

**USING DECISION CASES IN AGRICULTURE: A COMPARISON OF A
DECISION CASE METHOD AND A TRADITIONAL LECTURE**

by

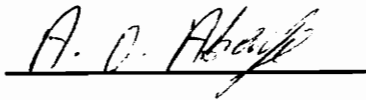
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(ABSTRACT)

The most widely used teaching method, lecture, results in students assuming a passive, non-thinking, information-receiving role. Due to the overwhelming use of lecture, teachers face the criticism that today's graduates lack the ability to think. Proponents claim that the decision case method recently introduced to the agriculture curriculum, will transform passive learners into active thinkers, problem solvers, and decision makers. A study was conducted to compare the effects of decision case and traditional lecture teaching methods on student cognitive learning and attitudes toward instruction. The study used a 2 x 2 factorial design. Students were randomly assigned to a teaching method and an instructor. Each instructor taught identical content using both a decision case and a traditional lecture method. Following instruction, each student completed a 40-question, multiple-choice cognitive exam, and a semantic differential attitude scale. Analysis of covariance techniques were used to test the research hypotheses. In this study,

there were no significant differences in cognitive learning between students who received decision case or traditional lecture instruction. However, students receiving the decision case method had significantly more positive attitudes toward the instruction.

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Chapter I

Introduction

Instructors teaching agricultural curricula have implemented a wide variety of teaching methods, which fit different niches within the agricultural classroom. In the past, agricultural educators have utilized descriptive or historical “case studies” as a teaching tool (Stanford, Crookston, and Davis, 1992). Recently the agricultural profession has adopted the decision case teaching method, which varies considerably from the case study method. Decision cases present real issues or decisions to be made, while descriptive case studies describe events, practices, conditions, or references (Stanford, 1992). In addition, decision cases are brought to the student from the point of view of a decision maker, as opposed to the standpoint of an analyst, expert, or historian. Both methods are valuable and should be selected in accordance to teaching objectives. However, in this study the focus is on the decision case method which reflects the teaching goals of the study, to expand student learning.

Description of Study

An old Talmudic expression states “If you feed a man a fish, you have fed him for a day, but if you teach him how to fish, you have fed him for a lifetime.” As educators it is our task to provide edible fish (content knowledge), but it is also our task to teach our students how to fish (how to become strategic learners and

decision makers) (McKeachie, 1994). It is the obligation of instructors to select teaching methods which are specifically tailored to the teaching objectives, as well as the needs of the student. If students are expected to know how to fish, then instructors must teach and test beyond the realm of knowledge, and into the various levels of cognition.

Bloom's taxonomy (Bloom, Englehart, Furst, Hill, and Kratwohl, 1956) defines six levels of cognition, ranging from lower to higher-order thinking. Knowledge, comprehension, application, analysis, synthesis, and evaluation are all cognitive levels at which students operate within the learning process. Unfortunately according to Newcomb (1992) students are primarily taught with methods which result in students operating at the lower, knowledge, to middle, comprehension, application, analysis, level of cognition. Current instruction activates student cognitive thinking at 37% remembering (knowledge), and 44% processing (comprehension, application, analysis). Only 19% of student learning is at the higher-order creating and evaluating (synthesis, evaluation) levels. The case study is a method of instruction which operates at all levels of cognition (Newcomb, 1992). Unlike the case study which primarily favors processing, the decision case requires students to process, create, and evaluate information. The decision case encourages students to analyze a situation, and identify key issues surrounding possible outcomes, objectives, and options (McKeachie, 1994). Decision cases promote higher level learning by activating student thinking at the creating and

evaluating levels. Students must brainstorm alternative solutions, and evaluate the efficacy of selected solutions.

In today's rapidly changing world, the ability to acquire or use knowledge and skills is more important than compiling a static knowledge base (McKeachie, 1994). Teaching methods must be changed to reflect a modern society mandating the need for functional, thinking-oriented, decision-making students. Methods, such as the decision case, which facilitate greater student involvement in an active learning process, and encourage greater breadth of learning (Stanford et al., 1992), must be implemented.

Employers expect a college graduate to have obtained an education which expands beyond technical knowledge. The successful employee must consider several decision-making factors such as the relative importance of technical knowledge from several disciplines, the ability and willingness to consider the viewpoints of others, the ethical issues, inherent at arriving at a decision on a problem, and the impact of decisions on others (Davis, 1992). Employers expect much more than familiarity with knowledge from students emerging from academia.

Agriculture has traditionally relied on highly technical-oriented instruction. The introduction of decision cases will allow agricultural educators to teach technical knowledge (biological, physical, ecological, and economical), as well as explore the non-technical (human relationships, personnel management, and ethical considerations) (Stanford et al., 1992).

Decision cases have been valuable teaching tools for educating students in the business, law, and medical professions, however they have only recently been introduced to the field of agriculture. The agricultural professorate have utilized descriptive case studies, but have not widely adopted the use of decision cases within the classroom. Decision cases have been overlooked in the agricultural curriculum because of the lack of carefully researched cases involving agriculturally-based decisions, as well as the lack of faculty expertise and experience in researching, writing, and teaching decision cases (DCCPC, 1991).

Professors at the University of Minnesota recognized the potential contribution decision cases could make in educating agriculturalists. They have made pioneering efforts to bring decision cases into the agricultural classroom by disseminating decision case information through a newsletter, Case Notes. In addition they have held workshops to educate and encourage agricultural professors to explore the use of decision cases within their classrooms.

In 1991 two professors within the College of agriculture at Virginia Polytechnic Institute and State University attended the first decision case conference hosted by the University of Minnesota. The workshop convinced them that decision cases could be a beneficial teaching technique for agriculture. After returning to Blacksburg, they held a seminar titled "Decision Cases in Agriculture: A Method Whose Time Has Come?". The seminar allowed them to share the newly gained knowledge about decision cases with their colleagues.

In convincing others of the usefulness of decision cases, they decided that decision cases had potential for advancing the education of future agricultural professionals, however they realized that it was a novel approach to our field. Claims about the use of decision cases were made, but could these theories be substantiated for an agricultural field?

The need to scientifically determine if decision cases could be an appropriate teaching tool within the agricultural curriculum was apparent. A committee was established to oversee a study to compare the decision case method with the more widely utilized teaching method, the traditional lecture within an agricultural course. Two experimental groups were established. The treatment group was taught a lesson with the insertion of a decision case. The control group was taught the same lesson, but the instruction relied solely on the traditional lecture with no insertion of a decision case. The objectives of the study were:

1. To determine if there was a significant difference in cognitive retention between students taught with the decision case, as opposed to the traditional lecture method.
2. To determine if there was a significant difference in attitude between students taught with the decision case method, as opposed to the traditional lecture method.

References

- Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., and D. R. Kratwohl. 1956. Taxonomy of educational objectives. David McKay Co. Inc., New York, NY.
- Davis, D. W. 1992. Decision cases as a teaching component in the classroom and workplace. p. 20-23. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Decision Case Conference Planning Committee. 1991. Decision cases in agriculture. University of Minnesota, St. Paul, MN.
- McKeachie, W. J. 1994. Teaching tips: strategies, research, and theory for college and university teachers. 9th ed. D. C. Heath and Co., Lexington, MA.
- Newcomb, L. H. 1992. Class notes. Agricultural Education 631: Methods in teaching agriculture (special section for college teachers). Columbus, OH.
- Stanford, M. J. 1992. What are decision cases? p. 16-19. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J., Crookston, R. K., and D. W. Davis. 1992. Decision cases in agriculture. p. 6-11. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Chapter II

Literature Review

Educators are constantly researching new methods of teaching students material which expands beyond the realm of knowledge. All six levels of cognition - knowledge, comprehension, application, analysis, synthesis, and evaluation skills (Bloom, Englhart, Furst, Hill, and Krathwohl, 1956) are important considerations of any instructor concerned about student learning. Unfortunately, the oldest and most widely used teaching method, lecture, is predominantly tailored to encourage remembering, or knowledge-based learning, instead of middle and higher-level cognitive skills. Methods which promote retention of information, application of new concepts, ability to solve problems, change of attitudes, and motivation to learn more, favor discussion methods over lecture (McKeachie, Pintrich, Lin, Smith, and Sharma, 1990).

The traditional lecture, or "chalk and talk" method is hailed as the best tool for disseminating information, but it is inadequate in other areas. Lecturing does not inspire students to think. Lecturing results in students assuming a passive, non-thinking, information-receiving role (McKeachie, 1994). Due to the overwhelming use of lecture in college instruction, teachers face a common criticism that today's graduates lack the ability to think (Greathouse and Karmos, 1987). As educators it is our duty to prepare students for future employment, thus we must empower students with the ability to think at the higher cognitive levels.

In order to encourage students to think, educators need to go beyond old lecturing habits, and explore other teaching methods. Faculty at the Harvard Business School advocate the use of decision cases to motivate students to think (Dooley and Skinner, 1977). They have been developing and teaching business decision cases for the past eighty years. Their pioneering efforts in teaching critical thinking via decision cases is successfully arming students with decision-making skills necessary for real-world managerial work. The Harvard Business School has laid the foundation for others to explore the use of decision cases in the classroom.

What is a Decision Case?

A decision case, simply termed "case" at the Harvard Business School, is a "documentation of reality" (DCPCC, 1991; Simmons, Crookston, and Stanford, 1992). It is a written document of an actual situation (Stanford, 1992) which is presented to the class through an unbiased, multidimensional perspective (Merseeth, 1990). Decision cases are based on real-life unresolved decisions (Simmons, 1992) which place the students in decision making roles (Simmons, 1993). In this role the student analyzes a situation, and identifies the key issues surrounding possible outcomes, objectives, and options (McKeachie, 1994).

Student Outcomes and Objectives

In an experiment, Watson (1975) found that the case study method classes were superior to the lecture classes in the application of concepts. Watson taught classes using the case study method and the traditional lecture. The two groups were then given identical exams. Case study students scored significantly higher in their ability to apply management principles and concepts involving goal-setting, leadership, motivation, communication, and change (Watson, 1975). Like the case study method, decision cases are encouraging students to process information. In addition decision cases activate learning at the creating and evaluating levels by emphasizing the need to brainstorm solutions and evaluate the efficacy of decisions. Decision cases are presumed to transform passive learners into active thinkers, problem solvers, and decision makers (McKeachie, 1994), however these claims are not supported by research. Research experiments such as Watson's study may support the case study method, but no research currently supports the theory that decision cases promote higher-level learning.

Educators experienced in teaching with decision cases believe that cases facilitate higher level learning by engaging students in critical thinking and problem-solving processes (Coleman, 1985). Cases involve students at all levels of problem solving. Students identify the problem, gather data, brainstorm alternative solutions, select an alternative, implement that alternative, and finally evaluate the chosen alternative's effectiveness (Greathouse and Karmos, 1987). In addition to

stimulating thought, a well written and taught case is reported to elevate student confidence, activate discussion and participation (Merseeth, 1990), and enhance decision making skills (Davis, 1992) while considering human relations and ethical issues (Reneau, 1992).

Decision cases offer a wide range of opportunities in improving the learning process; however, cases must be adapted to specific course objectives (Stanford, 1992). Dooley and Skinner, who have both been influential in the decision case movement at the Harvard Business School, have defined educational objectives of cases (Dooley and Skinner, 1977). They classify decision cases as excellent in developing judgement and useful attitudes among students. It is also an excellent means of acquiring skills in synthesis of action plans, and analyzing problems. Decision cases only rated fair to good for acquiring skills in the use of techniques, and understanding those techniques. Overall, the use of decision cases rated higher in its ability to promote higher-level learning.

Cases in Agriculture

For many years cases have been irreplaceable teaching tools for faculties teaching business, law, medicine, and politics (Coleman, 1989). Although only recently introduced to agricultural sciences, decision cases may offer an opportunity for improvement of teaching within our field. The University of Minnesota has seized this opportunity by establishing a program for decision cases.

This program is fundamental for the development, research, and dissemination of decision case work.

Stanford, Crookston, Davis, and Simmons are all agricultural professors at the University of Minnesota who are enthusiastically teaching via the decision case method. A crop course at the University of Minnesota taught primarily by cases has provided evidence that students have a more positive perception of learning when taught using cases (Stanford, Crookston, and Davis, 1992). Instructors asked students to rate themselves on skills and competencies both before and after taking the course. Students unanimously reported an increase in problem solving and decision making ability. Participants were also more competent at describing and defending decisions, working on teams, and understanding management principles in cropping systems.

In conclusion, decision cases may be instrumental in improving agricultural education. Agriculture is the largest industry in the world, employing more people than any other occupation. Employees of agriculture will continue to face global dilemmas encompassing limited resources, environment degradation, and explosive populations. Unfortunately the world's largest industry requiring decisions, which may influence millions of lives, has not yet incorporated decision making teaching methods in the classroom. If we are to meet the challenges ahead, agricultural educators must provide scientifically researched evidence concerning the ability of decision cases to produce competent decision makers.

The educational value of decision case instruction must be validated with proof of its efficacy. Future research evaluating the effectiveness of decision cases in agriculture may be instrumental in enlightening lecturers of the potential of decision cases.

References

- Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., and D. R. Kratwohl. 1956. Taxonomy of educational objectives. David McKay Co. Inc., New York, NY.
- Coleman, P. C. 1989. Case studies as teaching tools in human genetics. *The American Biology Teacher* 51:418-420.
- Davis, D. W. 1992. Decision cases as a teaching component in the classroom and workplace. p. 20-23. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Decision Case Conference Planning Committee. 1991. Decision cases in agriculture. University of Minnesota. St. Paul, MN.
- Dooley, A. R., and W. Skinner. 1977. Casing casemethod methods. *Academy of Management Review* 2:277-289.
- Greathouse, L. R., and J. S. Karmos. 1987. A new look at two established teaching methods: case studies and role playing. *Journal of Studies in Technical Careers*. 9:361-367.
- McKeachie, W. J. 1994. Teaching tips: strategies, research, and theory for college and university teachers. 9th ed. D. C. Heath and Co., Lexington, MA.
- McKeachie, W. J., Pintrich, P. R., Lin, Y. G., Smith, D. A. F., and R. Sharma. 1990. Teaching and learning in the college classroom: A review of the research literature. 2nd ed. University of Michigan, Ann Arbor, MI.
- Merseth, K. K. 1990. Case studies and teacher education. *Teacher Education Quarterly* 17:53-62.
- Newcomb, L. H. 1992. Class notes. *Agricultural Education* 631: Methods in teaching agriculture (special section for college teachers). Columbus, OH.
- Reneau, J. K. 1992. Decision cases for extension teaching. p. 24-28. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Simmons, S. R. 1992. Decision cases to facilitate creative decision making. p. 31-32. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

- Simmons, S. R. 1993. Program for decision cases. Case Notes. Oct. 1993. University of Minnesota, St. Paul, MN.
- Simmons, S. R., Crookston, R. K., and M. J. Stanford. 1992. A case for case study. p. 12-13. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J. 1992. What are decision cases? p. 16-19. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J. 1992. Educational objectives. p. 14-15. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J., Crookston, R. K., and D. W. Davis. 1992. Decision cases in agriculture. p. 6-11. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Watson, C. E. 1975. The case-study method and learning effectiveness. College Student Journal 9:109-116.

Chapter III

Materials and Methods

This study was basically exploratory in nature. The research experiment involved the development of lesson plans and measurement instruments for both cognitive learning and attitude hypotheses. The study mandated the need to validate, field test, establish reliability, and revise the lesson plans as well as the instrumentation. The following sections explain the research activities in greater detail.

Development of Instruments

A variety of instruments had to be prepared. The first undertaking of the study consisted of the development of a decision case. Several published decision cases compiled in Decision Cases for Agriculture (Stanford, Crookston, Davis, Simmons, 1992) were considered, but not selected.

Steve Simmons (1994), chair, Program for Decision Cases, stated that every case needs a theory, a purpose embedded in some educational or research context. Since the foundation of the research would be based on the final decision case product, the decision was made to specifically tailor the case for utilization within a Crop and Soil Environmental Sciences (CSES) course at Virginia Tech. Many students enrolled within CSES courses are native to Virginia, therefore a compelling topic would be Virginia born. The information to compile a decision

case based on a local issue would be more accessible. In addition the process of creating a decision case would allow the case developer to know the case in-depth. Familiarity with the case would be beneficial at the time of instruction because the experience of writing a case can often help a teacher become more effective in the classroom (Stanford, 1992).

Simmons (1994) suggested that ideas for decision cases can come from a variety of sources including newspaper articles. The topic for the study decision case came from a series of reports entitled "Pests, Poisons, and Risks" printed in The Roanoke Times and World News, a newspaper serving Southwest Virginia residents. The reports centered around the death of Hubert and Frieda Watson, an elderly Southwest Virginia couple who died from exposure to high levels of Vikane, a fumigant. The case titled Ex-terminators (Appendix A) was developed according to the models published in Decision Cases for Agriculture (Stanford et al., 1992). Ex-terminators consisted of a written document presenting an unbiased, multidimensional perspective (Merseth, 1990) of the actual events. In addition 5 study questions and 12 exhibits were included. Accompanying the case was a 12 page teacher's reference guide. The components of the teaching-notes (Appendix B) were a case overview, case goals and objectives, and the target audience or use of the case, followed by the author's insights for each decision case study question.

The case and teaching note were prepared and ready to be inserted into a lesson plan. Lesson plans had to be developed for each instructional method,

decision case (Appendix C) and traditional lecture (Appendix D). Both plans needed to be identical in nature except for the use of the decision case method in one and traditional lecture method in the other. Students being taught with either method needed to have identical instructional contents with the same learning objectives. Eight learning objectives and an interest approach were constructed to be used with both methods.

Both instructional methods contained overheads. The only difference in the two lesson plans was the insertion of the case discussion revolving around the decision case study questions. This discussion would be guided with the use of an extra overhead (Appendix C, OH5) for the decision case instruction.

The lessons concluded with an evaluation of student learning measured with a 40 question cognitive exam (Appendix E). The development of the examination instrument posed several problems. Among the problems was the decision of making the exam subjective essay, or an objective multiple choice format. After much consideration the chosen format was multiple choice. An objective exam should be utilized when impartiality of evaluation, absolute fairness, and freedom from halo effects are essential (Ebel and Frisbie, 1991). In addition an objective exam is the best format if estimating the reliability coefficient is important. Obtaining a high degree of reliability is possible with an objective exam because student responses are usually limited to a single letter or number (Ebel and Frisbie, 1991). Essay exams are subjected to a high degree of scorer unreliability due to

the halo effect, extraneous factors, and an indefinite scoring key. The multiple choice format of an objective exam was also selected because multiple choice items are better suited for testing higher order skills (Kryspin and Feldhusen, 1974). True/false and matching ordinarily only assess knowledge level behaviors.

Other considerations were making certain that the exam thoroughly, and equally, covered all aspects of the unit. The questions also had to be well written to ensure that they were comprehensible. The exam had to be able to measure student learning, and not their ability to decipher questions.

In order to evaluate the efficacy of the exam a validation panel was established. The review panel consisted of three professors, a former agriculture student, and a specialist with the Office of Pesticide Regulation. The validation panel made the necessary final revisions to the test.

In addition to measuring student cognitive retention, the study aimed to rate student attitude toward the teaching methods. A semantic differential attitude scale (Appendix F) was devised to measure student attitude for the overall lesson on pesticide management in Virginia, as well as rating each of four aspects of the unit: class content, class discussion, teaching style, and reading materials. When developing survey instruments which involve human participation, the Institutional Review Board (IRB) requires a copy to be submitted for their approval. Institutional Review Board approval was granted under the condition that no humans would be at risks, and all responses would remain anonymous.

Pilot Study

Once the instruments were developed they were field tested for effectiveness and reliability. A pilot study was conducted on the Advanced Cropping Systems class within the CSES Department. The class met on a Monday, Wednesday, Friday schedule. On Monday the 17 students were given a reading packet composed of the case and exhibits. On Wednesday the pilot students received 50 minutes of instruction which included the insertion of the decision case method within the lesson. At the culmination of class the attitude scales were distributed to be completed, and then collected the next class period. Friday the students turned in the attitude scales and then completed the opscan examination.

The exams were collected and then taken to the Office of Measurement and Research Services, Test Scoring and Analysis Program. Test score statistics were tallied as indicated in Table 1.

Table 1. Test score statistics for pilot study

Number of Examinees	17
Mean Number Right (Median)	28.00
Standard Deviation of Number Right	2.808
Mean Number Omitted	0.00
Standard Deviation of Number Omitted	0.000
Reliability Estimate (KR-20)	0.233
Standard Error of Measurement	2.459

Since the reliability estimate, 0.23, was very low for the pilot study test instrument, revisions were imperative. Reliability indicates the internal consistency of an exam. The low reliability could have been attributed to a variety of reasons. The sample number was small. Also the students were from a relatively homogeneous group with similar educational level and background experiences due to being enrolled in an advanced class. In addition reliability may be low if the test is composed of quite easy or difficult items, and if item choices are not discriminating (Ebel and Frisbie, 1991). Since the instrument's reliability is a function of the variability of the individual items, all 40 items were analyzed and revised as necessary. If a distractor had not been chosen it was eliminated and a more plausible distractor was inserted.

After implementing changes, the exam was again reviewed by the validation panel. Revisions were also made to the attitude scale. The original attitude scale consisted of ten adjective pairs for each aspect of the unit. After completion by the pilot study subjects, two adjective pairs were eliminated. Fast-slow and complex-simple were not understood by students.

