Vu

Jaunay.

1° Hier les propositions de recherche élaborées à Londres ont été maintenues à Bandoeng ; elles doivent être ~~proposées~~ au comité de Direction IFRA le 18 août 1977

2° le laboratoire est considéré comme une des autorités chargée de l'exécution de toutes les activités de recherche.

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THE INTERNATIONAL RESEARCH ASSOCIATION FOR NEWSPAPER TECHNOLOGY

WASHINGTONPLATZ 1 – 61, DARMSTADT (WEST GERMANY) – TELEPHONE 76057 TELEX 0419273

Prof. A. Wisner
C.N.A.M.
41, Rue Gay-Lussac
75005 Paris
Frankreich

reçu 13.7.77

1977-07-08
DH/af

Dear Professor Wisner,

Following on from the second meeting of the project group in Hamburg on June 14th, the members of the group were agreed that this project is not only necessary, but must be assigned the highest priority. The viewpoints of the project group, together with the enclosed project proposal were then submitted to the IFRA Technical Committee on June 30th.

During this meeting this project was given the full support of the Committee, and the proposal will be submitted to the IFRA Management Board on August 18th.

In the meantime, and thanks to the help of Mr. J. May, a preliminary application for financial assistance has been made to the European Commission. This preliminary application was posted on July 7th.

I will keep you fully informed as to our progress and may I take this opportunity to thank you once again for your much-appreciated efforts on our behalf.
Kindest regards,

Yours sincerely

David J. Hart

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THE INTERNATIONAL RESEARCH ASSOCIATION FOR NEWSPAPER TECHNOLOGY

WASHINGTONPLATZ 1 – 61, DARMSTADT (WEST GERMANY) – TELEPHONE 76057 TELEX 0419273

MEMORANDUM 77/08F

Juin 23, 1977

"LES ASPECTS HUMAINS DU TRAVAIL A DES TERMINAUX A ECRAN"

... CONCEPT, METHODES ET DESSEIN DU PROJET IFRA

1. Fondement

Avec l'appartition d'ordinateurs à introductions de données par terminaux à écran, des craintes sont apparues quant-à l'éventualité d'une détérioration de la vue des opérateurs occupés de façon prolongée devant de tels équipements. Cette polémique a particulièrement intéressé de nombreux syndicats nationaux dans le secteur de l'impression et de l'édition mais, comme ces craintes n'ont cessé de se répandre, le débat s'est étendu à tous les secteurs de l'industrie qui utilisent ou qui vont introduire ce système de terminaux à écran à une vaste échelle comme par exemple: les banques, les assurances etc.

Les efforts de recherche des deux dernières années n'ont pas été suffisants pour définir la véritable nature de ce problème et durant l'année écoulée, plusieurs syndicats nationaux - incluant celui des journalistes - ont demandé qu'une enquête de ce type soit faite. En Allemagne de l'Ouest, par exemple, le syndicat des journalistes a activement supporté le DAG (Deutsche Angestellten Gewerkschaft - Syndicat des Employés Allemands) en menant une enquête avec l'Université de Berlin qui, bien que pas spécifiquement concernée par la situation de l'industrie de l'impression et de l'édition a fourni une grande quantité d'informations valables relatives aux conditions des places de travail en général. Des inquiétudes similaires ont été exprimées dans les pays du Bénélux, en France et en Grande Bretagne ou une décision du N.U.J. (Syndicat National des Journalistes) appuyait la recommandation d'entreprendre "un examen médical dans le cadre des aspects de santé lors de l'utilisation des terminaux à écran."

C'est par conséquent pour cette raison qu'il est urgent de faire une étude objective orientée vers l'industrie (plutôt qu'en laboratoire) avec le plus haut niveau de crédibilité afin de situer cette question dans la perspective exacte.

Ce point a été soulevé lors des négociations de tarifs entre les employeurs et les syndicats en Allemagne de l'Ouest, et l'IFRA a donné une grande priorité à ce sujet parce que ce point est susceptible d'être soulevé lors de négociations dans d'autres pays européens.

2. Dessein du projet

Les objectifs principaux du projet IFRA sont orientés vers deux buts:

* L'établissement d'un minimum de spécifications pour la conception et les caractéristiques d'affichage des terminaux à écran pour le traitement de textes et
* La fourniture d'un minimum de spécifications relatives au plan de la place de travail au terminal et de la salle de terminaux en totalité.

Les critères qui ont été adoptés en recherchant ces spécifications sont ceux qui assurent la libération individuelle du sentiment de contrainte, de l'insatisfaction et de la communication visuelle du travail.

Au fond, l'établissement de ces "spécifications minimus" reposera sur les réponses à quatre questions de base, c'est-à-dire:

1. Le terminal à écran représente-t'il une menace significative pour la santé et le bien-être de l'opérateur au travail, et
2. Cette menace est-elle très différente de celles habituellement associées aux méthodes traditionnelles de travail?
3. A quelles circonstances ou à quels facteurs personnels, caractéristiques du dispositif et de l'environnement, ces risques peuvent-ils être imputés, et,
4. Quelles sont les phases à suivre - en tenant compte de la conception de l'équipement et du plan de la place de travail - pour minimiser ou éliminer ces problèmes?

En réfléchissant à la façon dont le problème devrait être attaqué, et comment cette enquête devrait être formulée, il est apparu que ces questions ne sont pas aussi évidentes qu'elles ne le paraissent. Tandis que les malaises physiques tels que la contrainte des yeux, les maux de tête et ainsi de suite sont relativement faciles à déterminer, les causes de ce type de plaintes ne sont pas aussi clairement définissables qu'on ne pourrait le supposer. De telles plaintes peuvent, jusqu'à un certain point, être reportées aux caractéristiques du dispositif et de son environnement (les conditions d'éclairage en particulier), au type de travail étant exécuté, aux facteurs personnels et ainsi de suite.

Même à ce niveau, le nombre de facteurs individuels, qui pourraient contribuer à des sentiments de malaises physiques au travail, est vraiment très grand, bien que pour la plupart, ils peuvent être examinés en termes quantitatifs.

Une complication de base concernant le problème surgit toutefois, du fait que les plaintes de malaise au travail correspondent probablement dans de nombreux cas, en partie au refoulement de frustrations individuelles et d'anxiétés qu'il est nécessaire de mieux comprendre en vue d'établir un projet et de définir les caractéristiques d'opérations appropriées le terminal et le système.

Il y a donc deux aspects - le physique et le psychologique - à la question de "malaise au travail" dans l'utilisation de terminaux à écran. En ce qui concerne cette enquête, il est maintenant clair que les deux aspects peuvent et doivent être considérés.

La complexité du problème a défié toute tentative de conception d'une étude qui, à un niveau fondamental et à court terme, apporterait toutes les réponses que nous recherchons. En fait, en ce qui concerne le risque d'altération de la vue, une réponse ne peut être apportée qu'après plusieurs années d'examens médicaux réguliers et seulement après avoir subi des analyses de type "épidémiologique".

