NEW ENGLAND UNIVERSITY LABORATORIES PROJECT XL

FIRST YEAR STATUS UPDATE

DECEMBER 28, 2000

for

BOSTON COLLEGE

UNIVERSITY OF MASSACHUSETTS BOSTON

UNIVERSITY OF VERMONT

STATUS UPDATE 12/28/00
NEW ENGLAND UNIVERSITY LABORATORIES PROJECT XL

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I. INTRODUCTION

The purpose of this First Year Status Update is to provide a narrative description of the New England University Laboratories Project's first year, including qualitative information with respect to specific environmental training, implementation and monitoring information from Boston College, University of Massachusetts Boston and the University of Vermont. This Interim Report will not duplicate information already presented in the initial Baseline Assessment Report submitted June 28, 2000.

Under the terms of the Final Project Agreement (FPA), a first year report is due on or before December 28, 2000. This interim report is designed to fulfill that reporting obligation. As described in the FPA, the purpose of the First Year Report is to summarize six months of environmental performance data and evaluate the collected data against the initial environmental performance baseline that was submitted to EPA on September 28, 2000. Unfortunately, each of the XL Institutions was delayed, for a variety of reasons, in finalizing and implementing their Environmental Management Plans for laboratories. As a result, six months of quantitative data for each of the Environmental Performance Indicators (EPIs) has not yet been collected and analyzed. A full First Year Environmental Performance Report will be submitted this spring to EPA, Vermont Department of Environmental Conservation and the Massachusetts Department of Environmental Protection. That report will provide information with respect to each of the identified Environmental Performance Indicators (EPIs) identified in Table 1 on the next page.

II. EXPERIENCES TO DATE

Environmental Management Plan (EMP) Design

Each college and university has designed its EMP to best meet its legal and institutional needs. These plans, and the approach for implementing and providing training and information with respect to these plans, are unique to each institution. For example, the plan at UVM is heavily web-based and includes specific laboratory procedures for managing laboratory waste embedded in the policy and planning portions of the EMP. The plan at University of Massachusetts Boston integrates the laboratory waste management requirements specified at 40 CFR 262 Subpart J with the institution's requirements and procedures for handling hazardous chemicals under their OSHA Chemical Hygiene Plan. Boston College's EMP is an effective hybrid of these two approaches, with the pollution prevention and hazardous waste procedures in a distinct document.

EMP Implementation

The schedule for implementing the EMPs has varied. The decision was made by all of the institutions, with agency agreement, to implement the EMPs in the fall of 2000 when all faculty, staff and students began the new academic year. Boston College officially implemented their plan September 1, 2000. The University of Massachusetts Boston was delayed in implementing their EMP for two principal reasons. First, the United States

presidential debate at the University focused all energy and attention at the university for the early part of the semester. Second, the new training and information material was delayed by the University printer and the Environmental, Health and Safety Department decided to delay implementation until all the materials were ready. The University of Massachusetts Boston implemented their integrated Chemical Hygiene and Environmental Management (CH/EM) plan on October 6, 2000.

TABLE 1. LIST OF ENVIRONMENTAL PERFORMANCE INDICATORS (EPI)

#	Performance Type	Purpose	EPI	Goal
1	Pollution Prevention and Risk Reduction	Annual surveys of Hazardous Chemicals of Concern	HCOC on shelf that exceed institution defined "shelf-life"	All HCOC on shelf are within their defined "shelf life"
2	Pollution Prevention	Verify annual surveys of Hazardous Chemicals of Concern	Surveys completed	100% completion of surveys each year
3	Pollution Prevention	Conduct pollution prevention opportunity assessments	Assessments completed	One opportunity assessment per laboratory per year
4	Pollution Prevention	Measure hazardous materials reuse and redistribution	Amount reused or redistributed within the institution (normalized and compared with and without RCRA in the lab) and cost savings	Twenty (20) percent increase in reuse/redistribution from baseline over life of project (with attendant reduction in waste disposal)
5	Pollution Prevention	Measure laboratory waste generation rates	Total laboratory wastes per institution (normalized and compared with and without RCRA in the lab) and cost savings	Ten (10) percent reduction of hazardous waste from baseline over life of project
6	Environmental Awareness and Risk Reduction	Assess environmental awareness of laboratory workers	Survey scores	Scores demonstrate improvement over life of project (note: the same people will not necessarily be tested)
7	Environmental Awareness	Provide environmental awareness training to a more diverse group	Students in teaching labs and laboratory workers receiving training	Increase number or percentage of students and lab workers receiving training
8	Compliance	Evaluate environmental management program effectiveness	Objectives and targets	Achievement of objectives and targets
9	Compliance	Audit environmental management plan conformance	Report of auditor	Reported improvement

