

This Health Hazard Evaluation (HHE) report and any recommendations made herein are for the specific facility evaluated and may not be universally applicable. Any recommendations made are not to be considered as final statements of NIOSH policy or of any agency or individual involved. Additional HHE reports are available at <http://www.cdc.gov/niosh/hhe/reports>

**HETA 2000-0385-2813
Equifax Payment Services
St. Petersburg, Florida**

**Max Kiefer, MS, CIH
Doug Trout, MHS, MD
John Cardarelli, Ph.D., CIH, PE**

PREFACE

The Hazard Evaluations and Technical Assistance Branch (HETAB) of the National Institute for Occupational Safety and Health (NIOSH) conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health (OSHA) Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

HETAB also provides, upon request, technical and consultative assistance to Federal, State, and local agencies; labor; industry; and other groups or individuals to control occupational health hazards and to prevent related trauma and disease. Mention of company names or products does not constitute endorsement by NIOSH.

ACKNOWLEDGMENTS AND AVAILABILITY OF REPORT

This report was prepared by Max Kiefer and Doug Trout of HETAB, Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS), and John Cardarelli, Health-related Energy Research Branch, DSHEFS. Field assistance was provided by Tanvir Hossain, HETAB. Desktop publishing was performed by Pat Lovell. Review and preparation for printing were performed by Penny Arthur.

Copies of this report have been sent to employee and management representatives at Equifax and the OSHA Regional Office. This report is not copyrighted and may be freely reproduced. Single copies will be available for a period of three years from the date of this report. To expedite your request, include a self-addressed mailing label along with your written request to:

NIOSH Publications Office
4676 Columbia Parkway
Cincinnati, Ohio 45226
800-356-4674

After this time, copies may be purchased from the National Technical Information Service (NTIS) at 5825 Port Royal Road, Springfield, Virginia 22161. Information regarding the NTIS stock number may be obtained from the NIOSH Publications Office at the Cincinnati address.

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Highlights of the NIOSH Health Hazard Evaluation of Health Complaints at Equifax

In September 2000, NIOSH investigators investigated reports of employee health problems at the Equifax Payment Services Building in St. Petersburg.

What NIOSH Did

- # We talked to employees about health concerns, including hair loss.
- # We reviewed information about Equifax employees with cancer.
- # We gathered surface dust samples to analyze for metals.
- # We measured ionizing radiation levels in the building.
- # We inspected the ventilation system.

What NIOSH Found

- # Several different types of hair loss have occurred among employees.
- # Hair loss or cancer was not associated with any work-related exposure.

- # Ionizing radiation in the building was within background levels.
- # No environmental contaminants that could explain the employees' health problems were found.

What Equifax Payment Services Managers Can Do

- # Ensure effective communication with employees regarding building evaluations.

What the Equifax Payment Services Employees Can Do

- # Use physicians with occupational or environmental medicine experience and training if there are concerns that workplace exposures are causing a health problem.



What To Do For More Information:
We encourage you to read the full report. If you would like a copy, either ask your health and safety representative to make you a copy or call 1-513/841-4252 and ask for HETA Report # 2000-0385-2813



**Health Hazard Evaluation Report 2000-0385-2813
Equifax Payment Services
St. Petersburg, Florida
October 2000**

**Max Kiefer, MS, CIH
Doug Trout, MHS, MD
John Cardarelli, Ph.D., CIH, PE
Tanvir Hossain, MD**

SUMMARY

On August 7, 2000, the National Institute for Occupational Safety and Health (NIOSH) received a confidential employee request for a health hazard evaluation (HHE) at the Equifax company in St. Petersburg, Florida. The request asked NIOSH to determine if workplace exposures are related to health problems that some employees at this facility have reported. The primary health complaint indicated on the request was hair loss. Specific work areas of concern identified in the request were offices in the Southeast section of the building.

On September 12-13, 2000, NIOSH researchers conducted a site visit at the Equifax facility. The objectives of this site visit were to determine if there were unusual occurrences of hair loss or other health problems among employees and evaluate plausible exposure pathways for environmental substances that could cause hair loss or other health problems. During the site visit, a walkthrough of the facility was conducted, and reports from previous evaluations that assessed employee health complaints and measured environmental contaminants at Equifax were reviewed. The air handling units (AHUs) supporting the Southeast portion of the building were inspected, and surface samples were collected for metals analysis. Information regarding the past use of radioactive materials at the building prior to occupancy by Equifax was reviewed, and a survey to assess ionizing radiation was conducted. Confidential medical interviews with 28 Equifax employees were conducted. Following the site visit, two Equifax employees and one former employee who were unavailable during the site visit were interviewed by telephone. NIOSH representatives also reviewed information compiled by the requestor concerning employees diagnosed with cancer.

The building walkthrough and review of previous environmental evaluations did not identify any obvious pollutant sources that could contribute to the reported health complaints or poor indoor environmental quality (IEQ). The AHUs inspected were operational, clean (filters, coils, accessible portions of the AHUs), and appeared well-maintained and in good condition. The outdoor air intakes were well-spaced and were not located in close proximity to building exhaust vents. Surface samples collected from the ventilation systems supporting the Southeast portion of the building and the cafeteria did not identify any thallium, a metal associated with hair loss.

All radiation measurements were within general background levels (<15 microRoentgens per hour) and no evidence of contamination was found in any of the surface measurements.