Students in the pilot study were asked to provide written comments on the attitude scale. Their suggestions were reflected in revisions to the lesson plan as well as the scale itself. Students stated that the class was too fast and that they wished they could have had more discussion time. As a result the lesson was expanded by an increment of 20 minutes. Students would receive a total of 70

minutes of instruction as opposed to 50 minutes allotted to pilot students.

Study Design

After field testing the instruments and making appropriate adjustments, the data collection could commence. The study was executed among subjects within the World Crops class within the CSES Department. The study used a 2 x 2 factorial design. Students from both the 9:00 am and 10:00 am section were randomly subdivided, using a random table of numbers, into two groups resulting in a total of four groups. Each group was then randomly assigned a teaching method. The 9:00 am was randomly assigned an instructor. Each instructor had to teach a case and a lecture, therefore if an instructor was randomly assigned a case in the 9:00 am section, then he would automatically receive a lecture group from the 10:00 am section. Two instructors were utilized to control for instructor bias. The random division and assignment resulted in the formation of four groups (Table 2).

Table 2. Random group division and assignment

Group #	Class Section	Method	Instructor
#1	9:00 am	Case	1
#2		Lecture	2
#3	10:00 am	Lecture	1
#4		Case	2

Study Procedures

Identical lessons were taught except that the treatment groups, 1 and 4, received decision case instruction. The control groups, 2 and 3, were taught the same lesson, but without the insertion of a decision case. The control groups were given only the traditional lecture instruction. The content was identical for all 4 groups. The control group received the content of the decision case, but it was delivered by lecture.

The 4 groups were given instruction according to the applicable lesson plan. Midway through class on Monday students were informed of their group, location, and instructor. Students were separated and then given more instruction. At the end of class treatment groups 1 and 4 received a handout packet containing decision case reading material. The control groups 2 and 3 appeared to receive the same handout, except the 8 page case was omitted. Lecture students received the learning objectives followed by all the case exhibits.

On Wednesday class resumed in separate locations and received 50 minute instruction guided by appropriate lesson plans. Friday the groups merged and were given the attitude scale. Once the scale was completed the student exchanged it for an exam. The attitude scale was given prior to the exam to prevent students disgruntled with the exam from giving an unfavorable rating. After completion, the exams were collected , and taken to the Test Scoring Center to be analyzed.

The results were retrieved, and scores were entered into Number Cruncher

Statistical System (Hintze, 1992), a statistical analysis program. Data was coded and entered for each individual score, gender, academic level, major, instructor, and method. It is assumed that students receiving decision case instruction have a basic knowledge of facts and a level of maturity (Stanford, 1992), therefore student scores were analyzed for possible differences due to academic level and major. Students majoring within the CSES Department may possess a greater knowledge base of the decision case subject matter due to relevant instruction in other CSES courses. Information indicating student gender was available, therefore the methods were tested to determine if a method favored a gender. The variable of instructor was analyzed to indicate if instructor performance was similar, thus suggesting that all students had the same opportunity to score high. The last variable measured was method. The methods were examined to test the research hypothesis that students receiving decision case instruction do not score differently than students taught utilizing the traditional lecture method.

The data was analyzed using the analysis of covariance (ANCOVA) procedure which partials out the effects of covariates. The ANCOVA procedure (Steel and Torrie, 1960) was also selected for its ability to:

- assist in the interpretation of data, especially with regard to the nature of treatment effects
- partition a total covariance or sum of cross products into component parts
- control error and increase precision

-adjust treatment means of the dependent variable for differences in sets of values of corresponding independent variables.

The attitude scales were scored using a computer spreadsheet. Each individual unit component score for class content, class discussion, teaching style, and reading material was calculated and totaled to produce the cumulative attitude score for the unit. The component scores and total score were then entered into Number Cruncher Statistical System (Hintze, 1992) along with the dummy-coded information of instructor and method. The data was then analyzed using the analysis of covariance technique.

References

- Ebel, R. L., and D. A. Frisbie. 1991. *Essentials of educational measurement*. 5th ed. Prentice Hall, Englewood Cliffs, NJ.
- Hintze, J. L. 1992. *Number cruncher statistical system*. Kaysville, UT.
- Krispin, W. J., and J. F. Feldhusen. 1974. *Developing classroom tests - A guide for writing and evaluating test items*. Burgess Publishing Co., Minneapolis, MN.
- Merseth, K. K. 1990. *Case studies and teacher education*. *Teacher Education Quarterly* 17:53-62.
- Simmons, S. R. 1994. *Case development and use*. *Case Notes*. Jan. 1994. University of Minnesota, St. Paul, MN.
- Stanford, M. J. 1992. *What are decision cases?* p. 16-19. *In Decision cases for agriculture*. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J. 1992. *Every teacher a case writer*. p. 39-41. *In Decision cases for agriculture*. Duplicating Services, University of Minnesota, St. Paul, MN.
- Stanford, M. J., Crookston, R. K., Davis, D. W., and S. R. Simmons. 1992. *Decision cases for agriculture*. Duplicating Services, University of Minnesota, St. Paul, MN.
- Steel, R. G. D., and J. H. Torrie. 1960. *Principles and procedures of statistics*. McGraw-Hill Book Co. Inc., New York, NY.

Chapter IV

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Education

Ex-terminators: A Decision Case Incorporating Politics with Chemical Application

M. G. Allen, J. R. McKenna, A. O. Abaye, and W. G. Camp

Abstract

Chemical usage for pest management has been a sensitive issue for many years, representing a multitude of divergent opinions. The risks associated with chemical applications may pose a global threat to mankind and the environment. In Virginia, many incidents of misuse have been documented including the pollution of the Chesapeake Bay, the death of wildlife, the destruction of residential property, and a deterioration of consumer health. Yet until the 1986 death of the Watsons, an elderly couple residing in south west Virginia, little attention was paid to the toxic nature of chemicals. When the Watsons expired due to an inappropriate application of Vikane, a fumigant, public fury was fueled. A series of reports entitled "Pests, Poisons, and Risks" in The Roanoke Times & World News generated public safety concerns. The goal of this case is to actively involve participants in the chemical controversy. Students are

presented with various viewpoints portrayed by media reports, and fellow classmates. Students are encouraged to defend their stance, while considering ethical issues surrounding opposing views. Ultimately the participant must address the dilemma with a synergistic decision of providing safe and effective pest control services, while meshing the desires of consumers, exterminators, agriculturalists, and government officials.

The Case (Abridged)¹

One Sunday morning I sat down in my easy chair with a piping hot cup of coffee and the Sunday newspaper. Instantly my attention was drawn to the front page story of "Pests, Poisons, and Risks". As a part-time farmer, I have always been aware of the public concern for pesticide usage. As I focused on the article I began to wonder what we farmers had done to deserve front page coverage. I scanned the article, and to my relief, discovered that agriculture was not the topic of discussion, but instead home exterminators were the focus. According to the Roanoke Times & World-News, "bad things can happen when an exterminator visits."

Mary Bishop, a staff writer, reported that Virginians have suffered at the hands of exterminators. Homes have been made unlivable, health has been ruined, and elderly have been cheated out of thousands of dollars. These instances have

all been due to the lax laws and regulations governing pesticides in Virginia. Pesticide misuse had even resulted in the death of an elderly Galax couple (Exhibit 1).

I took a sip of coffee, and eased back in my recliner. I was filled with mixed emotions. I was relieved that the agricultural industry was not responsible, yet I was outraged that exterminators were capable of inflicting human death. My heart sank thinking about the Watsons, who lost their lives during a routine fumigation. The Orkin sales supervisor had reassured them, "It's not dangerous, don't worry." If only Orkin had taken the proper precautions and monitored the house for Vikane levels, perhaps the Watsons would still be living.

After reading about the tragic death of the Watsons, I began to follow the pesticide series in the Roanoke Times & World-News. I wondered if the death of the Watsons, along with the long list of other claims ranging from poor health and property damage to money theft, would influence the pesticide industry.

Mary Bishop's articles had elevated anxieties and skepticism among Virginia residents concerning the application of home insecticides. Several articles reported that the laws were not successfully monitoring the handling of pesticides in Virginia. According to Bishop no training or experience is needed for pesticide application. She stated, "In Virginia it is harder to become a hairdresser than an exterminator.

Beauticians in Virginia must undergo extensive training and pass an examination. But to set up shop as an exterminator you need only a business license - and sometimes not even that. You don't have to have any experience, training, or knowledge of pesticides."

She continually alluded to the fact that the state of Virginia did not control the pesticide industry. Virginia officials did not even know how many exterminators were operating statewide. Andre Perdue, head of the Roanoke Valley Pesticide Control Association, told Bishop, "We have people out there right now operating out of a trunk of a car without any insurance. This industry is wide open for it. You don't have to have any certification to be an exterminator. You can start an exterminating business tomorrow."

Bishop reported that once such a business is established, inappropriate handling of chemicals results in little or no reprimands. In one article, she wrote, "The restaurateur in Virginia whose service personnel sell beer to a minor can lose his ABC license. The pest-control company whose personnel render a home unfit for human habitation can go down the road and sell its services to another customer. Something is wrong."

Over a two and a half year period, 67 complaints had been filed against exterminators at the state office of pesticide regulation (Exhibit 2). Of those cases, 41 were found free of pesticide misuse, and a majority of the remaining cases had resulted in mere warning letters.

Another Sunday morning commenced with my routine of drinking coffee while browsing the paper. Articles concerning pesticides had become as common as the comics. I continued following the reports in anticipation of a resolution. Would the uproar catalyzed by the Roanoke Times & World-News be calmed? What exactly would have to be done to alleviate the skepticism encompassing exterminators?

Pest control companies were beginning to defend their tumbling reputations. Companies like Terminix confirmed the competency of its operators via a letter to the readers of the Roanoke Times.

Orkin attempted to redeem itself with a full page letter in the Roanoke Times & World News. Orkin expressed its condolences for the deaths of the Watsons, while emphasizing that the Galax fumigation was not representative of its business activities. Orkin also stressed that it is dedicated to high standards of safety in providing effective pest control services.

I sipped my coffee, while digesting what I had just read. Homeowners were skeptical, and some hysterical. The media had instilled panic in exterminators, customers, and state officials at the Office of Pesticide Regulations (also referred to as the Office of Pesticide Management) in the U.S. Department of Agriculture. How could pesticide regulators make amends?

A few days later, talk of stiffer regulations and punishments has been

circulating. Some people opposed tighter regulations, while others saw stricter regulations as a means of sprucing up the image of legitimate operators. Ron Chaney, President of the Virginia Pesticide Control Association, acknowledged the need for more government control, as long as the controls are laws "that we can live with."

Governor Baliles reacted to public concerns by establishing an eight-person pesticide enforcement team, The Council on the Environment, costing \$535,000. The panel was requested to conduct a 90-day investigation of pesticide regulations in Virginia (Exhibit 3).

The Council roused the concerns of agriculturalists. Farmers vocalized their opinions at a public forum in Harrisonburg. One farmer announced that chemicals have made great contributions to fruit production. He also warned that in the past "near panic" was caused due to new federal regulations. Farmers suggested that the panel should only increase regulations where problems could be documented.

Billy Walls, Virginia's Chief Pesticide Regulator, expressed his concerns about the banning of agricultural pesticides, "If you eliminate too many pesticides, you are going to affect the cost of food and fiber." When Furadan, an agricultural pesticide that environmentalists claimed to have killed bald eagles, was under siege in 1987, a Virginia Tech Extension Entomologist wrote Billy Walls, adamantly opposing the regulation of Furadan: a "good insecticide".

The news featured additional coverage concerning pesticides in agriculture.

Lt. Governor, Doug Wilder, was quoted at an annual Farm Bureau meeting, "It is obvious to all of you as it is to me that, without pesticides, the American farmer could not feed the people of this country...but it is also obvious that the use of pesticides has created problems."

Editorials and commentaries featured in the Roanoke Times depicted readers' viewpoints. One reader wrote an editorial suggesting that in the process of settling the disagreement that persisted over additional regulations, people must be protected. He stated, "Protecting people, let's recall, is what this whole controversy is about".

Another reader suggested that the government and the exterminating businesses should not bear total responsibility for claims of pesticide misuse. She stated that we live in a period of "information overload". Information indicating the dangers of chemicals is readily available. She asked, "In this age of information overload, how much protection should willful ignorance purchase?"

Occasionally readers still write letters to the editor in response to the pesticide series. One reader wrote the editor alleging that the pesticide reports had been one-sided. "She (referring to Mary Bishop) heard one side of the issues, thus her article had a very negative tone."

As I see it, the media has captured the concerns of both the private and public sector. Exterminators are defending their reputations, pesticide regulators are investigating existing laws, farmers are voicing their concerns, and residents are expressing their fear and anger. All citizens have an opinion, whether positive or negative, about pesticide application and regulation. Most Virginians recognize the contributions chemicals have made to our society, however negative publicity has clouded our perception.

I am a farmer and a consumer of agricultural commodities as well as a resident and homeowner in Southwest Virginia. I want to see agriculture continue to meet the needs of our population, yet I want to see my family protected against environmental hazards. In order to ensure that my concerns are addressed I plan to testify at one of the forums held by the Pesticide Enforcement Board (Council on the Environment). What should I recommend to the Council concerning pesticide regulations?

¹ This is an abridged version of the original case. The complete case consists of 9 pages of text, 16 pages of exhibits, and a 15-page interpretive note. For a copy of the complete case contact the author.

Case Exhibits²

1. 21 Aug. 1988 article "Pests, Poisons, and Risks" from The Roanoke Times & World News.
2. Aug. 1988 reprint article "Fumigation 'Loaded Gun', Expert says" printed in The Roanoke Times & World News. Included in this abridged case as Exhibit 1.
3. Aug. 1988 Visual of Complaints in Virginia featured in The Roanoke Times & World News. Included with this abridged version as Exhibit 2.
4. 25 Aug. 1988 letter to the readers of The Roanoke Times & World News from Terminix, stating the competency of Terminix as a pest control service.
5. 20 Nov. 1988 letter to the Roanoke Valley Community from Orkin, expressing condolences to the Watson family, while emphasizing that the incident was not representative of its work.
6. Aug. 1988 article "Exterminators Want Some Government Regulation" printed in The Roanoke Times & World News.
7. Jan. 1989 excerpts from the published review of The Council on the Environments findings concerning pesticide regulation in Virginia. Condensed version included in this abridged case as Exhibit 3.
8. 28 Sept. 1988 article "Pesticide study Worries Farmers, Orchardists" printed in The Roanoke Times & World News.
9. 20 Feb. 1987 letter to Bill Walls at the Office of Pesticide Regulation from

James Roberts, extension entomologist at Virginia Tech, indicating his belief that no chemicals should be banned. Printed in The Roanoke Times & World News on 21 Aug. 1988.

10. 23 Oct. 1988 editorial "Exterminators Not Selling Cookies" printed in The Roanoke Times & World News.

11. 28 Oct. 1988 commentary "Restrict Exterminator's Role" printed in The Roanoke Times & World News.

12. 12 Oct. 1988 letters to the editors "Pesticide stories Confuse the Elderly" and "Pesticide Hearings: One-sided Report" printed in The Roanoke Times & World News.

²This list shows all exhibits included in the complete case. In this abridged case, only Exhibits 2 and 3 are shown in their entirety. Exhibit 7 is displayed as a condensed version of the original exhibit.

Interpretive Note

Case Goals and Objectives

The aim of this case is to familiarize students with the sensitive issue of chemical application for home exterminations and commercial food and fiber production. Students should be aware of how even a single instance of chemical misuse can result in chaos for the pesticide industry. Participants will ultimately be

challenged to resolve the pesticide dilemma through a synergistic approach which will benefit both the pesticide industry, and consumers.

After completion of the case, students should be able to:

- Recall specific problems associated with chemical application,
- Explain the circumstances leading to the death of the Watsons,
- Explain the role of the state, exterminators, agriculturalists, and consumers in ensuring public safety in regards to chemical usage
- Explain how the media's portrayal of an incident can cause disruption within an entire industry,
- Decide if Virginia's pesticide laws are adequately monitoring the handling of chemicals,
- Determine if additional government regulation of pesticides is necessary,
- State who to target if new laws are imperative.

Use of the Case

This case is applicable to a wide-ranging audience. Any individual interested in promoting synergy between the public and private sector, regarding the use of chemicals, may benefit from Ex-terminators.

Study Questions

In-class discussion of the following questions will guide participants to the main issues within the case.

1. Who is responsible for the death of the Watsons?
2. Is the media coverage of the pesticide industry in the best interest of the public?
3. Who, if anyone, should be taking a defensive stance: consumers, state officials, or exterminators?
4. Should the agricultural industry be dragged into an exterminator's problem?
5. What action should the reader recommend the Council take?

The author's insights to the study question are provided in the complete interpretive note.

Fumigation 'loaded gun,' expert says

By MARY BISHOP
STAFF WRITER

GALAX — Hubert and Freida Watson's house was one of the showplaces of Galax.

They designed the white-columned brick colonial in the early 1970s with architectural details they got from trips to Williamsburg and a Tidewater plantation.

They furnished it with Victorian antiques. An out-of-state professional decorated it.

They installed an elevator.

Solid walnut paneling went into the dining room.

The den was paneled with wormy chestnut.

Hubert Watson cut and dried the wood himself so it would be just right.

Wood, after all, was his life's work.

Until they retired, Hubert Watson owned Sawyers Furniture Co. here. Freida Watson, the company vice president, ran the office.

So it was no small matter when a man with Orkin Exterminating Co. in Roanoke told them that wood-boring beetles were eating their house.

The Watsons gave the go-ahead for an \$8,000 fumigation.

On Sept. 25, 1986, the men from Orkin put a huge red-orange tarpaulin over the Watsons' five-bedroom house at the corner of Roseland Road and Bona Vista Lane.

It was an astonishing sight — like a giant fluttering piece of fabric art. The Watsons' next-door neighbor took a picture.

The Watsons abandoned their home — usually buzzing with their 13 grandchildren — and stayed with a daughter overnight.

Orkin workers pumped the house full of Vikane, or sulfuryl fluoride. The colorless,



Hubert and Freida Watson died within a week of the fumigation of their home

almost odorless gas permeates wood — furniture, woodwork, everything — to kill wood-eating bugs.

A former Orkin sales supervisor remembers reassuring the Watsons about the fumigation when he settled with them on a price.

"...I met the people, and the last thing I said to the people before I left their home was, 'It's not dangerous, don't worry,'" Emmett Lee Farmer testified in an unrelated lawsuit last year.

Another Orkin worker said that the Watsons could move back in after 3 the afternoon of Sept. 26. And they did.

Within a few hours, according to federal court documents, the Watsons were sick. They experienced nausea, chills, weakness — all symptoms of Vikane poisoning. On Sept. 28, Hubert Watson had a severe

PLEASE SEE **WATSONS/3**

POISON IN OUR HOMES

RISKS AND RIP-OFFS IN THE PEST CONTROL INDUSTRY



Watsons

FROM PAGE 1

spell of coughing. His wife called the rescue squad, but he was dead by the time he got to the hospital.

Hubert Howard Watson was 73 years old.

Richard Haskin, a neighbor who visited Freida Watson shortly after Hubert Watson died, recalled that she needed help getting to the phone to take condolence calls. Haskin said she was weak and coughing.

By the time of her husband's funeral, Freida Settle Watson, 65, lay dying in Twin County Hospital. She died Oct. 2.

A state medical examiner says Vikane killed the Watsons.

Hubert Watson's body was embalmed without an autopsy. So, the medical examiner said, he could not chemically confirm Vikane as the agent of death.

But Dr. David H. Oxley, deputy chief medical examiner for Western Virginia, says Hubert Watson's physical problems were the same as those of his wife, whose body was given a full autopsy. In an opinion filed by a federal judge in U.S. District Court in Roanoke, Oxley was quoted as saying both died of "respiratory failure secondary to massive severe pulmonary edema due to exposure to a toxic agent (Vikane)."

In layman's terms: They stopped breathing because of fluid buildup in their lungs.



Hubert and Freida Watson's Galax house was put under a tent for an \$8,000 fumigation that involved Orkin workers pumping the place full of Vikane: a colorless, almost odorless gas that permeates everything inside to kill wood-eating bugs. A state medical examiner said the Watsons died of exposure to the fumigant. A neighbor of the Watsons' took the photo above.

'It's a loaded gun'

Industry officials say Vikane has been used in millions of fumigations and that deaths are rare. They say victims usually are burglars trying to loot a fumigated house that's still vacant or somebody who has intentionally entered an unsafe house to commit suicide.

Some states make exterminators post a guard at houses during fumigations. Virginia does not require guards unless the pesticide label does.

"Fumigation is no small matter. It's a loaded gun," said William Robinson, a Virginia Tech expert on household pests who wrote the Virginia Cooperative Extension Service's manual on fumigation.

A state pesticide inspector testified that Orkin workers acknowledged not using an air monitor to see if the Watsons' house was safe for occupancy, as recommended on the Vikane label.

"They didn't even make an attempt to monitor it," Douglas S. Vaught, the former Grayson County commonwealth's attorney, said in an interview. Vaught went to church with the Watsons and prosecuted the local case against the exterminators.