A court terme, nous avons eu à rechercher une voie alternative pour aborder le problème, et la réponse semble se trouver dans une comparaison détaillée de méthodes de travail "traditionnelles" avec celles de "nouvelles techniques". Cette ligne d'approche et les méthodes d'observation et de mesure qui ont été développées et appliquées par nos experts au cours de l'année écoulée, ont lourdement pesé dans le concept de l'enquête comme cela est sommairement résumé dans ce rapport.

3. Etudes à effectuer

En annexe 1, l'enquête a été subdivisée en ses différentes étapes avec indication des objectifs principaux à chaque stade.

On peut constater que l'accent a été mis sur quatre lignes parallèles de recherche, à savoir:

Analyse de tache. Deux études, l'une générale de l'autre détaillée indiquent combien l'introduction de terminaux à écran pour le traitement de textes a transformé les méthodes de travail ainsi que les demandes physiologiques et psychologiques de l'individu. Il est envisagé que ces études soient exécutées au sein de 18 journaux et agences d'information essentiellement en France, en Allemagne de l'ouest, en Grande Bretagne, en Hollande et en Belgique

pendant une durée de 14 mois à daté de la fin de cette année. Les techniques qui sont utilisées dans cette partie de l'enquête sont basées sur une observation directe et sur des mesures propre à fournir une description quantitative des tâches concernées dans chacune des fonctions considérées. Ceci concernera principalement les opérations de salles d'informations et de composition.

Ce type d'étude se réfère quelquefois comme à une observation "de moments multiples", et ces techniques ont été utilisées par l'université de Berlin d'un bout à l'autre de leurs enquêtes en cours, au profit du Ministère du Travail de l'Allemagne de l'Ouest, incluant une étude pilote qui a été menée par les services du DPA à Hambourg.

Cette étape de l'enquête comportera aussi un programme d'évaluation pour décrire la place de travail et les conditions de la position de travail, c'est-à dire: l'entourage et les niveaux d'illumination locaux, les caractéristiques de l'équipement, etc.

Exposé des expériences. Au sein de chacun de ces 18 supports, mais aussi sur un profil beaucoup plus large de journaux européens et d'agences d'informations, une tentative sera faite afin de mieux définir les attitudes et expériences des individus à l'introduction et l'utilisation de terminaux à écran. Une attention particulière permettra de déterminer quel plan, quelles caractéristiques opérationnelles d'un terminal à écran et de ses équipements annexes ont le plus grand impact sur l'opérateur, et permettra de déterminer les caractéristiques qui devraient servir de base pour tenter de définir les propriétés de l'équipement.

Cette enquête se composera d'un questionnaire et d'une série d'interviews dont beaucoup ont déjà été réalisés. En utilisant ces techniques, une tentative sera également effectuée pour déterminer si oui ou non l'introduction de terminaux à écran cause ou est de nature à causer des changements d'attitude significative de l'individu vis à vis du poste qu'il occupe et d'interpréter ces réactions du point de vue de l'insatisfaction et de l'inconfort au travail.

En recherchant un plus vaste champ d'application pour l'analyse de ces expériences, il est proposé que ce stade de l'enquête soit étendu de sorte à inclure une étude parmi un choix représentatif de l'industrie des journaux américains.

Test ophtalmique. Parallèlement à ces types d'études "à support" un grand accent a été mis sur le développement

d'un procédé standard de vérification de la vue qui peut être facilement appliqué sur une base routinière consistant en un contrôle périodique de la vue des opérateurs de terminaux à écran. Il est apparu essentiel que de tels tests soient effectués à intervalles réguliers, mais il est indispensable que les méthodes soient standardisées afin de rendre les comparaisons possibles et significatives.

Pour développer ce procédé, des conseils seront sollicités des meilleurs occulistes européens. La méthode développée sera testée et appliquée au cours des enquêtes citées ci-dessus. Un essai de développement d'une procédure de rapport standard sera fait. Il est proposé de créer une banque centrale d'informations dont le rôle sera d'analyser les résultats de ces enquêtes au sein d'un groupe représentatif et sur une période de plusieurs années.

Emission de radiations et exposition. En vertu de ce mode d'opération, le tube cathodique doit être considéré comme une somme potentielle de diverses formes d'émission de radiations. Les émissions de cette sorte et particulièrement dans la zone de rayon X du spectre électromagnétique, ont été largement accusées d'être la source de l'inconfort visuel et de formes plus sérieures d'altération de la vue parmi les opérateurs de terminaux à écran.

L'IFRA a porté une attention particulière à cette question. Lors des enquêtes déjà menées, des spécialistes d'équipement, des autorités chargées de l'hygiène du travail et de la protection contre les radiations ont été consultés dans de nombreux pays. Sur la base de ces enquêtes, et des résultats de nombreuses mesures de la radiation X, l'émission des dispositifs à tube cathodique avec un potentiel opérationnel de moins de 20 Kilovolts n'a pas permis de trouver une quantité mesurable.

Néanmoins, d'autres régions du spectre électromagnétique sont considérées comme étant potentiellement néfastes à l'oeil humain. Des études plus compréhensives au sujet de l'émission de radiations de fréquence-radio et d'infrarouge optiques et visibles sont nécessaires afin de répondre totalement à cette question du point de vue de la santé et de la sécurité.

Il est donc proposé de faire exécuter une série d'analyses radiométriques profondes de l'émission de radiation des terminaux à écran. Il est demandé que ces études soient exécutées avec l'aide des équipements de pointe fabriqués en Allemagne de l'ouest, en France et en Grande Bretagne, en travaillant en liaison étroite avec les autorités nationales de santé et de sécurité de ces nations.

4. Budget nécessaire; programme

Les nécessités budgétaires pour ces activités projetées sont sommairement exposées en Annexe 2.

Une nécessite globale de 1.200.000 DM est envisagée, basée sur l'estimation des coûts, pour la période s'étendant de juillet 1977 à juillet 1979. Les prévisions faites pour le projet sont néanmoins fortement dépendantes de la disponibilité de fonds suffisants.

5. Administration du projet

Les trois autorités suivantes sont chargées de la planification et de l'exécution détaillées de ces activités:

Technische Universität Berlin,
Institut für Arbeitswissenschaft,
Hardenbergstrasse 34,
1-BERLIN 12
REPUBLIQUE FEDERALE ALLEMANDE

Chef de Département: *Professeur A. Armbruster*
Adjoint: *Dr. A. Cakir*

Conservatoire National des Arts et Métiers,
Laboratoire de Physiologie du Travail
et Ergonomie,
41, Rue Gay-Lussac,
75005 PARIS
FRANCE

Chef de Département: *Professeur A. Wisner*
Adjoint: *Dr. F. Jankowsky*

University of Loughborough,
Department of Human Sciences,
Leicestershire LE11 3TV
ENGLAND

Chef de Département: *Professeur B. Shackel*
Adjoint: *Mr. T. Stewart*

Ces trois instituts ont été et continueront à être représentés dans le groupe de travail qui a été élu par le Comité Technique de l'IFRA et qui comprend les représentants suivants:

Mr. P. Jaume,
Directeur Technique
Entreprise de Presse No. 1,
F-69680 CHASSIEU, FRANCE

Mr. J. May,
Director of Research, Development and Engineering
Mirror Group Newspapers Ltd.,
33, Holborn Circus
LONDON, ENGLAND

Dr. T. Pohlert
Directeur Administratif
Deutsche Presse Agentur
Mittelweg 38
HAMBURG 13, R.F.A.