[123]he University of Vermont has not yet implemented its EMP. Under the terms of the Final Project Agreement, the Vermont Department of Environmental Conservation (VT DEC) has the oversight authority to approve UVM's EMP. UVM initially submitted their draft EMP to the VT DEC in March 2000. Over the course of 10 months, discussions have been ongoing to amend and clarify the document to meet the expectations of the VT DEC. Some of the specific issues addressed during these discussions are described below in the UVM section of this Report. The EMP was approved by the VT DEC in late December 2000.

Boston College and the University of Massachusetts have focused their resources, during the fall '00, on providing information and training to laboratory workers. Boston College has scheduled training classes for laboratory workers in the approximately 130 laboratories on campus and conducted departmental training in a systematic and consistent manner. While there is some overlap with other training requirements (e.g., Chemical Hygiene Plan), the focus has been on laboratory waste and hazardous waste management. Training has been classroom-based, with web-based resources supporting the classroom training. The University of Massachusetts Boston has developed "hard copy" informational materials that summarize the requirements and has distributed the CH/EM Plan to all laboratory workers in the approximately 144 laboratories. The EHS staff has scheduled both departmental and laboratory training in an effort to deliver this integrated training to laboratory workers in the most user-friendly,

[1] An opportunity assessment conducted for one laboratory waste stream may be broadly applied to other laboratories

[2] EPA and the States are expected to evaluate program conformance to the XL Participant's Environmental Management

[3] This internal EMS audit will assess laboratory conformance to the XL Participant's Environmental Management Plan in accordance with audit protocols developed by the institution.

accessible manner. These efforts are further described below in the institution-specific summaries.

At UVM, preparations for participation in the XL project have gone forward while the University worked toward final agreement with the state on the proposed EMP. UVM Environmental Safety Facility staff have met with a variety of campus constituencies to discuss the implementation process and changes in current practices that will result. The ESF staff has met twice with the Chemical and Biological Safety Committee to discuss its role in overseeing campus compliance, twice with the Vice Provost for Research to discuss management and resource considerations, and the Vice Present's staff to discuss implementation challenges. UVM will conduct specific EMP training of laboratory workers in January and February 2001 now that the EMP has been approved.

State Agency Involvement

The state agencies have taken quite different approaches with respect to this project. During this first year, the Massachusetts Department of Environmental Protection participated in a May 24, 2000 meeting with EPA and the XL Institutions regarding the EPA's plans to assess an institution's compliance with the XL Rule, and focused its resources on developing a state rulemaking. It is expected that a Massachusetts rule for this project will be finalized by March 28, 2001, in accordance with the FPA. The Massachusetts DEP has not played an active role in reviewing and commenting on the EMPs of Boston College and the University of Massachusetts. The Vermont Department of Environmental Conservation has played a very active role in ensuring that UVM's EMP clearly and thoroughly meets all of the requirements of the XL Final Rule and the obligations specified in the FPA. This process has been somewhat akin to a permitting process vis-à-vis requests for clarification and supporting documentation, and recommendations for making the EMP information more accessible and user-friendly.

Project Planning

Over the course of the first year, there were a number of discussions between the XL institutions and the regulatory agencies. We first met with EPA representatives, and James Miller of the MA DEP, on May 24, 2000 to discuss substantive and logistical issues with respect to the final development and implementation of the EMPs. We also discussed at that meeting issues associated with EMP Implementation Reviews, such as the purpose and scope of the review, roles, responsibilities and authority of participants and follow-up activities. It was subsequently agreed that agency reviews of Boston College and the University of Massachusetts Boston will be led by a member of the Assistance and Pollution Prevention staff with participation by the Agency's inspection group. VT-DEC staff will lead the review of UVM, with EPA participation. We met again with EPA representatives on July 27 to further clarify the 2nd and 3rd year audits or reviews, clarify the purpose of these reviews, outline the anticipated inspector role and describe likely post audit activities. In addition to these communications, Thomas Balf, representing the C2E2, is in frequent contact with Gina Snyder and George Frantz of the EPA.