Farmer, the former Orkin sales supervisor, said in an interview that the company's Roanoke office didn't own a monitor. When Orkin officials from Richmond visited the Watsons' house after the couple died, Farmer said, he was told to go to Virginia Tech and pick up a monitor owned by another exterminator.

Industry leaders and state regulators say virtually no exterminators used the air monitor recommended by Vikane's manufacturer.

"We were told that the whole industry, not just Orkin, but the whole United States, wasn't using monitoring equipment at that time," said William E. "Billy" Walls, Virginia's chief pesticide regulator who investigated the Watson case.

An inspector with the state Office of Pesticide Regulation said the

Orkin men didn't follow other label instructions:

■ They didn't remove water-proof-covered cushions and mattresses. Removing cushions can be crucial. Theoretically, someone sitting on cushions hours or days after a fumigation can be subjected to puffs of trapped gas.

■ They didn't use a strong-smelling warning agent along with the Vikane. Chloropicrin, a pungent chemical that makes the eyes tear, is supposed to be used with the odorless Vikane so exterminators and homeowners can know whether a house has been aired out completely. The smell is also supposed to help keep intruders out.

In April, a federal grand jury in Roanoke indicted Orkin Exterminating Co. Inc. on five counts of misapplying Vikane. On Aug. 8, a federal judge ruled the company failed to use a monitoring device to determine whether it was safe to enter the Watsons' home after the fumigation. The other four charges against the company were dismissed.

Assistant U.S. Attorney Richard Pierce said the agreement to drop four of the charges was worked out after Judge James C. Turk ruled Orkin could only be punished on one charge.

Turk had decided before the trial that because all five charges were related, the most severe punishment Orkin could face would be a fine of \$500,000 — whether for one conviction or five, Pierce said.

A sentencing hearing is scheduled for next month. At that time, arguments will be heard as to whether the Watsons' deaths were a direct result of Orkin's actions. If so, Orkin could face the \$500,000 fine. Otherwise, the maximum fine will be \$100,000.

Judith Donner, an Orkin spokeswoman at the company's headquarters in Atlanta, has declined comment since the federal charges were filed.

Shaking up the industry

The Watsons' deaths sent a shudder through the national pest control industry.

Dow Chemical Co., Vikane's maker, previously recommended air-monitoring instruments for use with Vikane. Now, it makes exterminators prove they own an air monitor before they buy Vikane.

Dow has declined to talk about the case. Gary Hamlin, public affairs manager for North American Agricultural Products, a Dow subsidiary, said only that Dow denies responsibility for the Watsons' deaths.

Orkin has also denied responsibility for the deaths.

Right after the Watsons died, an Orkin spokesman in Atlanta told reporters the Watsons had heart problems. The couple's doctor of many years said that was not true, and Richard Haskin, the Watsons' next-door neighbor, testified in court they were active, vibrant people.

"Oh, these were very vital people, not elderly at all," said the Rev. Robert B. Hudson, their former United Methodist minister.

Daymon Robertson and Ron Mullins, the Orkin workers who supervised the Watson fumigation, pleaded guilty in Grayson County Circuit Court last year to a misdemeanor charge of pesticide misuse. They received suspended sentences.

The men surrendered state permits for general, wood-infesting and food-processing pest control for five years. Robertson still works for Orkin in Roanoke, and Mullins is with Orkin in Charlottesville.

When the Watsons died, there was no requirement that anyone in a company be state-certified in fumigations to use Vikane. That's now required by federal law.

Involuntary manslaughter charges against the two exterminators and against Orkin as a corpora-

tion were dropped by Vaught, the former prosecutor, so federal authorities could bring indictments.

Under Virginia law, the stiffest penalty for a corporation in a wrongful death case is a \$1,000 fine for each count. A violation of pesticide label directions poses a fine of \$500. The maximum state punishment Orkin would have faced for the two deaths would have been \$2,500.

The executor of Freida Watson's estate sued Orkin and Dow in federal court last year for \$2.5 million, alleging that she died as a direct result of her exposure to Vikane. That trial is set for December.

Having nightmares

Emmett Lee Farmer, the former Orkin sales supervisor, said recently he will never forget the last time he saw the Watsons. Farmer is now with Brown Exterminating Co. in Pulaski County.

"... then two days later the man's dead," Farmer testified in an unrelated lawsuit, "and that just ate me out inside." He said in an interview he still has nightmares about the case.

The Watsons' neighbors remember when the Watsons' house was full of life, when the place was overrun with grandchildren.

Though the Watsons had a fancy home, they weren't possessive about it. They opened it to friends, family, visiting church youth groups, the Christmas banquet of the church choir and other gatherings.

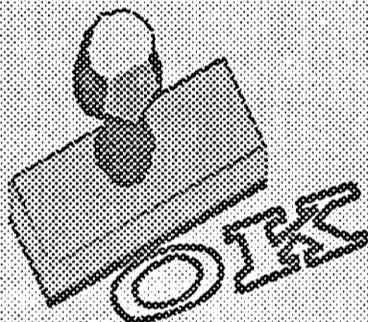
Friends and neighbors said Hubert and Freida Watson were known as some of the most generous people around Galax, helping often when they heard of people in trouble. They gave their money anonymously and rarely talked about it.

Said Robert Hudson, their former minister: "They did it in such a way that no one was aware."

Complaints in Virginia

Of 67 complaints files against exterminators at the state office of pesticide regulation:

The state found no pesticide misuse in 41 cases



It sent warning letters to 18 exterminators.



It suspended licenses in one case.



It fined one exterminator \$500.



It referred 4 cases to police or commonwealth attorneys



It referred one case to the U.S. Environmental Protection Agency.



It referred one case to the state of Maryland.

Council on the Environment Findings:

INTRODUCTION

Pesticides are widely recognized for their contributions to modern society. The productivity of modern American agriculture owes much to the use of chemical pesticides. Some estimates indicate that worldwide food production could drop by as much as forty percent without agricultural chemicals. Public health throughout the world would be in a far more precarious state were it not for the use of pesticides in the eradication of insect, rodent and other disease vectors.

However, pesticides are a concern because they are so effective and because they are widely available and common toxic chemicals. For most other chemicals, toxicity is merely incidental to their main purpose in manufacture or other chemical processes. Except in rare cases, their release into the environment occurs only by accident. Pesticides are different. They are meant to be poisonous and cannot reach their intended targets unless released into the environment.

It is essential that pesticides--both their chemical make-up and their use--be strictly controlled to minimize the risk to public health, safety and the environment while allowing their continued use to benefit society.

Any program which seeks to manage or control the risks associated with pesticides must concentrate in two areas. First, it must ensure that the pesticides work the

way they are intended, are not toxic to non-target organisms, or are not excessively persistent in the environment beyond the time of their intended use. Secondly, the management of pesticides must concentrate on the proper application and use of the chemicals, including developing less toxic alternatives. This report examines all aspects of pesticide use and management in Virginia.

Overall, the subcommittee finds that Virginia's citizens do not have adequate assurance that pesticides used here are safe for use under Virginia conditions and that they are applied in a way that guarantees public health, safety and the protection of the environment. This is in part due to insufficient training and verification of competence for those who apply large quantities of pesticides, and in part due to inadequate monitoring, enforcement and penalty provisions. It is compounded by the lack of basic data on the chemicals themselves and how and where they are used, by the lack of public understanding regarding the appropriate use of pesticides, and by the lack of applied research to guide management actions. Virginia's pesticide management program as a whole suffers from a lack of direction, oversight and coordination and insufficient staffing and funding support. In addition, the subcommittee finds gaps in program elements dealing with disposal of pesticide wastes and worker and public safety.

Chapter V

Manuscript for article to be submitted to

Journal of Agricultural Education

Using Decision Cases in Agriculture: A Comparison of a Decision Case Method and a Traditional Lecture

M. G. Allen, A. O. Abaye, J. R. McKenna, and W. G. Camp

Abstract

The most widely used teaching method, lecture, results in students assuming a passive, non-thinking, information-receiving role. Due to the overwhelming use of lecture, teachers face the criticism that today's graduates lack the ability to think. Proponents claim that the decision case method recently introduced to the agriculture curriculum, will transform passive learners into active thinkers, problem solvers, and decision makers. A study was conducted on college level students primarily consisting of juniors in Agronomy to compare the effects of decision case and traditional lecture teaching methods on student cognitive learning and attitudes toward instruction. The study used a 2 x 2 factorial design. Students were randomly assigned to a teaching method and an instructor. Each instructor taught identical content using both a decision case and a traditional lecture method. Following instruction, each student completed a 40-question, multiple-choice cognitive exam, and a

semantic differential attitude scale. Analysis of covariance techniques were used to test the research hypotheses. In this study, there were no significant differences in cognitive learning between students who received decision case or traditional lecture instruction. However, students receiving the decision case method had significantly more positive attitudes toward the instruction.

Instructors teaching agricultural curricula have implemented a wide variety of teaching methods, which fit different niches within the agricultural classroom. In the past, agricultural educators have utilized descriptive or historical case studies as a teaching tool (Stanford, Crookston, and Davis, 1992). Recently the agricultural profession has adopted the decision case teaching method, which varies considerably from the case study method. Decision cases present real issues or decisions to be made, while descriptive case studies describe events, practices, conditions, or references (Stanford, 1992). In addition decision cases are brought to the student from the point of view of a decision maker, as opposed to the standpoint of an analyst, expert, or historian. Both methods are valuable and should be selected in accordance to teaching goals. If the instructor aspires to help students build analytical and synthesis skills, apply concepts, learn to solve problems, develop mature judgement, enhance communication skills, and retain

information (Simmons, 1994), then the decision case may be an appropriate method.

Decision cases have been advocated by faculty at the Harvard Business School for their ability to motivate students to think (Dooley and Skinner, 1977) for the past eighty years. A decision case, simply termed "case" at the Harvard Business School, is a documentation of reality (DCPCC, 1991; Simmons, Crookston, and Stanford, 1992). It is a written document of an actual situation (Stanford, 1992) which is presented to the class through an unbiased, multidimensional perspective (Merseeth, 1990). Decision cases are based on real-life unresolved problems (Simmons, 1992) which place the students in a decision-making role (Simmons, 1993). In this role the student analyzes a situation and identifies the key issues surrounding possible outcomes, objectives, and options (McKeachie, 1994).

Case studies are praised for their ability to require students to think across all levels of cognition (Newcomb, 1992). The levels of cognition were outlined by a document which has come to be known as Bloom's taxonomy (Bloom, Englehart, Furst, Hill, and Krathwohl, 1956). Knowledge, comprehension, application, analysis, synthesis, and evaluation are all levels at which students operate along the learning curve. Unfortunately, the oldest and most widely used teaching method, the traditional lecture, is best suited to encourage remembering, or knowledge-based learning, instead of a range of cognitive skills. Lecturing results

in students assuming a passive, non-thinking, information-receiving role (McKeachie, 1994).

Due to the widespread use of the traditional lecture, students are taught to think at the lower (knowledge) to middle (comprehension, application, and analysis) levels of cognition (Newcomb, 1992). Newcomb (1992) also stated that current instruction activates student cognitive thinking at 37% remembering (knowledge), and 44% processing (comprehension, application, and analysis). Only 19% of student learning is at the higher-order creating and evaluating (synthesis and evaluation) levels.

In today's rapidly changing world, the ability to acquire or use knowledge and skills is more important than compiling a static knowledge base (McKeachie, 1994). Teaching methods must be changed to reflect a modern society mandating the need for functioning, thinking-oriented, decision-making students. Methods, such as the decision case, which transform passive learners into active thinkers, problem solvers, and decision makers (McKeachie, 1994); facilitate higher level learning (Coleman, 1985); and encourage greater breadth of learning (Stanford et al., 1992) must be implemented.

Decision cases are reported to elevate student confidence, and to activate discussion and participation (Merseth, 1990). Dooley and Skinner (1977) classified decision cases as excellent in developing mature judgement and useful attitudes. Instructors at the University of Minnesota provided evidence that students have a

higher perception of learning when taught using decision cases (Stanford et al., 1992).

Purpose and Objectives

The purpose of this study was to compare the effects of decision case and traditional lecture teaching methods on student cognitive learning and attitudes toward instruction. The study focused on the utilization of two teaching tools to teach a unit on pesticide management in Virginia. Data were collected for student retention scores, and attitude scores toward method. The objectives of this study were:

1. To determine if there was a significant difference in cognitive retention between students taught with the decision case, as opposed to the traditional lecture method.
2. To determine if there was a significant difference in attitude between students taught with the decision case method, as opposed to the traditional lecture method.

Related null hypotheses were formulated and tested at the .05 alpha level.

Procedures

Several instruments were prepared. A decision case entitled Ex-terminators was compiled according to guidelines outlined in Decision Cases for Agriculture

(Stanford, Crookston, Davis, and Simmons, 1992). Ex-terminators consisted of a written document presenting an unbiased, multidimensional perspective (Merseeth, 1990) of the death of an elderly Virginian couple, who died from exposure to high levels of Vikane, Sulfuryl Fluoride. The case containing five study questions and twelve exhibits was accompanied by teaching-notes. The teaching-notes provided a case overview, case goals and objectives, target audience, and author's insights concerning the case study questions.

Lesson plans were developed for each method of instruction. Both the decision case and lecture lesson plans consisted of identical content with the same learning objectives. Lessons concluded with an evaluation of student cognitive learning measured with a 40 question multiple-choice exam and attitude scale reviewed by a validation panel. In addition, a semantic differential attitude scale was devised to measure student attitude toward the unit, and its components. Class content, class discussion, teaching style, and reading material were rated by students. The lesson plans, cognitive examination, and attitude scale were all submitted to a validation panel consisting of 3 agricultural professors, a former agriculture student, and a specialist with the Office of Pesticide Regulation.

A pilot study was conducted on 17 students enrolled in World Crops, an Agronomy course primarily consisting of juniors. After receiving 50 minutes of instruction with the insertion of a decision case, pilot students completed the semantic differential scale and the multiple-choice cognitive exam. The test was

computer graded, and appropriate statistics were tallied by the Test Scoring and Analysis Program. Based on pilot study results the lesson plan, cognitive exam, and attitude scale were revised and resubmitted to the validation panel. Written comments on the attitude scale indicated that the instruction was too fast, therefore lessons were altered. Both instructional methods were allocated an additional 20 minutes of instruction.

The experiment utilized a 2 x 2 factorial design. Students from each of two sections of the course, World Crops, were randomly assigned to treatment and control groups, resulting in a total of 4 groups as described in Table 1. Each group was randomly assigned a teaching method. Groups also received one of two instructors. Two instructors were utilized to control for instructor bias. The first section was randomly assigned an instructor, but the second section was purposefully assigned an instructor - so each instructor taught both methods.

-Insert table one about here-

The groups were given instruction according to the applicable lesson plan. Similar reading packets were prepared. The only difference in reading material was that the decision case students received the case verbiage explaining the exhibits. Lecture students received all of the decision case material except for the verbiage linking the exhibits. Midway through class on Monday, students were informed of their group location and instructor. Students were separated and given 20 minutes

of preliminary instruction. At the end of class students received the reading material.

On Wednesday, the divided classes resumed in separate locations and received the remaining 50 minutes of instruction. The treatment groups receiving instruction with the insertion of a decision case, and the control groups receiving only the traditional lecture instruction. Friday the groups merged and were given the attitude scale. Once the scale was completed each student exchanged it for an exam. After completion, the exams were collected, coded to indicate the group, and taken to the Test Scoring Center to be analyzed.

Analysis of Data

Means and standard deviation for scores of students on the cognitive examination were calculated. Analysis of the revised cognitive exam produced a 0.61 coefficient alpha. Attitude scale scores were calculated for each of the unit aspects: class content, class discussion, teaching style, and reading material. All aspects were totaled to obtain a cumulative attitude score for the overall unit. The attitude scale means and standard deviations were reported for each component, and the overall unit. Statistical analysis was conducted for relationships between total and component scores and method and instructor.

An analysis of covariance (ANCOVA) procedure was utilized to test both of the null hypotheses.

Findings

Data were analyzed for 57 students enrolled in the college junior level class, World Crops. Twenty-seven students completed decision case instruction and testing, and 30 students completed traditional lecture instruction and testing.

The first null hypothesis of no significant difference between the mean cognitive retention scores between students receiving decision case or traditional lecture instruction was not rejected. There was no significant difference between the cognitive examination mean scores. The analysis yielded an F value of 2.08 with a p of 0.16 as reported in Table 2. In addition cognitive examination scores of students receiving decision case or lecture instruction were not significantly different for teacher, academic level, gender, or major. Table 3 summarizes the test data by groups. The decision case students, groups 1 and 4, had a total mean score of 22.05, and a standard deviation of 4.62. The traditional lecture groups, 2 and 3, had a mean score of 24.70 with a standard deviation of 4.04.

-Insert Table 2 and Table 3 about here-

The second null hypothesis of no significant difference between the mean attitude scores toward instruction between students receiving the decision case or traditional lecture was rejected. There was a significant difference between the mean attitude scores for the two treatment groups. The analysis of data yielded an F value of 9.70 with a p of 0.0030 as reported in Table 4. In further analysis, attitude scores for class content, class discussion, and teaching style were all

significantly different. Only reading material attitude scores were not significantly different. Table 5 summarizes the attitude scores by method. The mean attitude score for the overall unit was 124.94 with a standard deviation of 23.86 for students receiving decision case instruction. Students receiving traditional lecture instruction had a mean attitude score of 111.15 and a standard deviation of 22.66.

-Insert Tables 4 and 5 about here-

Conclusions and Discussion

In this study, students who received decision case instruction did not receive significantly different scores on the cognitive examination than students taught the same material, using the traditional lecture approach. These results do not support the claim that cognitive learning is enhanced by decision case instruction (Simmons, 1994). McKeachie's (McKeachie, Pintrich, Lin, Smith, and Sharma, 1990) claim that methods which promote retention of information favor discussion methods over lecture was also not supported by this study.

A significant difference was found between student attitudes when receiving decision case instruction. This finding reflects student's preferences for active, discussion-oriented, participatory instruction which was supported by Dooley and Skinner (1977), McKeachie (McKeachie et al., 1990), and Stanford et al. (1992).

This study leads to speculations that measuring long-term retention, instead of just short-term retention, might result in higher cognitive retention scores of

decision case students. Offering several decision case lessons, followed by multiple examination experiences may substantiate claims that decision cases promote retention. Students in this study encountered only one decision case so they were unfamiliar with the method and what was expected of them. When students experience decision cases many times, the decision-making process may become less overwhelming and more manageable (Simmons, 1993).

Overall, it is recommended that instructors should utilize decision case within the classroom. The fact that students find decision case learning more enjoyable, could reflect a better class attendance. If students are encouraged to come to class on a more regular basis the potential for learning is increased. In addition, decision cases may arouse student interest within the subject matter, and thus motivate students to seek additional information outside the classroom.

Dooley and Skinner (1977) state that decision cases are not equally suited for every educational purpose, but they are a powerful part of the educator's "tool box". Keep in mind that a smorgasbord of teaching methods are in existence. Each of the many methods serve a purpose along the educational spectrum. If an educator aspires to motivate students to learn, and capture student interest and attention, then the decision case is a viable method. Cases are also valuable to expand instruction beyond knowledge-based learning. Decision cases may be suitable as the primary form of instruction, as they are used at the Harvard Business School or they may be beneficial when complementing other methods, as

they were used in this study. These researchers believe a variety of methods may offer the greatest learning potential. The key to selecting and implementing an instructional method, such as the decision case, is to match teacher goals and student needs to the method.

Table 1. Random group division and assignment

Group #	Class Section	Method	Instructor
#1	9:00 am	Case	1
#2		Lecture	2
#3	10:00 am	Lecture	1
#4		Case	2

Table 2. Analysis of covariance for cognitive score

Source	df	SS	F	p
Teacher	1	36.97	1.76	0.19
Academic Level	1	34.65	1.65	0.21
Gender	1	8.51	0.4	0.53
Major	1	9.55	0.45	0.5
Method	1	43.76	2.08	0.16
Error	51	1072.69		
Total	56	1204.14		

Table 3. Score statistics for method by group

Group #	Mean	SD
Decision Case		
#1	21.64	5.16
#4	22.46	4.07
Total	22.05	4.62
Traditional Lecture		
#2	22.9	3.67
#3	26.5	4.41
Total	24.7	4.04

Table 4. Analysis of covariance for attitude toward method

Response Variable	<u>df</u>	<u>SS</u>	<u>F</u>	<u>p</u>
Class Content	1	146.05	8.72	0.0047
Class Discussion	1	374.42	15.51	0.0002
Teaching Style	1	267.56	10.7	0.0019
Reading Material	1	14.92	0.45	0.5052
Total		2668.24	9.7	0.003

Table 5. Attitude score statistics by method

	Mean	<u>SD</u>	Mean	<u>SD</u>
	Decision Case		Traditional Lecture	
Class Content	31.1	5.91	27.88	5.61
Class Discussion	31.77	7.18	27.4	6.81
Teaching Style	31.67	7.11	26.5	6.73
Reading Material	30.4	8.23	29.37	7.85
Total	124.94	23.86	111.15	22.66

References

- Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., and D. R. Kratwohl. 1956. Taxonomy of educational objectives. David McKay Co. Inc., New York, NY.
- Coleman, P. C. 1989. Case studies as teaching tools in human genetics. *The American Biology Teacher* 51:418-420.
- Decision Case Conference Planning Committee. 1991. Decision cases in agriculture, University of Minnesota.
- Dooley, A. R., and W. Skinner. 1977. Casing casemethod methods. *Academy of Management Review* 2:277-289.
- McKeachie, W. J. 1994. Teaching tips: strategies, research, and theory for college and university teachers. 9th ed. D. C. Heath and Co., Lexington, MA.
- McKeachie, W. J., Pintrich, P. R., Lin, Y. G., Smith, D. A. F., and R. Sharma. 1990. Teaching and learning in the college classroom: A review of the research literature. 2nd ed. University of Michigan, Ann Arbor, MI.
- Merseeth, K. K. 1990. Case studies and teacher education. *Teacher Education Quarterly* 17:53-62.
- Newcomb, L. H. 1992. Class notes. *Agricultural Education* 631: Methods in teaching agriculture (special section for college teachers). Columbus, OH.
- Simmons, S. R. 1992. Decision cases to facilitate creative decision making. p. 31-32. *In* Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.
- Simmons, S. R. 1993. Program for decision cases. *Case Notes*. Oct. 1993. University of Minnesota, St. Paul, MN.
- Simmons, S. R. 1994. Case development and use. *Case Notes*. Jan. 1994. University of Minnesota, St. Paul, MN.
- Simmons, S. R., Crookston, R. K., and M. J. Stanford. 1992. A case for a case study. p. 12-13. *In* Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Stanford, M. J. 1992. What are decision cases? p. 16-19. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Stanford, M. J. 1992. Educational objectives. p. 14-15. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Stanford, M. J., Crookston, R. K., and D. W. Davis. 1992. Decision cases in agriculture. p. 6-11. In Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Stanford, M. J., Crookston, R. K., Davis, D. W., and S. R. Simmons. 1992. Decision cases for agriculture. Duplicating Services, University of Minnesota, St. Paul, MN.

