Evaluation of
Current Air Pollution Training Program
(Task 1)

for
Environmental Protection Agency
Air Pollution Training Institute

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I. Introduction

Background

In May 2004, the Education and Outreach Group (EOG) of the Environmental Protection Agency (EPA) contracted with the Hay Group to conduct a Benchmarking Study of its Air Pollution Training program. The ultimate goal of the project is to provide options for improving the current Air Pollution Training program, and ultimately, EOG's business performance. The following three tasks are aimed at accomplishing this goal:

- Evaluate the current Air Pollution Training program (Task 1)
- Identify best practices of leading training programs (Task 2)
- Develop a plan of action for improving the current Air Pollution Training program (Task 3)

This report summarizes our findings from Task 1 - evaluation of the current Air Pollution Training program. The findings in this report provide an assessment of the practices, procedures and processes currently used by the Air Pollution Training Institute (APTI) to develop, deliver, and evaluate training. In this report, we focus on evaluating the current training program based on input from numerous sources.

In subsequent reports, we will present our conclusions regarding the direction that we believe the Air Pollution Training program should take.

Methodology

This section summarizes the methodology used to evaluate the current Air Pollution Training program. The steps for evaluating the current training program are described below.

Identify evaluation criteria. The first step was to identify the critical air pollution training practices, procedures, and processes that should be evaluated (i.e., evaluation criteria). These evaluation criteria were identified based on discussions with APTI staff, reviews of the training literature, and the Hay Group's extensive research and experience in training delivery and evaluation. The table on the following page shows the key aspects of the current training program that were evaluated during Task 1.

Evaluation Criteria	Types of Information Collected
Needs Assessment Process	• Effectiveness of Needs Assessment Survey • Uses of needs assessment results
Course Content	• Process for determining course content and delivery methods • Availability of courses • Extent to which courses are offered that meet student needs • Quality of course content
Course Delivery Methods	• Effectiveness of classroom courses and instructors • Effectiveness of satellite broadcasts • Effectiveness of on-line training • Effectiveness of self-instructional training
Training Evaluation Process	• Effectiveness of training evaluation instruments • Uses of training evaluation results

Conduct subject matter expert interviews. Hay designed an interview protocol (based on the evaluation criteria) to capture information that is critical to understanding and assessing the current Air Pollution Training program. The interview protocol included an introductory paragraph to read to participants at the beginning of the interview and interview questions.

Hay worked with APTI staff to identify appropriate individuals to interview about the current training program. An effort was made to interview a diverse group of individuals who have a good understanding of the training program, its objectives and desired results, its future direction, and its overall effectiveness. The following types of individuals were interviewed:

- Members of the Joint Training Committee (JTC)
- Members of the MARAMA Regional Consortium
- Individuals who run area training centers
- APTI course instructors
- Supervisors in state and local agencies who have sent employees to APTI training courses (some of these supervisors solicited feedback from their employees about the effective of APTI training)
- Contractors who design APTI course content and conduct the training needs assessment
- APTI management and staff

A total of 22 individuals participated in one-on-one interviews in person at Research Triangle Park or via the telephone. Additionally, we spoke to several other individuals in group settings (e.g., APTI staff members, JTC members, members of the MARAMA Regional Consortium) about the Air Pollution Training program.

An experienced Hay Group interviewer conducted all interviews using the standardized protocol. The interviews focused on:

- Gaining a better understanding of the practices, procedures and processes used by APTI to design and deliver air pollution training; and
- Obtaining opinions on the effectiveness of these practices/procedures/processes and ways to improve the current training program.

We also used these interviews to identify potential organizations to participate in the benchmarking study that will be conducted in the late July/August time frame. Extensive notes were taken during each 30 to 60 minute interview. Information collected from the interviews was reviewed, and we identified common themes (e.g., many interviewees indicated that "the training materials are outdated"). These themes are presented throughout this report.

Review key documents. In addition to conducting subject matter expert interviews, Hay reviewed several documents, web sites, and APTI training materials as part of the evaluation of the current APTI training program. More specifically, we reviewed the following:

- APTI web site (e.g., course schedules, training providers, APTI's mission, course registration)
- Site Coordinators Resource Center web site
- EOG FY03 Highlights and FY04 Midyear Accomplishments
- Training Needs Assessment Survey and results
- Training evaluation instrument and results (i.e., feedback from students about courses)
- Training materials (self-instructional workbooks, web-based training courses, satellite broadcasts)
- Statistics on training course attendance and certificates issued

Report Overview

In this report, we summarize our findings from the subject matter expert interviews and document/web site review in an effort to provide an assessment of the current training program. We provide an evaluation of each of the following aspects of the Air Pollution Training program:

- Program Mission and Direction
- Training Needs Assessment Process
- Course Content
- Effectiveness of Training Delivery Methods (classroom courses, satellite broadcasts, on-line interactive courses, self-instructional training)
- Training Evaluation Process

When describing our findings, we first provide a short overview of what the current APTI program looks like. We then present a summary of interviewee opinions about the current APTI training program. Finally, we provide options, **identified by interviewees**, for improving the APTI training program.

We conclude the report with a discussion of our main conclusions about the state of the current Air Pollution Training program and next steps in the benchmarking study.

II. Program Mission and Direction

Many interviewees praise APTI on its classroom training courses, particularly those with a laboratory component; the breadth of courses provided; and its efforts to create a blended approach to training in response to the current budget and travel restrictions faced by state and local agencies. However, some believe that APTI is no longer the premier training group that it was in the past and that it is not currently meeting the needs of state and local agencies.

