# Basic Personnel Tools to Help Ensure a Future Public Health and Environmental Laboratory Workforce

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## SYNOPSIS

Competition is growing in the United States for a shrinking national pool of qualified laboratory scientists. Public health and environmental laboratories (PHELs) must address this problem using a range of strategies and tools to ensure that a highly technical workforce of PHEL scientists is available in the future. One of these tools is the use of common personnel standards involving job titles and definitions, job classifications and minimum qualifications, and multi-step career paths. This article explains in detail the need for structure and use of common, basic personnel standards in developing and retaining a national workforce of PHEL scientists.

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Public health and environmental laboratory (PHEL) scientists employed in state and local government laboratories account for only 1.3% of the 448,000 salaried public health employees.[1] This is a small, often invisible, but very important group of public health professionals who must possess both degrees in laboratory sciences and specialty training in PHEL practice. They provide the first line of defense in protecting the public by identifying and monitoring newly emerging diseases, sporadic outbreaks, terrorist threats, hereditary disorders, and environmental hazards.

Since the late 1960s, when the mission of PHELs entered a continuing period of rapid expansion and evolution,[2] PHELs have been at an economic disadvantage compared with federal and private laboratories when it comes to recruiting, paying, and retaining PHEL scientists. From 1968 through 1991, an attempt to help solve this problem took the form of a series of reports on position classifications and pay in state and territorial public health laboratories (PHLs).[3,4]

These reports were intended to provide information for standardization of jobs, education, and experience requirements for comparable positions within state and territorial PHELs, which their laboratory directors could use to increase staff salaries. However, because position titles varied considerably among the states, compilers had to arrange laboratory positions into expedient job classifications (five in 1968, increasing to 12 by 1991).[3,4] The differences in job titles, state size, and state organization prevented the data from being fully comparable from state to state.[5] By 1991, a general classification structure was published, outlining a dozen professional and technical job classifications, ranging from biologist and chemist to medical technologist, microbiologist, and scientific specialist.[4]

Although these data were sometimes useful to PHEL directors seeking to justify salary increases in their individual states, they provided no underlying mechanism to support or raise PHEL salaries nationally. As the competition for a shrinking number of new laboratory scientists[6–8] increases, it is imperative that PHELs find mechanisms that support competitive salaries and recruitment and retention of qualified PHEL scientists throughout the country.

We approached this problem by applying an action-learning process[9] that yielded a tool kit of related solutions.[10] One of the identified tools is the adoption of common, basic personnel standards for all PHELs. As part of this action-learning process, we reviewed and compared different state PHEL personnel systems and standards and reviewed various state[4] and federal[11–14] PHEL position titles, definitions, and classifications, as well as the personnel requirements outlined by the federal Clinical Laboratory Improvement Amendments of 1988.[15] Through this process, we identified, defined, and reached consensus on a proposed set of basic PHEL personnel standards. To improve PHEL scientist salaries, recruitment, and retention, we believe PHELs throughout the country should adopt or adapt a common set of personnel standards and career paths, such as those presented in this article.

## THE NEED FOR NATIONAL PHEL PERSONNEL STANDARDS

The overall mission of the nation's state PHELs is based on providing the 11 Core Functions and Capabilities of State Public Health Laboratories.[16] The success of this mission requires the effort of PHEL scientists who possess similar scientific education and training in PHL practice.

However, among the 50 states, there are nearly as many different sets of personnel standards for similar PHEL scientist positions.[4] This often confusing variation makes it difficult to present and market PHL practice as a separate, cohesive, and rewarding career. Furthermore, these variations in personnel requirements and salaries[4,5] for similar PHEL positions will make attempts at developing a national PHEL workforce pipeline more difficult because they hinder both the horizontal and vertical interstate mobility of PHEL scientists.

Any PHEL workforce pipeline and maintenance plan must begin with common personnel language and standards that can be readily understood, marketed, adopted, and adapted for use in every state and region. PHEL directors must take the lead in requesting common personnel standards. Even where such efforts initially may be hampered by bureaucracy, PHEL directors have the expertise and motivation to effect necessary personnel changes. In our experience, human resource agencies often request and welcome their technical expertise when revising standards for scientific job classifications.

Common personnel terminology and classification qualifications are essential in any attempt to identify positions with similar duties and to provide equitable and competitive compensation for those positions, both within and outside of government. Salary competitiveness is essential to scientist recruitment, retention, and succession planning.[17] We've known for some time that laboratorians typically will accept a 5%–7% lower salary than they could get elsewhere; however, when the inequity reaches 10%, employees begin looking for a position somewhere else.[18] In addition, common PHEL personnel standards would enhance recruitment

by facilitating common, logical career paths needed to support staff retention and succession.[19] Finally, standardization is needed to facilitate competitive marketing of similar careers in PHEL practice regionally and nationally.

