the DOE Labs still operate as Government Owned Contractor Operated (GOCO) entities, contract terms added in the past decade have diminished the management role of the contractor. Some of this change is the result of public expectations for greater accountability for government funds, but the drift toward compliance-based management must be reversed. Six years ago, a major review of the DOE National Laboratories identified growing emphasis on oversight and compliance as a key concern, and stated "something really substantial has to be done soon or the vitality of the laboratories will founder."⁸

⁸ Report of the Task Force on Alternative Futures for the DOE National Laboratories, February 1995

The Department must emphasize performance over compliance, and reestablish the authority of the Laboratories and Contractors regarding best industrial practices, Lab and Contractor administration of compensation and benefits, and self-direction of exploratory research to attract world-class scientists and foster breakthrough innovations.

Summary of Recommendations

The DOE National Laboratories, with key missions in basic science, national security, energy resources, and environmental quality, have long been called “crown jewels”⁹ of the US scientific enterprise. However, at the current time, these Labs are experiencing difficulty in recruiting, retaining, and rejuvenating their key scientific and engineering workforce.

The recommendations given below summarize the steps, which we consider essential to redress this situation.

- ◆ The Department and Congress must reaffirm the importance of the DOE National Labs and the missions they serve. A renewed commitment is needed to invigorate the basic sciences and exploratory R&D that keep the Labs at the forefront of cutting-edge technology and thereby reenergize their workforce.
- ◆ Continuous support for the missions and stable, multi-year budget commitments are required to underscore the national importance of the DOE Labs’ work, and to allow them to implement more effective strategic planning, attract more scientific talent, and improve recruiting relationships with top universities.
- ◆ To remain competitive, the Labs need greater flexibility regarding compensation, benefits, and overall personnel management. A streamlined substitute for the current Appendix A¹⁰ needs to be designed that spells out general concepts and principles regarding compensation and benefits programs consistent with attracting and retaining the best and brightest.
- ◆ Congress must recommit significant DOE funding for staff career development and training programs, education outreach, and student internship programs in recognition of the workforce crisis developing at the Labs, and for the long-term health of the country’s economy which is stimulated by basic research.
- ◆ For those Labs with requirements to protect classified information, a cautious and rational security policy must be crafted to allow them to tap into the outstanding scientific and engineering talent pool in this country, including foreign nationals.
- ◆ The Department must emphasize performance over compliance, and reestablish the authority of the Laboratories and Contractors regarding best industrial practices, Lab and Contractor administration of compensation and benefits, and self-direction of exploratory research to attract world-class scientists and foster breakthrough innovations.

⁹ The DOE Labs have been referred to with this term in a number of assessments, including for example, reference 2.

¹⁰ Appendix A is the statement of contractual requirements for personnel management that many of the Labs must operate under.

Attachment 1: Process Description

At the March 2000 Lab Directors' meeting, Ernie Moniz requested the development of three white papers on the following topics: Workforce Challenges for the DOE Laboratories, DOE Infrastructure Modernization, and Communicating the Value of DOE's R&D Portfolio. Joan Woodard, Deputy Director of Sandia National Laboratories, was asked to lead a taskforce on the first topic, Workforce Challenges, and prepare this issue paper for the December 2000 Lab Directors' meeting. The intent is for these three papers to provide information to the transition process, highlighting these issues and proposed actions that would significantly benefit the DOE and its Laboratories.