Several types of hair loss have occurred among some Equifax employees. Eleven individuals with a history of current moderate to severe diffuse thinning over the scalp were interviewed; these 11 individuals worked in 8 different areas of the building. Five persons with confirmed or suspected alopecia areata of varying severity, were identified. Three of the five persons worked in one primary area and developed initial hair loss over an approximately 1 ½- year period. Regarding cancer, there was no unusual distribution of similar cancers or exposure to cancer causing agents found at this facility.

No evidence was found that the hair loss/thinning reported by Equifax employees is related to an occupational exposure(s) at Equifax. The occurrences of cancer among Equifax employees reported to NIOSH representatives are unlikely to be related to occupational exposures at the Equifax facility. No occupational exposure to ionizing radiation was identified. Recommendations to address employee health concerns are provided; the importance of continued efforts towards achieving effective communication with employees is stressed.

Keywords: SIC 7389 (Business Services, Not Elsewhere Classified). Alopecia, Hair Loss, Cancer, Ionizing Radiation, Thallium, Air Sampling, Water Sampling.

TABLE OF CONTENTS

Preface	ii
Acknowledgments and Availability of Report	ii
HHE Supplement	iii
Summary	iv
Introduction	1
Background	1
Methods	2
Ionizing Radiation	2
Surface Sampling	2
Employee Interviews	2
Evaluation Criteria	2
Hair Loss	3
Cancer	4
Surface Contamination	4
Results	5
Observations	5
Records Review	6
Ionizing Radiation	6
Surface Sampling	7
Employee Interviews	8
Review of Information on Cancer	9
Discussion	10
Hair Loss	10
Environmental Evaluation	10
Communication	11
Conclusions	11
Recommendations	11
References	11

INTRODUCTION

On August 7, 2000, the National Institute for Occupational Safety and Health (NIOSH) received a confidential employee request for a health hazard evaluation (HHE) at the Equifax Payment Services building in St. Petersburg, Florida. NIOSH was asked to determine if there was a building-related exposure associated with health problems, primarily hair loss, reported by some Equifax employees. Other health concerns included cancer, respiratory effects, skin rash, and cough. The primary area of concern was the Southeast section of the building.

On September 12-13, 2000, NIOSH investigators conducted a site visit at the Equifax facility. During the site visit, NIOSH investigators reviewed existing building monitoring data collected by Equifax and the Occupational Safety and Health Administration (OSHA). Surface samples were collected for metals analysis and the air handling units (AHUs) supporting the areas of concern were inspected. The potential for exposure to ionizing radiation was evaluated and confidential employee interviews were held with Equifax employees reporting health concerns. An interim report describing our initial site visit, preliminary findings, and preliminary recommendations, was mailed to management and employee representatives on September 26, 2000.

BACKGROUND

Equifax Payment Services in St. Petersburg, Florida, provides check verification, credit report services, and processes debit cards for financial institutions. Approximately 2200 non-union workers are employed at the 305,000 square-foot, single-story facility. No manufacturing is conducted at the building, although there is a printing, mailing, and credit-card embossing operation. The building layout is by function, with most of the work areas configured as open cubicles. Because personal and confidential financial information is handled at this facility, security is a prime concern. Certain areas of the building are only accessible to employees who have received appropriate clearances, and there are security monitors located throughout the building. The building was constructed in the late 1970's, and was originally occupied by Honeywell, Inc. Honeywell manufactured military equipment at this facility, including chemical warfare agent detectors.

Honeywell vacated the facility in December 1995, and the building was remodeled and occupied by Equifax in August 1996.

The company operates 24 hours/day, 7 days/week. There is a full-service employee cafeteria and a break room. Smoking is not permitted in the building. Potable water is supplied by the city municipal system.

Employee health concerns were first noted in 1999. In March 2000, an informal employee complaint regarding hair loss and possible exposure to non-ionizing radiation was filed with the OSHA Tampa Area Office. OSHA informed Equifax of the complaint and requested that Equifax conduct an investigation. Equifax surveyed the building for non-ionizing and ionizing radiation and reported the results to OSHA. Equifax reported that all measurements were consistent with background levels.

Employee health complaints continued to be reported to OSHA, and on-site inspections of the facility were conducted by OSHA compliance officers. Worker concerns included potential exposure to materials (chemicals, radiation sources) that may have been used by the former occupant, and possible building contamination from external sources (e.g., soil or groundwater, landfill, incinerator). Because only certain environmental agents are known to be associated with hair loss (e.g., thallium, ionizing radiation), these materials were the primary focus of the investigations. Thallium and other metals had been detected in groundwater samples collected from monitoring wells located on Equifax property; monitoring was conducted inside the building by Equifax (air and drinking water) and OSHA (air) for these substances. Additional testing of groundwater by Equifax consultants revealed no detectable thallium. Employee concerns with health problems possibly associated with working in the Equifax building continued, and a NIOSH HHE was requested.

METHODS

Upon receipt of the HHE request, information regarding the reported health problems and suspected environmental contaminants was obtained from the HHE requestors and Equifax representatives. Additionally, investigators from OSHA, who were conducting an inspection at Equifax in response to

employee complaints regarding health problems at this facility, provided NIOSH with information regarding their findings, and asked NIOSH to assist in their investigation of the health complaints. The radiation license held by the building's former occupant, Honeywell Corporation, was obtained for review.

On September 12, 2000, an opening conference was held with Equifax management and employee representatives. Representatives from OSHA (Tampa Area Office and Salt Lake City Health Response Team) and an environmental consultant employed by Equifax also attended. After the meeting we conducted a walkthrough inspection of the facility to familiarize ourselves with the building and work activities in the area of concern. Reports from previous evaluations that assessed employee health complaints and measured environmental contaminants at Equifax were reviewed. Subsequent activities included inspecting the AHUs supporting the Southeast portion of the building and collecting surface samples for metals analysis. Specific details regarding the evaluation methods are discussed in the following sections.