Several interviewees feel that training is not a priority at EPA and that EPA needs to recommit to its original function – training the people who do the "nuts and bolts" work at state and local agencies (i.e., air professionals). The perception is that APTI focuses too much on outreach and not enough on providing technical training to air professionals. As one interviewee put it, "EPA puts good lip service to training but doesn't put the dollars into training." Additionally, APTI has dramatically reduced its staff over time. As a result, some of the regional consortiums (e.g., NESCAM, MARAMA) have established their own training institutes to supplement APTI training. Some big states no longer rely on APTI as a training provider. Additionally, some feel that APTI is currently too focused on providing air pollution training internationally. Interviewees believe that there is a need for APTI to take care of the state and local agencies before expanding its training to other countries.

It should be noted that many interviewees commented that APTI leadership (particularly Lourdes Morales) is very committed to providing the best training to state and local agencies. Additionally, interviewees recognize that APTI has been faced with budget cuts over the past few years, which hinder its ability to satisfy all of the needs of state and local agencies.

One interviewee recommended that EPA create one group (versus separate groups, such as APTI) that is responsible for training across EPA. This training group would get one budget and be held responsible for delivering all EPA training (e.g., air quality, water, land).

III. Training Needs Assessment Process

EPA contracts with SYSTANI, Inc. to assist in administering a bi-annual Training Needs Assessment Survey. The last survey was completed in March 2004 with data collected in 2003 for projecting training needs into FY2005/2006. The data are collected from members of the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO). The training needs survey is designed, administered and reported with heavy involvement from the Joint Training Committee (JTC).

The survey has two primary purposes: 1) to assess training needs related to currently available courses and 2) to assess future training needs. The survey covers only classroom-based courses, including those provided by institutions other than APTI (e.g., NETI, CARB, and RACC). A total of 88 agencies completed the FY 2005/2006 Training Needs Assessment Survey. Thirty-eight responses were from state agencies, 46 were from local agencies, and four were from tribal agencies. Responses are also broken down by regional consortium (e.g., CENSARA, LADCO, MARAMA). The majority of the respondents work as training coordinators or managers.

For each classroom course, respondents are asked to project how many people from their areas will be attending if the course is given "In the State," "In the Region," or "Outside of the Region." Twenty-nine classroom-based courses tied for the top ten ranked courses in terms of prospective number of attendees in FY2005/2006. Of these courses:

- 15 were APTI courses;
- 10 were CARB courses;
- 3 were RACC courses; and
- 1 was a NETI course.

This list of training providers represents a significant change from the last survey administered (FY2002/2003 report administered in 2001). At that time, APTI courses comprised all of the top ten ranked courses in terms of prospective numbers of attendees. As can be seen above, in the most recent survey, CARB RACC, and NETI had courses ranked in the top ten (in terms of prospective number of attendees in FY2005/2006).

Of the 13 potential **new** training topics that appeared in the top ten list, nine of the topics were also listed in the FY2002/2003 survey results. Twenty respondents specified "Other" potential new training topics that were not included on the pick list.

Projected attendance for courses if offered "In the Region" is down by approximately 63% from the FY2002/2003 survey results. Projected attendance for classroom courses if held "Outside of the Region" is down by approximately 88% from two years ago. Similar results were found for staff projected to attend potential classroom courses. Attendance for potential classroom courses if offered "In the Region" is down by

approximately 52% from the previous survey two years earlier. Attendance for potential classroom courses if held "Outside of the Region" is down by approximately 82% from two years ago.

The Training Needs Assessment Survey also contains a question related to the factors that influence sending staff to training. In other words, what factors would either discourage or encourage managers from sending staff to training. Respondents indicated that the biggest factors that would discourage them from sending staff to training are costs, travel restrictions, workload, and staff shortages. Factors that would encourage them to send staff to training include course relevance, staff turnover, and staff development.

At the end of the Training Needs Assessment Survey, respondents are asked whether they have any additional comments or suggestions related to their agencies' training needs. Reponses cover several different areas and are bulleted below:

- Greater outreach by APTI is required to market and publicize training courses.
- Agencies need to be given at least 30 days notice that a classroom training course is coming up if they are to have enough time to process travel requests. Some agencies require up to 6 weeks.
- Attendance at classroom training is largely determined by budget. Training attendance must be prioritized based on the relevance of the course to the work being carried out in the job. Training methods should take into consideration budget/travel restrictions.
- Workload also dictates whether or not staff can take the time to attend classroom training courses. Budget restrictions have resulted in fewer people to do the work.
- More use of self-training is needed, especially interactive web-based methods.

Current Views of Training Needs Assessment

Few interviewees commented on the effectiveness of the Training Needs Assessment process. Those who did comment believe that, in general, the needs assessment is a useful tool for forecasting the future training needs of air professionals. They view the needs assessment as a snapshot in time and as a good technique for identifying trends and peaks (e.g., when a large group of people will need a basic air pollution training course). As one interviewee put it, "the needs assessment is a great tool and an effective way for making training needs known."

However, the following aspects of the needs assessment process were identified as areas for improvement:

Other feedback mechanisms are used to supplement the Training Needs Assessment Survey. Some interviewees indicated that in addition to the Training Needs Assessment Survey, they solicit other feedback to make decisions about course content and delivery methods. For example, one interviewee reported that he/she conducts interviews with directors who run state and local agencies and with training providers to determine the training needs of the consortium. This finding may indicate that the current Training Needs Assessment Survey is not broad enough to provide comprehensive data for decision-making about future training content and delivery methods.

Not enough is done with needs assessment results. Some interviewees questioned whether APTI uses the results of the Training Needs Assessment Survey in its internal decision-making regarding course content. As one interviewee put it, "I am not sure if APTI is using it (the needs assessment) for anything more than scheduling based on the 'number of staff likely to attend training' question." Interviewees believe that other organizations (e.g., CARB) are using the needs assessment results to develop new training topics/courses.

