



**HEALTH INVESTIGATION OF THE DEATHS OF SIX STUDENTS  
FROM THE EAST PENNSBORO SCHOOL DISTRICT  
DURING THE 2001-02 SCHOOL YEAR**

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**Commonwealth of Pennsylvania  
Department of Health**

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**EXECUTIVE SUMMARY**

On May 2, 2002, an official from East Pennsboro Township (Cumberland County) contacted the Pennsylvania Department of Health (PADOH) and the Pennsylvania Department of Environmental Protection (DEP) to express concerns about perceived health problems within the East Pennsboro School District because, at that point, five students had died during the 2001-02 school year. Three of those five deaths involved high school students, and most of the health and environmental concerns related to the high school. Subsequently, a fourth high school student died, bringing the total number of student deaths to six.

In response to these concerns, DEP conducted environmental testing of air and drinking water on May 3 and 4 at several locations throughout the high school. On May 4 and 5, the PADOH reviewed the results of environmental testing by DEP and determined that the levels of chemicals detected presented no public health threat at the school. While the PADOH was conducting its review, the sixth student died on Sunday, May 5, 2002.

The PADOH met with the School District on May 6, 2002 and recommended that the School District contract with an independent environmental testing firm to perform additional, comprehensive environmental testing of the school's facilities. The PADOH also offered to conduct a review of health and other records related to the student deaths. On May 23, the School Board authorized the PADOH to initiate its investigation on May 28. The School Board had already authorized the hiring of an outside environmental testing firm.

The PADOH assembled a group of physicians, epidemiologists, communicable disease and environmental health experts, nurses and other community health professionals from the department. This interdisciplinary team initiated its health investigation on May 28, 2002. The epidemiological component involved a review of available health records for the six deceased students, available health records for 13 other high school students who had specific health concerns, and available school health logs for the 2001-02 school year. In addition, PADOH's environmental investigation included a review and assessment of the results of testing done by DEP on May 3 and 4, 2002, information on environmental projects conducted by outside firms and the School District at the high school during the 2001-02 school year, and the final report submitted by the independent environmental testing firm, Coggiardi and Associates, Inc.

After careful evaluation of all the data presented for review, both epidemiological and environmental, the PADOH can find no link between environmental conditions or complaints at East Pennsboro School District facilities, including the high school, and the six student deaths or other health status indicators of students during the 2001-02 school year. In addition, although there were various construction, remodeling and other environmental projects at the high school during the school year

under review, any environmental impact or health concerns that could have been associated with these projects appear to have been adequately addressed through appropriate environmental remediation efforts and recommendations. Accordingly, the data do not suggest that any excess environmental exposures involving students were associated with adverse health effects.

In conclusion, although the PADOH does not find any causal link between environmental conditions at East Pennsboro School District facilities and the health status of its students during the 2001-02 school year, we do recommend, as a prudent public health measure, that the School District follow the recommendations outlined in the environmental study it commissioned from Cocciardi and Associates. The recommendations described in the report issued by that consulting firm will help assure that the students and others who occupy the school are protected from unnecessary exposures to any environmental health hazards.

## **BACKGROUND**

On Thursday, May 2, 2002, an official from East Pennsboro Township, located in Cumberland County, Pennsylvania, contacted the Pennsylvania Department of Health (PADOH) to express concerns about perceived health problems at the East Pennsboro School District (see Table 1). At that time, five students (two boys and three girls) from the School District had died during the five-month period from December 15, 2001, through May 2, 2002. Three of the deceased youngsters were high school students, one was a kindergarten student and one was a middle school student. In addition to the five deaths, a number of students had presented with health complaints at the high school during the current school year.

Also on May 2, 2002, an official from East Pennsboro Township contacted the Pennsylvania Department of Environmental Protection (DEP) and asked that agency to perform indoor environmental testing at the high school. In response to these environmental concerns, DEP initiated environmental sampling of air and water on Friday, May 3, 2002, at several locations throughout the high school.

On May 4 and 5, the PADOH reviewed the results of those tests and determined that the levels of chemicals detected presented no public health threat at the school. While the PADOH was reviewing the test results, a sixth child, a high school boy, died on Sunday, May 5, 2002.