Mr. J. Saint-Cricq
Directeur Général
La Nouvelle République
du Centre-Ouest
4-18, Rue de la Préfecture
F-37000 TOURS, FRANCE

Monsieur D.J. Hart, Directeur de la Recherche à l'IFRA, a la fonction de coordinateur de projet.

Il est souhaité que les membres de ce groupe de travail continuent leurs effort pour établir une liaison étroite et active avec les syndicats.

David J. Hart

Darmstadt, le 23.6.1977

ANNEXE 1

ETUDES A REALISER

ETUDES A ACCOMPLIR

METHODES CONVENTIONNELLES NOUVELLES TECHNIQUES	OBJECTIFS
1. ANALYSES DE LA TACHE	
1.1 Analyse générale de la tâche des catégories sélectionnées	En examinant, en termes généraux, le contenu du travail, les instruments utilisés et le temps consacré au travail pour déterminer a) les caractéristiques essentielles du travail dans ces catégories et b) le changement des méthodes de travail résultant des nouvelles techniques.
1.2 Analyse de la tâche individuelle	Par l'examen quantitatif du comportement des yeux et autres parties du corps au travail, afin de déterminer a) les éxigences physiologiques de l'individu au travail et b) pour fournir la base à une description comparative de cette conduite dans une forme qui peut être interprétée du point de vue de la santé.

2. EVALUATIONS PHYSIQUES		
	2.1 Evaluation propre au lieu, à la lumière ambiante, à la configuration de la place de travail etc...	Pour en établir une description et comparer les conditions individuelles au travail afin d'identifier les facteurs "d'environnement" qui pourraient être responsables de l'inconfort chez les individus au travail.
3. FACTEURS PERSONNELS	3.1 Estimation de la fonction visuelle	Afin de déterminer: a) les types et les fréquences des défauts de vue dans ces catégories professionnelles b) développer un procédé standard du test de vue et de protection et le contrôle de routine des opérateurs des terminaux à écran.
	3.2 Révision du passé médical individuel	Afin de mieux décrire les maladies "de travail" auxquelles ces catégories professionnelles sont exposées et pour déterminer les fréquences relatives auxquelles surviennent ces maux dans le cadre des techniques traditionnelles et modernes.
	3.3 Particularités individuelles, c'est-à dire, tranche d'age, fumeur, etc.	Par l'examen, des tranches d'age, des habitudes face au tabac etc. afin de mieux définir les facteurs personnels qui pourraient avoir un effet "de synergie" sur le malaise au travail.

ETUDES A ACCOMPLIR

METHODES CONVENTIONNELLES	NOUVELLES TECHNIQUES	OBJECTIFS
4. REACTIONS SUBJECTIVES 4.1 Attitude face au travail devant être accompli		En examinant les attitudes individuelles au point de vue créativité, niveau de responsabilité et satisfaction au travail pour déterminer: a) l'influence que les nouvelles techniques ont sur les attitudes au travail pendant son exécution, et b) l'étendue à laquelle les réactions négatives à cet égard, si elles sont détectées, pouraient contribuer à l'incidence des plaintes au travail.
4.2 Attitude face au moyen par lequel le travail est effectué		Pour comparer les attitudes face au moyen par lequel le travail est exécuté et pour déterminer plus spécifiquement: a) le secteur auquel ces attitudes peuvent donner l'impression de stress, de frustration etc. au travail, et b) par lequel les individus voient eux-mêmes une possibilité d'amélioration de la méthode de travail utilisée.

4.3 Attitudes antérieures aux "nouvelles techniques"	a) pour mieux définir l'attitude des individus qui travaillent avec des méthodes classiques face à la technologie à venir, et b) déterminer plus spécifiquement les facteurs qui peuvent être responsables des craintes du personnel, ou anxiétés en considérant l'introduction de nouvelles techniques.
4.3 Expérimentation des réactions à l'introduction passée de nouvelles méthodes	En examinant les expériences de ceux qui ont fait la transition de techniques plus anciennes à des nouvelles, pour déterminer: a) si les individus ont les sentiment que leur travail est devenu "meilleur ou pire" en tant que résultat de l'introduction de techniques nouvelles, et b) pour déterminer quels éléments individuels pourraient être devenus "négativement orientés" après l'introduction de nouvelles techniques et pour lesquelles ils n'avaient pas été formés aupréalable.

ANNEXE 2

ANALYSE PRELIMINAIRE DES FRAIS

BUDGET REQUIS

Tâches/Annotation	Frais	Total
1. TACHES 1.1 - 2.1, "ANALYSE DU PROJET"		
a) Préparation: Il est envisagé que la planification et le test de mesures et de techniques d'observation nécessiteront 8 mois/homme d'efforts, dans chacun des trois groupes. En plus, l'achat d'une quantité limitée d'équipement d'enregistrement et de mesure est envisagé.		
...Travail	96.000	
...Equipement	54.000	
b) Etudes des supports: Il est proposé que ces techniques soient appliquées à 18 supports. Ceci représente environ 24 jours/homme d'efforts au sein de chaque support et un surplus de 40 jours/homme de travail par support réservé à des analyses. Ceci est considéré comme devant être une activité à plein temps pour deux spécialistes par groupe sur une période de 14 mois.		
...Travail	336.000	
...Déplacement,	24.000	
Matériel, etc...	510.000	510.000

2. TACHES 3.2, 3, 4; 4.1 - 4.4, "EXPOSE DE L'EXPERIENCE"

Une technique de questionnaire/interview appuyée par l'utilisation de quelques expériences préalables pour l'établissement de techniques et de méthodes d'analyses permettra d'attaquer le problème.

a) Préparation:	...Travail	12.000
	...Déplacement, etc.	4.000
b) Etudes des Supports: Les coûts pour accomplir "ce travail" dans les 18 supports mentionnés précedemment sont inclus ci-dessus. En appliquant des techniques fondées sur des bases plus larges, les coûts supplémentaires suivants sont à prévoir. Il est à considérer comme base d'évaluation une nécessité de 5 jours/homme par support et ceci pour 20 supports supplémentaires. Ceci est considéré comme étant une activité à plein temps pour deux spécialistes dans chaque groupe pour une période de deux mois.		
	...Travail	(48.000)
	...Déplacement, etc.	(25.000)
c) Déchiffrage des analyses: L'analyse des résultats sera facilitée par l'utilisation de programmes sur calculateur. Considérant un exemple de 20 individus par support avec environ une centaine de questions par personne, environ 10 heures de temps de fonctionnement d'ordinateur seront nécessaires avec un supplément de 8 semaines/homme d'effort dans chaque groupe.		
	...Travail	24.000
	...Calcul, matériel	22.000
Avec les résultats des rapports de 20 supports supplémentaires le complément de frais suivants devrait être envisagé.		
	...Travail	(24.000)
	...Calcul	(22.000)
		62.000
		(181.000)
		62.000
		(181.000)