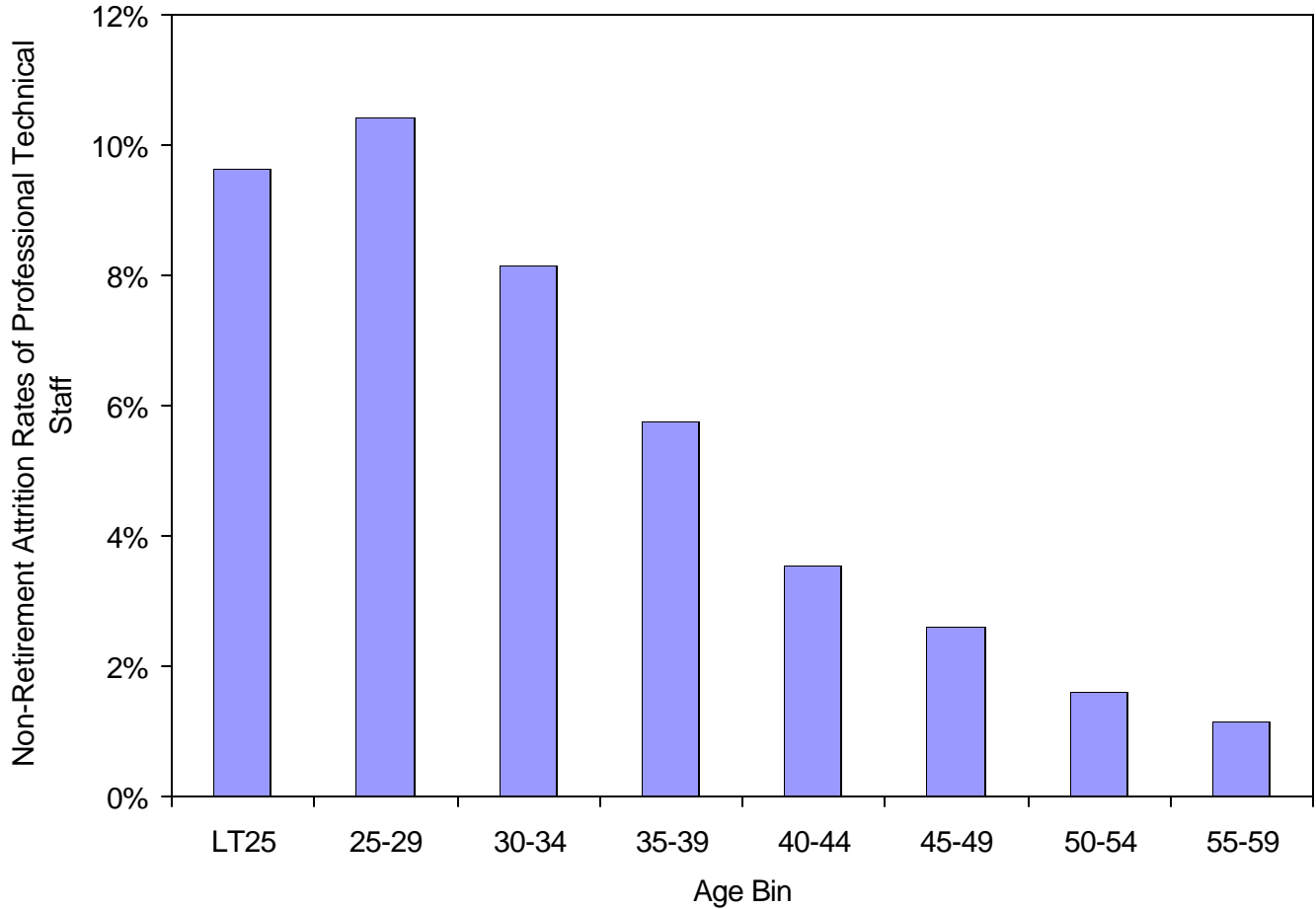
All of the DOE Laboratories were invited to participate on the Workforce Challenges Taskforce, and the following Labs were actively involved:

- Argonne National Laboratory
- Brookhaven National Laboratory
- Fermi National Accelerator Laboratory
- Idaho National Environmental Engineering Laboratory
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- National Energy Technology Laboratory
- National Renewable Energy Laboratory
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Princeton Plasma Physics Laboratory
- Stanford Linear Accelerator Laboratory
- Sandia National Laboratories
- Savannah River Technology Center

This paper was prepared through a two-part process of (1) semi-weekly teleconferences for discussing issues and best practices, and (2) data sharing and analysis. It has been extensively reviewed by the taskforce, and represents the common workforce challenges faced by the DOE system of Labs. All Lab Directors had the opportunity to review this paper as well.