In response to this series of events, staff from the PADOH met with School District officials on Monday, May 6, 2002, to discuss the situation and provide public health recommendations. At that meeting, the PADOH recommended that the School District contract with an independent environmental testing firm to perform additional, comprehensive testing of the school's facilities. The PADOH also offered to conduct a review of health and other records related to the student deaths.

The School Board approved the PADOH's proposed health investigation at its meeting on May 9, pending clarification of the PADOH investigation protocols. As a follow-up, the PADOH had a second meeting with the School District on May 13 to further discuss its proposal. On May 23, the School District advised the PADOH that its staff could initiate the health record review on Tuesday, May 28, 2002. Accordingly, during the period of May 28-31, public health nurses from the PADOH were on-site at the high school and began reviewing health records in cooperation with school officials. In addition, physicians and epidemiologists from the PADOH began their review of the medical and health records collected at the high school and from hospitals and coroner offices during this period. In addition, the School Board approved the use of an outside environmental testing firm at its meeting on May 20.

## **METHODOLOGY**

Following a pre-designed protocol for the health investigation, the PADOH initiated its study by requesting information from the School District on four categories of students: 1) the six deceased students; 2) the two high school students who reportedly fainted, passed out, or collapsed on Thursday, May 2, 2002; 3) one high school student reported to have been diagnosed with pericarditis on or around May 2, 2002; and 4) all other high school students reported to have had a serious health complaint or diagnosis during the 2001-02 school year.

The PADOH also requested from the School District information on important environmental or building-related issues or projects covering the period from July 1, 2001 through the end of the 2001-02 school year. Nurses from the School District provided the requested health information to PADOH staff for review during the period of May 28-31, 2002. The school health office logs used by the school nurses at the high school were also made available for review. As part of the methodology for reviewing the logs, PADOH staff excluded students who presented to the school nurse as a result of injuries or for the administration of routine medications or medical care.

In addition to health records from the school, the PADOH requested available information on all of the deceased children from the Cumberland County Coroner's office and the Dauphin County Coroner's office. The PADOH also requested that the parents/guardians of the six deceased students and the three students described in numbers two and three in the first paragraph above give consent for the release of hospital information relating to the student's medical histories. The records of those students for whom parental consent was obtained were reviewed in the hospitals by PADOH staff for relevant medical data. Consent was not given for two of the six deceased students.

Regarding environmental testing results, the PADOH considered the following: 1) the results of DEP testing conducted at the high school beginning on May 3, 2002; 2) the results of environmental projects conducted by outside firms and the School District at the high school during the 2001-02 school year; and 3) the findings of Cocciardi and Associates, the environmental consulting firm approved by the School Board on May 20, 2002, who presented a report on their comprehensive environmental investigation on July 31, 2002.

The health investigation primarily focused on the four deceased children for whom consent was given to review medical records, and other students who attended the high school. However, the clinical and epidemiological issues for the two deceased children who did not attend the high school were also considered.

## **RESULTS**

### **I. Epidemiological Investigation**

#### **A. Review of Health Records for Deceased Students**

Six students died during the school year: one kindergarten student, one middle school student and four high school students (one sophomore, two juniors and one senior). There were three boys and three girls. The six deaths fall within two time periods. The first three deaths (two high school students and one kindergarten student) took place over approximately a seven-week period from December 15, 2001 to January 31, 2002. The last three deaths (two high school students and one middle school student) occurred over approximately a two-week period from April 22 to May 5, 2002. The PADOH's review of the causes of death, gender, age and grade level relating to the six students demonstrated no similar patterns or "clustering" effect. Based on a review of all available health and environmental information, the PADOH concluded that the school environment did not contribute to the deaths of these children.

The three students who died earlier in the school year were all affected by serious medical conditions diagnosed prior to the 2001-02 school year. Two of the three students were high school students, who also lived on the same street and suffered from different types of cancer. One of the students was diagnosed with cancer while in middle school. There are a number of risk factors that may increase the chances of developing cancer, and these factors may differ depending on the type of cancer. Factors often associated with childhood cancers include a positive family history for similar types of cancer and genetic factors. There is no evidence of any environmental factors associated with the school that had any bearing on the risk of developing cancer. There is also no evidence of any significant school related environmental factors that contributed to the deaths of any of these children.