3. TACHE 3.1, "TEST DE CONTROLE DE LA VUE" Les dépenses entrainées par l'établissement et la vérification d'une procédure standard de test de la vue ont été estimées sur la base des activités d'un spécialiste dans chaque groupe sur une période de 6 mois. Ces coûts ont été préalablement estimés à 24.000 DM pour chaque groupe, ceci incluant les frais de travail, déplacement et l'engagement d'autorités indépendantes sur une base consultative. Il est prévu que quelques frais supplémentaires seraient entrainés par l'établissement d'une procédure de rapport, d'une banque de données et de facilités d'analyses. Ces coûts ne peuvent pas à présent être déterminés avec précision et il est proposé d'attribuer une marge de sécurité de 10.000 DM par groupe, en vue de couvrir ces frais.	72.000 30.000 102.000	
4. TACHE 5. "INVESTIGATION SUR LE DANGER DE RADIATION" Il est envisagé que cette enquête soit menée en liaison avec les reponsables de la Santé et de la Sécurité de deux nations. Les coûts entrainés par ces études seront imputables aux moyens de mesure, expertise et travail de ces autorités, procuration et transport de l'équipement nécessaire, coûts de comtes-rendus, etc.	25.000	25.000
5. ACTIVITES DE SUPPORT EXPERIMENTAL Il est envisagé qu'une certaine quantité de supports d'expériences deviendront nécessaires du fait que le projet procède à clarifier les points apparaissant des premières étapes de l'enquête. Il n'est pas possible à ce stade de prédire avec certitude l'étendue de ces activités quoique la somme qui est ici affectée est considérée comme étant réaliste.	200.000	200.000

	4.4 Attitude face à l'environnement et à la place de travail au terminal	Afin de déterminer: a) quelle ligne et quelles caractéristiques opérationnelles du terminal à écran et de l'équipement annexe, par exemple support de manuscript etc. ont la plus grande influence sur l'aversion (1) aux méthodes de travail et (2) de probabilité de malaise dans ces différentes catégories, et b) pour établir une base pour constituer les spécifications des terminaux à écran, en considérant un rapport minimum de recherche de ligne/facilité opérationnelle, dans ces catégories de travail.
5. RECHERCHE DE L'EMISSION DE RADIATION	5.1 Mesures d'émissions de radiation	Pour déterminer les caractéristiques d'émission de fréquence de radiation des ondes-radio et des micro-ondes des terminaux à écran et pour établir la signification de ces caractéristiques du point de vue de la santé et de la sécurité de l'opérateur.

6. "RAPPORT FINAL"

Au cours du projet et lors de son achèvement dans le courant de l'année 1979, il y aura plusieurs types différents de publications, à savoir: livres de poche, feuilles de données, articles etc. Il a aussi été proposé qu'une version du rapport final pourrait prendre la forme d'un ouvrage constitué de contributions demandées au sein de notre commité et d'ailleurs. Il est proposé que ceci fasse l'objet d'un budget détaillé et séparé s'élevant à:	180.000	180.000
		1.198.000

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Inca-Fiej research association

THE INTERNATIONAL RESEARCH ASSOCIATION FOR NEWSPAPER TECHNOLOGY

WASHINGTONPLATZ 1 – 61, DARMSTADT (WEST GERMANY) – TELEPHONE 76057 TELEX 0419273

MEMORANDUM 77/08E

June 23rd, 1977

"THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS"

... CONCEPT, METHODS AND SCOPE OF THE IFRA PROJECT

1. Background

With the introduction of computer systems with data entry from visual display terminals (VDTs), anxieties have arisen concerning the possibility that the eye-sight of VDT operators might become damaged due to their prolonged occupation with devices of this kind. This debate has been of particular concern to many national trade unions in the printing and publishing sector but, as these anxieties have continued to increase, the debate has been extended to include all sectors of industry in which VDTs have been or are being introduced on a widespread scale, e.g. banking, insurance, etc.

Research efforts during the past two years have not been sufficient to clarify the true nature of this problem, and within the past year, several national trade unions - including journalists unions - have called for an investigation of the type now being considered. In West Germany, for example, the journalists union actively supported the DAG (Deutsche Angestellten Gewerkschaft) in establishing an investigation with the University of Berlin which, although not specifically related to the conditions of the printing and publishing industry has produced a great deal of valuable information concerning workplace conditions in general. Similar concerns have been expressed in the Benelux countries, in France and in the United Kingdom where an N.U.J. resolution was recently passed in support of a recommendation that "a medical examination into the health aspects of using visual display terminals" be undertaken.

It is for this reason, therefore, that there is seen to be an urgent need for an objective and industry- (rather than laboratory-) oriented investigation with the highest level of authority in order to establish this question into the correct perspective.

This issue has been raised in the tarrif negotiations between the employers and trade unions in West Germany, and the IFRA Board has assigned a high priority to this project because it is considered most likely that these issues will also be raised in the negotiations in other European countries.

2. Scope of the project

The principal objectives of the IFRA Project are directed towards two goals:

* the establishment of minimum specifications for the design and display characteristics of VDTs for text processing and

* to provide minimum specifications relating to the layout of the individual terminal workplace, and the terminals office as a whole.

The criteria which have been adopted in seeking these specifications are those of ensuring individual freedom from feelings of strain, dissatisfaction and visual impairment at work.

In essence, the setting of these "minimum specifications" will rest upon the answers to four basic questions, i.e.

1. Does the VDT represent a significant hazard to operator health and well-being at work, and

2. are these hazards significantly different from those commonly associated with the more traditional methods of working?

3. Under what conditions or to which personal factors, features of the device and environment can these risks be attributed, and

4. what steps can be taken - by attention to equipment design and workplace layout - to minimise or eliminate these problems?

In considering how the problem should be tackled, and how this investigation should be formulated, it has become apparent that these questions are not as straightforward as they might appear. Whilst physical discomforts such as eye-strain, headaches and so on are relatively easy to categorise, the causes of these types of complaint are not as clearly defined as we might suppose. To a certain extent, complaints such as these can be traced to the characteristics of the device and its environment (especially as regards lighting conditions), the type of work being performed, personal factors and so on. Even at this level, the number of individual factors which might contribute to feelings of physical discomfort at work is very large indeed, although for the most part, they can be examined in quantitative terms.