Attachment 2: FY00 Non-Retirement Attrition

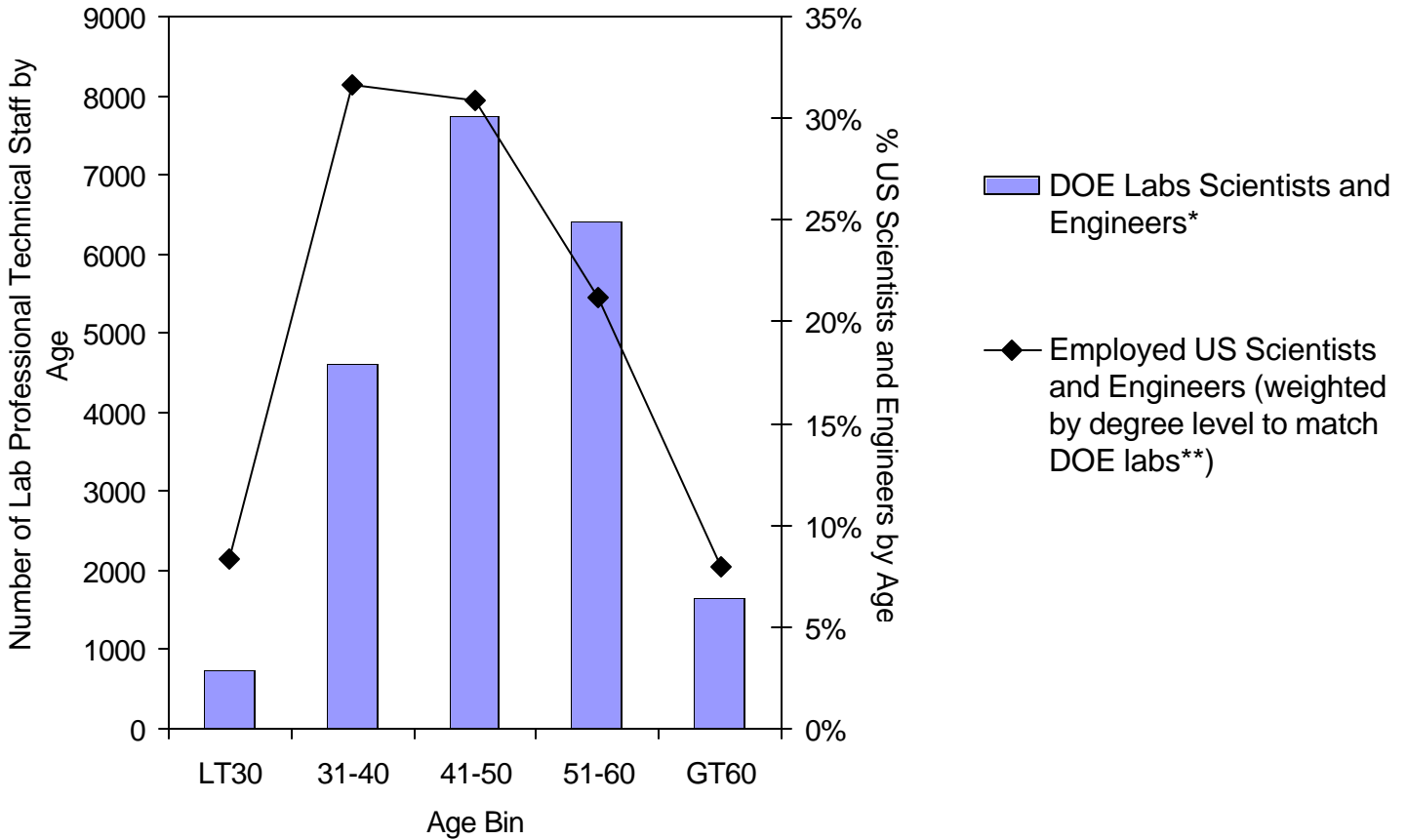
High attrition rates for younger employees means the Labs are losing new skills which are essential in rapidly advancing areas such as computer science.



Note: Includes data for ANL, BNL, FNAL, INEEL, LANL, LLNL, NETL, NREL, ORNL, PNNL, PPPL, SLAC, SNL, SRTC

Attachment 3: FY00 Age Distribution

Even after accounting for differences in degree levels, the DOE Labs have a significantly smaller proportion of scientists and engineers under the age of forty than the US norm (26% vs 40%).