## PHEL PERSONNEL STANDARDS: TERMS AND DEFINITIONS

The basic, standard personnel terms proposed in this article (i.e., PHEL aide/assistant, PHEL technician, PHEL scientist, PHEL developmental scientist, PHEL scientist-supervisor, PHEL scientist-manager, and PHEL director) are defined in Figure 1.

In naming job titles and classifications, we purposely used general position titles (e.g., technician, scientist, and supervisor) rather than more specific titles (e.g., chemist, medical technologist, or microbiologist). Using more specific titles or job options greatly complicates a PHEL job classification system by requiring different sets of minimum qualifications (e.g., specific coursework and job experience to distinguish each classification). More specific classification options also require the creation and maintenance of more job specifications, recruitment notices, eligible hiring lists, paperwork, personnel-related knowledge, and training for their effective use.

We have found it much simpler and more efficient to recruit using only general position titles and minimum qualifications, to which other, specific preferences can be appended as needed. The latter might include a degree in chemistry or biology, compliance with the

**Figure 1. Standard personnel terms and definitions proposed for use in state PHELs**

| *Term* | *Definition* |
|---|---|
| Job classification | The set of job titles, grade levels, and minimum qualifications associated with a closely related set of positions |
| Lead | A non-supervisory grade level for a laboratorian employed as an aide/assistant, technician, or scientist whose job description includes assigning, reviewing, and approving the work of lower-level laboratorians in the same job classification |
| PHEL aide/assistant | A laboratorian who possesses a high school diploma or equivalent and who performs simple to complex repetitive tasks and laboratory procedures |
| PHEL developmental scientist | A non-supervisory laboratorian who possesses an earned master's or doctoral degree from an accredited institution and special scientific knowledge, skills, or research experience needed to perform applied research (e.g., transferring and developing new technologies, researching and validating new analytical procedures, preparing grant proposals, and writing scientific publications) and technical oversight of developmental projects |
| PHEL director, environmental laboratory | A laboratorian with an earned doctoral degree in chemistry (e.g., analytical, biochemical, or environmental chemistry) from an accredited institution, and sufficient previous scientific and supervisory experience to meet requirements set by the hiring entity |
| PHEL director, public health laboratory | A laboratorian who possesses an earned doctoral degree (PhD, MD, DrPH, ScD/DSc, DVM/VMD) from an accredited institution, national certification, and sufficient experience to meet pertinent federal and state qualifications to direct a medical laboratory in one or more laboratory specialties |
| PHEL scientist | A laboratorian who possesses an earned bachelor's degree in a laboratory science or medical technology from an accredited institution who may perform a variety of laboratory duties that include processing specimens/samples, performing moderate- or high-complexity testing, and reporting test results |
| PHEL scientist-manager | A laboratorian who possesses an earned doctoral degree (PhD, MD, DrPH, ScD/DSc, or DVM/VMD) from an accredited institution and previous scientific and supervisory work experience in a public health, medical, environmental, or research laboratory, and who develops, oversees, and consults on a wide range of public health or environmental laboratory tests, services, and operations in a particular field (e.g., microbiology, molecular biology, newborn screening, or environmental chemistry) |
| PHEL scientist-supervisor | An individual with responsibilities that include signing employee time cards, conducting performance appraisals, and initiating progressive discipline |
| PHEL technician | A laboratorian who possesses an earned associate degree in a laboratory science or medical laboratory technology from an accredited institution |

PHEL = public health and environmental laboratory

PhD = doctor of philosophy

MD = doctor of medicine

DrPH = doctor of public health

ScD/DSc = scientific doctor/doctor of science

DVM/VMD = doctor of veterinary medicine/veterinary medical doctor

U.S. Patriot Act, and willingness to accept certain immunizations. Additional work experience preferences (e.g., polymerase chain reaction testing, food microbiology, or gas chromatography/mass spectrometry) can also easily be added, based on the needs of any particular position. Using preferences, based on the needs of a specific position, provides system flexibility. It also reduces how often formal position descriptions/specifications must be updated to keep up with ever-evolving career-field changes related to technology, education, experience, and regulatory requirements.

We also have found it useful to formally identify a list of acceptable bachelor's and master's degrees as part of PHEL personnel standards. Depending on a particular position's minimum qualification requirements, acceptable degrees may include or be limited to degrees in biology, biotechnology, chemistry, genetics, immunology, medical technology, microbiology, molecular biology, pharmacy, and zoology.