Chapter VI

Conclusions, Recommendations, and Discussion

Conclusions and recommendations from the study may not be generalized beyond to the population of students enrolled in World Crops at Virginia Tech.

1. There is no advantage in cognitive retention for students who receive decision case instruction, as opposed to traditional lecture instruction.
2. Students' attitudes toward the unit on pesticide management in Virginia are positively affected by decision case instruction as opposed to traditional lecture instruction.

In this study, students who received decision case instruction did not score significantly higher on the cognitive retention exam than did students taught the same material, using the traditional lecture approach. These results do not support the claim that cognitive retention is enhanced by decision case instruction (Simmons, 1994). McKeachie's (McKeachie, Pintrich, Lin, Smith, and Sharma, 1990) claim that methods which promote retention of information favor discussion methods over lecture was also not supported by this study.

A significant difference was found between student attitudes when comparing the results of decision case instruction verses traditional lecture. This finding reflects student's preferences for active, discussion-oriented, participatory instruction which was supported by Dooley and Skinner (1977), McKeachie (McKeachie et al., 1990), and Stanford (Stanford, Crookston, Davis, 1992).

This study leads to speculations that measuring long-term retention, instead of just short-term retention, might result in higher cognitive retention scores of decision case students. Offering several decision case lessons, followed by multiple examination experiences may substantiate claims that decision cases promote retention. Students in this study encountered only one decision case so they were unfamiliar with the method and what was expected of them. When students experience decision cases many times, the decision-making process becomes less overwhelming and more manageable (Simmons, 1993). In addition the instructors taught a decision case for the first time. Reneau (1992) suggest that the decision case may not be the most appropriate method for the beginning teacher. Decision case instruction requires the instructor to have sufficient experience to accurately and skillfully direct the discussion.

Overall, it is recommended that instructors should utilize decision cases within the classroom. The fact that students find decision case learning more enjoyable, could reflect a better class attendance. If students are encouraged to come to class on a more regular basis the potential for learning is increased. In addition decision cases may arouse student interest within the subject matter, and thus motivate students to seek additional information outside the classroom.

Dooley and Skinner (1977) state that decision cases are not equally suited for every educational purpose, but they are a powerful part of the educator's "tool box". Keep in mind that a smorgasbord of teaching methods are in existence. Each

of the many methods serve a purpose along the educational spectrum. If an educator aspires to motivate students to learn, and capture student interest and attention, then the case is a viable method. Cases are also valuable to deviate instruction from knowledge-based learning. Decision cases may be suitable to be used as the sole form of instruction, or they may be more beneficial when complementing another method. A variety of methods may offer the greatest learning potential. The key to selecting and implementing an instructional method, such as the decision case, is to match teacher goals and student needs to the method.

Decision cases offer a tremendous potential to educators in business, law, medicine, or agriculture. Decision cases may require greater preparation and consume more class time than non-discussion methods; however, the extra effort may produce great educational rewards by creating a more favorable learning environment.

References

- Dooley, A. R., and W. Skinner. 1977. Casing casemethod methods. *Academy of Management Review* 2:277-289.
- McKeachie, W. J., Pintrich, P. R., Lin, Y. G., Smith, D. A. F., and R. Sharma. 1990. *Teaching and learning in the college classroom: A review of the research literature*. 2nd ed. University of Michigan, Ann Arbor, MI.
- Reneau, J. K. 1992. Decision cases for extension teaching. p. 24-28. In *Decision cases for agriculture*. Duplicating Services, University of Minnesota, St. Paul, MN.
- Simmons, S. R. 1993. Program for decision cases. *Case Notes*. Oct. 1993. University of Minnesota, St. Paul, MN.
- Simmons, S. R. 1994. Case development and use. *Case Notes*. Jan. 1994. University of Minnesota, St. Paul, MN.
- Stanford, M. J., Crookston, R. K., and D. W. Davis. 1992. Decision cases in agriculture. p. 6-11. In *Decision cases for agriculture*. Duplicating Services, University of Minnesota, St. Paul, MN.

Appendix A.

Ex-terminators, a Decision Case Prepared by

Marlo G. Allen

One Sunday morning I sat down in my easy chair with a piping hot cup of coffee and the Sunday newspaper. Instantly my attention was drawn to the front page story of "Pests, Poisons, and Risks". As a part-time farmer, I have always been aware of the public concern for pesticide usage. As I focused on the article I began to wonder what we farmers had done to deserve front page coverage. I scanned the article, and to my relief, discovered that agriculture was not the topic of discussion, but instead home exterminators were the focus. According to the Roanoke Times & World-News, "bad things can happen when an exterminator visits (Exhibit 1)."

Mary Bishop, a staff writer, reported that Virginians have suffered at the hands of exterminators. Homes have been made unlivable, health has been ruined, and elderly have been cheated out of thousands of dollars. These instances have all been due to the lax laws and regulations governing pesticides in Virginia. Pesticide misuse had even resulted in the death of an elderly Galax couple (Exhibit 2).

I took a sip of coffee, and eased back in my recliner. I was filled with mixed emotions. I was relieved that the agricultural industry was not responsible, yet I was outraged that exterminators were capable of inflicting human death. My heart sank thinking about the Watsons, who lost their lives during a routine fumigation. The Orkin sales supervisor had reassured them, "It's not dangerous, don't worry." If only Orkin had taken the proper precautions and monitored the house for Vikane

levels, perhaps the Watsons would still be living.

After reading about the tragic death of the Watsons, I began to follow the pesticide series in the Roanoke Times & World-News. I wondered if the death of the Watsons, along with the long list of other claims ranging from poor health and property damage to money theft, would influence the pesticide industry.

Mary Bishop's articles had elevated anxieties and skepticism among Virginia residents concerning the application of home insecticides. Several articles reported that the laws were not successfully monitoring the handling of pesticides in Virginia. According to Bishop no training or experience is needed for pesticide application. She stated, "In Virginia it is harder to become a hairdresser than an exterminator. Beauticians in Virginia must undergo extensive training and pass an examination. But to set up shop as an exterminator you need only a business license - and sometimes not even that. You don't have to have any experience, training, or knowledge of pesticides."

She continually alluded to the fact that the state of Virginia did not control the pesticide industry. Virginia officials did not even know how many exterminators were operating statewide. Andre Perdue, head of the Roanoke Valley Pesticide Control Association, told Bishop, "We have people out there right now operating out of a trunk of a car without any insurance. This industry is wide open for it. You

don't have to have any certification to be an exterminator. You can start an exterminating business tomorrow."

Bishop reported that once such a business is established, inappropriate handling of chemicals results in little or no reprimands. In one article, she wrote, "The restaurateur in Virginia whose service personnel sell beer to a minor can lose his ABC license. The pest-control company whose personnel render a home unfit for human habitation can go down the road and sell its services to another customer. Something is wrong."

Over a two and a half year period, 67 complaints had been filed against exterminators at the state office of pesticide regulation (Exhibit 3). Of those cases, 41 were found free of pesticide misuse, and a majority of the remaining cases had resulted in mere warning letters.

Another Sunday morning commenced with my routine of drinking coffee while browsing the paper. Articles concerning pesticides had become as common as the comics. I continued following the reports in anticipation of a resolution. Would the uproar catalyzed by the Roanoke Times & World-News be calmed? What exactly would have to be done to alleviate the skepticism encompassing exterminators?

Pest control companies were beginning to defend their tumbling reputations. Companies like Terminix confirmed the competency of its operators via a letter to

the readers of the Roanoke Times (Exhibit 4).

Orkin attempted to redeem itself with a full page letter in the Roanoke Times & World News (Exhibit 5). Orkin expressed its condolences for the deaths of the Watsons, while emphasizing that the Galax fumigation was not representative of its business activities. Orkin also stressed that it is dedicated to high standards of safety in providing effective pest control services.

I sipped my coffee, while digesting what I had just read. Homeowners were skeptical, and some hysterical. The media had instilled panic in exterminators, customers, and state officials at the Office of Pesticide Regulations (also referred to as the Office of Pesticide Management) in the U.S. Department of Agriculture. How could pesticide regulators make amends?

A few days later, talk of stiffer regulations and punishments has been circulating. Some people opposed tighter regulations, while others saw stricter regulations as a means of sprucing up the image of legitimate operators (Exhibit 6). Ron Chaney, President of the Virginia Pesticide Control Association, acknowledged the need for more government control, as long as the controls are laws "that we can live with."

Governor Baliles reacted to public concerns by establishing an eight-person pesticide enforcement team, The Council on the Environment, costing \$535,000.

The panel was requested to conduct a 90-day investigation of pesticide regulations in Virginia (Exhibit 7).

The Council roused the concerns of agriculturalists (Exhibit 8). Farmers vocalized their opinions at a public forum in Harrisonburg. One farmer announced that chemicals have made great contributions to fruit production. He also warned that in the past "near panic" was caused due to new federal regulations. Farmers suggested that the panel should only increase regulations where problems could be documented.

Billy Walls, Virginia's Chief Pesticide Regulator, expressed his concerns about the banning of agricultural pesticides, "If you eliminate too many pesticides, you are going to affect the cost of food and fiber." When Furadan, an agricultural pesticide that environmentalists claimed to have killed bald eagles, was under siege in 1987, a Virginia Tech Extension Entomologist wrote Billy Walls (Exhibit 9), adamantly opposing the regulation of Furadan: a "good insecticide".

The news featured additional coverage concerning pesticides in agriculture. Lt. Governor, Doug Wilder, was quoted at an annual Farm Bureau meeting, "It is obvious to all of you as it is to me that, without pesticides, the American farmer could not feed the people of this country...but it is also obvious that the use of pesticides has created problems."

Editorials and commentaries featured in the Roanoke Times depicted readers' viewpoints. One reader wrote an editorial suggesting that in the process of settling the disagreement that persisted over additional regulations, people must be protected (Exhibit 10). He stated, "Protecting people, let's recall, is what this whole controversy is about".

Another reader suggested that the government and the exterminating businesses should not bear total responsibility for claims of pesticide misuse (Exhibit 11). She stated that we live in a period of "information overload". Information indicating the dangers of chemicals is readily available. She asked, "In this age of information overload, how much protection should willful ignorance purchase?"

Occasionally readers still write letters to the editor in response to the pesticide series. One reader wrote the editor alleging that the pesticide reports had been one-sided (Exhibit 12). "She (referring to Mary Bishop) heard one side of the issues, thus her article had a very negative tone."

As I see it, the media has captured the concerns of both the private and public sector. Exterminators are defending their reputations, pesticide regulators are investigating existing laws, farmers are voicing their concerns, and residents are expressing their fear and anger. All citizens have an opinion, whether positive

or negative, about pesticide application and regulation. Most Virginians recognize the contributions chemicals have made to our society, however negative publicity has clouded our perception.

I am a farmer and a consumer of agricultural commodities as well as a resident and homeowner in Southwest Virginia. I want to see agriculture continue to meet the needs of our population, yet I want to see my family protected against environmental hazards. In order to ensure that my concerns are addressed I plan to testify at one of the forums held by the Pesticide Enforcement Board (Council on the Environment). What should I recommend to the Council concerning pesticide regulations?

Study Questions

1. Who is responsible for the death of the Watsons?
2. Is the media coverage of the pesticide industry in the best interest of the public?
3. Who, if anyone, should be taking a defensive stance: consumers, state officials, or exterminators?
4. Should the agricultural industry be dragged into an exterminator's problem?
5. What action should the reader recommend the Council take?

Bad things can happen when the exterminator visits

By MARY BISHOP
STAR-NEWS

Marcelle and Joel Gabriel of Prince Edward County have been sick since an exterminator illegally sprayed chlordane, a now-banned pesticide, under their house two years ago. A scientist determined the house was ruined and that no clean-up could make it safe, but the Gabriels can't afford to move — or sue.

The state's response, a warning letter to the exterminator.

Perfection Exterminators — with a string of crimes in other states — billed hundreds of elderly Virginians of \$400,000 by taking bugs into their homes and selling unneeded treatments. One of the con artists said the crew lied Virginia because its laws regulating exterminators are weak.

Chlordane dripped from the basement floor after an exterminator treated the home of a young couple, Marie and Steve Stoner, a year ago. They said they had to destroy 300 cans of food that had been spiced by chemicals. An employee of the exterminating company was convicted of failure to follow pesticide label directions, a misdemeanor.

The penalty: a \$150 fine.

Bluth and Patricia Sexton's baby was born dead months after an exterminator pumped at least 25 times more termitic repellent than needed under their Caryn County home. The Sextons sued for \$18.2 million, claiming the pesticide killed their baby and that their lives — physically, financially, emotionally.

Terrible things can happen in Virginia when an exterminator comes into a house to treat it for bugs.

Many Virginians claim their health has been ruined by bad exterminators who either carelessly or illegally applied toxic chemicals in their homes. In one case, people died after a fumigant was misapplied in their home.

Other Virginians say their homes have been made uninhabitable after exterminators sprayed them with deadly chemicals. In many cases, exterminators

lacks the legal muscle to stop pesticide abusers and phony exterminators.

Some exterminators — worried about the industry's image because of news stories about pesticide

"We have people out there right now operating out of the trunk of [a] car without any insurance. This industry is wide open for it. You don't have to have certification to be an exterminator. You can start an exterminating business tomorrow."

Andre Perdue, Head of the Roanoke Valley Pest Control Association

Many pest control companies are honest, diligent and careful when they inspect homes and businesses. Many take precautions to make certain they don't use pesticides needlessly and that they apply them properly when they're necessary.

And the number of formal complaints against Virginia exterminators is minuscule compared with the total volume of pesticide treatments — only 67 complaints in the past three years out of hundreds of thousands of treatments.

But the actual number of complaints is not an accurate gauge of the real and potential risks that Virginians face.

In Virginia, you can't be certain you're getting a good exterminator when one comes to visit.

And you can't be certain the treatment you get is safe — or even necessary.

Because the industry is virtually unregulated, consumers are at risk from unscrupulous exterminators and con artists. When consumers finally do complain, the state responds only slowly to complaints about questionable practices. And

Consumers aren't blameless. They spray pesticides around their homes with little regard for safety. Experts say they assume that if a pesticide has made it to a store shelf, it must be safe.

Yet most of the 45,000 pesticide products on the U.S. market have not been fully tested and aren't scheduled to be until the next century.

Pesticide poisoning can disable people slowly. Some Virginians believe they have been sick for years because of sloppy insecticide treatments in their homes.

When people are poisoned by pesticides, though, they get little comfort from the medical community. Their symptoms resemble those of the flu and can easily fool physicians.

Many pest control companies are honest, diligent and careful when they inspect homes and businesses. Many take precautions to make certain they don't use pesticides needlessly and that they apply them properly when they're necessary.

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And you can't be certain the treatment you get is safe — or even necessary.

Because the industry is virtually unregulated, consumers are at risk from unscrupulous exterminators and con artists. When consumers finally do complain, the state responds only slowly to complaints about questionable practices. And

laws are weak when bad exterminators use pesticides negligently.

Tighter laws and regulations would protect Virginia consumers from bad and fraudulent exterminators. Many other states have

"A large majority of people in this country never give safety a thought because they trust these people to do their job."

Gregory Patton, Lawyer for Bluth and Patricia Sexton, a Carroll County couple who have sued an exterminator for \$18.2 million

tougher laws controlling the licensing of exterminators and the way they do their jobs.

Law enforcement officials say the state needs to tighten its regulation of the industry. And many pest control operators say the same thing.

Andre Perdue, who heads the Roanoke Valley Pest Control Association, says stricter rules would protect consumers and legitimate exterminators.

"We have people out there right now operating out of the trunk of [a] car without any insurance," he said.

"This industry is wide open for it. You don't have to have certification to be an exterminator. You can start an exterminating business tomorrow."

Gregory Patton is the lawyer for Bluth and Patricia Sexton, whose \$18.2 million suit against an exterminator has yet to be heard. He says people put too much faith in government regulators, the chemical industry and exterminators.

"A large majority of people in this country never give safety a thought because they trust these people to do their job."

Fumigation 'loaded gun,' expert says

By MARY BISHOP
STAFF WRITER

GALAX — Hubert and Freida Watson's house was one of the showplaces of Galax.

They designed the white-columned brick colonial in the early 1970s with architectural details they got from trips to Williamsburg and a Tidewater plantation.

They furnished it with Victorian antiques. An out-of-state professional decorated it.

They installed an elevator.

Solid walnut paneling went into the dining room.

The den was paneled with wormy chestnut.

Hubert Watson cut and dried the wood himself so it would be just right.

Wood, after all, was his life's work.

Until they retired, Hubert Watson owned Sawyers Furniture Co. here. Freida Watson, the company vice president, ran the office.

So it was no small matter when a man with Orkin Exterminating Co. in Roanoke told them that wood-boring beetles were eating their house.

The Watsons gave the go-ahead for an \$8,000 fumigation.

On Sept. 25, 1986, the men from Orkin put a huge red-orange tarpaulin over the Watsons' five-bedroom house at the corner of Roseland Road and Bona Vista Lane.

It was an astonishing sight — like a giant fluttering piece of fabric art. The Watsons' next-door neighbor took a picture.

The Watsons abandoned their home — usually buzzing with their 13 grandchildren — and stayed with a daughter overnight.

Orkin workers pumped the house full of Vikane, or sulfuryl fluoride. The colorless,



Hubert and Freida Watson died within a week of the fumigation of their home

almost odorless gas permeates wood — furniture, woodwork, everything — to kill wood-eating bugs.

A former Orkin sales supervisor remembers reassuring the Watsons about the fumigation when he settled with them on a price.

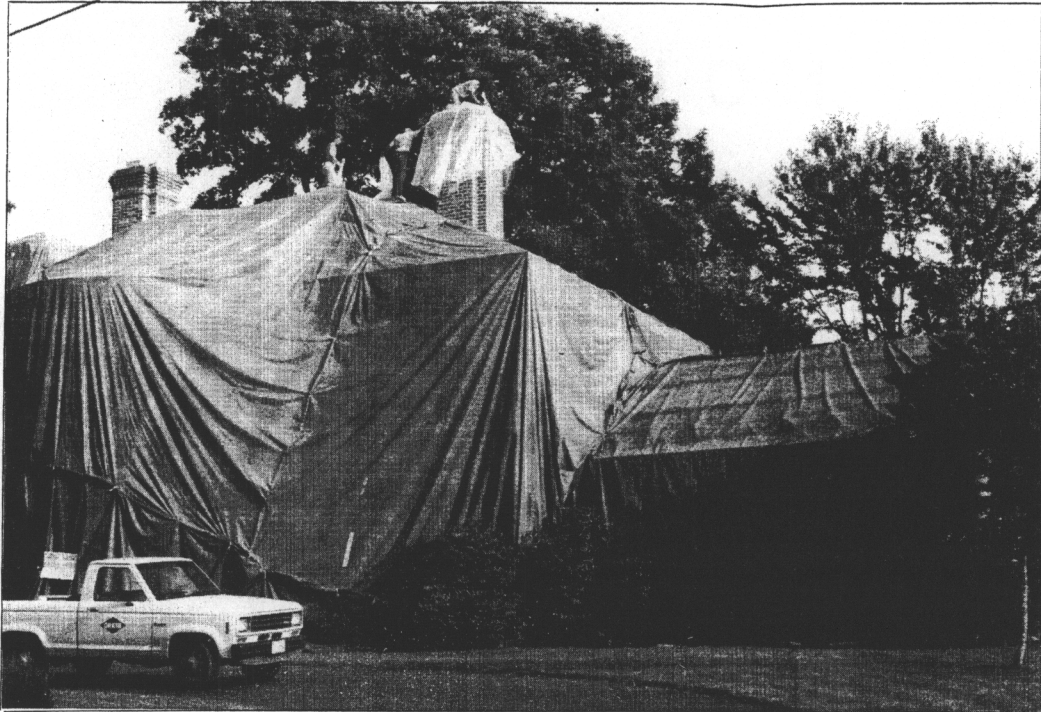
"... I met the people, and the last thing I said to the people before I left their home was, 'It's not dangerous, don't worry,'" Emmett Lee Farmer testified in an unrelated lawsuit last year.

