Labor Market Trends for Health Physicists Through 2012

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INTRODUCTION

This report assesses labor market trends for health physicists through 2012.[1] The assessment includes information on employment and salary trends in the general scientific and technical workforce as well as data specific to health physicists. In addition, for health physicists estimates of the number of job openings[2] are compared to the available supply of new graduates[3] to assess relative job opportunities in the labor market. The report includes jobs in nuclear energy, DOE laboratories and facilities, and nuclear weapons but excludes positions in medical/health facilities, active duty military, and other industries.[4] A reoccurring issue in the report is the extent that the current economic recession is affecting the labor market this year and will likely continue to do so through 2012.

CURRENT LABOR MARKET CONDITIONS

General Labor Market Conditions for Professional and Scientific Staff

Currently, the United States is experiencing a severe economic recession, the effects of major financial difficulties, higher unemployment, and fewer job openings. While these economic difficulties are reducing employment and hiring of scientific and technical workers in the U.S. economy, the impact is relatively less than in the broader workforce. The broad U.S. economy suffered a loss of 4.3% in the total number employed between September 2008 and September 2009, while employment decreased 1% in life, physical, and social science occupations.[5] Similarly, total employment decreased less than 1% during that time period for those with a college degree (bachelors or higher).[6]

The opportunities for new science and engineering college graduates were more severely affected by the recession. A survey of employers conducted during the spring 2009 indicated that expected hiring of new college graduates during 2009 will be down by 20% compared to 2008.[7] An exception was hiring expectations by Federal government agencies which were up almost 6% over 2008. Actual job offers to new college graduates through the summer 2009, substantiates these expectations as the number of job offers for science and engineering majors appears to be down by 20% or more from a year ago.[8] The declines in offers occurred for almost all job functional areas and types of employers, except for the Federal Government. Increased student interest in Federal government employment is shown in a recent survey of undergraduates' ideal employers.[9] Compared to surveys in previous years, students ranked several Federal agencies higher as employer choices with four agencies in the top twenty-five. The survey also indicated that students were more focused on career and job stability which many cited as a reason for selecting government agencies.

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[1] The data are for health physics scientist level positions and exclude technologists and technicians.

[2] Job openings for new graduate health physicists result from: (1) increases (if any) in the total number of health physics positions and (2) from net replacement needs resulting from attrition of health physicists who retire or otherwise leave the labor force, or who switch to a different occupation (such as, business managers or technical sale representatives). While some of the net health physics job openings are filled by workers moving in from other scientific or engineering occupations or by persons returning to the health physics occupation, most are filled by new graduates.

[3] In this report, the available supply of new graduates is defined as the total number of degrees granted each year minus those graduates who: (1) continue further study, (2) enter the U.S. military (active duty), and (3) accept a position in medical/health facilities or outside the U.S. with a non-U.S. employer.

[4] Employment data in the report include: nuclear electric utilities; vendors; consultants; fuel cycle; reactor and instrument design and manufacture; facility architectural design; civilian and defense decontamination and decommission; civilian and defense waste management and environmental restoration; nuclear energy research and development; nuclear weapons research, development, and design; nuclear weapons maintenance and production; academic institutions; and federal, state, and local government agencies.

[5] U.S. Department of Labor, Bureau of Labor Statistics, on-line data tables for employed persons by occupation.

[6] U.S. Department of Labor, Bureau of Labor Statistics, on-line data tables for employment status of the civilian non-institutional population 25 years and over by educational attainment.

[7] National Association of Colleges and Employers (NACE) report, "Job Outlook 2009, Spring Update," March 2009.

[8] National Association of Colleges and Employers (NACE) report, "Salary Survey," Summer 2009 data online.

[9] Survey by Universum USA cited in Business Week, "Undergrads Shuffle List of Dream Employers," May 18, 2009.