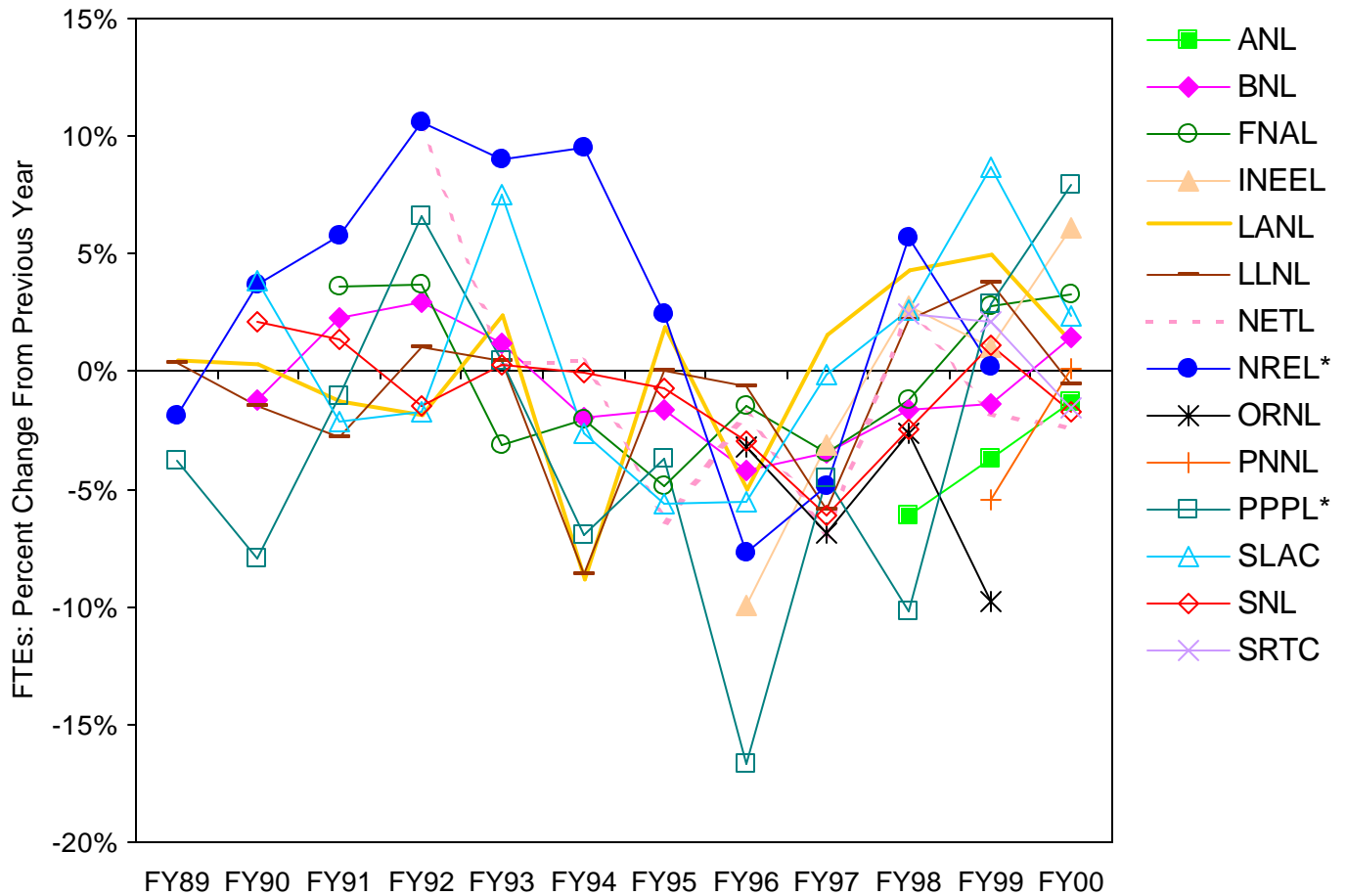


*Note: Includes data for ANL, BNL, FNAL, INEEL, LANL, LLNL, NETL, NREL, ORNL, PNNL, PPPL, SNL, SLAC, SRTC.