Another Orkin worker said that the Watsons could move back in after 3 the afternoon of Sept. 26. And they did.

Within a few hours, according to federal court documents, the Watsons were sick. They experienced nausea, chills, weakness — all symptoms of Vikane poisoning. On Sept. 28, Hubert Watson had a severe

PLEASE SEE **WATSONS/3**

POISON IN OUR HOMES
RISKS AND RIP-OFFS IN THE PEST CONTROL INDUSTRY



Watsons

FROM PAGE 1

spell of coughing. His wife called the rescue squad, but he was dead by the time he got to the hospital.

Hubert Howard Watson was 73 years old.

Richard Haskin, a neighbor who visited Freida Watson shortly after Hubert Watson died, recalled that she needed help getting to the phone to take condolence calls. Haskin said she was weak and coughing.

By the time of her husband's funeral, Freida Settle Watson, 65, lay dying in Twin County Hospital. She died Oct. 2.

A state medical examiner says Vikane killed the Watsons.

Hubert Watson's body was embalmed without an autopsy. So, the medical examiner said, he could not chemically confirm Vikane as the agent of death.

But Dr. David H. Oxley, deputy chief medical examiner for Western Virginia, says Hubert Watson's physical problems were the same as those of his wife, whose body was given a full autopsy. In an opinion filed by a federal judge in U.S. District Court in Roanoke, Oxley was quoted as saying both died of "respiratory failure secondary to massive severe pulmonary edema due to exposure to a toxic agent (Vikane)."

In layman's terms: They stopped breathing because of fluid buildup in their lungs.



Hubert and Freida Watson's Galax house was put under a tent for an \$8,000 fumigation that involved Orkin workers pumping the place full of Vikane: a colorless, almost odorless gas that permeates everything inside to kill wood-eating bugs. A state medical examiner said the Watsons died of exposure to the fumigant. A neighbor of the Watsons' took the photo above.

'It's a loaded gun'

Industry officials say Vikane has been used in millions of fumigations and that deaths are rare. They say victims usually are burglars trying to loot a fumigated house that's still vacant or somebody who has intentionally entered an unsafe house to commit suicide.

Some states make exterminators post a guard at houses during fumigations. Virginia does not require guards unless the pesticide label does.

"Fumigation is no small matter. It's a loaded gun," said William Robinson, a Virginia Tech expert on household pests who wrote the Virginia Cooperative Extension Service's manual on fumigation.

A state pesticide inspector testified that Orkin workers acknowledged not using an air monitor to see if the Watsons' house was safe for occupancy, as recommended on the Vikane label.

"They didn't even make an attempt to monitor it," Douglas S. Vaught, the former Grayson County commonwealth's attorney, said in an interview. Vaught went to church with the Watsons and prosecuted the local case against the exterminators.

Farmer, the former Orkin sales supervisor, said in an interview that the company's Roanoke office didn't own a monitor. When Orkin officials from Richmond visited the Watsons' house after the couple died, Farmer said, he was told to go to Virginia Tech and pick up a monitor owned by another exterminator.

Industry leaders and state regulators say virtually no exterminators used the air monitor recommended by Vikane's manufacturer.

"We were told that the whole industry, not just Orkin, but the whole United States, wasn't using monitoring equipment at that time," said William E. "Billy" Walls, Virginia's chief pesticide regulator who investigated the Watson case.

An inspector with the state Office of Pesticide Regulation said the

Orkin men didn't follow other label instructions:

■ They didn't remove waterproof-covered cushions and mattresses. Removing cushions can be crucial. Theoretically, someone sitting on cushions hours or days after a fumigation can be subjected to puffs of trapped gas.

■ They didn't use a strong-smelling warning agent along with the Vikane. Chloropicrin, a pungent chemical that makes the eyes tear, is supposed to be used with the odorless Vikane so exterminators and homeowners can know whether a house has been aired out completely. The smell is also supposed to help keep intruders out.

In April, a federal grand jury in Roanoke indicted Orkin Exterminating Co. Inc. on five counts of misapplying Vikane. On Aug. 8, a federal judge ruled the company failed to use a monitoring device to determine whether it was safe to enter the Watsons' home after the fumigation. The other four charges against the company were dismissed.

Assistant U.S. Attorney Richard Pierce said the agreement to drop four of the charges was worked out after Judge James C. Turk ruled Orkin could only be punished on one charge.

Turk had decided before the trial that because all five charges were related, the most severe punishment Orkin could face would be a fine of \$500,000 — whether for one conviction or five, Pierce said.

A sentencing hearing is scheduled for next month. At that time, arguments will be heard as to whether the Watsons' deaths were a direct result of Orkin's actions. If so, Orkin could face the \$500,000 fine. Otherwise, the maximum fine will be \$100,000.

Judith Donner, an Orkin spokeswoman at the company's headquarters in Atlanta, has declined comment since the federal charges were filed.

Shaking up the industry

The Watsons' deaths sent a shudder through the national pest control industry.

Dow Chemical Co., Vikane's maker, previously recommended air-monitoring instruments for use with Vikane. Now, it makes exterminators prove they own an air monitor before they buy Vikane.

Dow has declined to talk about the case. Gary Hamlin, public affairs manager for North American Agricultural Products, a Dow subsidiary, said only that Dow denies responsibility for the Watsons' deaths.

Orkin has also denied responsibility for the deaths.

Right after the Watsons died, an Orkin spokesman in Atlanta told reporters the Watsons had heart problems. The couple's doctor of many years said that was not true, and Richard Haskin, the Watsons' next-door neighbor, testified in court they were active, vibrant people.

"Oh, these were very vital people, not elderly at all," said the Rev. Robert B. Hudson, their former United Methodist minister.

Daymon Robertson and Ron Mullins, the Orkin workers who supervised the Watson fumigation, pleaded guilty in Grayson County Circuit Court last year to a misdemeanor charge of pesticide misuse. They received suspended sentences.

The men surrendered state permits for general, wood-infesting and food-processing pest control for five years. Robertson still works for Orkin in Roanoke, and Mullins is with Orkin in Charlottesville.

When the Watsons died, there was no requirement that anyone in a company be state-certified in fumigations to use Vikane. That's now required by federal law.

Involuntary manslaughter charges against the two exterminators and against Orkin as a corpora-

tion were dropped by Vaught, the former prosecutor, so federal authorities could bring indictments.

Under Virginia law, the stiffest penalty for a corporation in a wrongful death case is a \$1,000 fine for each count. A violation of pesticide label directions poses a fine of \$500. The maximum state punishment Orkin would have faced for the two deaths would have been \$2,500.

The executor of Freida Watson's estate sued Orkin and Dow in federal court last year for \$2.5 million, alleging that she died as a direct result of her exposure to Vikane. That trial is set for December.

Having nightmares

Emmett Lee Farmer, the former Orkin sales supervisor, said recently he will never forget the last time he saw the Watsons. Farmer is now with Brown Exterminating Co. in Pulaski County.

"... then two days later the man's dead," Farmer testified in an unrelated lawsuit, "and that just ate me out inside." He said in an interview he still has nightmares about the case.

The Watsons' neighbors remember when the Watsons' house was full of life, when the place was overrun with grandchildren.

Though the Watsons had a fancy home, they weren't possessive about it. They opened it to friends, family, visiting church youth groups, the Christmas banquet of the church choir and other gatherings.

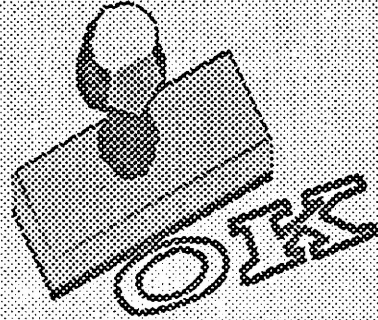
Friends and neighbors said Hubert and Freida Watson were known as some of the most generous people around Galax, helping often when they heard of people in trouble. They gave their money anonymously and rarely talked about it.

Said Robert Hudson, their former minister: "They did it in such a way that no one was aware."

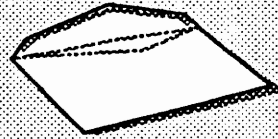
Complaints in Virginia

Of 67 complaints files against exterminators at the state office of pesticide regulation:

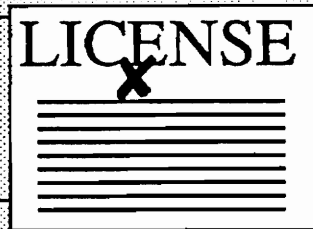
The state found no pesticide misuse in 41 cases



It sent warning letters to 18 exterminators.



It suspended licenses in one case.



It fined one exterminator \$500.



It referred 4 cases to police or commonwealth attorneys



It referred one case to the U.S. Environmental Protection Agency.



It referred one case to the state of Maryland.

TERMINIX COMPANY

P.O. BOX 8089, 404 Walnut Avenue, S.E., Roanoke, VA 24014



TERMITE and PEST CONTROL

August 25, 1988

TO THE READERS OF THE ROANOKE TIMES AND WORLD-NEWS:

This is to assure our friends and customers that the series of articles recently appearing in the Roanoke Times & World-News with reference to the termite and pest control industry concerns The Terminix Company as much as it must each of you. While it is a worthwhile and important expose of many abuses within this very poorly regulated industry, we want you to be aware that there are competent operators within this industry and The Terminix Company is one of them.

The Terminix Company has been in the termite and pest control business in the Roanoke Valley and surrounding areas for more than 50 years. James B. Robertson has been the owner of the company and its President for more than 39 years. John B. Robertson, his son, has assumed much of the responsibilities of management after more than 10 years with the Company.

Terminix Company imposes safety standards upon itself and its employees which are the highest in the industry and well ahead of the minimal requirements of the State of Virginia. Hopefully, the time is not too far away when all service personnel must be certified by the State. The Terminix Company is prepared for that eventuality.

Every person who comes to work for Terminix must be well trained in the use of chemicals and pesticides. In addition, we have a continuing program of education for all employees, including at least one full day of instruction of every month for all employees engaged in the application and use of chemicals and pesticides. Our employees are instructed to be particularly careful that chemicals and pesticides are used only when necessary and never abused.

The Terminix Company is proud of its reputation, and the many friends it has made over the years. Our Company fills a very real need in this area from our large industrial customers to the smallest homeowner who does not wish to do his or her own pest control or lacks the knowledge or sophistication to do so. We hope you will feel comfortable in calling on us for our services.

Sincerely,

James B. Robertson
President

JBR/ak



PEST CONTROL
World's Largest

*A Message To The
Roanoke Valley Community*

Orkin Exterminating Company, Inc. wishes to publicly express our sympathy to the family of Hubert and Freida Watson. We recognize the death of Mr. and Mrs. Watson is a loss to the community as well as a personal one for the family.

To our many customers and our hard working employees in Virginia, we want to say that while the fumigation in Galax had a tragic end, it is NOT representative of the way in which Orkin conducts its business.

Over the past 87 years, thousands of Orkin employees have provided pest control services safely and effectively to millions of customers throughout America. We have a strong record of customer satisfaction. Yet we believe more could be done to strengthen levels of safety and training in our industry. We said so publicly at the recent hearings conducted by the Council on the Environment throughout the state.

You have our commitment that Orkin is dedicated to high standards of service quality and safety. The people who work for Orkin in the Roanoke Valley are members of this community with families and friends and they care just as much as you do. They're good people who are proud of their work, and they will continue to do their very best to provide you, their neighbors, with safe, effective pest control services.

Bob Mercer
President

2170 Piedmont Road, Atlanta, Georgia 30324
ANOTHER ROLLINS SERVICE

Exterminators want some government regulation

Ron Chaney and many other exterminators in the state admit the need for more government controls. They're just not sure what kinds of controls are needed. There are bad exterminators.

Chaney, president of the Virginia Pest Control Association, acknowledges it. But he contends that there are only a few. "I would say we have a smaller percentage of illegal operators in the state of Virginia in the last 10 years than has the legal profession or the medical profession."

Still, he wants the bad ones out of the business. "We will go to any lengths to get that cancer out of our industry."

"We realize that we need regulation and we want regulation," he said, "but we realize that we could be legislated out of business. He wants laws "that we could live with."

Image-conscious

Jim Stegall was a reporter for the Toledo Blade before he joined his father's exterminating firm in Martinsville 15 years ago. When his father died in 1986, Stegall bought the business.

He takes a Jaycee, squeaky-clean approach to the trade. Crisp shirts and ties. A stylish new office. Neat uniforms for his crews. A newsletter for his customers. He thinks the exterminating industry needs to spruce up its image.

Stegall shuns bug gimmicks — the big pictures of cockroaches, the puns about insects in promotional literature — to sell his services. He finds it silly, unprofessional.

His only dalliance with bugs are two pet Madagascar cockroaches, 2 inches long, that live in a terrarium in his office. He feeds them dog food.

And, like any exterminator, he has his share of bizarre stories — like the colony of scorpions he found under a Martinsville house.

But Stegall takes his business seriously.

He goes way beyond what Virginia requires for the training of his six crew members. Reputable exterminators are all doing that, he said. "They've really got to educate themselves."

What bothers Stegall are the people in his profession who look and act sloppy and treat customers poorly. He winces at headlines about pesticide poisonings and exterminator fraud.

They make the honest exterminators look bad. "We are running a legitimate business," he says with fervor.

He's seen fly-by-night exterminators swing through his community. He's helped police nail exterminators who rip off old people.

"I know of people operating out of their homes — legally or illegally — back in the mountains."

He speculates they aren't legitimate. He never sees them at meetings of the Virginia Pest Control Association, his trade group.

Stegall objects to the common practice of exterminators going door-to-door selling their services. Many exterminators also make what they call "creative calls" — phoning people from the phone book

to talk them into an inspection or treatment. Pesticide peddling of this sort cheapens his industry's image, Stegall said. "I don't believe in selling any type of pesticide or home treatment. Our customers come to us. We have not and we never will go door-to-door. I detest that."

He refuses to do fumigations. "Fumigation is dangerous. I don't want to deal with it." A Galax couple died in 1986 after their house was fumigated and the exterminator failed to use a monitoring device to determine whether it was safe to re-enter their home.

He questions the necessity of covering a house with a tarpaulin and filling it with deadly gas to kill bugs. "I've never seen a case of wood-destroying organisms so bad that a house had to be fumigated."

Stegall is pleased that Virginia has improved its regulation of exterminators since the state's law was enacted in 1975. For example, when he went into business, the state had open-book exams. That was stopped a few years ago.

"The state of Virginia has really worked up in the past 10 years," he said. "When I started here I could not believe 14 years ago the degree of laxness in the pest control industry. There was little enforcement. No one was concerned about training."

He credits the Virginia Pest Control Association, which represents only 150 of the state's exterminating firms, with leading exterminators to greater professionalism. The trade group has backed a new Virginia Tech center for research on pests that damage buildings. Stegall thinks the



Jim Stegall is one of the exterminators who favor stricter state regulation center will bring Virginia national prominence in the pest control area.

But he also believes that state regulation still has a way to go.

In the early 1980s, state officials announced they would be doing spot checks of exterminators. They inspected Stegall's premises and went out with his crew but they've never returned for another inspection.

Stegall hopes well-publicized cases of fraud and contamination by Virginia exterminators in the past two years will push the state toward a thorough reform.

"What we need to do," he said, "is learn from the situation and make ourselves the better for it."

Council on the Environment Findings:

INTRODUCTION

Pesticides are widely recognized for their contributions to modern society. The productivity of modern American agriculture owes much to the use of chemical pesticides. Some estimates indicate that worldwide food production could drop by as much as forty percent without agricultural chemicals. Public health throughout the world would be in a far more precarious state were it not for the use of pesticides in the eradication of insect, rodent and other disease vectors.

However, pesticides are a concern because they are so effective and because they are widely available and common toxic chemicals. For most other chemicals, toxicity is merely incidental to their main purpose in manufacture or other chemical processes. Except in rare cases, their release into the environment occurs only by accident. Pesticides are different. They are meant to be poisonous and cannot reach their intended targets unless released into the environment.

It is essential that pesticides--both their chemical make-up and their use--be strictly controlled to minimize the risk to public health, safety and the environment while allowing their continued use to benefit society.

Any program which seeks to manage or control the risks associated with pesticides must concentrate in two areas. First, it must ensure that the pesticides work the

way they are intended, are not toxic to non-target organisms, or are not excessively persistent in the environment beyond the time of their intended use. Secondly, the management of pesticides must concentrate on the proper application and use of the chemicals, including developing less toxic alternatives. This report examines all aspects of pesticide use and management in Virginia.

Overall, the subcommittee finds that Virginia's citizens do not have adequate assurance that pesticides used here are safe for use under Virginia conditions and that they are applied in a way that guarantees public health, safety and the protection of the environment. This is in part due to insufficient training and verification of competence for those who apply large quantities of pesticides, and in part due to inadequate monitoring, enforcement and penalty provisions. It is compounded by the lack of basic data on the chemicals themselves and how and where they are used, by the lack of public understanding regarding the appropriate use of pesticides, and by the lack of applied research to guide management actions. Virginia's pesticide management program as a whole suffers from a lack of direction, oversight and coordination and insufficient staffing and funding support. In addition, the subcommittee finds gaps in program elements dealing with disposal of pesticide wastes and worker and public safety.

SUMMARY OF SUBCOMMITTEE FINDINGS

PROGRAM ADMINISTRATION AND FUNDING

FINDING: Virginia has no stated policy with regard to pesticides or pesticide management. The lack of policy leaves Virginia's current pesticide management program to operate with no clear sense of overall mission.

FINDING: Administration of Virginia's pesticide management program has not provided sufficient policy direction and oversight to ensure that public health, safety and environmental protection are properly balanced with the promotion of agricultural production. Considering the alternatives and the need to keep many diverse elements together in a single comprehensive and coordinated program, VDACS remains the most appropriate location for the overall responsibility for pesticide management.

FINDING: Staffing and funding are inadequate to guarantee the aggressive, thorough and consistent implementation of current pesticide laws and regulations in Virginia. Additional responsibilities recommended in this report will create an even greater need for manpower and supporting resources.

FINDING: The existing fee structure does not support Virginia's current pesticide management program and would be even less capable of supporting the expanded program recommended in this report.

FINDING: Effective management of pesticides requires that a large body of data be collected and maintained, and that it be efficiently organized and retrievable for analysis. Virginia's current pesticide data base is inadequate in content and is only partially automated. The data management system now in place is not adequate in design nor is there sufficient capacity for expansion to ensure adequate support for Virginia's pesticide management program.

PRODUCT REGISTRATION

FINDING: Pesticide products are not currently analyzed to assess their safety or effectiveness under specific conditions found in Virginia. Virginia now relies on the EPA pesticide registration process to judge whether a product is safe to use and will work as intended, and registers products virtually automatically if they have received EPA registration. However, many scientists, managers and laymen alike have raised serious questions about the validity of that process. Virginia does not regularly obtain from the prospective registrants the data upon which its own review could be based.

LICENSING OF BUSINESSES

FINDING: The use and misuse of pesticides is one of the most significant ways in which toxic compounds enter the general environment. Virginia's ability to manage the use of pesticides, and thereby reduce the risk they pose to the public health, safety and the environment, is severely hampered by a lack of direct control over businesses which sell and store certain quantities of pesticides or apply pesticides, and by the lack of basic information concerning the amounts, types and locations of pesticides used. State management of pesticides is now attempted mainly through restrictions and requirements placed on some individual employees of these businesses. The lack of a state licensing requirement deprives the Commonwealth of the most direct, effective and equitable means of ensuring the safe and appropriate application of pesticides, safe storage, sufficient liability coverage and adequate record-keeping. Also, public trust in the legitimate pest control business has suffered due to the fraudulent activities of individuals posing as pest control operators. Virginia law does not now provide citizens with any means of distinguishing between established, legitimate pest control businesses and those that are not.

TRAINING AND CERTIFICATION OF APPLICATORS AND TECHNICIANS

FINDING: Current requirements for training and certification of commercial operators are not sufficient and do not apply to a broad enough range of individuals to guarantee the safe and effective application of pesticides in all cases. Training does not give adequate attention to the public health, safety and environmental consequences of pesticide use. Certification is required only for one individual in each commercial operation; no requirements are placed on technicians who do most of the actual commercial pest control work. Businesses and individuals using only general use pesticides are exempt from any existing requirements.

ENFORCEMENT

FINDING: Virginia's ability to effectively monitor and enforce compliance with its current law and regulations is severely hampered by a lack of manpower and supporting resources. Increased enforcement responsibilities that would result from this subcommittee's recommendations would further strain this ability. VDACS currently relies on the part time attention of 22 field inspectors and 4 supervisors, who must share their time with other plant and product regulation programs, to monitor and enforce pesticide regulations. No field personnel are now devoted to or trained specifically in pesticide enforcement.

FINDING: Timely and effective enforcement is hampered by unclear and inconsistent penalty provisions in the current law and by the lack of a full range of administrative actions available to the Board.