Ionizing Radiation

Information regarding the past use of radioactive materials at the building prior to occupancy by Equifax was reviewed. A building survey for ionizing radiation was conducted using a Ludlum Model 2350 instrument to measure area radiation and surface contamination. The purpose of the survey was to determine if current workplace ionizing radiation exposures were elevated above background. Three detectors sensitive to different forms of ionizing radiation were used to conduct the survey. Over 60 area radiation measurements were performed throughout the building using a sodium-iodide scintillation detector (Model 44-2). Several surface contamination measurements were performed on desk tops and the interior/exterior duct work of AHU 17 using an alpha scintillation detector (Model 43-65) and an ion-chamber detector (Model 44-9). Each detector was calibrated with the Ludlum Model 2350 instrument on September 8, 2000.

Surface Sampling

Surface wipe samples were collected to determine the presence and extent of metal dust surface contamination in certain areas in the building. These samples were collected with commercially available pre-moistened Wash 'n Dri™ hand wipes according to the monitoring protocol described in the NIOSH Manual of Analytical Methods, 4th edition.¹ A clean pair of disposable gloves was worn during the collection of each sample to prevent cross contamination. Using a template, 100 square centimeters of surface area were wiped with each hand wipe. The samples and field blanks were sealed in labeled sample containers and sent via overnight express to the NIOSH contract laboratory (Data Chem, Salt Lake City, Utah) for metals analysis. The samples were analyzed according to NIOSH Method 7300 by first digesting the sample in an acid mixture and using an inductively coupled plasma spectrometer to measure 26 different metals.

Employee Interviews

The NIOSH medical officers identified employees for interview from the following sources: (1) a list provided by the requestor of Equifax employees reporting hair loss (26 persons); (2) all employees reported by Equifax management as having total or patchy hair loss from the scalp (12 persons), as well as a random sampling of employees reporting to Equifax a history of thinning hair (6 persons); and (3) all other employees not included on the previous lists who requested to be interviewed (4 persons). The medical interviews consisted of questions concerning demographic information, work history, and past medical history. A focused examination of the skin was conducted when the interview suggested a current skin problem.

EVALUATION CRITERIA

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for the assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will

be protected from adverse health effects even though their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy). In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increases the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: (1) NIOSH Recommended Exposure Limits (RELs),² (2) the American Conference of Governmental Industrial Hygienists' (ACGIH®) Threshold Limit Values (TLVs®),³ and (3) the U.S. Department of Labor, OSHA Permissible Exposure Limits (PELs).⁴ Employers are encouraged to follow the OSHA limits, the NIOSH RELs, the ACGIH TLVs, or whichever are the more protective criterion.

OSHA requires an employer to furnish employees a place of employment that is free from recognized hazards that are causing or are likely to cause death or serious physical harm [Occupational Safety and Health Act of 1970, Public Law 95-596, sec. 5.(a)(1)]. Thus, employers should understand that not all hazardous chemicals have specific OSHA exposure limits such as PELs and short-term exposure limits (STELs). An employer is still required by OSHA to protect their employees from hazards, even in the absence of a specific OSHA PEL.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended STEL or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from higher exposures over the short-term.

Hair Loss

Hair loss (alopecia) can be classified into scarring and non-scarring types. There are many types of non-scarring alopecias, including andro-genetic alopecia, non-scarring alopecias associated with systemic diseases or processes (telogen effluvium, nutritional/metabolic deficiency states, endocrine diseases, drugs and chemical agents, infections), alopecia areata, and traumatic alopecia.

Andro-genetic alopecias (often referred to as common balding in men and hereditary thinning in women) is the most common cause of hair thinning in both men and women. In females this condition usually involves the central scalp with a diffuse thinning of the hair; very rarely does it progress to a complete loss of hair in females. Hair loss may occur in waves, with periods of heavier hair loss that may last for several months. There is at present no effective treatment for andro-genetic alopecia.

Another condition associated with diffuse hair loss is telogen effluvium (or defluvium), which is a condition in which the hair loss is caused by large number of hairs that have entered the telogen (resting) stage of hair growth cycle in a relatively synchronous fashion. It is usually a diffuse process, and the affected individual may notice increased hair loss that may or may not be obvious clinically. Telogen effluvium can be either an acute or chronic condition. Hair loss in acute telogen effluvium can follow a stressful event (such as childbirth) by about 2 to 4 months. Other stressors related to telogen effluvium include certain medical conditions and stopping the use of certain medications. Chronic telogen effluvium is differentiated from andro-genetic alopecia by its clinical and microscopic findings.

Other non-scarring alopecias can be associated with nutritional/metabolic deficiency states (e.g., iron, zinc, or essential fatty acids, or caused by crash dieting) and endocrine diseases (such as hypothyroidism, hyperthyroidism, hypopituitarism, and hypoparathyroidism). Diffuse alopecias have also been reported to be related to exposure to chemical agents, including a variety of pharmaceuticals (these include some specific cytotoxic agents, anticoagulants, and antithyroid, antihypertensive, antiepileptic, and antipsychotic drugs), vitamin A and its analogues, thallium

(formerly used in pesticides), selenium, boric acid, chloroprene (used in synthetic rubber production), and mercurials (used in bleaching cream and antiseptics).⁵ Acute or chronic poisoning from thallium can cause reversible (non-permanent) hair loss.^{6,7} Hair loss associated with acute thallium toxicity is usually associated with other clinical findings (such as neurological and gastrointestinal effects). In acute thallium poisoning, hair loss usually occurs between the second and third week after exposure. In chronic thallium poisoning, hair loss is usually associated with hair discoloration, a dark pigmentation at the base of the hair shaft, and neurologic abnormalities such as numbness and pain in the fingers and toes (painful peripheral neuropathy).