Some decisions about training are not well understood. Some interviewees (particularly members of the JTC) indicated that they are not always clear about how decisions regarding training content are made by APTI. As one interviewee put it, "we sometimes wonder where some of the training comes from and why APTI picked a certain course or satellite broadcast."

Options for Improvement:

Interviewees provided some suggestions for improving the current needs assessment process.

1. Include a skills assessment in the Training Needs Assessment Survey in addition to projecting the numbers of attendees. For example, have respondents assess their group's overall skill level related to each Potential New Training Topic. This information would help course developers determine at what level (beginning, intermediate, or advanced) training should be targeted.

2. APTI should clearly communicate what changes to training are being made as a result of the needs assessment survey and link the results to course development efforts.

3. Expand the needs assessment beyond classroom courses. For example, use the assessment to attempt to gauge what types of satellite and web-based courses will be needed by air professionals in the future.

IV. Course Content

APTI currently develops few new courses from scratch each year (0 – 2 new classroom courses per year). The focus is on updating current courses (which is a key concern raised by interviewees) and converting course material to be delivered in a different medium, such as the web. In 2003, APTI updated four courses (e.g., Combustion Evaluation, Principles and Practices of Air Pollution Control). All development and updating of APTI courses is done by contractors with insight from EPA subject matter experts.

Current Views of Course Content

We consistently heard from interviewees that in cases where APTI course content is up-to-date, the content itself is very good. APTI courses are considered to be comprehensive and cover a wide breadth of subject matter.

However, some interviewees stated that they prefer attending CARB, NETI, or RACC courses over APTI courses because courses provided by these agencies are consistently more up to date, more specialized, and have more knowledgeable instructors than APTI courses. Additionally, many consortia members are developing their own courses over time to supplement APTI courses. As described below, interviewees identified several opportunities for improving APTI course content.

Need to update course materials. By far the most prevalent comment regarding course content and design is that many APTI courses are in need of updating to the point of being obsolete, and APTI is not updating these courses fast enough. For example, some interviewees believe that the Introduction to Air Pollutants course is so outdated that it is not even worth attending. Some courses have not been updated for over 15 years. Additionally, some APTI course materials contain inaccurate data. Interviewees also commented that in the course evaluations, students complain about course materials more than anything else. The FY2005/2006 Training Needs Assessment also reveals that many students are disappointed with the quality of APTI courses and believe that many courses are out-of-date.

Because APTI course materials are out-of-date, instructors often must update the course material prior to delivering the course. As one participant put it, “they (EPA) expect industry to be up to date; I think it is reasonable that they keep themselves up to date.” Some interviewees believe that updating existing courses should be a priority over developing new courses.

Outdated course content is also an issue for paper-based and .pdf on-line self-instructional courses. That is, on-line .pdf courses are not looked upon favorably by those interviewed primarily because course materials are out of date. Interviewees indicated that if course materials are old and contain out-of-date or incorrect information, then it could be detrimental to make them easily accessible through the web. As one interviewee put it, “this serves to propagate the inaccuracies.”

One interviewee stated that outdated APTI course materials actually influence the selection of contractors (instructors) in the sense that contractors who have taken their own time to update APTI course materials will be selected over contractors who teach the course content as it is. Interviewees reported that APTI courses have to be modified before they are delivered and that these modifications require a significant amount of instructor resources. Related to this, some individuals who have updated APTI courses out of necessity are unwilling to share their updates with APTI as they see the revised course materials as their own intellectual property. One implication of the need to update course content is that there is a lack of consistency in how APTI courses are delivered (i.e., course instructors modify the course content in different ways).

Other interviewee comments related to the need to update APTI course content include:

- There is a large need for introductory courses to be updated because of staff turnover in state and local agencies due to retirement.
- Policies and case laws change, so training must be modified to account for these changes.
- In addition to the need for course content to be updated, some interviewees believe that laboratory equipment/sampling equipment needs to be updated.
- There is a need to update lab books used in classroom training (e.g., to reflect new instruments).

It should be noted that many interviewees recognize that budget restrictions limit the number of course updates that EPA can handle.

Some course material is of poor quality. In addition to needing to be updated, the overall quality of the course materials is viewed as being poor. Booklets are sent out that are difficult to read; pages are missing, upside down, or out of order; materials arrive late; or the wrong materials are sent out. Interviewees believe that basic quality assurance is not carried out on a consistent basis. Some interviewees reported that it is frustrating to either have to fix the same typos every time the materials are received or continue to receive materials with the same errors after repeatedly reporting them to EPA. As one interviewee put it, "the content may not be out of date, but it looks out of date."

There is overlap in course content. Course content is also seen by some interviewees as overlapping too much in certain courses. Supervisors who have sent their employees to training indicated that their students complain that they sometimes take a course that is too similar to another course they have already taken. The FY2005/2006 Training Needs Assessment also found that many students believe that there is too much overlap in content among APTI courses. Interviewees agree that with training dollars and training time being stretched to the limit, there is little tolerance for learning about the same topic in two or more different courses.

There is a need for more specialized courses. Several interviewees commented that more specialized courses need to be added to the course schedule each year. Some

interviewees perceive that EPA is not spending enough time teaching courses that have specialized content. Additionally, APTI is not offering enough courses that are at a higher, more strategic level. One interviewee stated that they hired contractors to develop a specialized course because the need was not being met by APTI.