**Note: Weighting factors derived using data from a representative set of Labs.

Attachment 4: Impact of Budget Fluctuations on Staffing

Wide fluctuations from year to year in Lab budgets make strategic workforce planning extremely challenging.

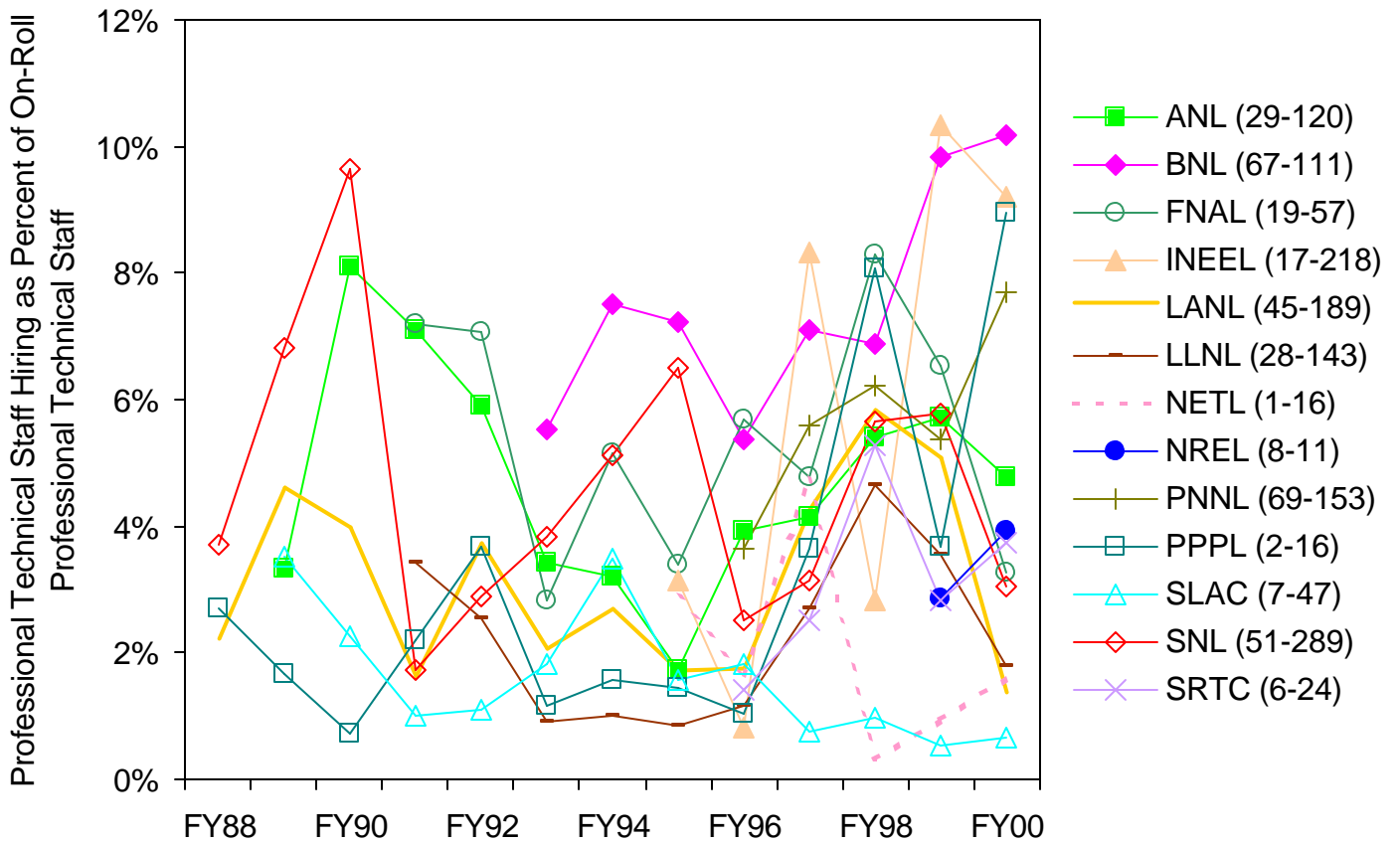


*PPPL and NREL data have been reduced by a factor of two for ease of plotting on the same graph.