Pesticide study worries farmers, orchardists

By MARY BISHOP
STAFF WRITER

HARRISONBURG — Farmers, fruit specialists and forestry officials expressed worry Tuesday night over a state study of pesticides.

"I wonder why the short fuse on your survey," an elderly farmer asked members of a state Council on the Environment subcommittee doing a 90-day investigation of pesticide regulation in Virginia.

Keith Buttleman, a subcommittee member and administrator of the council, said the group may take longer to study some issues but otherwise may call for action in January's General Assembly session.

A Virginia Tech fruit researcher from Winchester told the study group of the "immense contribution" of pesticides in the fruit industry. He warned that in the past, new federal regulations have caused "near panic" in the agriculture industry. Some, he said, could not be complied with or enforced.

Officials of the Virginia Farm Bureau Federation fear the study will threaten use of farm chemicals. In a federation news release last week, acting president Wayne Ashworth said there may be proposals

for "further restriction of farm pesticides."

The federation also has complained that the study is being done too quickly. "They're covering so much territory in this study, it's hard to believe they could come up with the right recommendations for every use."

Robert Dunn, a regional forester with the Virginia Division of Forestry, asked the panel not to increase regulation "where problems are not documented."

He said also that pesticide regulation should remain in the state Department of Agriculture and Consumer Services, rather than be moved to another agency as some critics of state regulators have suggested.

A Harrisonburg-area resident estimated that half the audience of 70 people at the hearing, held at James Madison University, were farmers.

State agriculture officials were praised by Bob Russell, vice president for governmental relations for Orkin Pest Control, for doing a good job with pesticides.

As another Orkin official did at a Monday night hearing in Blacksburg, Russell called for tightening

regulation of Virginia's exterminators. His recommendations were essentially the same as those endorsed recently by the Virginia Pest Control Association, the state trade group.

He also suggested that state regulators examine whether liability insurance requirements for pest control operators are adequate.

At least until mid-December, the council subcommittee is doing an intensive study of how Virginia regulates the use of pesticides. The review was announced in late July as a yearlong investigation, but Gov. Gerald Baliles put it on a faster track early this month after the Roanoke Times & World-News published a series of stories on the state's lax regulation of pest control operators.

The newspaper reported that exterminators go virtually unregulated in Virginia and that many Virginians claim that exterminators' sloppy use of pesticides led to the poisonings of them and their homes.

Baliles has asked the council for a report by mid-December so he can prepare recommendations for the General Assembly session opening in January.

VIRGINIA COOPERATIVE EXTENSION SERVICE

**VIRGINIA
TECH**

**VIRGINIA
STATE**

Blacksburg, Virginia 24061

January 20, 1987

Mr. William E. Wall's
VDACS, Office of Pesticide Regulation
P.O. Box 1163
Richmond, VA 23209

Dear Billy:

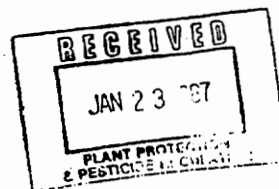
This is with regard to Furadan 15G. This insecticide is good. We need to keep it around if possible. However, if it has to go, so be it. We must be aware that when the environmentalists get "one" their appetite is whetted all the more to go for another, another, and another until they are all gone.

I know Furadan 15G is toxic. You know it is toxic. It has been and still is very popular. Popular pesticides are "vulnerable" in that the chances for problems are enhanced by the sheer poundage. Nevertheless, I suggest that "we never say die". Best regards.

Sincerely yours,

Jim Roberts

James E. Roberts, Sr.
Extension Entomologist



Virginia Cooperative Extension Service programs, activities, and employment opportunities are available to all people regardless of race, color, religion, sex, age, national origin, handicap, or political affiliation. An equal opportunity/affirmative action employer.

An Educational Service of the Virginia Polytechnic Institute and State University and Virginia State University.
Virginia's Land Grant Institution with US Department of Agriculture and Local Governments Cooperation

EDITORIALS

Exterminators not selling cookies

SINCE AUGUST, when this newspaper published a series of articles on abuses in the pest-control industry, it seems that everyone has come to favor stricter regulation. That includes not only industry leaders but also state officials, who had been accused of lax enforcement of the weak laws already on the books.

It's fine that everyone has got religion. The issue is not settled, however. Disagreement persists over what kind of added regulation is needed and how strong it should be.

William E. Walls, supervisor of the state's Office of Pesticide Regulation, came out Tuesday for licensing of pest-control companies and for more surveillance of how pesticides are used — not only by exterminators, but also by farmers and lawn-care businesses. "Fraud is serious and you need to take it very seriously," he told about 100 people at the annual Virginia Tech Pest Control Conference in Richmond.

Walls apparently reflects the sentiments of his boss, Gov. Gerald Baliles. The governor cited this newspaper's series last month when he ordered the state's Council on the Environment to give him its findings on a year-long pesticide study by December. Walls says he understands that the state budget office will approve his request, carried over from last year, for a new eight-person pesticide enforcement team costing \$535,000.

The Virginia Pest Control Association says it has favored stricter state controls for years. Its agenda includes outlawing exterminator fraud, registering all pest-control operators, and requiring training for all exterminators. But talk of licensing still raises red flags within the industry. Licensing goes beyond registration and gives government

say over whether a pest-control company can do business.

One reason Walls wants licensing is the high turnover among pest-control workers; it is difficult for the state to keep track of them, which also makes it harder to keep track of those who do not hew to the highest professional standards. This could include those who knock on doors to drum up business. Opposing a legislator's proposed ban on such activities, Joe Wilson — a Fredericksburg exterminator and the association's legislative chairman — said: "If we're going to ban door-to-door solicitation, let's be fair and let's do it to the Girl Scouts and their cookie sales . . . and the Jaycees selling their light bulbs and Christmas wrapping paper."

While we're being fair, let's also use a little common sense. Even improperly applied, Girl Scout cookies aren't usually capable of killing people. Neither are light bulbs, and the worst we've heard about Christmas wrappings is that the inks on some of them contain tiny amounts of lead. Those who go door to door hawking these products may play on sentiment a bit. But normally, they don't seek out the elderly and ill-informed who find it hard to resist a pitch for an exterminating job that may not be needed and could cost hundreds or even thousands of dollars. Scare tactics haven't sold many cookies in Virginia.

Most companies outside the pest-control field find it unnecessary and unproductive to knock on doors; they do pretty well at selling themselves through reputation and advertising. Most of those that must be licensed also have learned how to cope with government regulation and still give good and profitable service to the public. Protecting people, let's recall, is what this whole controversy is about.

Restrict exterminator's role

By HARRIET HODGES

THANK YOU for a wonderful series on the exterminator business. You and Mary Bishop should win awards for it.

Of course, there's almost total corruption where she turned the spotlight. As Bishop points out, no one wants to visit where bugs are thought to dwell. And certainly no one wants to learn to identify them. We fear the whole subject. And there's money freely available in every housing transaction. Everyone wants the area certified, stamped with government approval. We all want to pass the buck. Banks do, sellers do, buyers do, real-estate agents do. All the "exterminator" has to do is stand at the end of the line, and we will pour money in his bucket. In my own eagerness as a seller of a rental house, I have allowed without much protest a "treatment" of a frame house that I knew to be (1) insect-free and (2) recently treated. Lord knows what they used. I didn't ask because I wasn't going to live there.

Try to get an old wood-frame house certified insect-free. The frame house, though more vulnerable, is an open checkbook to exterminators. With another house I sold, I was more stubborn. I knew it to be sound as I had spent much time in the basement over a period of years. Also, it was home to a feisty old woman I had come to admire. I didn't want her last years to dwindle in a complex of vague symptoms related to pesticides. When the expected diagnosis came in — termites — from the company the Realtor used, I was angry. Not at the broker,

who had no choice but to order an inspection for the mortgage company, but at the system. I called another company, making it clear that I disagreed with the finding but that any treatment, if necessary, would be done by the first company. The second company, therefore, was invited to pick up money by simply certifying the house clean (which it was). They did so. Small problem solved; racket untouched.

The basis for the racket, is, of course, greed and ignorance. If human health were to be the overriding concern, then first we would deal with greed:

1. Exterminators would have no part in the inspection process. A cadre of inspectors passing rigorous biyearly tests would be developed. Anyone could take the test, but very few would pass.
2. Inspectors at every housing transaction would report presence or absence of pests, with particular emphasis on structural deficiencies contributing to or likely to contribute to infestation.
3. These inspectors would also test for pesticide contamination. Their findings would be permanently attached to the house. No house with residues could be retreated. A contaminated house could be sold, but the buyer would be warned, such warning rendering him/her unable to sue later.
4. Pesticides would be at first actively discouraged (as we come to our senses about their danger) and later forbidden in favor of foundation repair, silica gel dessicants, and perhaps — in the case of wood borers — ephemeral gases. Pesticides for cockroaches, ants, fleas, would

how much protection should willful ignorance purchase? If information is readily available, and we choose to watch soap operas instead, does that excuse us from the responsibility knowledge bestows? Or, to put it another way, aren't we all as citizens obliged to read the newspaper? And a few decent news magazines? The danger of chlordane, for instance, to my certain knowledge has been widely reported since 1968. Surely no one beginning to smoke today can sue for injured health. May we sue over chlordane or weed killers today simply because we preferred not to know of their danger or act on the knowledge?

On the one hand, I am in favor of suits. Sue the hell out of them, and maybe our companies will stop making stuff that kills and maims even the remotest species. I'm sympathetic to the poor couple whose baby was born dead after a termite treatment. But still: Expecting a baby and allowing pesticide on the premises? Was that entirely responsible?

I don't know the answer to that one. I do know the answer isn't as simple as saying that responsibility lies completely on the side of business and government. We're all in this together, and we'd better learn that one right quick. Get on your coveralls and inspect your own foundations today. Just dirt. Nothing down there very dangerous — if you haven't had them sprayed.

Harriet Hodges, who lives in New Castle, is a regular letter-writer of this newspaper.

be illegal, the presence of these pests being merely a cosmetic concern, and all being controllable by safe means.

5. Ridiculous "buyer protection" provisions demanded by banks and companies buying packages of mortgages would be reviewed and revised. They are actually "corporation protection" clauses for companies wanting to throw protective blankets over their legal and financial asses.

6. State offices designed to protect us would be set up. The good old

In this age of information overload, how much protection should willful ignorance purchase? If information is readily available, and we choose to watch soap operas instead, does that excuse us from the responsibility knowledge bestows?

boys supposedly overseeing our health but actually mouthing sugary kisses over the back fence with the pesticide industry, would be fired, and their agency dismantled. Angry young zealots on our side would be

Ignorance is more difficult. In this age of information overload,

LETTERS

Pest-control stories confuse the elderly

YOU NEVER have anything good to say about the independent pest-control operators. All you read is about how we are crooks and extort old people's money and make people sick with the chemicals that we spray.

I've been working off and on with pesticides ever since I was 16 years old. I've had them spilled on me; I've inhaled them, but not intentionally. I'm 37 years old, I have owned my own business going on 14 years, and I'm still in perfect health.

These newspaper articles have confused old people into thinking that exterminating chemicals will kill them. I've had to explain to my customers and newcomers to our company all summer long the difference between exterminating chemicals and vicane and methol bromide gas, which is used in fumigations. So a lot of this has been blown out of proportion.

I think it's time to form some type of union for the independent operators to speak for us. Let the mighty stand alone; they can take care of themselves. The big company does the bad and us little independent companies have to take the blame right along with them.

I saw this man on Channel 7 news telling how he wants to push legislation to ban exterminators from knocking on doors in Virginia and about how he wants exterminators to have a college degree.

If this does come to pass, when an exterminator is called out to do a job, the price is going to be unreal. I know poor families right now who would like to have their houses exterminated but cannot afford today's prices.

DANNY L. CRESS
Reedy's Exterminating Service
MARION

Pesticide hearings: one-sided report

I ATTENDED the pesticide hearings that your staff writer, Mary Bishop, reported on in your Sept. 27 issue. I realize that she had a deadline, but it seems to me if you are going to run a story, you should cover the entire story and get all the information first.

She only heard one side of the issues, thus her article had a very negative tone. It did not include any of the speakers who presented positive steps being taken to reduce the use of pesticides, recommendations for changes or improvements or research now under way at Virginia Tech on safe disposal methods.

She also missed points by most of the speakers concerning the short notice of the hearings, their broad scope in a short time span, the bad timing for farmers (this is their prime harvest season), and the fact that the committee had no experts on the subject to help analyze the information presented — not to mention that two committee members were absent (Mr.

Broaddus, chairman, and Mason Carbaugh, commissioner of agriculture).

No one has questioned the credentials of the committee or the fact that they have not even studied current regulations and that they don't even have a copy of these regulations.

After recent articles by this writer, I seriously question her objectivity on the issues presented.

JEFFREY B. MILLER
President, Laurel Creek Nursery, Ltd.
BLACKSBURG

Appendix B.

Teaching-Notes for Ex-terminators

Overview

The Roanoke Times & World News began a series of reports entitled "Pests, Poisons, and Risks" following the death of an elderly Galax couple. Mr. and Mrs. Hubert Watson died from exposure to high levels of Vikane, a chemical used in fumigations. Their deaths resulted in accusations directed towards exterminators, state officials at the Office of Pesticide Regulations, and consumers. This case study revolves around the media's ability to create chaos within the pesticide industry, thus forcing state officials to calm public concerns. The state must decide how to ensure public safety while providing effective pest control services.

Case Goals & Objectives

The aim of this case is to familiarize students with the sensitive issue of chemical application for home exterminations and commercial food and fiber production. Students should be aware of how even a single instance of chemical misuse can result in chaos for the pesticide industry. Participants will ultimately be challenged to resolve the pesticide dilemma through a synergistic approach which will benefit both the pesticide industry, and consumers.

After completion of the case, students should be able to:

- Recall specific problems associated with chemical application,
- Explain the circumstances leading to the death of the Watsons,
- Explain the role of the state, exterminators, agriculturalists, and consumers

in ensuring public safety in regards to chemical usage

- Explain how the media's portrayal of an incident can cause disruption within an entire industry,
- Decide if Virginia's pesticide laws are adequately monitoring the handling of chemicals,
- Determine if additional government regulation of pesticides is necessary,
- State who to target if new laws are imperative.

Use of the Case

This case is applicable to a wide-ranging audience. Any individual interested in promoting synergy between the public and private sector, regarding the use of chemicals, may benefit from Ex-terminators.

Study Questions

Question #1

Who is responsible for the death of the Watsons?

Author's insights:

There are several options that need to be considered when placing blame. The Watsons' death may have been attributed to the extermination company, state officials at the Office of Pesticide Regulations, or potentially, to the Watsons themselves. An examination of each option individually becomes necessary.

The most plausible candidate for blame is the extermination company. A state medical examiner stated that Vikane caused the deaths. The Watsons reentered the house while Vikane levels remained too high for safe habitation. Their reentry should have been prohibited by Orkin. The exterminators told the Watsons that they could safely reenter the house the day following the fumigation; however a professional verification of Vikane levels was never made. The Vikane label clearly mandates that an air monitor be used after a fumigation. Orkin did not even own a monitor. In addition the exterminators failed to remove sofa cushions or mattresses, which could have trapped the gases, nor did they use a strong smelling warning agent to alert homeowners that the house had not sufficiently aired out (exhibit 2).

Perhaps Orkin should not be held entirely accountable because state pest control officials should have had tighter control of its industry. Virginia's laws and regulations are not strict, hence inexperienced people are operating extermination businesses from the trunk of an automobile (exhibit 1). State officials do not even know how many extermination companies exist statewide. In Virginia the pesticide industry is under-regulated as a result of under-staffing of the Office of Pesticide Regulations; therefore the mishandling of chemicals may occur on a more frequent basis.

Some people may believe that the Watsons played a part in their untimely death. Perhaps homeowners should not trust their safety to pest control

companies. Even though the Orkin employee reassured the Watsons that it was not dangerous, they should have taken a more active role with the extermination of their home. Perhaps the couple needed to obtain a second opinion concerning the fumigation of their home. If the fumigation was deemed necessary the Watsons should have demanded information about Vikane. Being informed about safety instructions and precautions could have saved their lives.

Question #2

Is the media coverage of the pesticide industry in the people's (reader's) best interest?

Author's insights:

This question can not be answered with a simple yes or no. The medias coverage of the pesticide industry has its advantages, disadvantages, and perhaps personal motives.

The underlying issue is that a newspaper reports news as a business. A business can not be successful without profits, therefor a major goal of a paper is to publish issues which will stir interest among readers. Often such stories harbor a very negative tone. For example if you have ever glanced at the front page headlines it is obvious that tragedy out sells the positive, upbeat stories. Would you be more likely to purchase a paper titled "O. J. Simpson indicted in the brutal slaying of his former wife" , or would you buy the paper headed "Space shuttle

Mission a Success"? According to USA Today every time O. J.'s dilemma appears on the front page they sell 700,000 more copies.

If the paper prospers on the negative or tragic issues, perhaps newspaper journalists are biased and thus are swayed to report the news more one-sided. In the case of the pesticide industry the paper is very condemning. The Roanoke Times continually slashes The State Office of Pesticide Regulations. The paper reports that the chemical laws and regulations are so lax in the state of Virginia that it is easier to become an exterminator than a hairdresser. The paper constantly devalues chemicals, and those who apply them. Rarely do papers report on the value of chemicals to our society.

Generally speaking I would be more apt to say no, the medias coverage of the pesticide controversy is not in the public's best interest. The Roanoke Times has raised anxieties and fueled the fires of panic among Virginians. However elevated anxieties has caused Virginia residents to investigate the operation and management of a potentially dangerous industry. The paper generated concerns about a problem which may have been overlooked if not brought before the public. Publicizing the death of the Watsons' brought about changes in an under-regulated industry. Perhaps when voiced, these concerns will help to protect another human from an untimely death.

Question #3

Who, if anyone, should be taking a defensive stance: consumers, state officials, or exterminators?

Author's insights:

Consumers, state officials and exterminators are all under scrutiny. Fingers are pointing and blame has been laid on all three parties. Usually when being attacked, one is thrown into a defensive mode. Under these conditions issues can not be as easily resolved because the stress and emotions of all parties involved are intensified. If a resolution is to be reached there is an old saying which should be addressed; the best defense is a good offense.

Offensively speaking the exterminators tried to make amends by writing letters to Virginia residents stating that safety is a priority with their companies (Exhibit 4 & 5). One company said that this chaos was a chance to spruce up the image of legitimate operators (Exhibit 6). Jim Stegall took the frame of mind that a reevaluation of the pesticide industry would not be detrimental to his business which operates above the margin of safety.

Exterminators should use the media outbreak as an opportunity to market safety. Companies should: inform the public of safety precautions and employee training, show how the company in the past and in the future will make safety it's top priority, and institute changes in safety regulations which surpass state requirements.

State regulators need to investigate allegations of misuse and implement preventive measures in the future. They must also evaluate current regulations ,and tighten controls and penalties. The state is a representative of its people, thus the need to show that the people's voices are being heard. The consumers must ban with state officials to ensure that all citizens become active and educated regarding chemicals.

Question #4

Should the agricultural industry be dragged into an exterminator's problem?

Author's insights:

This question warrants discussion. Some people may suggest that an investigation of pesticide applicators occur only where problems have been documented. In this particular instance the industry of agriculture was not responsible for the death of the Watsons. Since agriculture can not be held accountable , they should not suffer the consequences of an exterminator's problem. However, one must consider that problems have been documented concerning the use of agricultural chemicals.

In 1983, Ethylene dibromide, a pesticide used on soil, grain, and citrus, was detected in stored grain, food commodities, and well water. Also in 1983 the Chesapeake Bay was documented to contain toxic chemicals and pesticides. In 1986 granular carbofuran, an insecticide/nematocide, was confirmed as the cause

of death of two bald eagles. Once again in 1986 the contamination of drinking water resulted from a leak at a bulk pesticide storage facility. All of these past incidents can be attributed to the inappropriate handling of agricultural chemicals. Shouldn't the state take a proactive stance and prevent exterminators, as well as agriculturalists, from inflicting further injury or death?

The industry of agriculture is estimated to use 75 percent of the chemicals applied in the state of Virginia. Agriculture utilizes 5 million pounds, as opposed to the 1.5 million pounds used for other purposes. Agriculture is more likely to result in accidents than non-agricultural activities, therefore agriculture should work with the public and state officials to reevaluate chemical use before another tragedy occurs. Agriculturalists are well aware of the damage in which negative publicity can do to chemicals involving food and fibers. Since agriculture is not to blame for this outbreak use the attention to gain respect for agricultural chemicals. Inform the public of the value of chemicals.

Agriculturalists need to understand that their livelihood depends on the public acceptance of chemicals used for food production. Farmers must also adhere to public demands and concerns. The public's concern for safety is the issue being addressed in the Watsons' case. The panel established by Governor Baliles aims to ensure that applicators obey safety standards. The committee is not trying to ban chemicals, but to regulate them.

James Roberts' letter to the Office of Pesticide Regulation is not a justifiable

reaction (Exhibit 9). He states that "we never say die". If one chemical is allowed to be taken off the market they will want more removed. The banning of pesticides is not being considered, but if it were, Roberts would not win the respect of the public. He is ignoring the toxic nature of pesticides simply because he warrants them necessary. The needs and safety of the public must be meshed.

Question #5

What action should the reader recommend the board take?

