



HEALTH AND SAFETY **FACT SHEET**

Visual Display Terminals

Health hazards of VDTs

Over the past few years, there has been a growing concern among workers about the use of visual display terminals. This concern has been fueled by increasing numbers of reports of ill health and also by the uncontrolled accelerating increase in the number of VDTs being introduced into the worksite. In many European countries, there was an early recognition of potential problems, and there has been ongoing pressure to control the use of VDTs.

These controls have taken the form of contract language in some countries and/or legislated regulations in others. In Canada, there is no legislation controlling the use of VDTs, nor is the design of the workplace regulated. There are no specific regulations for VDTs to ensure that a level of safety is achieved and maintained.

Are CUPE members exposed?

The use of VDTs is growing. Many CUPE members are already working with VDTs. In libraries, schools and hospitals, thousands of sets are already in use.

Secretaries are increasingly expected to use word processors. Public utilities are using the machines for billing purposes, for ordering parts and for stock control.

What are the effects of exposure?

There are a number of possible health hazards involved. Studies have shown concerns in the following areas:

1. Visual Problems
2. Physical Hazards
3. Stress Related Problems
4. Radiation

Visual problems

The major complaint of VDT operators is that of "eye strain". This complaint is typically described by workers as one or more of the following: soreness, irritation, burning, and dryness, a general tenderness of the eyes and grittiness or gravel in the eyes. These symptoms may be the first signal of visual problems, including: difficulty in focusing, double vision, blurring, seeing colour fringes, or difficulty in looking at one spot for any length of time.

One worker has reported that she has to spend at least 15 minutes resting her eyes at the end of the shift before she dares drive her car home because she found it difficult to focus on any oncoming traffic, and had almost run into another vehicle. Workers report many systemic symptoms such as headaches, stabbing pains in the area of the eyes, fatigue and nausea. There is an increase in the frequency that prescription glasses have

to be renewed. Vision apparently deteriorates more quickly. The causes of the visual problems are rooted in the design of the VDTs and work area – poor character definition, poor luminance, reflective glare, flicker, and poor colour contrast. There are further problems if the eye has to adjust and readjust between contrasting sources, such as the screen and a printed page. This causes a continuous refocusing and readjustment of the eyes to accommodate the contrast between the set and the printed material.

Studies have shown that 30 to 40 per cent of VDT users complain of visual problems. This percentage increases as the time spent per day on the sets increases. In one study, more than 55 per cent of a group of persons who use word processors for eight hours or more per day complained of eye problems. There is good correlation between the time spent on the sets without a break, the total number of hours spent and reported incidence of vision problems. Statistics show that if more than two hours are spent without a break, there is a large increase in symptoms reported. If more than four hours per day are spent on the sets (even with breaks) the symptoms reported increase.

Controls

Many unions have negotiated eye tests paid for by the employer. In addition, the employer is responsible for payment of new eyeglasses that may be required as a result of VDT work.

Controls that have been successfully used include:

- correcting office lighting, provision of

- drapes and dimmers, and purchase of mat VDT screens to eliminate glare;
- purchase of equipment with less flicker;
- provision of adjustable, individual
- work station lights;
- reducing time worked on a VDT.

Physical hazards

These hazards are the result of poor planning and design of workplaces and workstations. VDTs have been introduced into the workplace with little forethought or planning so that the normal worksite design has to accommodate the VDT. In many instances, workers themselves have attempted to redesign their workstation. Cushions are used to give the operator more height; footstools are brought in to ensure that the feet have something to rest on.

The complaints that are most often recorded are shoulder, neck and backaches, and numbness, tremors and weakness in the hands. However, incorrect seating and furniture design can lead to more long-term serious problems, such as varicose veins, hemorrhoids, and repetitive strain injuries such as carpal tunnel syndrome and tenosynovitis. Another end product of this poor design is fatigue. This physical fatigue, when experienced with other stress factors can lead to long-term chronic fatigue.

Controls

Since the root of these physical problems lies in design of equipment, furniture and work areas, this is where attempts to eliminate the problems should be

focused:

- Chairs must provide support for the back, pelvis and buttocks; be stable (preferably five legs), and be easily adjustable;
- Workstations must provide adequate room for written documents, document holder, workstation light and other materials necessary for the job;
- Desks must be adjustable;
- Wrist supports may alleviate some of the arm/wrist strain;
- Keyboard should be separate from the screen, and moveable.