III. COMMUNICATION TO STAKEHOLDERS

This status update will be available on the Lab XL Web Page at www.c2e2.org. Each University will also post their status update on its own web page. The URLs are as follows:

University of Vermont - http://esf.uvm.edu/uvmemp
University of Massachusetts Boston –http://omega.cc.umb.edu/~ehs/ch_em/ch_emii.htm#B.6

Boston College – http://www.bc.edu/ehs

Information regarding the availability of the update will be posted to the XL and Safety listserves, managed by Ralph Stuart at UVM, announced in each campus newsletter and communicated to individuals or organizations. Additionally, individuals identified as key stakeholders during the XL negotiation process, or other interested parties identified since September 28, 1999, will receive a communication that this status report is available.

IV. FOR MORE INFORMATION

For more information about the New England Universities Laboratories Project XL, contact Thomas Balf at the Campus Consortium for Environmental Excellence, at One Financial Center, Boston, MA 02111 (617) 951-1181 or at tbalf@nexep.com Interested parties may also communicate with the XL University contacts directly at:

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V. STATUS UPDATES FROM THE XL INSTITUTIONS

See inserts at Tabs

A Boston College

B University of Massachusetts Boston

C University of Vermont

BOSTON COLLEGE

December 2000

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This report is the first year report due for the New England University Laboratories XL Project. It provides data with respect to Environmental Performance Indicators indicated in the Final Project Agreement (FPA) and other items described in Section IIIG. This report is due fifteen months after the effective date of the final rule, September 28, 1999. Boston College will disseminate this report to identified stakeholders, and it will be on the Boston College web page, and is available upon request.

The FPA states that the XL participants will provide status reports on the following:

- Survey of hazardous chemicals of concern
- Pollution prevention opportunities
- Amount of laboratory wastes generated
- Environmental awareness of laboratory workers, and
- Compliance performance data such as laboratory inspection results.

This interim status update will concisely describe activities to date. Quantitative information regarding environmental performance and progress against baseline data will be presented in a report later this spring.

ENVIRONMENTAL PERFORMANCE INDICATORS (EPIs)

Pollution Prevention Performance Indicators

Hazardous Chemicals of Concern - EPI # 1 and 2

Each university must define a list of hazardous chemicals of concern (HCOC) and annually conduct a risk evaluation survey of these chemicals. Criteria for selecting HCOC are specified in the FPA.

In Spring 2000 the Office of Environmental Health and Safety requested that labs provide complete chemical inventories (The local fire responders have required complete

inventories.) Ninety percent of labs were able to comply with this request at that time. The remaining labs will provide inventories after they have resettled following a major renovation project in Higgins Hall. The inventories are prepared or supervised by lab workers who take the opportunity to examine and update their chemical stores.

Early in the second semester, the members of the Chemical Hygiene Committee (which also oversees the EMP) will review the current chemical inventories. They will decide if complete inventories should be conducted again in March 2001, or if the list should be limited to specified Hazardous Chemicals of Concern (HCOC's). During the laboratory audit program, which will begin in February 2001, EH&S personnel will also inspect chemical storage areas in laboratories and identify any expired HCOCs.

Pollution Prevention Assessments - EPI #3

The initial focus of Boston College's pollution prevention strategy is to describe and promote P^2 via the laboratory training and EMP information. Boston College has decentralized purchasing and chemical management, so in training we address issues such as purchasing controls, rental of gas cylinders and inventory management to all lab workers. We also describe steps lab workers can take to reduce waste production, such as modifying processes, product substitution and waste segregation. This effort is reinforced during waste pick-ups by our hazardous waste contractor, during informal lab visits, through outreach efforts, and will continue to be a significant element in discussions with faculty and lab workers during meetings and audits.

As part of the EMP, Boston College includes a "Pollution Prevention Tracking Form." It is our intention to provide lab workers with this form prior to lab audits so that we can discuss pollution prevention opportunities at the time of the audit. We are collecting examples of successful P^2 opportunities to propose to the labs (e.g. mercury thermometer alternatives), and are also recording known P^2 activities.