Incorporate more real-world applications to training content. Some of those interviewed believe that while the APTI courses offer good technical information, they do not always cover how the information relates to industry or the "real world". Some courses focus too much on theory and not enough on practical applications in the field. Many APTI courses give air professionals background information but not the process skills they need to do their jobs (although, lab courses do develop these types of skills). As one course instructor who was interviewed put it, "the course needs to tell people what they need to know to do their jobs in the field." One supervisor also stated that "meetings put on by local groups/associations are more meaningful than APTI courses because there are people attending from industry; you get more dialogue, different perspectives."

Need for more courses and better scheduling. Some interviewees indicated that APTI needs to make more courses available each year, and that the number of courses APTI provides has declined over the past few years (due to budget restrictions). Additionally, comments were made about the importance of course timing and scheduling, and that courses should be staggered throughout the year.

Options for Improving Course Content

Interviewee recommendations for improving APTI course content are summarized below.

1. Provide clear direction about the process for updating course content. Questions that should be addressed by EPA include:
    a) Will EPA take the lead in updating APTI courses?
    b) How will consistency be ensured if different contractors/groups are updating the same APTI courses themselves?
    c) Who owns the intellectual property when an outside group spends time updating out-of-date APTI courses?
    d) How many courses will APTI be able to update per year?
    e) Who will determine which courses are updated and in what order (e.g., update highest volume course first)?
    f) What process will be used to update specific course content?
    g) Given the fact that many APTI courses need to be updated, should certain courses be "shelved" as opposed to having inaccurate information going out over the web site?
    h) Should APTI turn over certain outdated courses to other institutions (e.g., RACC)?
    i) What is the process for certifying an outside course? Is there a standard process?

2. Put into place regular review cycles to keep courses up to date. For example, review course content, objectives, and resources on a three-year review cycle. Ensure that course materials are relevant to what is going on in today's regulatory world and incorporate the use of modern technology (e.g., some sampling equipment has changed drastically).

3. At a minimum, there should be a process for checking course materials before they are sent out. Missing pages, upside down pages, and pages out of order should be eliminated. When typos are found in course materials, they should be corrected before being sent out again. Interviewees feel strongly that APTI should take responsibility for correcting errors in its courses.

4. Review and redesign courses to minimize content overlap. However, given the need to update course content, this is likely not a big priority. A better alternative may be to review course overviews and objectives with the goal that prospective course participants can clearly see whether or not the material covers topics they have already learned. This will enable participants to make a judgment as to whether they should attend the course or download the materials from the web.

5. Review the look and feel of the course content. Interviewees suggested updating the course content to be much more visually oriented by adding pictures and making the science aspect much more interactive by putting courses on the web.

6. Centralize the development of air pollution training (e.g., one interviewee indicated that there are two agencies that are spending time and resources developing the same course separately). EPA should provide more centralized support in course development.

V. Course Delivery

There are four types of courses provided by APTI: classroom, satellite, on-line interactive, and self-instructional (.pdf on the web and paper-based). In the past few years, APTI has put an emphasis on moving more training to an on-line and satellite format (distance learning techniques) to meet the needs of a largely dispersed customer population faced with travel and budget restrictions. Additionally, on-line and satellite training allow state and local agencies to train new hires and others who require air pollution training in a timely manner (just-in-time training).

For the purposes of this report, on-line courses will refer to web-based interactive courses only; self-instructional courses will refer to hard copy manuals and .pdf files that are available for download on-line but include no interaction.

In the remainder of this section, we discuss and evaluate each of the four training delivery methods.

Classroom Courses

Currently, classroom courses are those which are presented live by recognized professionals (e.g., consultants, university faculty) and held either at an Area Training Center, a related university, or on-site at a state or local agency. APTI is actively involved in updating and developing courses. In 2003, four APTI courses were updated and thirty-seven courses were delivered nationwide. Students can receive certification for courses by completing class assignments, passing a final exam, attending and participating in class sessions, and submitting a course evaluation.

Current Views about Classroom Courses

By and large, most people interviewed prefer the classroom delivery vehicle when time and travel is not an issue. This perception is held by interviewees, as well as by students who have completed APTI courses (as indicated by student evaluations and feedback from supervisors who have sent their employees to training). Student evaluations of classroom training courses tend to be very favorable, and many students feel that the course materials will be useful to their jobs. Classroom training allows for the most interactions with the instructor, personal attention to questions and students learning from one another. Classroom training is seen as the most effective delivery method, especially for higher level technical classes and those with a laboratory component.

However, most interviewees agree that classroom learning is not appropriate for all APTI courses, especially in light of recent budget cuts. Despite the fact that classroom training was the preferred method in the past, most agencies are under budget constraints and travel restrictions that prevent them from getting to the classes. Therefore, agency training professionals recognize the need to have a complement of vehicles, although some interviewees believe that classroom courses should be mandatory for classes with

laboratory components. Additionally, many interviewees indicated that the quality of APTI classroom courses vary greatly and primarily depend on the instructors.

A summary of comments made by interviewees and students (in response to student evaluation forms) regarding the APTI classroom courses is provided below.

Overall, classroom is best of the four delivery methods. While there is a need for a variety of training vehicles, classroom delivery of courses is viewed as the most effective. One interviewee said, "students are completely dedicated to learning in that environment and the diversity of students allows for different perspectives and better learning."

However, most interviewees indicated that while classroom interaction is effective, it should not be used for all courses. The perception is that while it is a good technique, the classroom is not the most efficient way to deliver training, especially for introductory classes or classes that need to be attended by large numbers of people.