A basic complication in dealing with the problem arises, however, from the fact that complaints of discomfort at work are likely, in many cases, to stem partially from individual frustrations and anxieties which it is necessary to better understand in order to establish appropriate design and operating characteristics for the terminal and the system.

There are, therefore, two aspects - the *physical* and the *psychological* - to the question of "discomfort at work" using VDTs, and as far as this investigation is concerned, it is now clear that both aspects can and should be looked into.

The complexity of the problem has defied any attempt to concieve of an investigation which, at a fundamental level and in the short term, would provide all of the answers that we are looking for. In fact, as far as the risk of sight impairment is concerned, it can only be after several years of regular medical inspections that a clear answer might emerge and then only on the basis of what is usually called an "epidemiological" type of analysis.

In the short term, we have had to look for an alternative route in tackling the problem, and the answer seems to lie in a detailed comparison of "traditional" working methods with those of the "new techniques". This line of approach, and the methods of observation and measurement which have been developed and applied by our experts during the past year, has weighed heavily in the concept of the investigation at it is briefly summarised in this note.

3. Studies to be performed

In Appendix 1, the investigation has been subdivided into its component stages with an indication as to the principal objectives in each stage.

It can be seen that emphasis has been placed on four parallel lines of enquiry, viz:

Task analysis, i.e. both a general and detailed investigation of how the introduction of VDTs for text processing has changed working methods as well as the physiological and psychological demands of the individual. It is envisaged that these studies will be carried out in about 18 newspaper and news agency offices primarily in France, West Germany, United Kingdom, Holland, Belgium and Italy over a period of 14 months beginning at the end of this year. The techniques which are used in this part of the investigation are based on direct observation and measurements in plant to provide a quantitative description of the tasks involved

in each of the functions which are considered. This will principally concern the newsroom and composing room operations.

This type of study is sometimes referred to as a "multimoment" study, and these techniques have been used by the University of Berlin throughout their current investigations on behalf of the West German Ministry of Labour, including a pilot study which was made at the DPA offices in Hamburg.

This stage of the investigation will also entail a programme of measurement to describe workplace and work station conditions, e.g. ambient and local levels of illumination, furniture characteristics etc.

Experience survey. In each of these 18 plants, but also on a much broader cross-section of European newspaper and news agency offices, an attempt will be made to better define the attitudes and experiences of individuals to the introduction and use of VDTs. Particular attention will be paid to determining which of the design and operating characteristics of a VDT and its ancilliary equipment has the greatest impact on the operator, and to determine which of these characteristics should form the basis for attempts at laying down specifications for the equipment.

This investigation will be carried out using a questionnaire and interview "package", much of which has already been developed. Using these techniques, an attempt will also be made to determine whether or not the introduction of VDTs is causing or is likely to cause any significant change in the attitude of the individual to the job that he is doing, and to interpret these reactions from the point of view of dissatisfaction and discomfort at work.

In seeking a broader background for analysing these experiences, it is proposed that this stage of the investigation is extended to include a survey among a representative cross-section of the U.S. newspaper industry.

Sight testing. Parallel to these "in plant" types of investigation, equally great emphasis has been placed on developing a *standardised procedure for eye-sight testing* which can be applied easily on a routine basis as a means for periodic eye-sight control of VDT operators. It is felt to be essential that such tests are carried out at regular intervals, but it is absolutely essential that the methods are standardised in order to make comparisons possible and meaningful.

In developing this procedure, advice will be sought from Europe's leading opthalmologists and the method which

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MEMORANDUM 77/08E

June 23rd, 1977

"THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS"

... CONCEPT, METHODS AND SCOPE OF THE IFRA PROJECT

1. Background

With the introduction of computer systems with data entry from visual display terminals (VDTs), anxieties have arisen concerning the possibility that the eye-sight of VDT operators might become damaged due to their prolonged occupation with devices of this kind. This debate has been of particular concern to many national trade unions in the printing and publishing sector but, as these anxieties have continued to increase, the debate has been extended to include all sectors of industry in which VDTs have been or are being introduced on a widespread scale, e.g. banking, insurance, etc.

Research efforts during the past two years have not been sufficient to clarify the true nature of this problem, and within the past year, several national trade unions - including journalists unions - have called for an investigation of the type now being considered. In West Germany, for example, the journalists union actively supported the DAG (Deutsche Angestellten Gewerkschaft) in establishing an investigation with the University of Berlin which, although not specifically related to the conditions of the printing and publishing industry has produced a great deal of valuable information concerning workplace conditions in general. Similar concerns have been expressed in the Benelux countries, in France and in the United Kingdom where an N.U.J. resolution was recently passed in support of a recommendation that "a medical examination into the health aspects of using visual display terminals" be undertaken.

It is for this reason, therefore, that there is seen to be an urgent need for an objective and industry- (rather than laboratory-) oriented investigation with the highest level of authority in order to establish this question into the correct perspective.

This issue has been raised in the tarrif negotiations between the employers and trade unions in West Germany, and the IFRA Board has assigned a high priority to this project because it is considered most likely that these issues will also be raised in the negotiations in other European countries.

2. Scope of the project

The principal objectives of the IFRA Project are directed towards two goals:

* the establishment of minimum specifications for the design and display characteristics of VDTs for text processing and

* to provide minimum specifications relating to the layout of the individual terminal workplace, and the terminals office as a whole.

The criteria which have been adopted in seeking these specifications are those of ensuring individual freedom from feelings of strain, dissatisfaction and visual impairment at work.

In essence, the setting of these "minimum specifications" will rest upon the answers to four basic questions, i.e.

1. Does the VDT represent a significant hazard to operator health and well-being at work, and

2. are these hazards significantly different from those commonly associated with the more traditional methods of working?

3. Under what conditions or to which personal factors, features of the device and environment can these risks be attributed, and

4. what steps can be taken - by attention to equipment design and workplace layout - to minimise or eliminate these problems?

In considering how the problem should be tackled, and how this investigation should be formulated, it has become apparent that these questions are not as straightforward as they might appear. Whilst physical discomforts such as eye-strain, headaches and so on are relatively easy to categorise, the causes of these types of complaint are not as clearly defined as we might suppose. To a certain extent, complaints such as these can be traced to the characteristics of the device and its environment (especially as regards lighting conditions), the type of work being performed, personal factors and so on. Even at this level, the number of individual factors which might contribute to feelings of physical discomfort at work is very large indeed, although for the most part, they can be examined in quantitative terms.

A basic complication in dealing with the problem arises, however, from the fact that complaints of discomfort at work are likely, in many cases, to stem partially from individual frustrations and anxieties which it is necessary to better understand in order to establish appropriate design and operating characteristics for the terminal and the system.

There are, therefore, two aspects - the *physical* and the *psychological* - to the question of "discomfort at work" using VDTs, and as far as this investigation is concerned, it is now clear that both aspects can and should be looked into.