Acute exposure to high doses of ionizing radiation can also cause hair loss as one of the phases of acute radiation syndrome.⁸ Extensive ionizing radiation doses would be necessary to cause hair loss, and such exposure would also be expected to result in other serious health problems. Exposures such as this would generally be the result of accidents involving nuclear material.

Alopecia areata is one of the more common non-scarring alopecias. It can range in severity from localized patches of hair loss, to complete loss of scalp hair (alopecia totalis), to generalized loss of body hair (alopecia universalis). Males and females are equally affected, and it has been estimated that about 1% of the population will have at least one episode of alopecia areata by age 50.⁹ Others have estimated that alopecia areata may affect between 0.2% and 2% of the U.S. population.^{10,11} Alopecia areata can occur at any age, although the peak incidence is in the third to fifth decade. Most commonly, alopecia areata presents as one or more round or oval patches of total hair loss measuring up to several centimeters in diameter. The scalp, bearded area, eyebrows, or other body sites may be involved. There usually are no clinically evident abnormalities of the skin surface other than hair loss. With a small number of patches, the majority of people with alopecia areata will exhibit hair regrowth within 6 to 12 months. New patches may develop while older ones are resolving, and relapse can occur.

The causes of alopecia areata remain unknown. Alopecia areata is most commonly viewed as an inherited or autoimmune disorder.^{12,13} Although clusters of alopecia areata in workplaces have been

reported in the literature,^{14,15} there is inadequate evidence to establish occupational or environmental exposures as a cause of alopecia areata.

Cancer

Cancer is a group of different diseases that have the same feature, the uncontrolled growth and spread of abnormal cells. Each different type of cancer may have its own set of causes. Cancer is common in the United States; one of every four deaths in the United States is from cancer.¹⁶ Many factors play a role in the development of cancer. The importance of these factors is different for different types of cancer. Most cancers are caused by a combination of several factors. Some of the factors include: (a) personal characteristics such as age, sex, and race, (b) family history of cancer, (c) diet, (d) personal habits such as cigarette smoking and alcohol consumption, (e) the presence of certain medical conditions, (f) exposure to cancer-causing agents in the environment, and (g) exposure to cancer-causing agents in the workplace. In many cases, these factors may act together or in sequence to cause cancer. Although some causes of some types of cancer are known, much is not known about the causes of cancer. To assess whether the cancers among a group of employees could be related to occupational exposures, the number of cancer cases, the types of cancer, the likelihood of exposure to potential cancer-causing agents, and the timing of the diagnosis of cancer in relation to the exposure are considered.

Surface Contamination

Standards defining "acceptable" levels of workplace surface contamination have not been established for most substances. However, wipe samples can provide information regarding the effectiveness of housekeeping practices, the potential for exposure to contaminants by other routes (e.g., surface contamination on a table that is also used for food consumption), the potential for contamination of worker clothing and subsequent transport of the contaminant, and the potential for non-process related activities (e.g., custodial sweeping) to generate airborne contaminants.

RESULTS

Observations

Inspection of the building did not identify any obvious pollutant sources that could contribute to the reported health complaints or poor indoor environmental quality (IEQ). No unusual odors were reported or noted. A limited review of the janitorial program did not suggest any unusual practices that would be considered to adversely affect IEQ. The building has a concrete slab floor with carpet or tile in most areas. The carpet in all areas inspected appeared clean.

According to information provided by Equifax management and the HHE requestors, the majority of the health complaints, including concerns with hair loss, were in the Southeast section of the building. These areas included Product Services/Performance Management (approx. 80 workers in this area), Client Relations (approx. 120 workers in this area), and Client Services/Card Customer Services (approx 400 workers in this area). However, health complaints had also been reported in other areas, including Collections and Authorizations, Accounting, and Merchant Services.

A limited visual inspection of AHUs 24 (Client Relations), 25 (Performance Management/Product Services), 17 (Client Services), and 33 (Cafeteria) was conducted. All of these units were installed during original construction and were operational when Honeywell occupied the facility. Each AHU inspected supplies air at a constant temperature via ductwork to terminal variable-air-volume boxes located in the ceiling plenum. Electric heating is provided at the perimeter of the building. According to Equifax representatives, the AHUs are equipped with a minimum stop to ensure that sufficient outside air (OA) is always provided to occupied areas. Return air (RA) is obtained through ceiling-mounted louvers and conveyed back to the AHUs via a common RA plenum (the space above the false ceiling) to a collecting duct at each AHU. OA is obtained from roof-mounted intakes. The mixed air (RA & OA) is filtered (1-piece minimum efficiency filters) and conditioned (chilled water is used for cooling) prior to discharging to occupied areas. The supply air is then distributed via ceiling-mounted diffusers. The heating, ventilating, and

air-conditioning (HVAC) system operates continuously and there is no set-back mode.

Most of the HVAC system AHUs are located in the space between the suspended ceiling and the roof (there is approximately 11 feet of space in this area). AHU 33, which services the cafeteria, is roof mounted. The space between the roof and the suspended ceiling is not insulated; catwalks are in place to allow access to the AHUs. For the most part, the AHUs inspected were operational, clean (filters, coils, accessible portions of the AHUs), and appeared well-maintained and in good condition. One exception was the filters on AHU 17, which were visibly dirty. Building exhausts are from the restrooms, kitchen, Microfiche room, and Data Center.