Laboratory component is very valuable. There is agreement among interviewees that the laboratory component (included as part of some APTI classroom training courses) is very effective as a learning tool. Students are given the opportunity to actually learn the skills that they need to do their jobs effectively. Student evaluations of laboratory training courses echo this finding; students feel that the laboratory component is the best part of the classroom training experience. Students believe that the lab helps them understand the course materials, and they like the hands-on learning component of the classroom training. As one student indicated in the student evaluation, "the best part of the course was hands-on modeling and the exercises."

Students want more practical applications in non-laboratory courses. Some interviewees commented that lecture only courses need to be supplemented with more "real world" examples to emphasize how, for example, sampling techniques, equipment, mathematical equations, will actually be used in the field. Student feedback from course evaluations also suggests that they want more hands-on applications. Some courses focus too much on theory and "put people to sleep." Instead students want to know "what do I do with this information?" "The course needs to tell people what they need to know to do their jobs in the field."

Mixed opinions about the effectiveness of instructors. While the classroom environment allows people to remain engaged at all times, the effectiveness of the instructor can have a huge effect on whether the training is viewed as worthwhile. Some interviewees feel that there needs to be a process for ensuring that instructors are effective (e.g., monitoring student feedback on the effectiveness of instructors, observing instructors delivering classroom courses). Interviewees view instructors as having a thorough grasp of the technical information but do not see some instructors as effective in delivering the material. The general feeling is that the best instructors are those who have "worn all hats" (for example, worked for EPA, worked for private industry in a monitoring capacity and worked on the design or update of APTI courses). It should be noted that, overall, the student evaluation feedback that we reviewed was very favorable regarding

instructors. Instructors are viewed as dynamic and interesting, and students like the interactions among the instructors.

Lack of consistency in how classroom courses are delivered. Interviewees believe that classroom courses are delivered inconsistently when APTI materials are out-of-date because instructors must supplement APTI materials with their own. Inconsistencies can also occur when instructors travel to states that need the training delivered on-site. While traveling instructors are viewed positively in light of the travel restrictions that most states are under, the travel can lead to a less integrated training curriculum and inconsistent learnings.

Options for Improving the Classroom Courses

Interviewees had several recommendations for improving APTI classroom courses.

1. Consider a "train-the-trainer" approach so that there will be people on site at the agencies that are able to teach the course materials locally.
2. Increase the number of real world examples and hands-on applications included in classroom courses that are primarily in a lecture format. Supplement the lecture with practical illustrations when applicable.
3. Increase the prevalence of group exercises in order to expose attendees to one another and their respective issues and diverse perspectives. This practice can increase group learning for the class.
4. Ensure that instructors are not only knowledgeable about the materials but also skilled at teaching. Use course instructors who not only have educational experience but who have "done it in the field."
5. Make sure classes (including supplemental materials) are consistent across all courses, and then take the instructors on the road (one interviewee indicated that "EPA should travel more to the states to deliver training").
6. Shorten the length of classroom courses (e.g., 1 day training as opposed to 3 to 5 days). Shorter courses reduce costs and time away from the job.
7. Reserve classroom courses for those having laboratory assignments and covering more technical, specialized topics.
8. Ensure that classroom locations are easily accessible to most of the country.

Satellite Broadcasts

APTI uses its Air Pollution Distance Learning Network to deliver satellite broadcasts to air professionals (and other interested parties) throughout the country in a cost effective manner. The satellite broadcast is used to deliver informational broadcasts (e.g., to keep air professionals up to date on new regulations), as well as technical telecourses. For example, APTI course 427 (Combustion Evaluation) has been converted to a satellite course to be delivered in 4-hour blocks over a four-day period. Some satellite broadcasts allow participants to fax in questions and selected questions are answered by the

presenters. Participants are not required to register for satellite broadcasts, except for 300- and 400-level telecourses.

In 2003, APTI delivered a total of 14 broadcasts covering 66.5 broadcast hours. Additionally, several broadcasts have already been delivered or are in development for 2004.

There are approximately 100 downlink sites throughout the country. Site coordinators are responsible for advertising upcoming broadcasts, arranging the room where the broadcast will take place, and other logistical duties. Satellite broadcasts are often simulcast over the Internet and can be viewed on a PC. Videotapes of past satellite courses can also be used as self-instructional courses.

Current Views about the Satellite Broadcast

There are mixed opinions about the appropriateness of using the satellite broadcast as a training delivery method. Some interview participants do not like the satellite broadcast as a training delivery method. This camp believes that APTI has placed too much emphasis, and budget, on the delivery of training via satellite broadcasts at the expense of other delivery methods (e.g., many classroom courses have not been updated). As one interviewee indicated, "the direction towards satellite is a complete waste of time and resources."

Most interviewees, however, recognize that state and local agencies have budget limitations, travel restrictions, and the need to minimize employee time away from the job, making it necessary for APTI to deliver training in other ways besides the traditional classroom approach. This finding is echoed by the 2004 Training Needs Assessment through which participants urged APTI to consider budget/travel restrictions when making decisions about training delivery methods. Satellite broadcasts are seen as one cost-effective way to deliver training to a large, geographically dispersed audience.

Another benefit of the satellite broadcast is that it can provide timely and consistent information to air professionals. For example, satellite broadcasts allow 300- and 400-level training courses to be delivered in a consistent manner, which is not always the case with classroom training. Additionally, because satellite broadcasts are taped and can be re-shown in a video format at any time, state and local agencies can provide just-in-time training to new hires.

Although many interviewees recognize the potential value of satellite broadcasts, there is agreement that the current APTI satellite broadcast delivery method is not effective and is in need of improvement. Many satellite broadcasts play to a very small audience or no audience at all. Proponents of the satellite training method feel that APTI should focus its limited resources on improving its satellite broadcasts so that air professionals have easy access to APTI training (particularly those who are impacted by travel restrictions and can not attend classroom training). It should be noted that some interviewees indicated that the satellite broadcasts have improved over the past few years (e.g., instructors are more effective, satellite productions are better).