The complexity of the problem has defied any attempt to concieve of an investigation which, at a fundamental level and in the short term, would provide all of the answers that we are looking for. In fact, as far as the risk of sight impairment is concerned, it can only be after several years of regular medical inspections that a clear answer might emerge and then only on the basis of what is usually called an "epidemiological" type of analysis.

In the short term, we have had to look for an alternative route in tackling the problem, and the answer seems to lie in a detailed comparison of "traditional" working methods with those of the "new techniques". This line of approach, and the methods of observation and measurement which have been developed and applied by our experts during the past year, has weighed heavily in the concept of the investigation at it is briefly summarised in this note.

3. Studies to be performed

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It can be seen that emphasis has been placed on four parallel lines of enquiry, viz:

Task analysis, i.e. both a general and detailed investigation of how the introduction of VDTs for text processing has changed working methods as well as the physiological and psychological demands of the individual. It is envisaged that these studies will be carried out in about 18 newspaper and news agency offices primarily in France, West Germany, United Kingdom, Holland, Belgium and Italy over a period of 14 months beginning at the end of this year. The techniques which are used in this part of the investigation are based on direct observation and measurements in plant to provide a quantitative description of the tasks involved

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Experience survey. In each of these 18 plants, but also on a much broader cross-section of European newspaper and news agency offices, an attempt will be made to better define the attitudes and experiences of individuals to the introduction and use of VDTs. Particular attention will be paid to determining which of the design and operating characteristics of a VDT and its ancilliary equipment has the greatest impact on the operator, and to determine which of these characteristics should form the basis for attempts at laying down specifications for the equipment.

This investigation will be carried out using a questionnaire and interview "package", much of which has already been developed. Using these techniques, an attempt will also be made to determine whether or not the introduction of VDTs is causing or is likely to cause any significant change in the attitude of the individual to the job that he is doing, and to interpret these reactions from the point of view of dissatisfaction and discomfort at work.

In seeking a broader background for analysing these experiences, it is proposed that this stage of the investigation is extended to include a survey among a representative cross-section of the U.S. newspaper industry.

Sight testing. Parallel to these "in plant" types of investigation, equally great emphasis has been placed on developing a *standardised procedure for eye-sight testing* which can be applied easily on a routine basis as a means for periodic eye-sight control of VDT operators. It is felt to be essential that such tests are carried out at regular intervals, but it is absolutely essential that the methods are standardised in order to make comparisons possible and meaningful.

In developing this procedure, advice will be sought from Europe's leading opthalmologists and the method which

is developed will be tested and applied in the course of the aforementioned investigations. An attempt will also be made to develop a standardised reporting procedure, and it is proposed to establish a central data bank with which to analyse the results of these investigations in a sample group of plants and over a period of several years.

Radiation emission and exposure. By virtue of its mode of operation, the cathode ray tube (CRT) must be considered as a potential source of various forms of radiation emission. Emissions of this kind, and particularly in the X-ray region of the electromagnetic spectrum, have been widely implicated as a source of visual discomfort and more serious forms of visual impairment among VDT operators.

IFRA has paid serious attention to this question and in the course of the inquiries which have so far been made, equipment specialists, occupational and radiation health authorities in many countries have been consulted. On the basis of these enquiries, and the results from many series of x-radiation measurements, the emission of x-radiation from CRT devices with an operating potential of less than 20 kilovolts has not been found to be a measurable quantity.

However, other regions of the electromagnetic spectrum are considered to be potentially damaging to the human eye, and more comprehensive studies of the optical, visible, infrared and radiofrequency radiation emissions are necessary in order to fully resolve this question from the health and safety point of view.

It is proposed therefore to commission a series of in-depth radiometric analyses of the radiation emission from visual display terminals. It is proposed that these studies be carried out with the help of the leading equipment manufacturers in West Germany, France and the United Kingdom, working in close liaison with the national Health and Safety executive authorities in these nations.

4. Budget requirement; time frame

The budgeting requirements for these project activities are summarised in Appendix B.

Based on these cost estimates, an overall requirement of 1,200,000 DM is envisaged in the period extending from July 1977 to July 1979. The project schedule is, however, strongly dependent upon the availability of sufficient funding.

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5. Project administration

The detail planning and execution of these activities will be commissioned with the following three authorities:

Technische Universität Berlin,
Institut für Arbeitswissenschaft,
Hardenbergstrasse 34,
1-BERLIN 12
FEDERAL REPUBLIC OF GERMANY

Head of Department: *Professor A. Armbruster*
Research Leader: *Dr. A. Cakir*

Conservatoire National des Arts et Métiers,
Laboratoire de Physiologie du Travail et Ergonomie,
41, Rue Gay-Lussac,
75005 PARIS
FRANCE

Head of Department: *Professor A. Wisner*
Research Leader: *Dr. F. Jankowsky*

University of Loughborough,
Department of Human Sciences,
Leicestershire LE11 3TV,
ENGLAND

Head of Department: *Professor B. Shackel*
Research Leader: *Mr. T. Stewart*

These three institutes have been and will continue to be represented in the working group which has been nominated by the IFRA Technical Committee and which comprises the following representatives:

Mr. P. Jaume,
Technical Director
Entreprise de Presse No. 1,
F-69680 CHASSIEU, FRANCE

Mr. J. May,
Director of Research, Development and Engineering
Mirror Group Newspapers Ltd.,
33, Holborn Circus
LONDON, ENGLAND

Dr. T. Pohlert,
Managing Director,
Deutsche Presse Agentur,
Mittelweg 38,
HAMBURG 13, F.R.G.

Mr. J. Saint-Cricq,
Director General,
La Nouvelle République
du Centre-Ouest,
4-18, Rue de la Préfecture,
F-37000, TOURS, FRANCE

The Research Director of IFRA, Mr. D.J. Hart is acting in the role of Project Coordinator.

It is expected that the members of this working group will continue their efforts to establish a close and active liaison with the trade unions.

David J. Hart
Darmstadt 1977-06-23

APPENDIX 1

STUDIES TO BE PERFORMED

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
1. TASK ANALYSIS		
1.1 General task analyses of the selected categories		By examining, in general terms, the content of the work, the tools which are used and the time spent at work, to determine a) the essential characteristics of the work in these categories and b) to determine the changes in working methods which the new techniques have resulted in.
1.2 Individual task analyses		By quantitatively examining the behaviour of the eyes and other parts of the body at work, to determine: a) the physiological demands on the individual at work, and b) to provide a basis for a comparitive description of this behaviour in a form which can be interpreted from the "health" point of view.
2. PHYSICAL MEASUREMENTS		
2.1 In-plant measurements of local and ambient lighting, workplace configuration etc.		To provide a description of and to compare individual working conditions in order to identify the "environmental" factors which might be responsible for discomfort among individuals at work.