Finally, the demands of the job should be evaluated (e.g., number of keystrokes/hour). The amount of keying can be reduced and number of hours on the VDT limited, or the length and number of breaks increased.

Psychological problems (stress)

The very introduction of VDTs into the worksite has increased the stress levels experienced by workers. The efficiency of the terminal is a threat to employment; there is a dramatic increase in the amount of information handled; there is a deskilling of work; there is a loss of individual control over work – all factors that lead to increased stress. In many work situations, the VDT has become an all powerful supervisor. It has the ability to monitor every keystroke, every error, and every break taken.

The body reacts to stress physically, and common symptoms include:

- increased heartbeat and rapid breathing
- upset or "acid" stomach;
- headaches and other expressions of

tension;

- fatigue.

These symptoms are the result of the body gearing up to deal with a stressful situation – the so-called "fight or flight" reaction. In the short-term, this reaction is protective of the body and helps people adapt to a variety of stressful situations.

Continuous exposure to stressors, however, can lead to a burnout of these protective reactions, so that the stress reaction actually becomes destructive.

The results?

- increased alcohol or drug consumption as a way of coping;
- high employee turnover and absenteeism;
- chronic anxiety, depression and other psychological problems;
- development of chronic high blood pressure, heart disease and ulcers.

Controls

To reduce or eliminate stress related to VDT work, the union should consider:

- changes to the work environment such as increased space, reduction of noise from printers, improved lighting;
- improvements in equipment;
- redesign of the job to add variety/eliminate monotony, provide for increased individual decision making, increased job satisfaction;
- reorganization of work and the organization itself, including changes in work hours, flexibility in tasks, training provided, and notification of proposed changes in the work system.

Radiation

Over the years, since they were first introduced, there has been growing concern about the effects of VDT-produced radiation, particularly on reproductive function. Clusters of miscarriages and birth defects in the children of exposed operators have fueled increased research in the area.

What radiation is produced by VDTs?

Ionizing radiation is the type we associate with X-ray machines or nuclear power plants. It has the ability to alter the atomic structure of materials it passes through, and it is thought that ionizing radiation alters the DNA (genetic blueprint material in our cells) leading to mutations and cancer.

In general the ionizing radiation, X-rays in this case, is absorbed by the glass enclosure of the VDT, and although low levels may be given off by sets made before 1980.

According to the Canadian Centre for Occupational Health and Safety: "Around normally functioning VDTs, manufactured in the last decade, no X-ray emission has been found to be detectable above background radiation levels (approximately 100 mrem/year). Therefore, carcinogenic, developmental or genetic effects due to X-rays from VDT operation seem highly improbable.*" (*Emissions from Video Display Terminals and Their Measurement. Marka, Pathak and Charron. CCOHS, 1986.)

Non-ionizing ultraviolet, infrared, radio frequency and microwaves.

These forms of radiation do not alter the atomic structure; rather, their basic effect is one of heating material they pass through. However, the measured levels of electromagnetic radiation around VDTs are considered to be too low to cause thermal (heating) effects.

Non-thermal effects of some electromagnetic fields have been reported at very low exposures. The Very Low Frequency and Extremely Low Frequency (VLF and ELF) fields given off by VDTs, which do not cause thermal effects, are therefore still cause for concern. The reported effects are described below:

Symptoms

1. Increased fatigue;
2. Periodic or constant headaches;
3. Extreme irritability;
4. Sleepiness during work;
5. Decrease in olfactory (smell) sensitivity.

Signs

1. Bradycardia (reduced heart beat);
2. Hypo tension (low blood pressures);
3. Hyperthyroidism (excessive activity of the thyroid gland);
4. Increase in blood histamine level.

SOURCE: Letavet, A.A., and Z.V. Gordon, Biological action of ultra high frequencies. U.S.S.R. Academy of Medical Science, Translation 12 471, U.S. Joint Pub. Res. Service, 1962.

| | |
|-------------------------|--------------------------------------|
| Headaches | Feelings of fear |
| Eyestrain | Nervous tension |
| Fatigue | Mental depression |
| Dizziness | Impaired memory |
| Disturbed sleep | Pulling sensation in scalp and brows |
| Moodiness | Pain in muscle |
| Irritability | Pain in heart |
| Unsociability | Breathing difficulties |
| Hypochondriac reactions | Increased sweating of extremities |

SOURCE: Martha, K.; J. Musil, and H. Tuha. Electromagnetic Fields and the Life Environment. San Francisco Press, San Francisco, 1971.