For several bachelor degree level science majors, the average starting salary offers in 2009 were less or basically the same as average salary offers in 2008. This includes biological/life sciences, chemistry, computer science, and environmental science.[10]

Current Labor Market Conditions for Health Physicists

Looking first at recent education trends in health physics, enrollments in health physics programs at the undergraduate (juniors plus seniors) and graduate levels increased from 2004 through 2007. In 2008, undergraduate (juniors plus seniors) enrollments decreased 12% while graduate enrollments decreased less than 4%. These enrollment trends produced more undergraduate and graduate degrees through 2007, and more master's degree graduates through 2008. Based on the enrollment trends, it is estimated that in 2009 the number of bachelor's degrees decreased about 8% while the number of graduate degrees increased by 10%. The increase in the estimated number of graduate degrees reflects the increases in graduate enrollments through 2007 and the longer time to degree completion at the graduate level. The estimated number of undergraduate degrees in 2009 is still well above the number of graduates per year from 2000 to 2004. (See Table 1.)

On the employment side, the number of positions for health physicists is estimated to have increased by 2% in 2009 over 2008, following a very small increase from 2007 to 2008. (See Table 2.) However, in 2008, (the latest year for which placement data is available) the hiring of new graduates by nuclear power utilities was at a ten-year high.[11] The estimates for health physicist employment should be treated cautiously as they are based on limited available data. Neither the U.S. Department of Labor nor Census Bureau collects employment data for health physicists.[12]

Available data in related industrial segments supports the estimated increase in the employment of health physicists during 2009. Survey data indicates that employment in nuclear electric power generation increased by over 3% from August 2008 to August 2009.[13] In broader related industrial areas, employment in hazard waste treatment and disposal increased by over 9% from August 2008 to August 2009, while employment in environmental consulting services declined by less than 1%. In addition, employment in life, physical, and social science occupations increased by 1% between third quarter 2008 and third quarter 2009.[14]

However, data for the general area of utilities, transportation, and warehousing indicates there were fewer replacement positions to fill due to substantial decreases in the number of quits and retirements between September 2008 and September 2009.[15] The decreases in the number of quits and retirements reflects the combined negative effects of the current depressed labor market and decreases in the value of retirement funds due to the declines in the stock market.

Within the health physics field, the data indicate that health physicists still have good employment opportunities and relatively good salaries. However, the economic difficulties have affected hiring and salaries. The available data indicate that, in general, there were fewer job offers this year for health physicists at all degree levels, although the effects varied by region of the country, degree level, and years of professional experience.[16] Anecdotal evidence from professionals in the nuclear energy field also indicates some softening in the labor market for health physicists, including some organizations

[10] NACE, op. cit., compared to NACE, "Salary Survey," Fall 2008.
[11] This includes nuclear electric utilities, DOE contractor facilities, and other nuclear-related organizations. See "Health Physics Enrollments and Degrees Survey, 2008 Data," No. 63, Oak Ridge Institute for Science and Education, Prepared for the U.S. Nuclear Regulatory Commission, 2009, and reports for surveys for previous years.
[12] See the footnotes for Table 2.
[13] U.S. Bureau of Labor Statistics, "Employees on nonfarm payrolls by detailed industry," on-line monthly establishment employment data for 2008 and 2009 through September. This is seasonally unadjusted data.
[14] U.S. Bureau of Labor Statistics, Household data, quarterly averages, "Employed persons by sex, occupation, class of worker, full- or part-time status and race," on-line household data for third quarters, 2008 and 2009. This is seasonally unadjusted data.
[15] U.S. Bureau of Labor Statistics, on-line monthly establishment data for job openings and hires for 2008 and 2009 through August. This is seasonally unadjusted data.
[16] "Salary Information for Health Physicists and Nuclear Engineers, June 2009." Oak Ridge Institute for Science and Education. Prepared for the U.S. Nuclear Regulatory Commission. October 2009. Compared to earlier years, 2009 survey responses indicated that the respondents, in general, had not made job offers for as many categories of degree levels and years of experience.

offering positions to new health physics bachelor degree graduates as technicians rather than scientists.[17]

The recession has affected salaries, most noticeably for bachelor degree level health physicists. The average starting salary for new bachelor degree health physicists declined in 2009 compared to 2008. Many employers reported no salary increases in 2009 and several reported slightly lower salaries.[18] While there appears to be fewer job offers for master's and doctorate degree graduates, the starting salaries for both graduate degree levels increased over the last year. (See Table 3). It should be noted that starting salaries for health physicists still compare well to most other scientific fields. (See Table 4.)