3. PERSONAL FACTORS:	
3.1 measurement of visual function	To determine: a) the types and frequencies of uncorrected sight defects among these working categories, and b) to develop a standardised procedure for eye-sight testing for screening and routine control of VDT operators.
3.2 review of individual medical histories	To better describe the "occupational" ailments to which these working categories are prone, and to determine the relative frequencies with which these ailments occur in the traditional and new technique environments.
3.3 individual characteristics, e.g. age distribution, smoker etc.	By examining e.g. the age distribution, smoking habits etc., to better define those personal factors which might have a "synergistic" effect on discomfort at work.

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
4. SUBJECTIVE REACTIONS 4.1 attitude of work being performed		By examining individual attitudes as regards creativity, levels of responsibility and satisfaction at work, to determine: a) the impact which the new techniques may have had or be having on attitudes to work being performed, and b) the extent to which negative reactions in this respect, if they are detected, might contribute to the incidence of complaints at work.
4.2 attitude to the way the work is performed		To compare attitudes to the way the work is performed and to more specifically determine: a) the extent to which these attitudes might contribute to feelings of stress, frustration etc. at work, and b) the extent to which individuals themselves see room for improvement in the working methods being used.

4.3 prior attitudes to "new techniques"		a) to <u>better define</u> the attitude of individuals now working with conventional techniques to the "coming" technology and b) to more specifically <u>determine</u> which factors might be responsible for personal fears or anxieties as regards the introduction of new techniques.
	4.3 experience reactions to the new vs old methods	By examining the experiences of those who have made the transition from more conventional to new techniques, to <u>determine:</u> a) if individuals feel that their work has become "better or worse" as the result of the introduction of new techniques, and b) to determine which factors individuals may have become "negatively aware of" after the introduction of new techniques and of which they were not aware beforchand.
	4.4 attitude to the terminal workplace and environment	To <u>determine:</u> a) which of the design and operating features of VDTs and ancilliary equipment, e.g. manuscript holders etc., have the greatest impact (1) method of working and (2) likelihood of discomfort in these different categories and b) to provide a basis for establishing minimum design/operating facility specifications for VDTs in these working categories.

5. RADIATION EMISSION INVETIGATION

5.1 Radiation emission measurements	To determine the radio- and microwave frequency radiation emission characteristics of visual display terminals and to establish the significance of these characteristics from the point of view of operator health and safety.

APPENDIX 2

PRELIMINARY COST ANALYSIS

BUDGETING REQUIREMENTS

Task/Notes	Cost	Total
1. TASKS 1.1 - 2.1, "TASK ANALYSIS"		
a) Preparation: It is expected that devising and testing the measurement and observation techniques will require ca 8 man-months of effort in each of the three groups. In addition, a limited amount of recording and measuring equipment purchasing is expected.		
...labour	96.000	
...equipment	54.000	
b) In-plant studies: It is proposed that these techniques be applied in 18 plants. This will involve ca 24 man-days of effort in each plant and a further 40 man-days per plant in analysis. This is considered to be full time activity for 2 specialists in each group over a period of 14 calender months.		
...labour	336.000	
...travel, material etc.	24.000	
	510.000	510.000
2. TASKS 3.2, 3, 4; 4.1 - 4.4, "EXPERIENCE SURVEY"		
This will be tackled by a questionnaire/interview technique with some prior experience to draw upon in setting up the techniques and methods of analysis.		
a) Preparation: ...labour	12.000	
...travel, etc.	4.000	
b) In-plant studies: The costs for running this package in the above mentioned 18 plants are included above. In applying these techniques on a broader basis, however, the following additional costs would be expected. Assuming, as a guide, a requirement of 5 man-days per plant in a further 20 plants. This is considered to be a full-time activity for 2 specialists in each group over a period of 2 calender months.		
...labour	(48.000)	
...travel, etc.	(25.000)	

c) Decoding analysis: The results will be analysed using existing computer programme facilities. Assuming a sample of 20 individuals/plant in ca. 20 plants with ca. 100 "questions" per individual, roughly 10 hours of computing time will be necessary with an additional 8 man-weeks of effort in each group.

...labour	24.000	
...computing, materials	22.000	

With the results form an additional 20 plant surveys, the following additional costs could be envisaged.

...labour	(24.000)	
...computing	(22.000)	
	62.000	62.000
	(181.000)	(181.000)

3. TASK 3.1, "SIGHT CONTROL TESTING"

The costs involved in establishing and testing a standard sight testing procedure have been estimated in the basis of the activities of 1 specialist in each group over a period of 6 calender months. These costs have preliminarily been assessed at 24.000 DM in each group including the costs of labour, travel and the engagement of independent authorities on a consulative basis. 72.000

It is anticipated that some additional costs would be involved in establishing a reporting procedure, data bank and analysis facilities. These costs cannot be accurately specified at this time and it is proposed to allocate a contingency reserve of 10,000 DM per group to cover these costs. 30.000

102.000

4. TASK 5. "RADIATION HAZARD INVESTIGATION" It is expected that this investigation will be carried out in liaison with the Health and Safety Executives of at least two nations. The costs involved in these studies will be incurred in contracting the measuring facilities, expertise and labour of these authorities, procurement and transport of the necessary equipment, costs of reporting etc.	25.000	25.000
5. SUPPORTING EXPERIMENTAL ACTIVITIES It is anticipated that a certain amount of supporting experimentation will become necessary as the project proceeds in order to clarify points arising from earlier stages of the investigation. It is not possible at this stage to reliably predict the scope of these activities although the sum which is here assigned is considered to be realistic.	200.000	200.000
6. "FINAL REPORTING" In the course of the project and at its conclusion during 1979, there will be several different types of publication, e.g. handbooks, data sheets, articles etc. It has also been proposed that one version of the final report could take the form of a book with invited contributions from our committee and others. It is proposed that this be taken as a separate budget item with the following cost:	180.000	180.000 1.198.000

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"THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS IN THE NEWSPAPER INDUSTRY"...

... CONCEPT, METHODS AND SCOPE OF THE IFRA PROJECT

Dear Member,

As you know, the "expert" members of our project committee were to meet in London on May 26/27 in order to clarify the concept, methodology and scope of the work that will need to be undertaken within the framework of this project. I am pleased to be able to report that this meeting was highly successful and we were able not only to clarify the basic goals and working methods of the project, but also to establish a realistic time frame for these activities and to come to some preliminary estimate of the budgeting requirement. These thoughts are summarised in the following notes and will form the main topic for discussion during our meeting in Hamburg on June 14th.

By way of introducing these notes, it will be recalled that the initial concept of this project arose as the result of an increasing pressure from the trade unions as regards the provision of special restrictions on working time for employees working with VDTs. As suspected, these pressures have continued to increase and in several countries, this debate has been extended to include all sectors of industry where VDTs have been or are being introduced on a widespread scale, e.g. banking, insurance etc.