Amount of Laboratory Wastes Reused/Redistributed - EPI # 4

We have actively promoted a chemical redistribution program in training and in private consultations since September 1, 2000. We have been able to divert a few chemicals from the waste stream by transferring them from one lab or department to another. We are also in the midst of a lab clean-out in the Biology Department and have identified several chemicals that can be used by other labs, specifically some unopened solvents and solids. Researchers are reluctant to use materials in opened containers, but often we will be able to divert these to the teaching labs. The formal chemical redistribution program will go forward when the Chemical Waste and Recycling Room in Higgins Hall is completed in January 2001. Once the storage space is finished, chemicals will be evaluated, inventoried, and the inventory will be posted on the web. We will also alert some potential users of particular materials that become available. We expect this program to be fully functioning by the end of the 2001 spring semester.

Measurement of Laboratory Wastes – EPI #5

When technicians pick up wastes from laboratories, they receive inventory sheets that describe the waste to be picked up, including chemical name, room number and amount of material. These inventory sheets are kept on file in the Office of EH&S. The waste quantities are entered into a database that calculates the amount of waste generated in a laboratory per month.

In the four months that the EMP has been in place, there has not been sufficient time to measure any meaningful changes in monthly waste. We expect that the data from the entire academic year will provide us with better information on the effectiveness of our waste reduction efforts through training and lab audits. We should note that we have been cleaning out several laboratories due to a major construction and renovation project, so we may see increased waste disposal and costs during this time period.

Environmental Awareness Performance Indicators

Environmental Awareness Survey – EPI #6 and 7

We will conduct a new awareness survey in the spring semester after all training has been completed and lab workers have had a chance to work under the EMP. Our experience to date suggests that lab workers are becoming more aware of the assistance and information our office can provide. The Environmental, Health and Safety staff increasingly receive questions, emails and phone calls asking for information or supplies after each training class.

One tool incorporated into training is a short questionnaire. Its purpose is to get contact information from the participants, but also to "test" their awareness about waste. "What is one thing you learned today?" and "What question(s) do you still have?" have provided excellent feedback about prior knowledge and what we still need to provide in training and outreach.

Departments are playing stronger roles in the implementation of laboratory waste management procedures. The most successful (i.e. well attended and engaged) training sessions are those scheduled by the departments, especially during standard department meeting times. Thus the departments themselves are promoting the Office of Environmental Health and Safety and the EMP. Support from upper level administrators has been key in helping us get the message to the departments about the importance of EMP training.

Compliance Performance Indicators

Program Effectiveness – EPI #8

The best indicator of program effectiveness at this time is attendance at training. In the EMP, BC has stated that it will provide all personnel with information about the EMP immediately on employment in a lab, and training within six months of employment. For this time period we have provided information to all lab personnel as early as possible within the first semester (through 12/20, 2001), and expect to complete initial training by March 1, 2001.

Compliance and EMP program effectiveness has also become an issue for two key committees. The Chemical Hygiene Committee met on November 14, 2000. This committee is composed of representatives from each of the affected science departments. The safety coordinators and department administrators who serve on this committee have been able to convey to their departments the importance of achieving compliance with the EMP. This message was reinforced at the departmental level after a November 21 meeting of the EH&S Oversight Panel. This committee made up of upper level university administrators provided additional support. The academic deans have conveyed to department chairs the responsibilities of the departments in achieving compliance with the EMP.

As a result of these two key meetings, there was a surge in the attendance at EMP training in December, and two more training times are already scheduled in January for the Biology and Physics Departments, in addition to regularly scheduled monthly training for new lab workers. Each department has received packets of information on the EMP to distribute to personnel who have not yet attended training. We anticipate 100% compliance with the training requirement by March 1, 2001.

Assess Environmental Management Plan Conformance – EPI #9

There is a multi-level process for auditing performance and compliance in the labs. Lab personnel are expected to conduct weekly inspections of satellite accumulation areas, including container condition, labels, segregation and secondary containment. They are also given a shortened self-inspection checklist on the hazardous waste pick-up inventory forms they must complete, and the waste management guidelines are printed on each waste label. The Office of EH&S will conduct audits of all labs in February 2001. We will also be giving labs a self-assessment checklist and awareness survey in April. The results of these audits and surveys will be summarized by June 1, 2001.