The roof (galvanized flat metal with asphalt covering) was accessed and the OA sources for the AHUs were inspected. The OA intakes were well spaced and were not located in close proximity to building exhaust vents.

During the walkthrough and subsequent building inspection, informal conversations were held with building occupants. It appears there is a high level of employee concern and an element of distrust regarding information provided by Equifax management, past use of the facility by Honeywell, and contradictions in information from the news media and information being provided to employees by management. During the opening and closing meetings, Equifax management indicated they were also concerned with employee communication and expressed their intent to ensure all information regarding this issue is provided to employees as soon as it becomes available.

Employee concerns also included the condition of floor tile in two areas of the building (adjacent to the Board Room and hallway by the Mail Room). Some employees had noted frequent repairs and damaged concrete areas under the tile and were concerned that a chemical contaminant from the prior occupant was still present, corroding the floor and potentially creating an exposure hazard. Other concerns included exposure to contaminants from sources external to the Equifax facility, including soil, groundwater, a nearby landfill, and an incinerator.

Equifax representatives indicated that during the remodeling of the facility after acquisition from

Honeywell, the building was completely “gutted” with the exception of certain support walls and mechanical systems.

Records Review

In response to the OSHA investigation, Equifax safety and health consultants conducted a survey of the facility for non-ionizing and ionizing radiation. According to Equifax, all readings were consistent with background levels, and this was reported to OSHA. Following that survey, water samples were collected from all identified drinking water sources in the building and analyzed for antimony, lead, thallium, and arsenic. Elevated levels of lead (above the Environmental Protection Agency [EPA] Maximum Contaminant Level) were identified in water from a mechanical room water fountain and an ice/water dispenser. The mechanical room water fountain was taken out of service, and re-testing did not find lead in the ice/water dispenser. No thallium, arsenic, or antimony was detected. During the NIOSH site visit, Equifax representatives indicated that additional water samples for metal analyses had recently been collected from employee restrooms, the break room, and cafeteria. According to the report from this sampling survey, no lead, arsenic, selenium, antimony, or thallium was detected in the samples.

In August 2000, an air-monitoring survey was conducted by OSHA to collect integrated air samples in nine locations for thallium, lead, antimony, and arsenic; instantaneous air measurements for mercury were also collected at these locations. Both the OSHA sampling and “side-by-side” monitoring conducted by Equifax consultants showed no detectable amounts of any of these metals.

Existing survey reports and analytical information provided by Equifax and the requestors included: soil and groundwater tests, air sampling for metals, potable water tests, and ionizing and non-ionizing radiation test results. Initial groundwater testing (October 1998 and December 1999) detected thallium and other metals in water from some of the test wells. Subsequent groundwater monitoring conducted in August 2000, did not identify thallium, antimony, or arsenic in any of the samples. Groundwater is not used for any purpose inside the building or for irrigation purposes outside the building. As such, the presence of metals in

groundwater on Equifax property is not considered a relevant exposure source for Equifax employees.

Equifax contracts for quarterly IEQ evaluations that include monitoring for temperature, relative humidity, particulate concentrations, and carbon dioxide (CO₂), an indicator of general ventilation. A review of a report from a recent survey indicated that temperature, relative humidity, and CO₂ parameters were within current guidelines. Two of the reviewed reports recommended that action be taken to reduce particulate levels in certain areas of the building. The reported results were in particulates per cubic foot (no particulate size range was provided), and there is no comparable regulatory criterion.

To evaluate employee health concerns, prior to the NIOSH site visit Equifax consultants interviewed 92 employees with various health complaints and categorized this information by a number of parameters, including employee work location and symptoms experienced. NIOSH representatives reviewed this information, as well as information compiled by the requestor concerning employees diagnosed with cancer. Equifax recently contracted with an IEQ consultant to further evaluate potential exposure pathways in the building. The report from this consultant’s survey was not yet available for review.

Ionizing Radiation

Prior to occupancy by Equifax, Honeywell, Inc. used radioactive materials as ionization sources for the development and production of chemical agent detectors. Honeywell was granted a radiation license to use this material by the Florida Department of Health and Rehabilitative Services, Office of Radiation Control. The license contained provisions regarding the use, types, and specific quantities of radioactive materials permitted at the facility. A copy of the license indicated that Americium-241, Nickel-63, and Cesium-137 were used in various sealed sources at the facility. The license also authorized the use of tritium (Hydrogen-3); however, Honeywell representatives reported that this material was never used in the building. Reportedly, the radioactive material was stored and used in the Northwest area of the building (currently the Desktop Support and Open Systems area).

All radiation measurements were within background levels (<15 microRoentgens per hour), and no evidence of contamination was found in any of the surface measurements. Although tritium could not be measured using these detectors, potential exposure to tritium at concentrations above background was ruled out since the Nuclear Regulatory Commission (NRC) license termination papers accounted for all radioisotopes, which were removed from the premises by May 4, 1989.

Surface Sampling

The results of the surface sampling are shown in the following table. Samples were collected from various areas of the HVAC systems supporting the

Southeast portion of the building and the cafeteria (AHUs 17, 24, 25, and 33). Samples were also collected from the top of a ceiling tile adjacent to an air return. Surface sampling was also conducted in the employee breakroom and cafeteria to assess the potential for contamination in areas where food and beverage consumption occurs. No thallium, selenium, or arsenic was detected in any of the samples collected. Low levels of antimony and lead were detected in some samples obtained from the HVAC systems. Zinc and aluminum were found in most of the samples. In addition to the metals shown in the table, other elements, including iron, copper, magnesium, and manganese were found in some samples.