The kindergarten student who died on December 21, 2001, underwent lung transplant surgery several years before starting kindergarten. Although the one-year survival rate for patients with lung transplantation is good (greater than 70%), the average long-term survival rate for these patients is less than four years. (Arcasoy and Kotloff, 1999) Because the kindergarten student underwent transplant surgery before starting school and because of the low long-term survival rate for patients who have undergone such surgery, it also appears very unlikely that environmental factors associated with the school environment contributed to the death of this child.

Unlike the earlier three deaths, the deaths of the three students who died during April or May 2002 were sudden and unexpected. Nevertheless, the medical and epidemiological review of the available health records revealed important underlying factors, not related to the school environment, which could have contributed to the deaths of these students. These factors included family medical history for conditions similar to those affecting the deceased and congenital factors. As with the three students who died earlier in the school year, two of the three students in this group were also high school students.

## **B. Review of Health Records for 13 Identified Students**

The PADOH reviewed the available medical and health information for 13 other high school students who had specific health concerns. The PADOH requested information from the School District on two high school students who reportedly fainted, passed out or collapsed on or around May 2, 2002. Another high school student was reported to have been diagnosed with pericarditis on or around May 2, 2002. However, the PADOH was unable to verify the diagnosis. In addition, the PADOH also asked for information on other high school students reported to have had a serious health complaint or diagnosis during the 2001-02 school year. In response, the school provided the records for 13 students: the three students already identified and 10 additional students who were considered to have experienced a serious health condition or diagnosis during the current school year.

Based on this review, an interesting finding was that seven students experienced symptoms, particularly chest pain, during the period May 8-10. The reason for this occurrence was not clear. The last two student deaths occurred on May 2 and 5. DEP was also conducting testing at the school during the period May 3-4. In response to the death of the sixth student, school officials closed the East Pennsboro High School on May 6, 2002. Stress associated with these events, in addition to the extensive coverage by the media, may have overly sensitized students and others at the school and partially contributed to the events observed between May 8-10 and at other times during the school year. (Small and Nicholi Jr., 1982)

The PADOH was not able to identify any other common issues or factors relating to this group of 13 students based on its review of the available data. Relating to the school environment, the PADOH noted that, in the health records, no mention was made of environmental issues occurring in the school at the time these health complaints occurred.

## **C. Review of School Health Logs**

The PADOH reviewed the school health logs of high school students who presented to the school nurse with health complaints during the 2001-02 school year, excluding students with injuries or those receiving routine medication or medical care. The school health complaints were summarized by five-day school week periods, beginning on a Monday and extending through Friday. There were 39 of these five-day periods, extending from September 3-7, 2001 through May 27-31, 2002.

The number of students presenting with complaints during any five-day period ranged from only one student (during December 24-28, 2001) to a maximum of 113 students (during April 8-12, 2002). For 37 of the 39 five-day periods (95%), the total number of students presenting to the nurse was less than 100 students. The other two periods corresponded to two consecutive weeks in April (April 8-12 with 113 complaints; and April 15-19 with 103 complaints).

Since the two periods with the higher number of complaints appeared as outliers when compared to the other periods, the PADOH carefully reviewed the nature of the complaints during these periods to determine if there were any unusual patterns or circumstances

associated with the complaints. Based on this review, the PADOH determined that the types of health complaints seen during both of these time periods were generally similar to each other (Figure 1). The frequency of complaints for only one category (the “cold-like complaints” category) differed significantly between the two time periods. This category, however, was a collection of several related complaints representing cold-like symptoms.

By far, the most common complaint during both five-day periods was headache. It is interesting to note that headache is commonly seen in functional somatic syndromes (FSS). (Outline Med Inc., 2001) FSS usually includes headache, musculoskeletal pain, fatigue, GI distress, concentration and memory difficulties, and sleep problems. FSS can follow an environmental stimulus and consist of diffuse, non-specific complaints that can and do occur in healthy people. It is the magnitude of the response that may make the FSS out of the ordinary. The review of the school logs failed to detect the presence of any specific illness or condition that could be directly related to the four deaths involving the high school students. Although two high school students died during May 2002, neither student presented to the school nurse with health complaints during the April 8-12 or April 15-19 periods described in this section. Relating to the school environment, the PADOH noted that the school nurse made no mention of any unusual environmental issues or complaints taking place in the school during the period April 8-19, 2002.