Health Physics Current Job Openings Versus New Graduates Available in the Labor Supply

The number of job openings in 2009 for health physicists are estimated to be 75% or less of the number that would be expected with more "normal' economic conditions.[19] The economic recession and financial credit crunch have resulted in a lower estimated number of job openings due primarily to reducing the number of retirements and replacement positions, and, to a lesser extent, to some employment cutbacks or hiring delays.

In spite of the reduced number of job offers, degree trends and available employment data indicate that during 2009 the number of job openings still somewhat exceeds the number of new graduates available in the labor supply, especially for new graduates at the master's level. The total number of new graduates in the available labor supply in 2009 was approximately 100, an increase of 20% over 2006. As noted above, the increase in graduates and available labor supply results from the enrollment increases starting in 2004. The number of job openings for new graduates appears to be in the range of 125 to 175, giving a ratio of mid range job openings to new graduates available in the labor market of 1.5.

LABOR MARKET OUTLOOK THROUGH 2012

Future Trends for U.S. Economy

The major issues in trying to project ahead to 2012 are the rate at which the economy and employment will recover and the ability of the financial sector to support new investment including investments in nuclear energy projects. Historically, after the last nine recessions the economy rebounded strongly within four quarters, however; the current consensus of economic forecasters is for a much slower recovery this time due to the "aftershock of the financial crises."[20] Currently, the economy appears to have started recovering with increasing sales and production. As is normal in economic recovery periods, employment is expected to recover more slowly and the unemployment rate to actually continue to increase into, at least, early 2010. While most forecasters project a steady, if slower, recovery from this recession, there is concern among some forecasters that the economy may actually slip backward in the next year. Their concerns include projections of increased mortgage foreclosures during 2010, a continuing lack of financial funds for investment loans, and the effects of the phase-out of various Federal government support and stimulus funds.

Future Trends for U.S. Nuclear Energy

Over the last few years there has been renewed interest in the expansion of nuclear electric power generation. The U.S. Congress has authorized the Department of Energy to provide loan guarantees for new nuclear power facilities and the front end of the nuclear fuel cycle, risk insurance to cover delays attributed to licensing reviews or litigation, and a tax credit per kilowatt for the first 6,000 Mwe of deployed

[17] Personnel correspondence and discussions by Oak Ridge Associated Universities staff at professional society meetings and with health physicists employed in academia and private sector firms.
[18] "Salary Information for Health Physicists and Nuclear Engineers, June 2009." Oak Ridge Institute for Science and Education. Prepared for the U.S. Nuclear Regulatory Commission. October 2009.
[19] "Salary Information for Health Physicists and Nuclear Engineers, June 2009." Oak Ridge Institute for Science and Education. Prepared for the U.S. Nuclear Regulatory Commission. October 2009.
[20] "Business Outlook," *Business Week*, October 12, 2009, p. 18.

nuclear power. Currently, 18 applications involving over two dozen new nuclear plants have been submitted to the NRC. The Tennessee Valley Authority has resumed construction on one plant and had construction permits reinstated for two other plants. Several utilities have placed orders for large, long-lead nuclear components and signed contracts for engineering, procurement, and construction.[21]

The timing of new power plant construction and operation, and the actual number of the new plants that will be built are still being widely debated. At a conference held in April 2009, the consensus among experts attending the nuclear power session was that three new nuclear power plants would be built over the next 10 years. This is fewer than had been expected earlier. Three factors were given for the reduced number of plants: the recession has reduced demand for energy; declining prices for natural gas; and the credit crunch restricting the ability to obtain big loans.[22]

The Labor Market for Health Physicists, 2012

The continuation of relatively good employment opportunities and salaries for health physics graduates in 2009 strongly indicates that these trends will continue through 2012. Some growth in employment positions and more hiring for replacement needs is very likely among nuclear power-related employers, government agencies and contractors, universities, and medical/health organizations. Moreover, the increased attention to global nuclear safeguards combined with an aging workforce may lead to increased employment needs within the U.S. government and contractors. In looking ahead to 2012, it is significant that job offers for health physicists including new graduates did not experience the level of declines experienced in other occupations for college graduates.[23] This means that there will not be much, if any, of a backlog of unemployed recent health physicists graduates seeking employment and competing with the future new graduates for employment positions.