UNIVERSITY OF MASSACHUSETTS BOSTON

December 2000

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The Integrated Chemical Hygiene and Environmental Management (CH/EM) Plan

Upon the signing of the Final Project Agreement, EH&S worked extensively with the University's Chemical Hygiene Committee in developing the Environmental Management Plan. The Chemical Hygiene Committee is a standing committee appointed by the Deans of Arts and Sciences, and consists of a representative from each laboratory-based Department of the University including Biology, Chemistry, Environmental Coastal and Ocean Sciences, Psychology, and Anthropology, and one or more representatives from Environmental Health & Safety.

The Committee decided that the best approach for UMass Boston would be to integrate the new Environmental Management Plan with our existing Chemical Hygiene Plan. The resulting document, the Integrated Chemical Hygiene and Environmental Management (CH/EM) Plan, was completed and approved by the Committee in August 2000. It took approximately one month to procure binders and put together the manuals for distribution.

ENVIRONMENTAL PERFORMANCE INDICATORS

Pollution Prevention Performance Indicators

Hazardous Chemicals of Concern – EPI #1 and 2

The EH&S Office generates annually (August) a chemical inventory list for each lab from its database and sends them to all Principal Investigators. PI's have one month to update lists, sign them, and return them to EH&S for input into a central database. EH&S is in the process of implementing a new chemical bar code based tracking system on a lab-by-lab basis. EH&S hopes to have the new system in place for each laboratory by fall of 2001. We believe that the bar code system will speed up collection of our inventories and provide us with more accurate and reliable data. This tracking system will also likely enhance the ability EH&S to identify potential pollution prevention and redistribution opportunities. The new system will also be much quicker, more efficient,

and will allow EH&S to track chemicals from lab to lab. In addition, the EH&S Office has developed a list of HCOCs. These materials will be tagged on lab inventory sheets as items deserving special attention by researchers. The following materials have been designated HCOCs at UMass Boston:

- EPA P-listed wastes
- OSHA Special carcinogens
- OSHA Teratogens/Reproductive toxins
- OSHA designated highly toxic substances
- Explosive nitroarenes
- Peroxide-forming chemicals
- Pyrogens
- Shock-Sensitive Explosives

Pollution Prevention Assessments – EPI #3

The focus of both the EH&S Office and the Chemical Hygiene Committee has been training. During training, emphasis is placed on pollution prevention and researchers are encouraged to incorporate pollution prevention ideas into their everyday work. When researchers design their experiments, we encourage them to examine the materials they are working with to determine if there are better alternatives. If not, we remind them to purchase only what they need. Finally, we suggest that they consider whether or not a treatment method can be incorporated at the end of the experiment. We will be exploring pollution prevention initiatives for spring 2001 following the completion of the CH/EM training.

Amount of Laboratory Wastes Reused/Redistributed – EPI #4

EH&S has not yet implemented its re-use and redistribution program University-wide. During our training sessions, we have been introducing the idea and asking people to go back to their laboratories and look at their stocks. In January of 2001, EH&S will begin to solicit unneeded chemicals from each laboratory. We will obtain information from direct mail, email and departmental postings. Once we begin to collect materials, we will publish a list of materials available for redistribution on our website so that it will be accessible at any time. When materials are identified as potentially re-useable, they will be labeled with the date. Each time they are used, they will be tracked. If materials are in storage for more than two years, they will be disposed of in accordance with applicable requirements.

Measurement of Laboratory Wastes – EPI #5

A determination of total laboratory wastes, in pounds, was generated for the calendar year 1999 and 2000, from University manifests and the biennial report. For the year 1999, the University generated 5584.76 pounds of laboratory waste. A preliminary analysis of the year 2000 shows that the total pounds of laboratory waste generated has decreased to 4506.31 pounds. We have not yet determined why the decrease has occurred and will continue to examine this over the next two months.