The following is a summary of the comments that were made about APTI satellite broadcasts:

Speakers are not effective presenters. Many interviewees indicated that the speakers who deliver the satellite broadcast are often dull (speak in a monotone voice) and do not present the information well. Participants do not find many of these speakers engaging, and have difficulty paying attention to broadcasts that last for two hours or more (and thus, do not get much out of the broadcast). It is particularly important to have an engaging speaker because many of the satellite broadcasts are presented in a lecture format. Participants in the satellite broadcast often end up reading the text that is provided because they do not learn enough from the speaker (due to the poor presentation style). As one interviewee put it, "the material was good but the presenter got in the way." Another interviewee stated, "you need to pick the right people who can communicate and work the medium to deliver the broadcast."

It should be noted that some interviewees believe that APTI has improved in this area and is now using some of its best instructors to deliver the satellite broadcasts.

Limited opportunity for interaction. Perhaps the biggest complaint about the satellite broadcast is that it provides limited opportunity for student interaction (e.g., discussion among participants, interactions with the instructors). Most interviewees believe that it is very difficult to sit through a long television broadcast in a lecture format without opportunities for interaction. Furthermore, a lecture-style delivery method where students passively watch the television (versus one that facilitates student interaction) is not an effective adult learning technique (i.e., not effective for retaining information, particularly of a technical nature). One interviewee indicated that "the satellite can be a bit boring, not because of the instructors but because of the mode."

Even when the broadcasts allow for participants to fax in questions, there is the perception that few participants actually get their questions answered (e.g., speakers are often reluctant to answer some questions, such as about policy issues). As one interviewee put it, "in theory, you can ask questions during the satellite broadcast, but in application, you can't." Others feel that participants in a satellite broadcast are less likely to fax in questions than they would be to ask a question in a classroom setting. Additionally, the process of faxing in questions is not viewed as being "real time."

Length of broadcasts are too long. Some believe that the satellite broadcasts are too long (considering that there is little interaction and many speakers are not dynamic). For example, one interviewee indicated that it is not effective to do four-day satellite courses (which occurs with 400-level courses) because "you will bore students."

Location of satellite link is not always convenient. Some interviewees reported that the location of the satellite link may limit attendance for some air professionals. For example, some air professionals have to travel to the downlink location (in a time when state and local agencies have travel restrictions).

Topics do not meet customer needs. Some interviewees commented that the information covered by the satellite broadcasts does not meet the needs of air professionals. For example, many broadcasts focus on national topics versus local issues. As one interviewee put it, "one broadcast focused on air toxics, but we don't have toxics." Another interviewee believes that the satellite broadcasts are not really training but PR for EPA. One interviewee stated that "the broadcasts are good touchy-feely stuff versus training." Another commented that the satellite is sometimes used to provide information about topics that have nothing to do with air pollution.

Satellite was down for several months. Many interviewees expressed frustration that EPA lost its satellite for eight months. They also indicated that EPA did not provide adequate communication when the satellite was down. As a result, many site coordinators lost interest in the satellite as a training delivery method.

Options for Improving the Satellite Broadcasts

Interviewees provided several recommendations for improving the satellite broadcasts delivered by APTI:

1. Use the satellite broadcasts primarily to:
    a. Provide information about subjects of interest to a broad audience (not just air professionals)
    b. Deliver refresher training and less technical courses
    c. Show a panel discussion of topics covered in other courses
2. Enhance the satellite technology so that air professionals can view the satellite broadcasts from their PC (if not already done)
3. Do more marketing and outreach about satellite broadcasts
4. Incorporate opportunities for interaction into the satellite broadcast format, such as:
    a. Include a small group exercise facilitated via conference call by EPA representatives
    b. Include a workbook that is referred to and utilized during the course
    c. Use a state/local agency representative to facilitate discussion and answer questions during the sessions (with support from an APTI facilitation guide)
    d. Include a studio audience that asks questions of the presenters as part of the broadcast
5. Require read ahead materials to supplement the broadcast (similar to self-instructional course materials).
6. Shorten the length of broadcasts (e.g., one hour) to increase attendance and the potential for learning.

On-line Interactive Courses

In the past few years, APTI has placed a greater emphasis on moving training to a web-based format. Both classroom and self-instructional courses are being converted to this medium. Results of the FY2005/2006 Training Needs Assessment highlighted the importance of providing students with opportunities for self-training, especially through interactive web-based methods.

APTI will select seven courses as virtual classroom courses. These courses should be operational by October 2004. Several of the courses already being developed as web-based courses include: Emissions Inventory Introduction; Orientation to Air Pollution; Title V Citizen Training; and Ozone and Your Patient's Health. Examples of on-line interactive courses currently used by APTI include Air Toxics, Title 5 and Air Pollution Control Orientation. On-line, interactive courses do not require registration. There is a final exam for web-based courses and participants can now receive CEU credits.

Current Views about On-line Interactive Courses

Although APTI considers two types of courses to be web-based courses - .pdf files of paper materials and interactive web-based course materials - we will focus on only the interactive courses in this section (the .pdf courses are reviewed in the next section, Self-Instructional Courses).