## **II. Environmental Review**

### **A. DEP Testing on May 3 and 4, 2002**

In response to requests to conduct environmental testing at the high school, DEP took air samples in the gymnasium and weight room and drinking water samples from several locations during the period May 3-4, 2002. As part of the environmental testing, DEP analyzed the air samples for a variety of volatile organic compounds and the drinking water samples for numerous organic and inorganic chemicals. The purpose of this short-term testing was to determine if any unusual elevations of chemicals could be found that might be indicative of an indoor environmental health problem. The PADOH reviewed the results of the testing and determined that the levels of chemicals detected presented no public health threat.

### **B. Review of Environmental Issues and Projects at the School**

The PADOH received the results of seven separate environmental evaluations conducted by outside firms and the School District at the high school. The PADOH reviewed each of these evaluations and the results of the review are provided below:

1. The first evaluation, conducted by EHC Associates (EHC), provided the results of testing in the music room and instrument storage room on October 16, 2001. EHC performed the testing to confirm the results of an earlier cleanup of visible fungal contamination, performed by the School District. The contractor concluded that the extent of contamination in the instrument storage room was not significant. However, concentrations of the fungus, *cladosporium*, were above the acceptable level. The contractor provided recommendations to reduce the levels of *cladosporium* in the music room.

2. The second evaluation, conducted by Analytical Laboratories Services, Inc. (ALSI), provided the results of testing in the band room on January 25, 2002, and February 4, 2002. ALSI performed the testing as a follow-up to a bio-remediation project in this area. The contractor found elevated concentrations of several fungi during the first testing period and recommended re-cleaning and re-testing. These steps were followed and the contractor determined that all samples were acceptable based on the second round of sampling. The PADOH does not believe that this fungi elevation and remediation is related to any of the six student deaths.

3. The third evaluation, conducted by ALSI, provided the results of testing in selected locations of the high school during January and February 2002. ALSI performed the testing as a follow-up to earlier repair of water leaks and associated biological remediation in the sampled areas. The contractor determined that indoor sources of microbial growth and proliferation were not present in the physical education office and the main office. However, elevated concentrations of fungi were found on two occasions in the girls' locker room and the nurse's office. The contractor provided recommendations to deal with the microbial problem in the school.

4. The fourth evaluation, conducted by ALSI, provided the results of particulate (dust) and silica sampling in seven different locations in the high school on January 10, 2002. ALSI performed the testing as a follow-up to concerns about "air quality" and dust levels associated with recent renovations at the high school. The contractor determined that dust levels only exceeded recommended environmental guidelines in Room 107 and provided appropriate recommendations to deal with the dust problem in the school. The PADOH does not see any evidence that the transient dust problem at the school is related to any of the six student deaths.

5. The fifth evaluation, conducted by EHC, provided the results of chemical cistern soil sampling on January 18, 2002. The contractor determined that all test results were acceptable. The PADOH does not see any evidence that the sampling revealed any relationship to any of the six student deaths.

6. The sixth evaluation, conducted by EHC, provided the results of sampling of concrete expansion joint material for asbestos and of the ceramic tile for lead content on May 29, 2002. The contractor determined that the lead levels detected in the ceramic tile were acceptable. The concrete expansion joint material contained 3% chrysotile asbestos. According to federal guidelines, any building material comprised of over 1% asbestos is considered an asbestos-containing building material. The school district must then develop a plan for this material to address monitoring of the condition of the material, maintenance, and remediation, if necessary. The PADOH does not see any evidence that the lead elevations and asbestos-containing materials played a role in any of the six student deaths.