Environmental Awareness

Environmental Awareness Survey – EPI #6 and 7

In order to measure general environmental awareness on campus among faculty, staff, and students, a survey was distributed in the spring of 2000. Results were tabulated in the summer of 2000, and are posted on the EH&S web site. A second survey will be distributed in February of 2001, rather than in April, to allow for a broader, more general sampling of the population, to determine if environmental awareness on campus has improved or remained the same.

Prior to the commencement of CH/EMP training in October, EH&S distributed summary pamphlets about Project XL and specifics about laboratory waste collection to members of each relevant department to familiarize department members with the key elements of Project XL. In addition, EH&S has also posted new signage in each lab consistent with the CH/EM Plan and distributed new tie-on laboratory waste tags.

We began notifying all relevant departments that training would begin at the end of October. At that time, we asked departments to identify individuals, particularly the students who needed training. EH&S already maintains a list of all Principal Investigators (faculty and staff) so we directly contact them when the need arises. Training in the new CH/EM Plan for all faculty, staff, graduate students and undergraduates who work alone in laboratories began at the end of October 2000; and will continue over the next several months. The training program is a general introduction to the new elements in the CH/EM plan, which is distributed to each trainee, and is carried out mostly on a lab-by-lab basis. When feasible, EH&S has trained groups from departments in a single session. Each session lasts for roughly one to one and a half-hour. Our goal is to have all laboratory personnel trained in the CH/EM Plan by March of 2001. Thus far, EH&S has trained the Anthropology, Physics, and some of the Chemistry and Biology departments. Training for the ECOS, Psychology, and remaining members of the Chemistry and Biology departments will be completed in December and at the beginning of the spring semester of 2001. EH&S estimates that there are approximately 250-300 laboratory personnel from these departments. Since October, seventy-one people have been trained. This initial response to training far exceeds our prior experience with initial turnout to laboratory training. We anticipate that the majority of those remaining to be trained will be captured within the first two weeks of the Spring 2001 semester (first two weeks in February 2001).

Compliance

Program Effectiveness – EPI #8

University of Massachusetts Boston has been successful in achieving or being "on target" to achieve the environmental management objectives that were set for this project. The following list summarizes the most important objectives.

OBJECTIVES	STATUS
Development of new CH/EM Plan by August 2000	Complete
Develop training materials for CH/EM Plan by October 2000	Complete
Training of all laboratory personnel by March 2001	On-target
Roll out redistribution/re-use program by January 2001	On-target
Design of a new centralized chemical storage	March 2001
Building of a new centralized chemical storage area	Spring-Summer 2001

Assess Environmental Management Plan Conformance – EPI #9

The CH/EM Plan has a two-tiered system for evaluating conformance with the EMP. The laboratories conduct monthly self-inspections using a standardized form. The Environmental, Health and Safety Staff conducts annual oversight audits as well as performing informal assessments of conformance during waste pickups and removals. It is expected that the first EHS annual assessments will be conducted late Spring/early summer of 2001.

UNIVERSITY OF VERMONT

December 2000

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UVM representatives (specifically Ralph Stuart, Milly Archer and Francis Churchill) spent calendar year 2000 developing the institutional Environmental Management Plan for Project XL purposes. This work has proceeded steadily, but slowly, over the course of the year, in close consultation with Steve Simoes of the Vermont Department of Environmental Conservation. The speed of this work was affected by several factors. These include:

1. UVM decided to develop an innovative EMP based on a web-based design of policies, plans, procedures and record-keeping. This plan requires significant up front time in terms of planning and coordination with other documents, but should prove highly beneficial in the future development and modification of the EMP and related environmental health and safety management programs.

2. UVM's large number of laboratories (more than 500) are spread over more than 30 departments, whose use of chemicals varies from minimal to intensive. Developing effective communication channels on laboratory chemical waste issues with these departments is a time-consuming process. UVM's Environmental Safety Facility staff has worked effectively with the Vice Provost for Research, the Chemical and Biological Safety Committee and specific departmental representatives to assure that proposed changes to the EMP suggested by the state are understood by and manageable for the campus laboratory community.

3. The UVM ESF staff has invested significant time in assisting the C2E2's work to better understand and promote the integration of Environmental Management Systems (EMS) into the campus administrative environment. This work, which includes development of an EMS self-assessment tool for higher education, presentations at regional EPA conferences and publications in professional journals, has been key in the conceptual development of the UVM EMP, particularly in terms of improving the Plan's organization and developing strategies for effective implementation.