Interviewees consider APTI's on-line interactive courses to be very good, especially for courses covering introductory material. The on-line interactive medium is viewed as the best medium (better than the satellite broadcasts) for mass distribution of information and teaching of foundational materials. Interviewees believe that it is very easy to access on-line training courses (typically at one's PC), which is important due to budget and travel restrictions. On-line courses are also viewed favorably because: 1) students have the ability to go at their own pace; 2) technical information is presented in a consistent manner (which is not always the case with classroom courses); and 3) there is an element of interaction which holds participants' attention. Classes that are currently on-line and interactive are also viewed as being more up-to-date (e.g., than classroom or self-instructional, paper-based courses).

The on-line training delivery method is an area that interviewees view as having the most potential to make a positive impact for the least amount of money. Most interviewees agree that more on-line, self-instructional courses needed to be available. However, the consensus is that these types of training must be more interactive if they are to be effective.

Below is a summary of the specific comments that were made about APTI's on-line interactive courses:

On-line interactive courses are working. Most interviewees had positive comments to make about the APTI courses that are on-line and interactive. One interviewee commented that, "APTI has added interactive computer courses which are very good;

most students provide feedback that the courses are good." Another interviewee stated, "APTI is going in the right direction with computer-based courses."

On-line interactive courses work well for introductory materials. Interviewees mentioned multiple times that the accessibility of these types of classes was great for introductory classes or those in which the EPA needs to distribute information to a large number of people. One interviewee indicated that the "virtual classroom is great but should be used for introductory courses only. This allows everyone to have a certain level of background." "This is a priority because it is most cost-effective and [the student] can stop and go at their own pace." However, some interviewees questioned whether web-based courses are as useful for intermediate or advanced course content as they are for introductory course content.

There is a need to incorporate more interaction into on-line courses. As with the satellite broadcast delivery method, interviewees believe that one way to improve the APTI web-based courses is to add more opportunities for student interaction (e.g., through simulations, chat rooms). As indicated previously, training methods that facilitate student interaction are more effective for retaining information delivered in training courses than are methods without an interactive component.

Options for Improving the On-line Interactive Courses

Interviewees provided several recommendations for improving on-line interactive courses.

1. Use on-line interactive courses for introductory classes and classes that are taken most frequently.
2. Add additional opportunities for interaction to the on-line courses including regularly scheduled "chat rooms" where participants can have their questions answered and interact with instructors. This could be done at designated times in order for students to ask questions and discuss issues simultaneously.
3. Incorporate interactive video conferencing with the on-line classes.
4. Use more dynamic authoring tools for web-based training.
5. Add more computer-based simulation in order to demonstrate the equipment that the students will have to use in the field.

Self-instructional Courses (Non-Interactive)

APTI currently has two forms of self-instructional (non-interactive) courses, a paper-based course where APTI mails out the hard copies of materials in response to student requests, and an on-line version where the same materials are downloaded onto the Internet in a .pdf format. APTI is currently committed to putting all hard copy materials on-line, so mailings of self-instructional workbooks will not continue in the future.

In 2003, 1,583 students registered for self-instructional courses. It is expected that this number will grow in the next year due to continued budget restraints.

Current Views about Self-instructional Courses

Interviewees have mixed opinions regarding the APTI self-instructional delivery method. When course materials are out of date, self-instructional courses are viewed very negatively. Additionally, some interviewees believe that these courses have minimal benefit because there is no interaction, and no opportunity to have direct communication with instructors or other students. This camp sees self-instructional training as simply "feeding information" to students. As a result, many students do not ever finish the self-instructional courses and probably do not learn much from these courses.

Some interviewees, however, believe that the self-instructional method of training is valuable for certain types of classes and students. One interviewee commented that "these courses are good for students who are just starting to learn about air quality. The materials provide a good, basic understanding." This person also noted, however, that the materials need to be updated first before putting them on-line. Another interviewee mentioned that many of the engineers taking these classes are visual learners, so they like the self-instructional materials. Most interviewees believe that the two self-instructional media (paper-based and .pdf) are equivalent, although access to the .pdf files is seen as more convenient.

Below is a summary of specific comments that were made about APTI interactive courses:

Participants want more interactions. Interviewees indicated that students would like their questions answered while they are taking the self-instructional course, not after. Students also desire more practice problems, and would like to see what questions they missed on the final exam rather than just whether they passed. In this way, they can learn from their mistakes. One supervisor who has sent employees to training questioned whether any lasting learning had taken place although the supervisor's staff had passed their exams. Some interviewees indicate that adding more visual cues, and including interaction would help students retain the course information.

Course materials are not always reviewed by students. Some interviewees state that those who download the courses off the web rarely read all (or in some cases, any) of the course material. Instead they focus on responding to test questions. One interviewee indicated, "this problem is especially prevalent with courses in a .pdf format instead of the interactive web-site."

Supervisors want more controls around testing. One interviewee (a supervisor who sends employees to APTI training) is having problems with staff simply completing the open book test and not reading through the materials when .pdf courses are downloaded from the web.

Options for Improving the Self-Instructional Courses

Interviewee recommendations for improving self-instructional courses are summarized below.

1. Update the materials before putting them on-line.
2. Add some visuals to the materials in order to make them more appealing and memorable.
3. Do not make the test available on the web or have more controls built into the process. Do not send out the test until after participants notify APTI that they have read through the self-instructional materials.
4. Develop one comprehensive manual that users can reference in the future regarding all foundational air quality materials.
5. Put all hard copy manuals on-line for easier accessibility.

VI. Training Evaluation Process

APTI uses several different forms for evaluating its training courses. Typically, students are asked to complete these evaluations at the end of the course (or satellite broadcast). Many classroom courses also give students a pretest before the course begins to assess their level of knowledge and a posttest at the end of the course to see how much the students learned.