Author's insights:

Remember the reader is a farmer and a family man. He recognizes the contributions (increased food supply, and eradication of harmful insects and diseases) chemicals have made upon our society. Although he values chemicals, he does not warrant the abuse of toxic substances which may inflict harm or death to his family. What should the reader do to inform the board of his stance?

Should the reader recommend that:

1) the board increase staffing at the Office of Pesticide Regulations?

In 1948 Virginia's pesticide law modeled after the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) went into effect. Over the past 30 years additions to the law have been minimal, thus Virginia's laws remain very basic. Policies and regulations have not kept pace with the widespread use of pesticides.

The Virginia Department of Agriculture and Consumer Services (VDACS) regulates the use of pesticides. The Department provides pesticide management through its Office of Pesticide Regulation. The Office is staffed by five full time personnel, two supervisors and three secretaries. With five staff members the Office must focus on product registration, applicator training and certification, and inspection and enforcement. For a state using 6.5 million pounds of pesticide ingredients annually, five personnel does not seem sufficient.

2) more funding be allocated to the Office of Pesticide Regulations?

The operating budget for the Office is just under 500,000 dollars. Virginia's budget does not compare to national standards. For example, California's pesticide program budgets 20 million, and Texas allocates 1.6 million. Even neighboring states out budget Virginia; Maryland appropriates 613,000, and North Carolina 1.5 million dollars. Facts indicate that in order to be competitive with other states the allocation of additional funds is imperative. More funding can help support increases in staffing and pesticide programs.

3) changes be made concerning the registration of chemicals in Virginia?

Virginia is a transitional state from north to south. Statewide soil types, rainfall, agricultural practices, and wildlife vary from other states. Even though conditions in Virginia do not match national conditions, Virginians are allowed to

use identical chemicals.

Registration of chemicals in Virginia requires that the product be registered under FIFRA. In addition, the registrant needs only to supply his name and address, the name of the pesticide, and a copy of the pesticide label. No further testing to determine if the pesticide is adapted to Virginia's conditions is necessary. Considering Virginia's various environmental and topographical conditions, the state should require more extensive registration procedures.

4) all businesses, selling or buying chemicals, be licensed?

Forty states mandate licensing as an assurance that all business meet certain minimum requirements; Virginia is not among them. Without state licensing Virginia's residents have no way to distinguish between legitimate operations, and those that are not. Licensing would allow officials more control, and additional funding. Fees accumulated from licensing could support future pesticide programs.

5) certification procedures be updated?

Currently, persons who apply restricted use pesticides must be certified. A restricted use pesticide is one in which the EPA determines that a product " may generally cause, without additional regulatory restrictions, unreasonable adverse effects on (man and) the environment."

To become a certified private applicator in Virginia one must pass a written

or oral 50 question exam demonstrating competency in: the ability to identify agricultural pests, pesticide product label comprehension, application techniques, environment and safety. The effectiveness of this exam is uncertain. The same exam is given to all persons seeking certification. In addition the exam is only updated every two or three years. Exam content becomes public knowledge shortly after being updated. The ability of such an exam to prove a person's competency to apply chemicals is questionable.

6) the Office of Pesticide Regulations require more stringent training standards?

It is estimated that 2,000 to 3,000 individuals apply general use pesticides commercially without being required to meet any training or certification standards. Even though a major goal of FIFRA is to keep pesticide applicators informed of changes in regulation and technology through training, training is not mandatory. Private and commercial pesticide applicators are not required to attend supervised educational training courses, seminars, or any other training programs. Virginia's extension service offers optional certification and re-certification training programs. VDACS also announced that the courses which are taught are not reviewed to ensure that issues such as public health, safety, and environment are addressed.

In general private and commercial operators choose not to participate in training. Instead of active hands on involvement in training, applicators may choose to obtain training materials for take-home study. Training of applicators is lacking

do to legislation, staffing and funding. If Virginia expects operators to excel in safety they must generate funds specifically allocated for training. Training programs are useless if not utilized, therefore training must be mandatory.

7) the state strengthen the enforcement of pesticide regulations, and mandate stricter penalties in proven cases of chemical misuse?

Currently Virginia pesticide law does not allow VDACS authority to regulate businesses which sell or apply pesticides, to investigate fraudulent acts in the solicitation of clients, to regulate the storage of pesticides, or to enforce worker protection or safety. Illegitimate exterminators are allowed to operate statewide due to the lack of specific authorization for VDACS to investigate fraud, the lack of licensing pest control firms, the under-staffing of individuals with specific duties of investigation, and the absence of regulations for commercial applicators using general-use pesticides.

Not only is it easy for illegitimate exterminators to operate, it is rare that an incidence of misuse is detected, and penalized. Pesticide investigators are heavily burdened with inspections of feed, seed, fertilizer, lime, and motor fuel. Due to these time constraints the investigators will notify exterminators prior to a spot check. Prior notification allows disreputable businesses to conceal violations. If violations are documented through consumer complaints, the penalties induced upon violators are lax. The Office of Pesticide Regulations received 67 complaints

over a two and a half year period. Of these cases 41 were found to have no misuse, and majority of the remaining cases resulted in the business receiving a warning letter.

If Virginia is going to restore confidence in the extermination industry, illegitimate operators must be put out of business. Incidents of misuse must be discovered, properly investigated, and penalized when necessary in order to prevent further fraudulent activities.

Appendix C.

Lesson Plan for Decision Case Instruction

LESSON: Pesticide Management in Virginia

PREPARED BY: Marlo G. Allen

DATES: March 6-10, 1995

OBJECTIVES:

The student should be able to:

1. Recognize the extent of chemical usage in the past and present
2. Recall specific problems associated with chemical application
3. Explain the circumstances leading to the death of the Watsons
4. Explain the role of the state, exterminators, agriculturalists, and consumers in ensuring public safety in regards to chemical usage
5. Explain how the medias portrayal of an incident can cause disruption within an entire industry
6. Decide if Virginia's pesticide laws are adequately monitoring the handling of chemicals
7. Determine if additional government regulation of pesticides is necessary

8. State who to target if new laws are imperative

INTEREST APPROACH:

How many of you have ever used or applied a chemical? (Raise your hands.)

I just took a trip to Krogers. In this bag I have several pesticides in which I purchased there. Who wants to venture a guess as to what the contents of this bag are?

*Keep in mind that chemicals can be common household products. A grocery store typically has 30 different pesticides. A farm and garden store has at least 150 pesticide products available.

What are the contents of this bag? As students guess the correct contents pull the out and display them. When the last item is guessed reward that student with an apple which was enclosed in the bag with the chemicals.

See if the student is reluctant to eat it - his/her reaction may indicate people's fear of pesticides.

Now ask the students- How many of you have ever applied a chemical? With their new awareness of what chemicals are they should all raise their hands.

**PRESENTATION
MARCH 6, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

(The following will entail the last 20 minutes of Dr McKenna's class)

Pause for students to answer questions

Interest approach

Why do we use chemicals?

Food production
Estimated 40% decrease in world wide food production without chemicals
Public health
Eradication of insects, rodents, and other disease vectors

OH1

How long have we relied on chemicals?

OH2

How much/many chemicals do we utilize nationally?

OH3

How much do we use locally in Virginia?

When we increase chemical use,

do we increase the risks associated with chemicals?

Reoccurring problems involving health effects, environmental contamination, and waste disposal are a major concern. An example of a chemical risks which was reported by the media on a national level was the ahlar scare.

Risks are associated with chemical misuse.

Can you think of any incidents of chemical misuse which posed a risk to Virginia residents?

OH4

HANDOUTS:

- Literature involving death of Galax couple
 - Lesson title and objectives
-

**PRESENTATION
MARCH 8, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

(The following instruction should encompass a 50 minute class period)

OH5

Discuss details of case.
Have students focus on study questions found in case packet.

OH6

What do Virginians expect out of a pesticide management program?

Detail program goals

OH7

How is Virginia's pesticide management program organized?

OH8

What are the issues in which the program focuses?

OH9

A. Program administration and funding

OH10

B. Product registration

OH11

C. Licensing of businesses

OH12 (past)

OH13 (present)

OH14 & HANDOUT (exemptions)

D. Training and certification of
applicators and technicians

OH15

E. Enforcement

Summary

**PRESENTATION
MARCH 10, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

Distribute surveys

**Unit evaluation:
Exam**

BACKGROUND

1000 B.C. - Sulfur

79 A.D. - Arsenic

1930's - Era of modern chemicals

TODAY

1,400 active ingredients

~15 new active ingred. each year

Active ingred. formulated into
50,000 individual pesticides

Large scale additions due to speed of
resistance

Estimated resistant species by 1980:

400 Species of insects

150 Plant pathogens

50 Weed species

PESTICIDE USE IN U.S.

1950's - 200,000 lbs*

1986 - 1.1 billion lbs

* pounds of active ingredient per year

75% (820 million lbs) Agricultural sector

25% (276 million lbs) Non-agricultural activities

Non-agricultural pesticides used by:

->95 million households

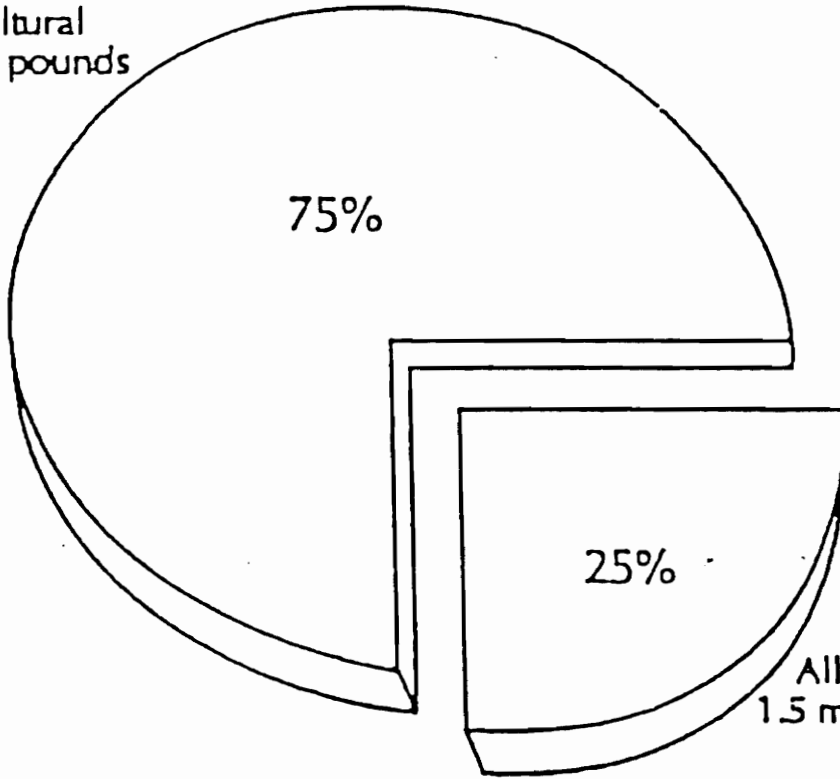
-40,000 pest control firms

Retail purchase of all chemicals
= \$6.5 billion annually

Estimated Pesticide Use in Virginia

based on figures extrapolated from
national data trends

Agricultural
5 million pounds



All Other Use
1.5 million pounds

Total: 6.5 million pounds annually

Resources for the Future 1966, 1987

RECENT MISUSE OF CHEMICALS IN VA

- 1983 -Ethylene dibromide (EDB) detected in stored grains and food commodities
- 1983 -7 year federal study indicated that the Chesapeake Bay was slowly dying from contamination from non-point sources
- 1985 -Debate on use of tributyltin (TBT)
- 1986 -Granular carbofuran confirmed as cause of death of two bald eagles
- 1986 -Leakage from a bulk pesticide storage facility contaminated residential drinking water
- 1986 -Vikane fumigation left elderly Galax couple dead

GALAX DEATHS

Hubert and Frieda Watson died after home fumigation

Orkin company representatives:

- Covered and fumigated home
 - Did not remove sofa cushions
 - Did not use an air monitor
 - Did reassure the watsons'
"it's not dangerous, don't worry"
-

Roanoke Times & World News reported:

- Laws in Virginia do not successfully monitor the handling of pesticides
 - To become an exterminator only need a business license, and sometimes not even that
 - Exterminators don't have to have any experience, training, or knowledge of pesticides
 - Virginia Office of Pesticide Management does not have a record of how many exterminators are operating within the state
 - Virginia has little to no punishment for chemical misuse
-

Virginia residents skeptical about exterminators

- Terminix confirms competency
 - Orkin defends reputation
-

Virginia reviews existing laws

- Virginia Pesticide Control Board established
 - Farmers suggest an increase in regulation only where problems are documented
 - Agriculturalist express concern over banning of chemicals
-

Citizens voice opinions

- Protect the people
 - Age of information overload
 - One-sided pesticide reports
-

Ultimate decision:

What action should the Council on the Environment take?

"Any program which seeks to manage or control the risks associated with pesticides must concentrate in two areas.

First, it must ensure that the pesticides work the way they are intended, are not toxic to non-target organisms, or are not excessively persistent in the environment beyond the time of their intended use.

Secondly, the management of pesticides must concentrate on the proper application and use of the chemicals, including developing less toxic alternatives."

Council on the Environment
January 1989

Environmental Protection Agency (EPA)

*

**Virginia Department of Agriculture and
Consumer Services (VDACS)**

*

Division of Product and Industry Regulation

*

Office of Pesticide Management

**United States Department of Agriculture
(USDA)**

*

Extension Service

*

Virginia Cooperative Extension

AREAS OF FOCUS

- A. Program administration and funding**
- B. Product registration**
- C. Licensing of businesses**
- D. Training and certification of applicators and technicians**
- E. Enforcement**

A. PROGRAM ADMINISTRATION AND FUNDING

PAST

Insufficient staff
~5 employees total

PRESENT

Increase in personnel
~11 employees allocated among:
-data & information mgmt
-product registration
-licensing
-training & certification
-public information & training activities
-overall program direction and oversight

FUNDING

PAST

Limited operational budget

PRESENT

Increased funding due to fees in:
-certification
-licensing
-registration

B. PRODUCT REGISTRATION

PAST

- Registered under FIFRA
- Registrant supply:
 - Name
 - Address
 - Name of pesticide
 - Copy of pesticide label
 - \$40 fee

PRESENT

- Same as above, except fee is \$125
- Since soil, rainfall, agricultural practices, and wildlife vary from state to state, Virginia may implement a new standard requiring registrants to conduct location specific test. This would ensure that chemicals applied in Virginia are adapted to Virginia conditions.

C. LICENSING OF BUSINESSES

PAST

- Licensing not a requirement
- No fee

PRESENT

Who?

Any person or business operating in Virginia, which in exchange for compensation, sells, stores, distributes, mixes, applies, or recommends use of pesticides.

How?

- Application
- If handle restricted-use pesticides must have a commercial applicator on premises
- No commercial applicator than licensee must pass written exam
- Certification of insurance
- \$50 fee per outlet
- Renew annually

D. TRAINING AND CERTIFICATION OF APPLICATORS AND TECHNICIANS

PAST

Certification Required

- Application of *restricted-use pesticides**
- Formal training not mandatory**

Certification Not Required

- Application of general-use pesticides**

***Restricted-Use Pesticide**

- is a product in which the EPA determines "may generally cause, without additional regulatory restrictions, unreasonable adverse effects on (man and) the environment."**

D. TRAINING AND CERTIFICATION (CONT.)

PRESENT

5 types of pesticide applicators

- Private applicator
- Commercial applicator for hire
- Commercial applicator not for hire
- Commercial applicator inactive
- Registered technician

Requirements and Procedures

Private applicator

- Self-study of core manual
- Written closed book exam, score 76% or better
- No fee
- Recertification every 2 years

Registered technician

- 40 hr minimum on-the-job training (supervised)
- Written, closed book examination
- \$35 fee, annual renewal
- Recertification every 2 years

Commercial applicator

- Valid RT for at least 1 year, or proof of sufficient training, education, and experience in pesticide usage
- Closed book examination (core and category)
- \$35 fee, annual renewal
- Recertification every 2 years

Exemptions

Some types of pesticide users do not have to be certified. Certification is not required of:

1. Persons conducting research in the laboratory;
2. Doctors of medicine and doctors of veterinary medicine applying pesticides as drugs or medications in the normal course of their practice (vs. doctors of veterinary medicine applying pesticides for hire, advertising themselves as pesticide applicators or engaged in large-scale pesticide use);
3. Providers of janitorial, cleaning or sanitizing services, including those who treat swimming pools and cooling towers, providing the only pesticides used are general-use sanitizers, disinfectants and germicides;
4. Persons selling or applying paints not classified as restricted use;
5. Painters applying restricted-use marine anti-foulant (TBT) paints under the on-site supervision of a commercial applicator certified in category 5B (Marine Anti-Foulant Paints). Under this exemption, one category 5B commercial applicator may supervise no more than eight uncertified painters.
6. Persons who use or supervise the use of any pesticide which is not classified as restricted-use for the purpose of producing an agricultural commodity on private land. This includes pesticide applications made on property owned or rented by the grower or, if applied without compensation other than trading of personal services between producers of agricultural commodities, on the property of another person; and
7. Farm hands; persons employed by agricultural producers who work only for that grower. Note: noncertified applicators employed by agricultural producers may not apply restricted-use pesticides unless under the direct supervision of a certified private applicator.
8. Private citizens using "homeowner" lawn, garden or household pest control products on their property or in their home.

E. ENFORCEMENT

PAST

- No employees specifically dedicated to field inspection and enforcement
- Warning letters primary disciplinary action against alleged chemical misuse

PRESENT

- 2 officials with supervisory and compliance responsibilities
- 9 field investigators responsible for investigations of recorded and discovered misuse

Appendix D.

Lesson Plan for Traditional Lecture Instruction

LESSON: Pesticide Management in Virginia

PREPARED BY: Marlo G. Allen

DATES: March 6-10, 1995

OBJECTIVES:

The student should be able to:

1. Recognize the extent of chemical usage in the past and present
2. Recall specific problems associated with chemical application
3. Explain the circumstances leading to the death of the Watsons
4. Explain the role of the state, exterminators, agriculturalists, and consumers in ensuring public safety in regards to chemical usage
5. Explain how the medias portrayal of an incident can cause disruption within an entire industry
6. Decide if Virginia's pesticide laws are adequately monitoring the handling of chemicals
7. Determine if additional government regulation of pesticides is necessary

8. State who to target if new laws are imperative

INTEREST APPROACH:

How many of you have ever used or applied a chemical? (Raise your hands.)

I just took a trip to Krogers. In this bag I have several pesticides in which I purchased there. Who wants to venture a guess as to what the contents of this bag are?

*Keep in mind that chemicals can be common household products. A grocery store typically has 30 different pesticides. A farm and garden store has at least 150 pesticide products available.

What are the contents of this bag? As students guess the correct contents pull the out and display them. When the last item is guessed reward that student with an apple which was enclosed in the bag with the chemicals.

See if the student is reluctant to eat it - his/her reaction may indicate people's fear of pesticides.

Now ask the students- How many of you have ever applied a chemical? With their new awareness of what chemicals are they should all raise their hands.

**PRESENTATION
MARCH 6, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

(The following will entail the last 20 minutes of Dr McKenna's class)

Pause for students to answer questions

Interest approach

Why do we use chemicals?

Food production
Estimated 40% decrease in world wide food production without chemicals
Public health
Eradication of insects, rodents, and other disease vectors

OH1

How long have we relied on chemicals?

OH2

How much/many chemicals do we utilize nationally?

OH3

How much do we use locally in Virginia?

When we increase chemical use,

do we increase the risks associated with chemicals?

Reoccurring problems involving health effects, environmental contamination, and waste disposal are a major concern. An example of a chemical risks which was reported by the media on a national level was the alar scare.

Risks are associated with chemical misuse.

Can you think of any incidents of chemical misuse which posed a risk to Virginia residents?

OH4

HANDOUTS:

- Literature involving death of Galax couple
 - Lesson title and objectives
-

**PRESENTATION
MARCH 8, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

(The following instruction should encompass a 50 minute class period)

Ask students if they have any questions about the reading assignment.

OH5

What do Virginians expect out of a pesticide management program?

Detail program goals

OH6

How is Virginia's pesticide management program organized?

OH7

What are the issues in which the program focuses?

OH8

A. Program administration and funding

OH9

B. Product registration

OH10

C. Licensing of businesses

OH11 (past)

OH12 (present)

OH13 & HANDOUT (exemptions)

D. Training and certification of
applicators and technicians

OH14

E. Enforcement

Summary

**PRESENTATION
MARCH 10, 1995**

TECHNIQUE (HOW)

CONTENT (WHAT)

Distribute surveys

**Unit evaluation:
Exam**

BACKGROUND

1000 B.C. - Sulfur

79 A.D. - Arsenic

1930's - Era of modern chemicals

TODAY

1,400 active ingredients

~15 new active ingred. each year

Active ingred. formulated into
50,000 individual pesticides

Large scale additions due to speed of
resistance

Estimated resistant species by 1980:

400 Species of insects

150 Plant pathogens

50 Weed species

PESTICIDE USE IN U.S.