Surface Sampling Results Equifax Payment Services, St. Petersburg, Florida September 13, 2000, HETA 2000-0385-2813							
Sample Location	Concentration Detected - micrograms per square centimeter ($\mu\text{g}/\text{cm}^2$)						
	Thallium	Selenium	Arsenic	Lead	Antimony	Zinc	Aluminum
Inside SA duct, AHU 25 (Performance Mgmt/Client Services)	<0.004	<0.2	<0.006	0.08	<0.007	10.7	<0.03
Inside RA plenum (louvers), AHU 25	<0.004	<0.2	<0.006	0.11	(0.007)	1.2	0.08
Mechanical space, outside duct work, North Side AHU 25	<0.004	<0.2	<0.006	0.05	(0.01)	2.4	3.9
Top of ceiling tile, SE corner of building adjacent RA grille, (near door x26E)	<0.004	<0.2	<0.006	(0.005)	<0.007	0.04	<0.03
Inside RA plenum (louvers) AHU 24 (Client Relations)	<0.004	<0.2	<0.006	0.65	0.03	5.3	17.4
Mechanical space, outside ductwork, North Side AHU 24	<0.004	<0.2	<0.006	0.026	0.088	0.9	3.7
Inside SA diffuser, AHU 24, adjacent column C-5	<0.004	<0.2	<0.006	0.024	<0.007	0.4	1.7
Top of ceiling tile adjacent RA grille, East Side of Bank Relations, Column C-5	<0.004	<0.2	<0.006	0.011	<0.007	0.24	0.6

Surface Sampling Results
Equifax Payment Services, St. Petersburg, Florida
September 13, 2000, HETA 2000-0385-2813

Sample Location	Concentration Detected - micrograms per square centimeter ($\mu\text{g}/\text{cm}^2$)						
	Thallium	Selenium	Arsenic	Lead	Antimony	Zinc	Aluminum
Inside RA plenum (louver), AHU 17	<0.004	<0.2	<0.006	0.29	(0.02)	9	13.4
Inside SA diffuser, AHU 17, Column C-8, Client Relations	<0.004	<0.2	<0.006	(0.006)	<0.007	0.14	<0.03
Top of ceiling tile adjacent RA grille (near door x 24E), Client Services	<0.004	<0.2	<0.006	0.012	<0.007	0.17	1.1
Inside RA/OA mixing plenum, AHU 33 (Cafeteria)	<0.004	<0.2	<0.006	0.098	0.039	26.7	5.7
OA intake (louver), AHU 33	<0.004	<0.2	<0.006	0.34	0.15	50.7	16.4
Counter top adjacent microwave oven, break room	<0.004	<0.2	<0.006	(0.007)	<0.007	0.05	<0.03
Counter top adjacent condiments, main cafeteria	<0.004	<0.2	<0.006	<0.004	<0.007	0.1	0.1

RA = return air

SA = supply air

OA = outside air

AHU = air handling unit

() = values in parentheses are between the limit of detection (LOD) and the limit of quantification (LOQ) and are semiquantitative.

< = less than

Employee Interviews

Forty-five employees were identified in the above described manner to be interviewed (there was overlap between the lists). Of the 45, 31 (69%) were available to be interviewed; 28 were interviewed during the site visit (including one telephone interview and one interview with a contractor who worked on-site), and 3 (2 Equifax employees and 1 former employee) were interviewed by telephone after the site visit. The remainder either could not be reached for interview or did not want to be interviewed. Based on the worker interviews (including history of hair loss) and current physical findings, the 30 current employees interviewed were grouped into the following categories (1 of the 31 persons interviewed was a former employee who

developed hair loss after leaving employment with Equifax):

1. Hair loss with moderate to severe, diffuse, hair-thinning possibly related to known or suspected causes (such as andro-genetic hair loss or medication use) -- 8 individuals.
2. Subjective experience of hair loss or thinning without objective findings currently -- 8 individuals.
3. Patchy or complete hair loss, due to unknown causes, affecting at least the scalp (alopecia areata) -- 5 individuals. One of these individuals has had complete recovery of hair growth. Three of the five have had the diagnosis confirmed by one or more personal physicians.

4. No concerns related to hair loss -- 4 individuals. These persons reported a variety of other health concerns; no common patterns of symptoms was apparent.

5. Hair loss with moderate to severe diffuse hair-thinning due to unknown causes -- 3 individuals. One of these persons has had complete recovery of hair growth.

6. Patchy hair loss, with possible causative factor by history -- 2 individuals.

These categories represent findings based on a single interview and examination. The existence of hair loss or thinning (except in the case of complete [or near-complete] hair loss), and the cause(s) for such findings, are often very difficult to determine, particularly during a single examination of the scalp and determination of hair distribution. These categories should not be considered final diagnoses; further medical evaluation of affected individuals on an individual basis would be necessary to establish appropriate diagnoses.

The five persons with patchy or complete hair loss and no known potential etiologic factors by history (those with alopecia areata) worked primarily in three different areas of the facility at the time the hair loss occurred:

1. Product Services/Performance Management -- 3 individuals, with hair loss reportedly beginning in January 1999, July 1999, and June 2000;

2. Client Relations -- 1 individual with hair loss beginning in November 1999; and

3. Seasons -- 1 individual with hair loss beginning in August 1997.

No persons with *scarring* alopecia were identified among Equifax employees interviewed during this HHE.