Acceptable doctoral degrees usually include the doctor of philosophy (PhD), doctor of medicine (MD), doctor of public health (DrPH), scientific doctor/doctor of science (ScD/DSc), and the doctor of veterinary medicine/veterinary medical doctor (DVM/VMD). Someone with a PhD or ScD/DSc is usually in an appropriate laboratory science. An individual possessing an MD or DVM/VMD is expected to have some level of medical laboratory training and/or experience. A person with a DrPH is expected to have a doctoral degree in PHL practice or have additional degree(s) in an appropriate laboratory science and possess substantial PHEL experience.

## PHEL PERSONNEL STANDARDS: JOB CLASSIFICATION CRITERIA

A typical job classification should contain a number of pay-grade levels. These grade levels may be based on the nature of the work (i.e., difficulty, complexity, required judgment, and lead responsibilities) and/or control over the work (i.e., independence and level of required supervision). More progressive classifications also allow for promotion from one grade level to the next, up to a certain level, based on time in grade and documentation that employees satisfactorily meet all job-related duties and responsibilities in their current grade level. Promotion normally becomes competitive when employees seek advancement to lead and initial supervisory and managerial levels.

We have named each classification, and grade levels within each, beginning with PHEL. This serves to limit the use of these classifications to PHELs. When multiple agencies use the same classification, it becomes much more difficult to justify, obtain, and equitably implement classification-based salary reviews and increases.

Each PHEL classification presented in this article is based on four criteria: (*1*) grade level, (*2*) supervision required, (*3*) minimum qualifications (i.e., required education and experience), and (*4*) promotional criteria. The complete list of proposed PHEL position classifications employing these four criteria is found in Figure 2.

We realize that some flexibility is key to the acceptance and adoption of common personnel terms and classifications. This means that some criteria in Figure 2 (e.g., number of grade levels, levels of supervision, minimum experience per grade level, and promotional criteria) may be open to some modification by individual jurisdictions. However, to ensure a minimum level of national standardization, other criteria (i.e., position and classification titles, minimum education requirements per classification, and minimum salary ranges per classification) should remain consistent among states and regions. The educational requirements proposed for PHEL technicians, scientists, supervisors, and directors are those already in effect, to a great extent, in most states because these education levels meet federal educational requirements for medical laboratories (including PHLs) under the federal Clinical Laboratory Improvement Amendments of 1988.[15]

## PHEL PERSONNEL STANDARDS: COMMON CAREER PATHS

One of the greatest barriers to ensuring a future PHEL workforce is a lack of adequate career paths.[19] In PHELs, too often this means a scientist seeking a promotion must wait for a higher position to open through retirement or death. Today's young scientists are not willing to wait two or three years, let alone five to 10 years, for a promotion. After obtaining a year or two of experience, they are highly marketable and readily seek new employers who will pay them what they are worth. For decades, this loss resulted in a very leaky PHEL workforce pipeline. It also has made PHELs training grounds for the federal government, universities, and the private sector—at great cost to state taxpayers.

Figure 3 shows how the eight position classifications in Figure 2 can provide career paths in PHELs. The individual classifications serve as stepping stones for an employee who, by meeting each classification's higher minimum qualifications, can be promoted to

**Figure 2. Standard job classifications, grade levels, and minimum qualifications proposed for state PHELs**

| *Job classification* | *Grade level* | *Supervision required* | *Minimum experience* | *Minimum education* | *Promotional criteria* |
|---|---|---|---|---|---|
| PHEL aide/assistant | 1[a] | Close | None | High school[b] | NA |
| | 2[c] | Moderate[d] | 1 year | High school | 1 year in grade |
| | 3[e] | General[f] | 2 years | High school | 1 year in grade |
| | Lead | General | 3 years | High school | Competitive |
| PHEL technician | 1 | Close | None | Associate degree | NA |
| | 2 | Moderate | 1 year | Associate degree | 1 year in grade |
| | 3 | General | 2 years | Associate degree | 1 year in grade |
| | Lead | General | 3 years | Associate degree | Competitive |
| PHEL scientist | 1 | Close | None | Bachelor's degree | NA |
| | 2 | Moderate | 1 year | Bachelor's degree | 1 year in grade |
| | 3 | General | 2 years | Bachelor's degree | 1 year in grade |
| | Lead | General | 3 years | Bachelor's degree | Competitive |
| PHEL developmental scientist | 1 | Close | None | Master's degree | NA |
| | 2 | Moderate | 1 year | Master's degree | 1 year in grade |
| | 3 | General | 2 years | Master's degree | 2 years in grade |
| PHEL principal developmental scientist | 1 | General | 3 years | Doctorate | NA |
| | 2 | General | 5 years | Doctorate | 2 years in grade |
| PHEL scientist-supervisor | 1 | General | 4 years | Bachelor's degree | Competitive |
| | 2 | General | 6 years | Bachelor's degree | 2 years in grade |
| PHEL scientist-manager | 1 | Managerial | 2 years | Doctorate | NA |
| | 2 | Managerial | 4 years | Doctorate | Time in grade |
| Assistant PHEL director | 3 | Managerial | 6 years | Doctorate | Competitive |
| Deputy PHEL director | 4 | Managerial | 8 years | Doctorate | Competitive |
| PHEL director | NA | Managerial | 8 years | Doctorate | NA |