1950's - 200,000 lbs*

1986 - 1.1 billion lbs

* pounds of active ingredient per year

75% (820 million lbs) Agricultural sector

25% (276 million lbs) Non-agricultural activities

Non-agricultural pesticides used by:

->95 million households

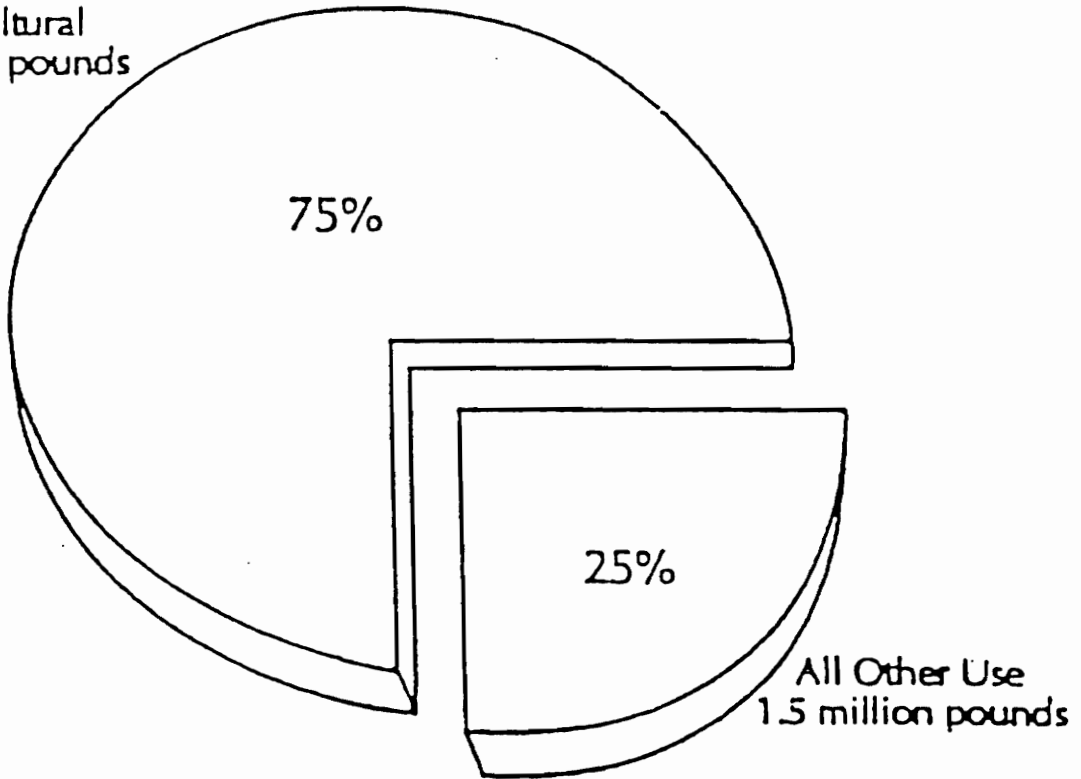
-40,000 pest control firms

Retail purchase of all chemicals
= \$6.5 billion annually

Estimated Pesticide Use in Virginia

based on figures extrapolated from
national data trends

Agricultural
5 million pounds



Total: 6.5 million pounds annually

Resources for the Future: 1966, 1987

RECENT MISUSE OF CHEMICALS IN VA

- 1983 -Ethylene dibromide (EDB) detected in stored grains and food commodities
- 1983 -7 year federal study indicated that the Chesapeake Bay was slowly dying from contamination from non-point sources
- 1985 -Debate on use of tributyltin (TBT)
- 1986 -Granular carbofuran confirmed as cause of death of two bald eagles
- 1986 -Leakage from a bulk pesticide storage facility contaminated residential drinking water
- 1986 -Vikane fumigation left elderly Galax couple dead

"Any program which seeks to manage or control the risks associated with pesticides must concentrate in two areas.

First, it must ensure that the pesticides work the way they are intended, are not toxic to non-target organisms, or are not excessively persistent in the environment beyond the time of their intended use.

Secondly, the management of pesticides must concentrate on the proper application and use of the chemicals, including developing less toxic alternatives."

Council on the Environment
January 1989

Environmental Protection Agency (EPA)

*

Virginia Department of Agriculture and
Consumer Services (VDACS)

*

Division of Product and Industry Regulation

*

Office of Pesticide Management

United States Department of Agriculture
(USDA)

*

Extension Service

*

Virginia Cooperative Extension

AREAS OF FOCUS

- A. Program administration and funding**
- B. Product registration**
- C. Licensing of businesses**
- D. Training and certification of applicators and technicians**
- E. Enforcement**

A. PROGRAM ADMINISTRATION AND FUNDING

PAST

Insufficient staff
~5 employees total

PRESENT

Increase in personnel
~11 employees allocated among:
-data & information mgmt
-product registration
-licensing
-training & certification
-public information & training activities
-overall program direction and oversight

FUNDING

PAST

Limited operational budget

PRESENT

Increased funding due to fees in:
-certification
-licensing
-registration

B. PRODUCT REGISTRATION

PAST

- Registered under FIFRA
- Registrant supply:
 - Name
 - Address
 - Name of pesticide
 - Copy of pesticide label
 - \$40 fee

PRESENT

- Same as above, except fee is \$125
- Since soil, rainfall, agricultural practices, and wildlife vary from state to state, Virginia may implement a new standard requiring registrants to conduct location specific test. This would ensure that chemicals applied in Virginia are adapted to Virginia conditions.

C. LICENSING OF BUSINESSES

PAST

- Licensing not a requirement
- No fee

PRESENT

Who?

Any person or business operating in Virginia, which in exchange for compensation, sells, stores, distributes, mixes, applies, or recommends use of pesticides.

How?

- Application
- If handle restricted-use pesticides must have a commercial applicator on premises
- No commercial applicator than licensee must pass written exam
- Certification of insurance
- \$50 fee per outlet
- Renew annually

D. TRAINING AND CERTIFICATION OF APPLICATORS AND TECHNICIANS

PAST

Certification Required

- Application of *restricted-use pesticides
- Formal training not mandatory

Certification Not Required

- Application of general-use pesticides

***Restricted-Use Pesticide**

- is a product in which the EPA determines "may generally cause, without additional regulatory restrictions, unreasonable adverse effects on (man and) the environment."

D. TRAINING AND CERTIFICATION (CONT.)

PRESENT

5 types of pesticide applicators

- Private applicator
- Commercial applicator for hire
- Commercial applicator not for hire
- Commercial applicator inactive
- Registered technician

Requirements and Procedures

Private applicator

- Self-study of core manual
- Written closed book exam, score 76% or better
- No fee
- Recertification every 2 years

Registered technician

- 40 hr minimum on-the-job training (supervised)
- Written, closed book examination
- \$35 fee, annual renewal
- Recertification every 2 years

Commercial applicator

- Valid RT for at least 1 year, or proof of sufficient training, education, and experience in pesticide usage
- Closed book examination (core and category)
- \$35 fee, annual renewal
- Recertification every 2 years

Exemptions

Some types of pesticide users do not have to be certified. Certification is not required of:

1. Persons conducting research in the laboratory;
2. Doctors of medicine and doctors of veterinary medicine applying pesticides as drugs or medications in the normal course of their practice (vs. doctors of veterinary medicine applying pesticides for hire, advertising themselves as pesticide applicators or engaged in large-scale pesticide use);
3. Providers of janitorial, cleaning or sanitizing services, including those who treat swimming pools and cooling towers, providing the only pesticides used are general-use sanitizers, disinfectants and germicides;
4. Persons selling or applying paints not classified as restricted use;
5. Painters applying restricted-use marine anti-foulant (TBT) paints under the on-site supervision of a commercial applicator certified in category 5B (Marine Anti-Foulant Paints). Under this exemption, one category 5B commercial applicator may supervise no more than eight uncertified painters.
6. Persons who use or supervise the use of any pesticide which is not classified as restricted-use for the purpose of producing an agricultural commodity on private land. This includes pesticide applications made on property owned or rented by the grower or, if applied without compensation other than trading of personal services between producers of agricultural commodities, on the property of another person; and
7. Farm hands; persons employed by agricultural producers who work only for that grower. Note: noncertified applicators employed by agricultural producers may not apply restricted-use pesticides unless under the direct supervision of a certified private applicator.
8. Private citizens using "homeowner" lawn, garden or household pest control products on their property or in their home.

E. ENFORCEMENT

PAST

- No employees specifically dedicated to field inspection and enforcement**
- Warning letters primary disciplinary action against alleged chemical misuse**

PRESENT

- 2 officials with supervisory and compliance responsibilities**
- 9 field investigators responsible for investigations of recorded and discovered misuse**

Appendix E.
Cognitive Retention Exam

Name _____

Please circle the appropriate response.

Instructor: Dr. McKenna or Marlo Time: 9:00 or 10:00

Group #: 1 2 3 4

Test: Pesticide Management in Virginia

Multiple choice (2.5 points each)

1. VDACS represents the
 - a. Virginia Department of Agriculture and Chemical Services
 - b. Virginia Department of Advocates for Chemical Safety
 - c. Virginia Department of Agriculture and Consumer Services
 - d. Virginia Department of Advocates for Consumer Safety

2. What was the name of the Galax couple killed after a routine fumigation?
 - a. Harold and Fran Watson
 - b. Hanson and Faye Watson
 - c. Hubert and Frieda Watson
 - d. Henry and Faith Watson

3. It is estimated that without chemicals world wide food production would
 - a. Decrease by 20%
 - b. Decrease by 30%
 - c. Decrease by 40%
 - d. Decrease by 50%

4. Which statement is NOT correct?
 - a. At least 1,400 active ingredients exist today
 - b. According to 1986 estimates the utilization of active ingredients in the U.S. has increased by approximately 1 billion pounds per year since the 1950's
 - c. Estimates indicate that only 15 new active ingredients are introduced yearly
 - d. Active ingredients typically make up at least 75% of most pesticide compounds

5. Arsenic was one of the earliest recorded pesticides. It was utilized as early as
 - a. 1000 B.C.
 - b. 1000 A.D.
 - c. 79 B.C.
 - d. 79 A.D.

6. Resistance to pesticides would most likely develop less rapidly in
 - a. Insects
 - b. Weed species
 - c. Plant pathogens
 - d. Target organisms

7. Which statement is FALSE?
 - a. The agricultural sector uses 820 million pounds of active ingredients each year
 - b. Over 95 million households utilize non-agricultural pesticides
 - c. Non-agricultural pesticides only account for 25% of the active ingredients used annually
 - d. 6.5 billion dollars are spent on agricultural pesticides each year

8. A state medical examiner said the Watsons were killed due to
 - a. Respiratory failure
 - b. Pulmonary edema
 - c. Toxic agent (Vikane)
 - d. All of the above

9. Over a two and a half year period 67 complaints were filed against exterminators. As a result
 - a. Only 41 cases were prosecuted
 - b. 41 cases were found to have no misuse
 - c. 41% of the cases were issued warning letters
 - d. 41% of the cases were dismissed

10. State pesticide regulations were investigated primarily because of
 - a. Orkin expressing neglect, and condolences to the Watson family
 - b. An extension entomologist voicing his anger about the banning of chemicals
 - c. The Council on the Environment's finding that "Pesticides used in Virginia are not applied in a way that guarantees public health, safety, and the protection of the environment."
 - d. Mary Bishop, a staff writer reporting for the Roanoke Times & World News

11. An extension entomologist at Virginia Tech voiced his opinions through a letter sent to the Office of Pesticide Regulation. Which statement best summarizes his viewpoint?
 - a. Popular pesticides are vulnerable, thus they should be regulated, not banned
 - b. Only toxic chemicals which have created problems should be banned
 - c. Chemicals are not toxic if handled properly
 - d. No chemicals regardless of toxicity should be taken off of the market

12. Virginia's pesticide programs are currently being funded by fees from all EXCEPT
 - a. Licensing
 - b. Pesticide registration
 - c. Private applicator certification
 - d. Registered technician recertification

13. In order to register a product, the registrant must provide the following information
 - a. Name, address, active ingredient, toxicity information
 - b. Name, address, name of pesticide, copy of pesticide label
 - c. Name, address, active ingredient, side effects to man and the environment
 - d. Name, address, name of pesticide, intended use

14. Pesticide licensing of businesses is a requirement of all EXCEPT
 - a. A person only selling general-use pesticides
 - b. A business which charges clients in exchange for storing pesticides
 - c. Any enterprise which recommends the application of pesticides
 - d. An individual who applies a pesticide without compensation

15. Farm Bureau handles restricted use pesticides, therefore they are required to do all of the following EXCEPT
 - a. Obtain a certification of insurance
 - b. Renew a pesticide business license annually
 - c. Secure a private applicator for the premises
 - d. Pay a \$50 licensing fee per outlet

16. Certification is required of
 - a. Farmhands, persons employed by agricultural producers who work only for that grower
 - b. Persons selling or applying paints classified as restricted-use
 - c. Veterinarians applying pesticides as medication in the normal course of practice
 - d. Private citizens using lawn, garden, or household pest control products on their property

17. Which of the following is NOT a type of pesticide applicator?
 - a. Commercial applicator not for hire
 - b. Registered technician
 - c. Commercial applicator inactive
 - d. Restricted-use applicator

18. A restricted-use pesticide is
 - a. A product which FIFRA has decided "may cause unreasonable adverse effects on (man and) the environment unless additional restrictions are imposed"
 - b. A product which the Council on the Environment mandates additional precautions in its application due to its "potential to cause adverse effects on (man and) the environment"
 - c. A product which VDACS believes "may be toxic to (man and) the environment if mishandled, thus it becomes imperative to impose more stringent restrictions concerning its application"
 - d. A product which the EPA has determined "may generally cause, without additional regulatory restrictions, unreasonable adverse effects on (man and) the environment"

19. Virginia's responsibility to educate the users/public about pesticide usage lies primarily on
 - a. Office of Pesticide Management
 - b. Virginia Cooperative Extension
 - c. VDACS
 - d. The Council on the Environment

20. Virginia's regulations are primarily monitored and enforced by
 - a. Virginia Pesticide Enforcement Board
 - b. Virginia Cooperative Extension
 - c. Office of Pesticide Management
 - d. Virginia Pesticide Control Association

21. Virginia's regulations are primarily established by standards set by
 - a. FIFRA
 - b. EPA
 - c. The National Pesticide Control Association
 - d. The Council on the Environment

22. William Walls, supervisor of the state's Office of Pesticide Management, favors licensing because of all EXCEPT
 - a. High turnover among pest-control workers
 - b. Difficulty in keeping track of exterminators in operation
 - c. Potential restrictions on door to door solicitations
 - d. Ease of notification of exterminators for periodic spot checks

23. Prior to the Galax deaths, Virginia did NOT
 - a. Require formal training of exterminators
 - b. Require pesticides to be registered under FIFRA
 - c. Perform spot checks of exterminators
 - d. All of the above

24. A seven year study in 1983 presented information specifically indicating that the Chesapeake Bay was
 - a. Dying from non-point source pollution
 - b. Polluted with high traces of TBT, a biocide found in boat paint
 - c. Toxic as a result of a leakage of carbofuran at a nearby bulk storage facility
 - d. Polluted, thus would no longer be a safe aquatic habitat

25. Prior to the Watson deaths most complaints of chemical misuse were handled by sending warning letters, or by
 - a. Fining exterminators
 - b. Referring complaints to the appropriate agencies
 - c. Suspending licenses
 - d. Mandating training workshops

26. After the Watsons died Orkin
 - a. Paid a fine, and was temporarily suspended from applying Vikane
 - b. Apologized for their inappropriate application of Vikane through a letter published in The Roanoke Times & World News
 - c. Denied responsibility due to the fact that the Watsons both had a history of heart problems
 - d. Dismissed both exterminators involved in the Watson fumigation

27. Most pesticides registered in Virginia are
 - a. Tested under Virginia conditions
 - b. Considered general-use pesticides
 - c. Labeled with a FIFRA registration number
 - d. Pesticides which require applicator certification

28. Which statement does NOT represent the viewpoint of legitimate exterminators?
 - a. Exterminators need regulation
 - b. Exterminators want regulation
 - c. Exterminators want to regulate themselves
 - d. All of the above

29. At the time of the Galax deaths Vikane was considered a
 - a. Vulnerable, under-regulated fumigant
 - b. Restricted-use pesticide
 - c. General-use pesticide
 - d. Banned chemical

30. The Council on the Environment was organized by
 - a. Governor Wilder
 - b. Governor Baliles
 - c. VDACS
 - d. The Office of Pesticide Management

31. The Overall duty of the Council on the Environment was
 - a. Enforcing the proper application of pesticides
 - b. Restructuring Virginia's Office of Pesticide Management
 - c. Protecting Virginians from pesticide negligence
 - d. Investigating Virginia's pesticide regulations

32. Which of the following was NOT considered a major area of focus by the Council on the Environment?
 - a. Program funding
 - b. Applicator training
 - c. Product Licensing
 - d. Administrational staffing

33. I own a farm in Southwest Virginia. I'm having a severe pest problem. If I want to salvage my crop I must apply a restricted-use pesticide. What type of applicator certification do I need?
 - a. Agricultural applicator
 - b. Commercial applicator not for hire
 - c. Private applicator
 - d. Restricted-use applicator

34. I want to work for a local pest control firm. Before I can begin my job I must become certified as what type of applicator?
- Commercial applicator active
 - Commercial applicator for hire
 - Extermination applicator
 - Commercial fumigation applicator
35. A Registered Technician must follow all of the certification procedures EXCEPT
- Complete training under supervision
 - Take a written, closed book exam
 - Work a 20 hour minimum of on-the-job training
 - Pay an annual renewal fee of \$35
36. Any program which seeks to manage or control the risks associated with pesticides must ensure all of the following EXCEPT
- Pesticides are effective only on target organisms
 - Pesticides do not have a residual effect longer than their intended use
 - Pesticides work according to their intentions
 - Pesticides be treated as restricted-use
37. Orkin could be held liable for the deaths of the Galax couple because
- Orkin did not have a valid pesticide business license
 - The exterminators were only certified to apply general-use pesticides
 - Orkin did not remove sofa cushions prior to the fumigation
 - Orkin did not guard the house to prevent the couple from reentering the home
38. Chloropicrin is a
- Chemical responsible for the deaths of several bald eagles
 - Pungent chemical which stimulates respiratory failure
 - Strong smelling warning agent
 - Chemical which polluted well water in the Richmond area

39. The manufacturers of Vikane
- a. Removed it from the market after the Galax incident
 - b. Found label provisions to be faulty, thus they now provide strict label recommendations for the use of Vikane
 - c. Require exterminators to provide proof of purchase of an air monitor
 - d. Require exterminators to undergo extensive training seminars hosted by their company
40. What is the best meaning of "in this age of information overload, how much protection should willful ignorance purchase?"
- a. A large majority of citizens never give safety a thought because they trust exterminators to do their jobs
 - b. The states office of pesticide management is responsible for its uneducated consumers concerning pesticides
 - c. Pesticide firms should be held accountable for inappropriate applications since the information for proper utilization is available
 - d. Consumers are responsible for reading the newspaper, and news magazines so that they are educated about the dangers of chemicals

Appendix F.

Semantic Differential Attitude Scale

Circle group #: 1 2 3 4

Here are some adjectives to describe various aspects of the unit on Pesticide Management in Virginia. For each pair of adjectives indicate how you felt about the item within the unit.

Unit on Pesticide Management in Virginia

1) Class Content

Interesting	1 2 3 4 5	Boring
Active	1 2 3 4 5	Passive
Hazy	1 2 3 4 5	Clear
Useful	1 2 3 4 5	Useless
Monotonous	1 2 3 4 5	Varied
Ordered	1 2 3 4 5	Chaotic
Common	1 2 3 4 5	Unique
Vague	1 2 3 4 5	Precise

2) Class Discussion

Interesting	1 2 3 4 5	Boring
Active	1 2 3 4 5	Passive
Hazy	1 2 3 4 5	Clear
Useful	1 2 3 4 5	Useless
Monotonous	1 2 3 4 5	Varied
Ordered	1 2 3 4 5	Chaotic
Common	1 2 3 4 5	Unique
Vague	1 2 3 4 5	Precise

3) Teaching Style

Interesting	1 2 3 4 5	Boring
Active	1 2 3 4 5	Passive
Hazy	1 2 3 4 5	Clear
Useful	1 2 3 4 5	Useless
Monotonous	1 2 3 4 5	Varied
Ordered	1 2 3 4 5	Chaotic
Common	1 2 3 4 5	Unique
Vague	1 2 3 4 5	Precise

4) Reading Material

Interesting	1 2 3 4 5	Boring
Active	1 2 3 4 5	Passive
Hazy	1 2 3 4 5	Clear
Useful	1 2 3 4 5	Useless
Monotonous	1 2 3 4 5	Varied
Ordered	1 2 3 4 5	Chaotic
Common	1 2 3 4 5	Unique
Vague	1 2 3 4 5	Precise

Vita

The author was born on October 13, 1969 in Fort Lauderdale, Florida. After graduating from the Nelson County Public School System in 1987, she attended Piedmont Virginia Community College for one year. In 1988/89 she withdrew from college to serve as Vice-president of the Virginia Association FFA. Upon the culmination of her state officer year she entered the Crop and Soil Environmental Sciences (CSES) Department at Virginia Tech. She received her B. S. In December of 1992. In the fall of 1993 she reentered the CSES Department as a masters student. While attending Virginia Tech, Marlo became a member of Alpha Zeta, and Gamma Sigma Delta, agricultural honor societies. In addition, she helped found Sigma Alpha, a professional sorority for women in agriculture.