Review of Information on Cancer

Information compiled by the requestor revealed the following types of cancer reported among Equifax

employees: breast (4 persons); brain (including one description of a "mass") (4 persons); colon (2 persons); lymphoma (2 persons); and 1 person each with endometrial, testicular, and skin cancers. The factors listed in the Evaluation Criteria section are discussed below as they apply to the information reviewed concerning Equifax employees.

1. Is there an unusual distribution of types of cancer? Cases of cancer thought to be related to a workplace exposure usually consist of the same types of cancer. When several cases of the same type of cancer occur and that type is not common in the general population, it is more likely that an occupational exposure is involved. When the reported cancers consist of multiple types of cancer, without one type predominating, then an occupational cause of the cancers is less likely. The information provided concerning Equifax employees shows that many different types of cancer have been reported.

2. Is there exposure to a specific chemical or physical agent known or suspected of causing cancer occurring? The relationship between some agents and certain cancers has been well established. For other agents and cancers, there is suspicion but the evidence is not definitive. There were no occupational exposures to known or suspected cancer-causing agents identified among employees at Equifax.

3. Has enough time passed since exposure began? The time between first exposure to a cancer-causing agent and clinical recognition of the disease is called the latency period. Latency periods vary by cancer type, but usually are 15 to 20 years. In some instances, the latency period may be shorter, but it is rarely less than 10 years. Because of this, past exposures are more relevant than current exposures as potential causes of cancers occurring in workers today. Equifax has occupied the current facility for less than 5 years.

DISCUSSION

Hair Loss

Several types of hair loss have occurred among Equifax employees. Eleven individuals with a history of past or current moderate to severe diffuse thinning over the scalp were interviewed; these 11 individuals worked in 8 different areas of the building. This type of hair loss is most commonly caused by genetic or hereditary factors (androgenetic alopecia, often referred to as common balding in men and hereditary thinning in women), although other factors or processes may also cause this type of hair loss.

The NIOSH evaluation identified five persons with confirmed or suspected alopecia areata of varying severity, with initial hair loss in those persons occurring over a nearly three year period. Three of the five persons worked in one primary area (Product Services/Performance Management) and developed initial hair loss over an approximate 1 1/2- year period.

Illnesses often appear to occur in "clusters," which can be defined as unusual concentrations of cases of illness in a defined area or time. The illnesses may have a common cause or may be the coincidental occurrence of unrelated causes. Illnesses may occasionally cluster in a way that is statistically significant, but such an occurrence may not be related to a specific exposure. Although clusters of alopecia areata in workplaces have been reported in the literature, there is inadequate evidence to establish occupational or environmental exposures as a cause of alopecia areata.^{14,15} A systematic approach to the evaluation of clusters of illness¹⁷ was followed at Equifax during the NIOSH HHE.

Environmental Evaluation

The NIOSH investigation focused on potential occupational exposure to selected contaminants (ionizing radiation, thallium and other metals) in the Southeast portion of the building; a general IEQ survey was not conducted. There is no manufacturing conducted at the facility (no production chemicals are used), and based on the NIOSH evaluation and review of data collected by Equifax and OSHA, Equifax employees are not occupationally exposed to any agents known to be associated with hair loss. Although environmental monitoring can be very useful, identifying and measuring specific contaminants in the absence of a readily identified source is often unsuccessful in

these types of investigations. However, specific findings from this HHE include: (1) it is unlikely that volatile residue from a chemical spill that occurred during the Honeywell occupancy (late 1995) would remain to this date and generate an exposure hazard to current office workers; (2) no ionizing radiation levels above background were detected; and (3) no source of exposure of Equifax employees to thallium was found.

A review of the HVAC systems supporting the Southeast portion of the building indicated that these systems were clean and operating properly. Monitoring results of standard IEQ environmental parameters suggest that sufficient conditioned outside air is being provided to occupied areas. A number of monitoring surveys and inspections to address the health concerns at the Equifax building have taken place, and management has established a program to routinely monitor air quality.

Surface sampling in the ventilation system and food and beverage areas did not identify any contaminants known to be associated with hair loss. A number of different metals were found including iron, zinc, and aluminum in the ventilation systems; lower concentrations of lead and antimony were also detected. Potential sources for these metals include components of galvanized and aluminum ductwork, and external sources such as combustion by-products. Many of the elements are natural constituents of the earth's crust and would be present in most areas. Lead and zinc associated with galvanized ductwork has been detected in a previous evaluation of an office building in North Carolina.¹⁸ Standards regarding surface contamination in occupational settings have not been established, and exposure can not be estimated from these results. Efforts to correlate surface sampling with occupational exposure have not demonstrated any reliable quantitative relationship.¹⁹ However, this information does show that dislodgeable metals are present in the HVAC system, and personnel (e.g., maintenance workers) who may come in contact with these systems should be informed and cautioned to thoroughly wash their hands prior to consuming food and beverages or using tobacco products.

Communication

Despite the efforts to resolve employee health concerns, concerns about building environmental

conditions contributing to health problems remain. A sense of frustration and/or miscommunication related to these concerns is present among some Equifax employees. These feelings are likely to heighten employee concerns regarding building-related issues. Continued communication between management and employees is a critical issue.²⁰ Productive relations will be enhanced if workers are provided accurate and timely information, in easily understood terms, during the process of investigation and mitigation of building-related concerns. Affected workers should be part of the problem-solving process and should be educated about ongoing investigations and building operations. An effective communication program is a shared responsibility and requires close coordination between building management and employees.²¹

CONCLUSIONS

Based upon the medical and environmental evaluations conducted at Equifax there is no evidence that the hair loss/thinning reported by Equifax employees is related to an occupational exposure at Equifax. Further evaluation by NIOSH will not likely be useful in finding an environmental cause of the hair loss occurring among these employees. Similarly, the occurrence of cancer among Equifax employees is unlikely to be related to occupational exposures since no such exposures were identified at the Equifax facility and since the facility has been occupied by Equifax for less than five years.