Some of the supervisors we interviewed believe that students learn a significant amount in APTI courses and this knowledge helps them to do their jobs more effectively. As one supervisor put it, "APTI courses really enhance peoples' learning." However, the current training evaluation process does not allow for an evaluation of the extent to which APTI training actually helps air professionals to be more effective in their jobs.

Additionally, many interviewees indicated that they have developed their own surveys to evaluate APTI training. This may suggest that the current APTI training evaluation process is not effectively meeting stakeholder needs to evaluate and improve upon training courses.

The comments below summarize what interviewees said about APTI's training evaluation process, as well as the Hay Group's assessment of the training evaluation process (based on our extensive experience in this area). It should be noted that few interviewees actually commented on the training evaluation process.

Too much focus on end-of-course evaluations. APTI focuses its training evaluation efforts solely on end-of-course evaluations (some call these surveys "smile surveys"). This type of evaluation provides limited information for determining the extent to which each APTI training course achieved its ultimate objective – to improve the job performance of air professionals.

Evaluation form does not provide enough useful information for improving courses.
The current course evaluations do not provide enough information for understanding why the training course was or was not effective, whether the delivery method is the best medium for delivering the training, and more importantly, how to improve APTI training courses. As one interviewee indicated, "the evaluation focuses mostly on the instructors (are they boring or not) and classroom logistics (coffee or snacks)."

Feedback is rarely used to improve courses. Many interviewees feel that APTI does not take feedback about its training program seriously, and rarely makes improvements to its training based on this feedback. When feedback about training courses is given to APTI, the typical response is "we will try to do better next time."

Options for Improving the Training Evaluation Process

Interviewees provided a few recommendations for improving the current training evaluation process.

1. Expand the training evaluation process beyond end-of-course evaluations. In order to truly assess the effectiveness of APTI courses, it is important to determine the extent to which the training actually helps air professionals to do their jobs effectively and contribute to the mission of their agency. It is critical to collect feedback about the effectiveness of the training at different points of time and from different sources (e.g., students themselves, supervisors, training coordinators). Suggestions include:
    a. Solicit feedback (e.g., through surveys, interviews) from supervisors of attendees of training to determine the extent to which they believe the training has helped their air professionals to be more effective in their jobs.
    b. Survey course participants 3 to 6 months after the training to assess the extent to which they have improved their job performance (not just after the course is complete)
    c. Survey site coordinators to determine why satellite courses are not well attended and how to improve them.

2. Add open-ended questions to the training evaluation form that will provide feedback for enhancing the effectiveness of the training courses. Examples questions are: What should we do differently and what should we do in the same way? How would you improve the current training course?

3. Solicit feedback about web-based courses (not just satellite and classroom courses) to assess their effectiveness and ways to improve them and make them more interactive.

4. Review feedback from training evaluations on a regular basis and make modifications to training courses, where appropriate. Communicate what changes to training are being made as a result of the training evaluation and link the results to efforts to update or redesign courses and make decisions about ways to improve courses.

VII. Conclusions and Next Steps

In this report, we provide an evaluation of the current Air Pollution Training program based on data from numerous sources: 1) interviews with stakeholders who have in-depth knowledge of the APTI training program and its effectiveness; 2) reviews of relevant documents and web sites about the APTI training program; and 3) reviews of actual training courses (e.g., self-instructional manuals, web-based courses, satellite broadcasts). In subsequent reports, after we identify the best practices around training (through site visits and benchmarking research), we will provide more insight into ways to improve APTI's training program, and where APTI should focus its limited training resources (how to deliver training to a large, geographically dispersed population of air professionals in the most effective and cost efficient manner).

In summary, our findings show that there are mixed opinions about the effectiveness of the Air Pollution Training program. An initial concern raised by the study is the extent to which EPA (and APTI) is committed to meeting its core objective of training air quality professionals. There is a perception among interviewees, whether it is valid or not, that EPA does not have a commitment to providing technical training to state and local agencies.

However, APTI was often praised for its classroom training, particularly courses with laboratory components; its breadth of courses; and its course content (for those courses that are up-to-date). Additionally, many interviewees believe that APTI is taking a step in the right direction by adopting a blended approach to training – providing easy access to courses (e.g., via web or satellite) when state and local agencies are facing budget cuts and travel restrictions.

Stakeholders are most concerned with the quality of course materials (i.e., many course materials are outdated and of poor quality). Additionally, there are several potential areas for improving APTI distance learning training methods (satellite and web-based training) that are the "wave of the future" for APTI, particularly increasing the opportunity for interaction. There is also a need to ensure that APTI courses (particularly classroom courses) are being delivered consistently and by instructors who have technical expertise, practical experience in the field, and "teaching ability." Finally, stakeholders would like to see APTI place more emphasis on reviewing and acting on feedback obtained through the needs assessment and training evaluation process in an effort to ensure that the needs of air professionals are being met through its training courses.

While there were numerous suggestions from the various constituents about what the EOG (and APTI) could do to improve its effectiveness, the following were the most prevalent and noteworthy:

- Reestablish and communicate the mission of APTI and its goals to all stakeholders

- Determine which courses are most important to foundational learning and update them
- Put more course materials on-line (those that are relevant and up-to-date)
- Move toward remote, interactive classes, either through web-based tools or satellite, especially for introductory courses
- Respond to needs assessments and course evaluations, even if to say the issue will not be addressed at this time
- Increase the use of practical, hands-on applications for all courses

Our next step in the benchmarking study is to identify the best practices of organizations that have been successful at delivering training to a geographically dispersed audience, and that use innovative training delivery methods. We will be selecting potential benchmarking partners and conducting site visits to learn about their training practices, processes, and procedures (which will be summarized in a separate report). In the final report, we will provide options for making APTI more successful going forward.