As noted above, there are a number of questions about the rate of recovery of the general economy and the development of additional nuclear power generation. The larger impact from the recovery of the general economy on employment opportunities for health physicists will be on replacement hiring for retirement and quits. A growing economy will increase the value of stocks and retirement funds which will bring retirement rates back to more normal levels and perhaps even somewhat higher than normal levels as those who have deferred retirement choose to leave the workforce. Also, a growing economy provides more opportunities for career changes and could increase quit rates. While a strong economy will promote more growth in new health physicists' employment positions, the growth through 2012 will probably remain modest and be similar to the growth experienced during the four years prior to the 2009 recession.

Recent trends in health physics student enrollments do not indicate any large scale changes in the number of new graduates and available labor supply through 2012. As noted earlier, enrollments in health physics programs decreased some in 2008 compared to 2007 but were still well above enrollments in the preceding five years. The available data for the ongoing survey of health physics enrollments and degrees in 2009 is very limited but does indicate an increase in enrollments at the undergraduate junior and senior level, and at the graduate level.[24] If the data from the completed survey confirms these increases in enrollments in 2009 and if these increases continue, the number of new graduates might increase by 10% to 20% by 2012.

[21] Nuclear Power 2010, *Quarterly NEWS*, October 2009. NP2010 is managed by the U.S. Department of Energy Office of Nuclear Energy.
[22] Discussions at Fortune's Brainstorm: Green conference, April 2009, as reported on-line in CNNMoney.com report "A nuclear power renaissance? Maybe not."
[23] U.S. Bureau of Labor Statistics reported in Business Week, October 19, 2009, page 34. The percentage of college graduates ages 22-27 employed decreased from about 84% in August 2007 to about 81% in August 2009.
[24] This is based on responses from less than 20% of the health physics education programs to the 2009 health physics enrollment and degree survey conducted by ORISE for the U.S. Nuclear Regulatory Commission.

Projections for 2012: Job Openings for Health Physicists and Available New Graduates

Projecting growth in total employment positions, which increases job openings, is always uncertain. However, the greatest variation in projecting future job openings through 2012 results from the uncertainty about the number of replacement hires that will be required for retirements. Available evidence on the age distribution of health physicists indicates that many are in their retirement-eligible years. Through 2009, the expected larger number of retirements and replacement hiring for health physicists has not emerged. But given the age distribution, more health physicists will be retiring over the next few years.

If the economy continues the rebound from the current recession and returns to historic "normal" growth in 2011 or, at the latest, by early 2012, then the projections of the annual number of job openings for new graduates in 2012 will be in the range of 200 to 300. These are somewhat higher than in 2008 and 2009, because of a projected return to modest growth in total employment positions for health physicists (see Table 2) and return to more normal rates of retirement and quits.

Based on recent enrollment trends and limited data for 2009, the number of graduates available in the labor supply in 2012 is expected to be approximately 110 to 120, or about 10% to 20% higher than in 2008 and 2009. (See Table 1.) These projections for job openings and new graduates available in the labor supply indicate that there will be approximately 1.5 to 2 job openings per each available new health physics graduate in 2012.

If the economy has a slower recovery than experienced after past recessions and very little occurs in the development of new nuclear power generation by 2012, the projections still indicate that there will be approximately 1.25 or more job openings per new graduate in the labor market in 2012. Even with slower growth, some firms will add health physics employment positions and the replacement needs will be higher as the relatively older workforce in the nuclear energy field leads to higher retirement rates.