In addition, some experimental studies have demonstrated that pulsed electromagnetic fields can affect developing test animal embryos. However, these studies must be repeated and are not considered conclusive.

Electrostatic

The electrostatic field produced on and around the screen of the VDT has been linked to skin rashes on VDT operators. Note however, that the general office environment, often with low humidity and containing airborne chemicals, is also a possible culprit for such rashes.

Are There Safe Exposure Levels for Radiation?

The standards that currently exist are not what we consider "safe" limits. They are based on currently available information, and vary widely from country to country.

However, the CLC has recommended standards based on those agreed to at an International Trade Union Conference on VDTs (1984); standards from "Terminal

Shock", by Bob DeMatteo and through consultation with experts at the Canadian Centre.

Controls

The glass enclosure of the VDT effectively limits the X-radiation emitted by newer VDTs, but it doesn't limit VLF or ELF electromagnetic radiation. Because we still don't know much about the effects of such radiation on humans we apply the recommendation of the American Conference of Governmental Industrial Hygienists that "Needless exposure to all radio frequency radiation exposures should be avoided, given the current state of knowledge on human effects, particularly non-thermal effects," (ACGIH; TLVS 1986-87).

First, the fields around the terminals must be measured using a field sensor or radiation hazard monitor. Wherever VDTs are used, workers should demand such tests be done. The Canadian Centre for Occupational Health and Safety has a publication, *Emissions from Video Display Terminals and Their Measurement* (P86 - 19E), which describes techniques and instrumentation for such measurements. To reduce or eliminate exposures, the VDT can be shielded with an external grounded metal cover, which leaves the ventilation openings free, yet covers the sides, top and back (it's the flyback transformer, usually on the machine's side, which produces the electric field). Some manufacturers will retrofit the machines by taking off the cover and spraying on conductive paints or putting in a conductive grounded metal liver.

Shielding may also reduce the magnetic field strength; however, a metal with a high mu rating, such as 12-16 gauge soft steel sheet metal, is recommended.

Since electromagnetic radiation levels drop off quite quickly as you move away from the source, increasing the distance between VDTs is a *temporary* control measure that can be used while shielding is installed or new equipment purchased. Note however, that you need to have the operator at least one meter away from the flyback transformer side of another VDT. This of course, does not eliminate the operator's exposure from her/his own machine.

What are other steps to take?

CUPE members should demand:

- Prior consultation before implementation;
- The right to veto the new technology;
- The right to participate in the design of workplaces;
- The right to be involved in the implementation of any new technology.

In the past, workers have been the guinea pigs for many hazardous substances. The toxicity of many chemicals was only recognized after the statistical computations of dead workers made it impossible to deny the obvious. This is unacceptable to our union.

Resources

Kark Marha, Bhawani Pathuk and David Charron. *Emissions from Video Display Terminals and Their Measurements*. CCOHS, 1986. (#P86-19E). Available from: The Canadian Centre for Occupational Health and Safety, 250

Main St. E., Hamilton, Ontario, L8N 1H6.
(416) 572-2981.

TCO Work Environment Committee. *VDU Work The Right Way*. TCO, Central Organization of Salaried Employees in Sweden, 1986. Available from: TCO, P.O. Box 5252 S-10245, Stockholm, Sweden.

CLC. *Fighting the Radiation Hazards of VDTs*: CLC Health and Safety Bulletin #3, January 1987.

Available from: Workplace Health and Safety, Canadian Labour Congress, 2841 Riverside Drive, Ottawa, Ontario, K1V 8X7.

NALGO Health and Safety Briefing: *The Health and Safety Aspects of VDU Work*. National and Local Government Officers' Association, February, 1986. Available from: Health and Safety. NALGO, 1 Mabledon Place, London, WC1 9AJ.

Bob DeMatteo. *Terminal Shock*. 1986. Available from: NC Press, Ltd., 31 Portland Street, Toronto, Ontario, M5V 2V9. Cost: \$9.95.

For further information contact:

CUPE National Health and Safety Branch
1375 St-Laurent Boulevard
OTTAWA, ON K1G 0Z7
Tel (613) 237-1590
Fax (613) 237-5508
Email: health_safety@cupe.ca
www.cupe.ca

cope 491
October 2003
K:\FACTSHEETS - 2007\VDT.doc