7. The seventh evaluation, compiled by East Pennsboro School District, included a chronology of events on the asbestos abatement project at the high school and a project summary of the asbestos abatement contract work. The PADOH noted that the asbestos abatement work was generally completed in accordance with the contract documents and applicable regulations,

although a few problems were encountered during the project. However, there is no evidence that any of the problems had any effect on the six student deaths.

### **C. Review of Evaluations by Environmental Testing Firm**

The PADOH reviewed the final report developed by the outside environmental consulting firm, Cocciardi and Associates Inc. This firm was hired by the School District in response to the PADOH's earlier recommendation that an outside firm be used to conduct additional and comprehensive environmental testing and evaluation, as a follow-up to testing by DEP.

Cocciardi and Associates reported that elevated levels of carbon dioxide, radon, formaldehyde, and toluene were detected in select locations in the school buildings examined. The PADOH does not see any evidence that the sampling results revealed any relationship to any of the six student deaths, and PADOH has concluded that the levels of various chemicals, microbes, and other substances detected do not pose any apparent public health hazard. However, exposure to indoor air pollutants (e.g., radon, formaldehyde, etc.) should be reduced since long-term exposure to some of these chemicals may cause health problems. Nevertheless, the PADOH recommends as a prudent public health measure that future air testing for chemicals be conducted to validate the recent test results.

The contractor also made several recommendations to improve the quality of the indoor environment of the school in order to protect the public health. Specifically, Cocciardi and Associates proposed that the School District do the following: 1) address environmental health issues prior to or at the time of routine re-occupancy of school buildings (Fall 2002); 2) address specific environmental health issues at East Pennsboro School District in an ongoing manner; and 3) retain and develop a relationship with an independent professional to advise/recommend on outstanding and ongoing issues. The PADOH agrees with these recommendations and recommends that the school district implement them as soon as possible.

### **REFERENCES**

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**TABLE 1**

**TIME-LINE OF KEY EVENTS AT EAST PENNSBORO SCHOOL DISTRICT  
DURING THE 2001-02 SCHOOL YEAR**

<b><u>Date</u></b>	<b><u>Event</u></b>
December 15, 2001 to January 31, 2002	Three deaths occur within a seven-week period.
April 22 to May 5, 2002	Three additional deaths occur within a two-week period.
May 2, 2002	An official from East Pennsboro Township contacts the Pennsylvania Department of Health (PADOH) to express concerns about perceived health problems associated with East Pennsboro School District facilities. An official from the Township also contacts the Pennsylvania Department of Environmental Protection (DEP) to request indoor environmental testing.
May 3 and 4, 2002	DEP initiates environmental sampling of air and water at several locations throughout the high school.
May 4 and 5, 2002	PADOH reviews the results of those tests and determines that the levels of chemicals detected presented no public health threat at the school.
May 6, 2002	School officials close East Pennsboro High School for one day after the death of a sixth student. PADOH officials meet with School District officials to discuss the situation and provide public health recommendations.
May 7, 2002	East Pennsboro School Board holds a special public meeting in response to community concerns over the deaths of the six students.
May 9, 2002	The School Board approves, in concept, the PADOH's proposed health investigation. The School Board also requests its staff to obtain additional information related to independent environmental testing firms for future consideration.
May 13, 2002	PADOH officials meet with School District officials to further discuss PADOH's recommendations and provide a protocol for its proposed health investigation.
May 20, 2002	The School Board approves hiring an environmental testing firm.