While these choices have resulted in more time being required to develop the UVM EMP than anticipated when the Final Project Agreement was signed, they reflect the goal of

both UVM and the Vermont Department of Environmental Conservation to make the UVM EMP a model document for a national audience. We recognize that the three pilot schools in the Lab XL Project represent a small selection of a highly diverse sector (higher education) and that UVM represents the largest and most research-intensive of the three. Therefore, we have placed significant effort in developing an EMP that we believe will be as flexible as possible within the constraints of the regulatory requirements and which could thus serve as a model for larger, decentralized Universities.

For example, UVM and Vermont DEC have agreed at a conceptual level on how modifications to the EMP will be handled:

1. Changes to the EMP overview document, which forms the basis for all the policy and planning statements in the procedure sections will only be made with prior notification of the agency, so that it may comment on the proposed changes.
2. Changes to the policy, planning and record keeping sections of the procedure files will be made by UVM and the DEC will be notified of such changes.
3. Changes to the forms which describe the actual procedures used to implement the EMP, which are likely to change regularly as facilities and resources available to the laboratories change, will be made without notification to the agency.

Chronology

UVM submitted its Environmental Management Plan to the Vermont Department of Environmental Conservation and the Environmental Protection Agency on March 23, 2000. This initial version of the EMP consisted of a group of 17 procedures required to 1) assure that chemical waste in laboratories was handled in accordance with the Minimum Performance Criteria specified in the Laboratory Environmental Management Standard and 2) establish a system to monitor the environmental performance of the University with respect to laboratory chemical waste. Each procedure was associated with policy, planning and record-keeping statements which specified the essential information (who, what, where, when, why and how) required to assure that the procedure was properly carried out.

In April 2000 UVM received a letter from the Vermont DEC commenting on this version of the EMP and in May of 2000, a similar letter was received from the EPA. In May, UVM representatives met with EPA Region 1 officials to discuss their comments at a conceptual level, and in July, UVM met with Vermont DEC officials to discuss their comments in detail. The comments from the two government agencies were similar, and because Vermont DEC was required to approve the working version of the EMP, it was decided that UVM would work closely with Vermont DEC to resolve their concerns, thereby satisfying EPA concerns at the same time.

The primary concern expressed by the Vermont DEC with regard to the first version of the UVM EMP was that it was difficult to track the connections between the various procedures and how they satisfied the requirements for the Environmental Management Plan as specified in the Environmental Management Standard. This led to confusion

about the roles and responsibilities of different segments of the campus laboratory population (laboratory technicians, students, laboratory supervisors, department chairs and upper management). The agency also said that the training and compliance oversight sections of the EMP were too vague.

In order to satisfy these concerns, UVM prepared an EMP overview document, which provided an introduction to the goals of the XL project and which tied together the procedures into a coherent whole. This overview is useful not only for auditors of the program but for University management in understanding how the laboratory waste management procedures connected with other laboratory health and safety programs. This document was presented to the Vermont DEC at a meeting in September 2000. On October 16, Vermont DEC responded with a new set of comments based on the revised EMP. On December 6, UVM provided a revised document based on those comments. This revision reduced the number of procedures to 15 and included more specific information about how training and laboratory compliance oversight would be implemented. On December 21, UVM and Vermont DEC representatives met to finalize the UVM EMP, which is available at http://esf.uvm.edu/uvmemp. Final changes to the EMP were made to the plan on December 27 and UVM is now operating under this plan.

Issues

The issues identified by the Vermont DEC as most problematic in understanding how the UVM EMP is to function are directly related to the decentralized nature of the academic enterprise: implementation of the training and compliance oversight requirements of the EMP.

Because of the diverse ways in which chemicals are used in UVM labs, it is not appropriate to specify the same training methods for every laboratory worker. In chemistry laboratories, where highly reactive chemicals are routinely used in large varieties, training needs to focus on the general principles of waste determination and procedures for its removal. On the other hand, in medical research laboratories or animal science laboratories where only a few specific chemicals are used, training on the specifics of handling those waste chemicals is more appropriate.