[a]1 = entry level
[b]High school = high school diploma or equivalent
[c]2 = journeyman level
[d]Moderate = close supervision at times and general supervision at times
[e]3 = full-performance level
[f]General = limited or minimal supervision
PHEL = public health and environmental laboratory
NA = not applicable

the next higher classification. An employee who begins working as a PHEL aide/assistant could, over time and by obtaining the required education and experience, work his or her way up to PHEL director. The bifurcation of the primary career path into supervisory and developmental paths also provides an opportunity to promote and retain scientists with a higher education and expanded technical skills, but who lack the interest or ability to become good supervisors or managers.

## CONCLUSIONS

The full set of proposed job classifications and career paths is advantageous even for small PHELs that may not fill every classification or grade level at a given time. It is important that PHEL personnel systems possess sufficient common classifications and career paths not only to competitively recruit and retain individuals who develop professionally, but also to ensure the flexibility to hire someone who fits any future routine or special mission need.

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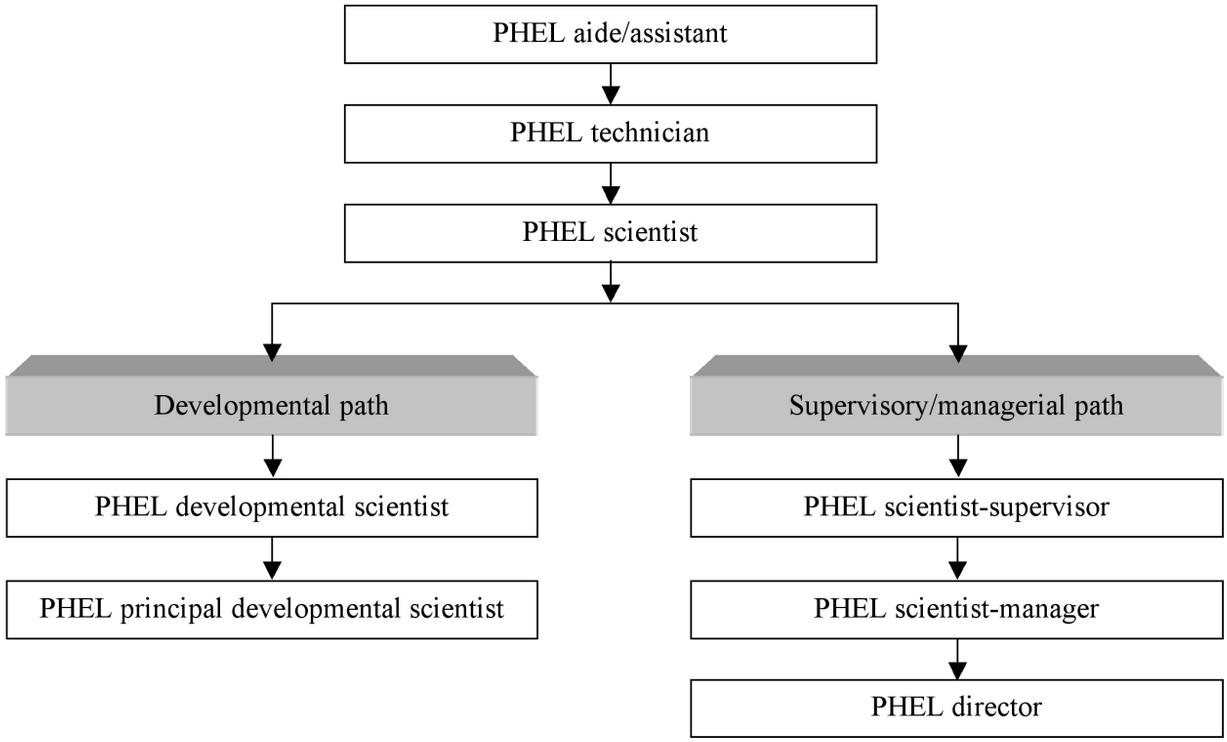
**Figure 3. Flow diagram of proposed common career paths for technical and scientific personnel in a PHEL**




PHEL = public health and environmental laboratory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