Note: Some of the changes shown are due to factors other than budget changes, e.g. transfer of function to a new contractor.

Attachment 5: Hiring Trends

A combination of erratic hiring over time and periods of very low hiring has prevented the Labs from adequately rejuvenating their S&T workforce.



Note: Numbers in parentheses in the graph legend denote the range of hiring in raw numbers over the period of time shown.

Attachment 6: Case Studies

Jane Doe worked at Lab X for nearly 11 years. She had a distinguished and promising career, and was most recently managing an important piece of a program considered key to the Lab's future. Although Jane felt she had a "dream job" in terms of her assignments and coworkers, she began to feel frustrated by bureaucratic requirements that were slowing the program's progress. Out of sheer frustration, she left the Lab for an offer she "couldn't refuse." She received a 30% increase in salary to work for an employee-owned business. Her signing bonus was \$15,000, and she will have two opportunities per year to buy into the company. The new firm paid a total of nearly \$58,000 in relocation expenses including the actual move of her family and belongings plus all closing costs on the home that was sold. In addition, Jane was given a no interest "bridge loan" to close on a new house before the old house sold.

Mary Garcia informed her manager and colleagues at Lab Y that she had accepted an offer from a web based help-desk software company about two miles from her home. She received an immediate 40% raise in salary, plus stock options and regular bonuses totaling \$20,000 over seven years. This was the first job she tried for, and here is how the process went: On Wednesday Sue filled out an application and emailed her resume to them. On Friday they called her at home to express interest and set up an appointment to phone-interview her on the evening of the following Monday. At the end of the phone interview, they set up an in-person interview for Wednesday evening. And after that meeting, they set up a series of individual and group interviews for Thursday morning. On Thursday morning, after those interviews were completed, the hiring manager invited her to wait a moment in her office, privately polled the interviewers, came back and made an offer which was accepted. Eight and a half days from start to finish, a 40% raise in pay, an interesting job, a title that will mean something on her resume when she makes her next move.

Sue Smith and Joe Jones were hired onto the scientific staff at Lab Z several years ago into the MRI research area which is a promising and hopefully well-funded future area for their department. Both had worked together and were doing so at the Lab and both left to join a prestigious school of medicine in the metropolitan area. Joe's salary was doubled and he indicated that the equipment he would have is more advanced and that the work environment was much better. He felt that working here under DOE was too uncertain and constrained and that the "systems" and "processes" that are being put in place due to DOE took too much time away from research. Sue shared the same feelings and looked forward to this new job to be in a more academic research environment. She felt constrained by the capriciousness of DOE funding also.

Attachment 7: Lab Best Practices

The Labs are exploring the following solutions to compensation and benefits issues:

- Total Rewards strategies that include challenging important work in addition to compensation and traditional benefits
- Increases in 401K benefits to employees (e.g. increasing company match, contributions based on gross pay as opposed to base pay) as well as increases in pension benefits
- Prestigious internal R&D awards that top Lab scientists compete for
- Royalty-sharing and technology spin-off programs, including “entrepreneurial leave”
- Work-life balance benefits such as additional vacation days, flex-time, telecommuting, compressed work week, etc.
- Cafeteria-style benefits plans that allow employees to make equivalent trade-offs within a suite of total benefits

The Labs are implementing innovative educational outreach and school-to-work programs to address pipeline issues.

- Student intern and co-op programs
- Community College programs
- Undergraduate fellowships
- Programs that fund completion of advanced degrees for high potential BS-level candidates, especially for women and minorities
- K-12 programs to enhance the math and science curricula
- Internships, research grants, training programs, and fellowships in conjunction with user facilities
- Training and course materials for elementary and high school teachers and students
- Programs for assisting potential employees, especially post-docs, with visa and citizenship procedures
- University funding for collaborative research

Attachment 8: Science and Engineering Graduates by Ethnicity and Citizenship

The population of students receiving advanced degrees in science and engineering from US universities is made up of an increasing proportion of non-US citizens which presents a difficult workforce pipeline challenge for those DOE Labs that must protect classified information. Recent racial profiling allegations against the Labs have caused some groups to call for employment boycotts against the Labs by the increasing numbers of Asian American science and engineering graduates.