Likewise, the same considerations dictate that some training of laboratory workers will be done in lecture style training sessions, while other training will be done “on the job” by other, more experienced laboratory workers. Therefore, the UVM EMP seeks to specify the topics that need to be covered during EMP training, with emphasis on how to find out more information about proper procedures, and how to document the training, rather than the specific methods of training used to deliver information.

Oversight of laboratory compliance is a shared responsibility between laboratories, their management and Environmental Safety Facility staff. The concern expressed by the Vermont DEC was that assignment of these responsibilities to specific individuals is not included in the EMP. UVM argued that such designation was problematic because of the continuous turn over of both individuals and positions within the academic environment. By definition, the academic mission of an educational institution assures that there will

be new people in the UVM laboratories every year. And as laboratory personnel change, their roles within the laboratory will be reorganized to reflect the technical expertise available within the laboratory. The same turnover, at a somewhat slower rate occurs within the management of laboratory departments because the higher education management system relies on peer consultation and easy movement of faculty between teaching and administrative positions. In this situation, rosters of individuals, and the laboratories for which they are responsible, become out of date almost immediately.

The UVM EMP meets this challenge by focusing on the mechanisms by which the appropriate conditions for regulatory compliance in the laboratory are overseen. Laboratory supervisors and workers provide the first line of compliance assurance by conducting laboratory self-inspections at least monthly. The ESF staff takes responsibility for checking both the physical conditions and auditing the safety management processes in the laboratory at least annually. Problems found by the ESF audits are managed by the departmental administration, with final responsibility laying with the Vice-Provost for Research, advised by the Chemical and Biological Safety Committee. This system, although complicated, is well adapted to the management realities of an academic institution; realities which reflect its mission of higher education and research.

ENVIRONMENTAL PERFORMANCE INDICATORS

Pollution Prevention Performance Indicators

Hazardous Chemicals of Concern – EPI #1 and 2

UVM will conduct a survey of Hazardous Chemicals of Concern in UVM laboratories in January of 2001. Results of this effort will be available by March 31, 2001. The goal of this year's survey effort will be to have 50% more of the surveys, (80% of total) turned in by March 1.

Pollution Prevention Assessments – EPI #3

UVM's primary laboratory pollution prevention effort in 2000 was its mercury thermometer swap. UVM received a 2000 Vermont Governor's Pollution Prevention award for this effort, which resulted in the identification and removal of more than 100 pounds of unnecessary mercury from UVM laboratories. We have begun a study of campus darkrooms to determine whether silver solutions from photographic processes offer the potential for an alternative management program that will allow further hazardous waste minimization.

Amount of Laboratory Wastes Reused/Redistributed – EPI #4

The UVM ESF staff will develop and implement a system within its TAGS database that can identify laboratory waste to be potentially reused on campus. This system will be developed and implemented by March 1, 2001.

Measurement of Laboratory Wastes – EPI #5

The TAGS database is used by UVM ESF staff to track hazardous waste on campus as it passes through our management system. Reports from this database will be developed to measure laboratory waste generation rates for specific waste streams by March 1.

Environmental Awareness Performance Indicators

Environmental Awareness Survey – EPI #6 and 7

In addition to the compliance audits, significant training efforts for all campus groups will be developed in 2001. ESF staff has already briefed the Vice Provost for Research, the Vice President's cabinet, the Chemical and Biological Safety Committee and a variety of campus lab workers on the Environmental Management Plan and its implications for their work (EPI 7). We expect that the effects of this effort will be seen in the annual laboratory environmental awareness survey to be conducted in June. (EPI 6)

Compliance Performance Indicators

Program Effectiveness – EPI #8

The effectiveness of the program could not be evaluated because of the delay in finalizing and approving the EMP.

Conformance with the EMP – EPI #9

Laboratory compliance audits by ESF staff will start in January 2001. These have been held in abeyance until the final EMP approval has been received from the state of Vermont. During 2001, we expect that the primary focus of the audits will be introducing the few new procedures of the EMP to laboratory workers and supervisors. Thus, during 2001, the laboratory compliance audits will have an important training component. The specific goal for this effort for 2001 is for all laboratories on campus to be audited by ESF staff. At the end of the year, an assessment of the EMP effectiveness will be written evaluating the results of this effort.