RECOMMENDATIONS

1. No additional environmental monitoring or ionizing radiation surveys are suggested at this time. However if plausible sources of environmental contaminants are identified, these should be investigated.
2. Effective communication with employees, including timely reporting of efforts to address building-related issues, is a key element in resolving worker concerns and distrust. Efforts to ensure effective communication between Equifax management and employees to facilitate the exchange of concerns about environmental conditions should be ongoing. Building occupants should be advised of actions taken and the rationale

for decisions that are made to address the problems. A forum within Equifax for effectively communicating issues to concerned employees should be established. Concerned employees should be advised of the mechanism for requesting assistance on building IEQ and worker health issues. As a component of an effective communication system, Equifax employees should continue to report all potentially work-related health problems to appropriate supervisory or health care personnel.

3. To help ensure good IEQ, filters on the AHUs should be replaced or cleaned on a routine scheduled basis.
4. Employees with health problems who are concerned about workplace exposures as a possible etiology for their symptoms should be evaluated by a physician or other health care professional who has experience with occupational and environmental health issues. These types of health care professionals may be identified by a variety of means. For example, there is an occupational medicine training program at the University of South Florida. Also, the Association of Occupational and Environmental Clinics (internet address – <http://www.aoec.org>) can provide information on its member clinics.

A. In relation to the issues under consideration for this HHE, since no occupational exposures have been identified at Equifax, no specific medical testing is indicated.

B. Because of the multiple potential causes of hair loss/thinning, each individual concerned about this problem should be evaluated by a health care professional, a dermatologist, for example, knowledgeable in the diagnosis and treatment of hair loss.

REFERENCES

1. NIOSH [1994]. Lead in surface wipe samples. Method Number 9100. In: NIOSH manual of analytical methods, 4th ed. Eller, RM, ed. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-113.

2. NIOSH [1992]. Recommendations for occupational safety and health: compendium of policy documents and statements. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 92-100.

3. ACGIH [1999]. 1999 TLVs® and BEIs®: threshold limit values for chemical substances and physical agents. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

4. CFR [1997]. 29 CFR 1910.1000. Code of Federal regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

5. Bertolino AP, Freedberg IM [1993]. Disorders of epidermal appendages and related disorders. In: Dermatology in General Medicine, Fitzpatrick TB, et al, eds. 4th Edition, McGraw Hill, Inc., New York, NY.

6. Franzblau A [1994]. Thallium. In: Occupational and Environmental Medicine, Rosenstock and Cullen, eds. W.B. Saunders Company, Philadelphia, PA.

7. ATSDR [1992]. Toxicological profile for Thallium. U.S. Department of Health and Human Services. Public Health Service, Agency for Toxic Substances and Disease Registry. US DHHS TP-91/26.

8. ATSDR [1997]. Toxicological profile for ionizing radiation, draft for public comment. U.S. Department of Health and Human Services. Public Health Service, Agency for Toxic Substances and Disease Registry.

9. Price V [1991]. Alopecia areata: clinical aspects. Journal of Invest Dermatology 96:68S.

10. Safavi K [1992]. Prevalence of alopecia areata in the First National Health and Nutrition

Survey. (Letter) Arch Dermatol 128(5):702.

11. Safavi K et al. [1995]. Incidence of alopecia areata in Olmstead County, Minnesota, 1975 through 1989. Mayo Clin Proc 70(7):628-33.

12. Madani S and Shapiro J [2000]. Alopecia areata update. J Am Acad Dermatology 42:549-66.

13. Bertolino AP [2000]. Alopecia areata: a clinical overview. Postgraduate Medicine 107(7):81-90.

14. Williams N and Rigert AL [1971]. Epidemic alopecia areata – an outbreak in an industrial setting. J Occ Med 13:11.

15. Roselino AM, et al. [1996]. Clinical-epidemiologic study of alopecia areata. Int J Dermatology 35(3):181-184.

16. Cancer Rates and Risks [1996]. Harras, A (ed.). Bethesda, Maryland: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute. NIH Publication No. 96-691.

17. CDC [1990]. Recommendation and reports: Guidelines for investigating clusters of health events. MMWR 39(No. RR-11).

18. Lovelace D, Guguerre M, Curran J, Morris P, Williams L, Matson P [1994]. Survey of lead contamination in an office building. Appl. Occup. Environ, Hyg. 9(6):389-392.

19. Caplan K [1993]. The significance of wipe samples. Am. Ind. Hyg. Assoc. J. 54: 70-75.

20. NIOSH/EPA [1991]. Building air quality: a guide for building owners and facility managers. Cincinnati, OH: U.S. Department of Health and

Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH)

Publication No 91-114.

21. U.S. EPA [1997]. An office building occupant's guide to indoor air quality. United States Environmental Protection Agency. Washington, D.C. EPA-402-K-97-003.

For Information on Other
Occupational Safety and Health Concerns

Call NIOSH at:
1-800-35-NIOSH (356-4674)
or visit the NIOSH Web site at:
www.cdc.gov/niosh



! Delivering on the Nation's promise:
Safety and health at work for all people
through research and prevention