**TABLE 1 (Continued)**

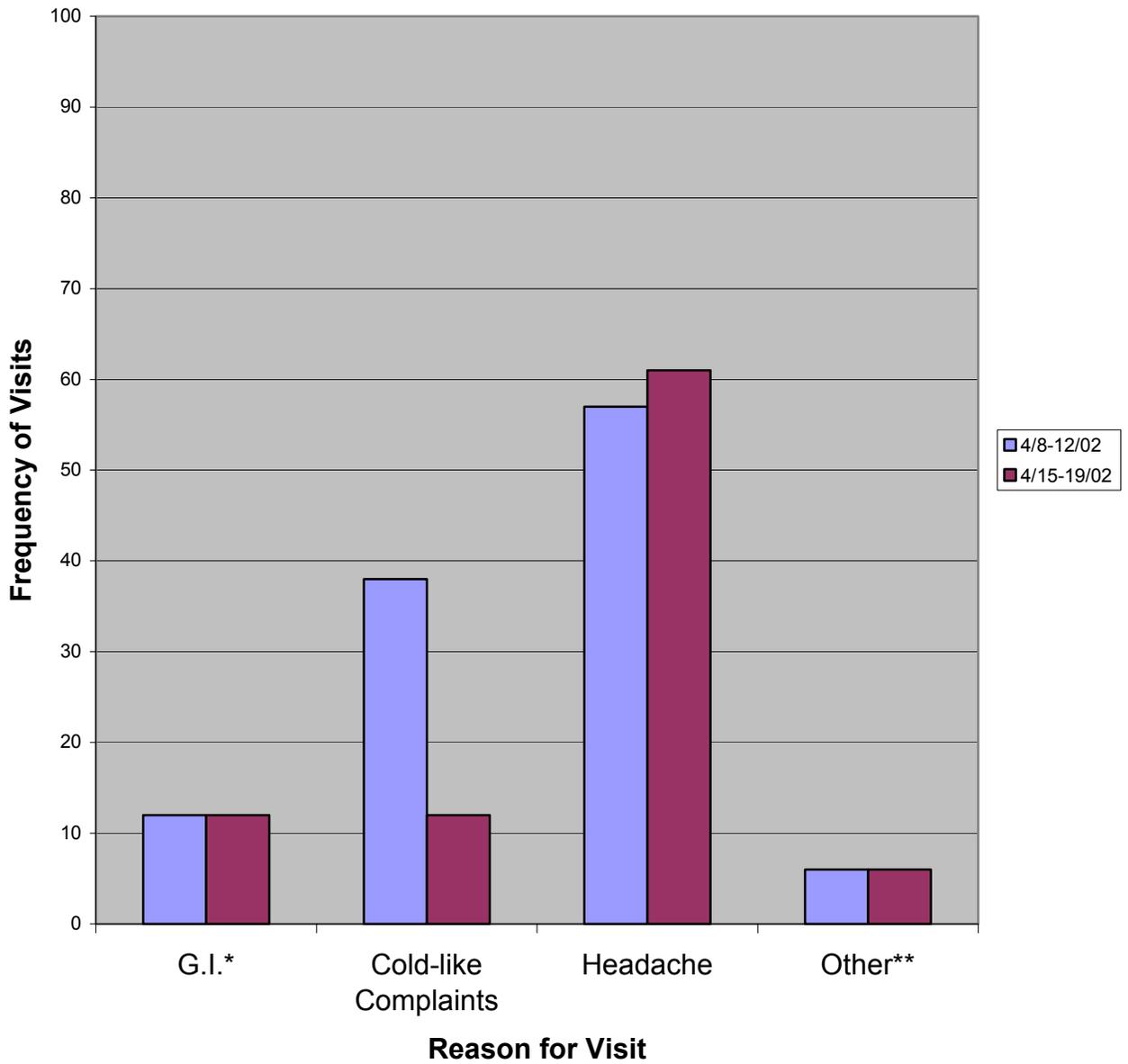
May 23, 2002	The School District advises the PADOH that its staff can initiate a health record review on May 28, 2002.
May 28-31, 2002	PADOH initiates a health record review with an interdisciplinary team of investigators. Public health nurses are on-site at the high school. They request and review literature as provided by School District nurses. In addition, PADOH physicians and epidemiologists initiate their review of other medical and health records, and PADOH environmental health professionals initiate a review of environmental health data.
June 1-July 31, 2002	The PADOH completes its review of available medical and health records and environmental health data. The PADOH prepares a comprehensive report outlining its findings, conclusions and recommendations.
August 16, 2002	PADOH submits a report of its health investigation of the deaths of six students to the East Pennsboro School Board.

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The following Department of Health staff participated in the investigation:

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**Figure 1. Frequency of Visits to School Nurse and Reason for Visit During Weeks of April 8-19,2002, Based on Review of School Health Logs**



\* G.I. = Gastrointestinal

\*\* Other = Oral problems, sent home, unknown, dizzy, lightheaded, and neck hurts