In summary, it is highly likely that the number of job openings for new graduate health physicists will continue to exceed the number of new graduates available in the labor supply through 2012. A continuing trend of relatively more job opportunities in health physics than in many other environmental, life, and physical science fields may stimulate even higher enrollment numbers in health physics programs which, in turn, would result in higher numbers of degrees than those projected. Based on historical experience, however, it appears quite unlikely that any further increase in the number enrolled would be sufficient in size to substantially reduce the projected relative shortages of new graduates over the next three years. On the employment opportunities side of the labor market, if the current interest in building new nuclear electric power plants materializes, the demand for health physicists could be substantially higher.

Table 1. Health Physics Enrollments, Degrees, and Estimated Available Supply[25]

Year	Total Enrollments	Total Degrees	Estimated Supply of New Graduates
1999	478	192	109
2000	393	136	81
2001	447	131	60
2002	425	137	73
2003	505	154	80
2004	568	132	60
2005	624	169	81
2006	639	173	83
2007	695	198	97
2008	646	189	98
2009 projected		*~200*	*~100*
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2012 projected		*~220-230*	*~110-120*

Table 2. Health Physicists Estimated Employment and Projections[26]
(*Excludes Medical Facilities, Active Duty Military, and Other Industries[27]*)

Year	Estimated Employment
1995	4,400
1997	4,000
1999	3,900
2001	4,100
2003	4,300
2005	4,600
2007	4,700 *(revised)*
2009	4,800
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2012 projected	*5,000 to 5,100*

[25] "Health Physics Enrollments and Degrees Survey, 2008 Data," No. 63, Oak Ridge Institute for Science and Education, Prepared for the U.S. Nuclear Regulatory Commission, 2009, and reports for surveys for previous years.
[26] Employment data before 1996 are from the Occupational Survey of Nuclear-Related Employment conducted biennially between 1975 and 1995 by Oak Ridge Institute for Science and Education (ORISE) for the U.S. Department of Energy. Employment data after 1995 are based on trends in the employment reported by organizations responding to the annual request for salary information conducted by ORISE for the U.S. Nuclear Regulatory Commission.
[27] Total employment of health physicists in medical/health facilities and other industries, based on very rough estimates, is about 2,000. This estimate is based on data on job placements of new graduates in medical/health facilities provided in the enrollment and degree surveys for over 30 years and on information found in various other reviews of the health physics profession.

Table 3. Annual Salary Percentage Increases for Entry Level Health Physics Positions[28]
(Excludes Government, Active Duty Military, Medical Facilities, and Academic Institutions)

Degree Level	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
B.S.	5.7%	1.7%	3.5%	2.5%	3.1%	5.3%	3.3%	-1.5%
M.S.	4.5%	0.0%	2.9%	2.2%	3.1%	5.2%	4.6%	5.7%
Ph.D.	4.4%	1.6%	0.9%	3.4%	2.1%	2.8%	3.1%	2.4%

Table 4. Entry Level Salaries: Health Physics Versus Other Fields, 2009[29]

	B.S. Level	M.S. Level	Ph.D. Level
Health Physics	$51,600	$62,000	$69,300
Nuclear Engineering	$62,500	$64,200	$69,500
Biological/Life Sciences	$33,300	not available	$43,200
Chemistry	$39,900	not available	$68,500
Computer Science	$61,400	not available	not available
Environmental Sciences	$39,200	not available	not available
Geological Sciences	$52,800	not available	not available
Physics	$51,600	not available	$72,400

[28] "Salary Information for Health Physicists and Nuclear Engineers, June 2009." Oak Ridge Institute for Science and Education. Prepared for the U.S. Nuclear Regulatory Commission. October 2009.
[29] Data on occupations other than health physics and nuclear engineering are from: "Salary Survey," Summer 2009, on-line data for members, National Association of Colleges and Employers. Data for health physics and nuclear engineering from "Salary Information for Health Physicists and Nuclear Engineers, June 2009." Oak Ridge Institute for Science and Education. Prepared for the U.S. Nuclear Regulatory Commission. October 2009.

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