These demands, which are expected to represent the most contentious aspects of the pending tariff contracts in the European graphic arts industry, are based on the claim that the operator of a VDT can, by the nature

of the work, be prone to certain short-term disturbances of the visual function - including what in laymans terms is often called "eye-strain" - and that repeated disturbances of this kind can eventually lead to permanent impairment of eye-sight. This claim stems in large measure from the results from one particular investigation which was carried out in Europe at the initiative of a national trade union organisation. It is unfortunate for the industry that the results from this investigation - which has been heavily criticised by many other European authorities and the results from which have in many cases been misinterpreted - are having such far reaching effects.

It is for this reason, therefore, that there is seen to be an urgent need for a more authoritative, objective and industry- (rather than laboratory-) oriented investigation with which to re-establish this question into a correct perspective. Furthermore, and in view of the fact that national tariff negotiations lay close at hand, the IFRA Board has assigned to this project the highest priority in order to ensure that both management and labour are in possession of the most reliable data at this time.

Turning now to the problem itself, it is quite clear that the questions which we are dealing with are not as straightforward as they appear. We might summarise the problem in terms of a single question, namely "does the VDT represent a significant health hazard to its operator"?, but the number of factors on which this might depend is very large indeed - ranging from the characteristics of the VDT itself, the working environment, the nature of the work, personal factors and so on. The very mangitude of the problem defies any attempt to concieve of an investigation which at a fundamental level and in the short term would provide an answer to

this question. In fact, it is only after several years of regular medical inspections that a clear answer might emerge and then only on the basis of what can be called an "epidemiological" analysis.

In the short term, we have had to look for an alternative route to tackling the problem, and the answer seems to lie on a detailed comparison of existing working methods with those of the "new techniques". This line of approach has weighed heavily in the concept of the project as it is presented here. It can be seen that a lot of emphasis has been placed on "task analysis", i.e. defining both in general and detailed terms how the introduction of VDTs as the working tool has changed the physiological and psychological demands on the individual. It is envisaged that this type of study will be carried out in about 18 newspaper and news agency offices over a period of 14 months beginning in October this year. The results from this investigation, combined with the results from an in depth assessment of experience and personal opinions in a wider cross-section of the industry will help greatly in highlighting if, and if so, where and under what conditions, significant problems exist.

Parallel to these "in field" types of investigation, equally great emphasis has been placed on developing a standardised procedure for eye-sight testing which can be applied easily on a routine basis as a means for periodic eye-sight control of VDT operators. We consider it essential that such tests be carried out - for the reason given earlier - but it is absolutely essential that the method be standardised in order to make comparisons possible and meaningful. This stage of the work will involve the seeking of advice from Europe's leading opthalmologists and the method which is developed will

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As you know, the "expert" members of our project committee were to meet in London on May 26/27 in order to clarify the concept, methodology and scope of the work that will need to be undertaken within the framework of this project. I am pleased to be able to report that this meeting was highly successful and we were able not only to clarify the basic goals and working methods of the project, but also to establish a realistic time frame for these activities and to come to some preliminary estimate of the budgeting requirement. These thoughts are summarised in the following notes and will form the main topic for discussion during our meeting in Hamburg on June 14th.

By way of introducing these notes, it will be recalled that the initial concept of this project arose as the result of an increasing pressure from the trade unions as regards the provision of special restrictions on working time for employees working with VDTs. As suspected, these pressures have continued to increase and in several countries, this debate has been extended to include all sectors of industry where VDTs have been or are being introduced on a widespread scale, e.g. banking, insurance etc.

These demands, which are expected to represent the most contentious aspects of the pending tariff contracts in the European graphic arts industry, are based on the claim that the operator of a VDT can, by the nature

of the work, be prone to certain short-term disturbances of the visual function - including what in laymans terms is often called "eye-strain" - and that repeated disturbances of this kind can eventually lead to permanent impairment of eye-sight. This claim stems in large measure from the results from one particular investigation which was carried out in Europe at the initiative of a national trade union organisation. It is unfortunate for the industry that the results from this investigation - which has been heavily criticised by many other European authorities and the results from which have in many cases been misinterpreted - are having such far reaching effects.

It is for this reason, therefore, that there is seen to be an urgent need for a more authoritative, objective and industry- (rather than laboratory-) oriented investigation with which to re-establish this question into a correct perspective. Furthermore, and in view of the fact that national tariff negotiations lay close at hand, the IFRA Board has assigned to this project the highest priority in order to ensure that both management and labour are in possession of the most reliable data at this time.

Turning now to the problem itself, it is quite clear that the questions which we are dealing with are not as straightforward as they appear. We might summarise the problem in terms of a single question, namely "does the VDT represent a significant health hazard to its operator"?, but the number of factors on which this might depend is very large indeed - ranging from the characteristics of the VDT itself, the working environment, the nature of the work, personal factors and so on. The very mangitude of the problem defies any attempt to concieve of an investigation which at a fundamental level and in the short term would provide an answer to

this question. In fact, it is only after several years of regular medical inspections that a clear answer might emerge and then only on the basis of what can be called an "epidemiological" analysis.

In the short term, we have had to look for an alternative route to tackling the problem, and the answer seems to lie on a detailed comparison of existing working methods with those of the "new techniques". This line of approach has weighed heavily in the concept of the project as it is presented here. It can be seen that a lot of emphasis has been placed on "task analysis", i.e. defining both in general and detailed terms how the introduction of VDTs as the working tool has changed the physiological and psychological demands on the individual. It is envisaged that this type of study will be carried out in about 18 newspaper and news agency offices over a period of 14 months beginning in October this year. The results from this investigation, combined with the results from an in depth assessment of experience and personal opinions in a wider cross-section of the industry will help greatly in highlighting if, and if so, where and under what conditions, significant problems exist.

Parallel to these "in field" types of investigation, equally great emphasis has been placed on developing a standardised procedure for eye-sight testing which can be applied easily on a routine basis as a means for periodic eye-sight control of VDT operators. We consider it essential that such tests be carried out - for the reason given earlier - but it is absolutely essential that the method be standardised in order to make comparisons possible and meaningful. This stage of the work will involve the seeking of advice from Europe's leading opthalmologists and the method which is developed will

also be applied and tested in some stages of these investigations.

Bearing in mind the fact that the results from the main part of the project will not be available until the end of 1978, it is proposed to issue two interim reports. The first report will deal with the question of radiation exposure, and the second will deal with the experiences which have so far been gleaned from the studies which have been made in U.K., West German and French newspapers and news agencies. In this latter report, which will be issued in October 1977, the central theme will be the concept of this project and the afore-mentioned results will be abstracted in order to illustrate the approaches which have been taken so far and the form in which the results from these types of study - which on this scale are quite new to our industry - are presented.

With these short introductory notes, I would like you now to turn to the following pages which give a more detailed description of the project activities so that you might prepare your comments in readiness for our meeting in Hamburg. On the following page - page 6 I have listed out the factors which will need to be examined, and on pages 7 to 10 I have broken the overall project into its "components" giving some indication as to the objectives in each stage. To avoid any confusion, it is worth mentioning that these "enquiries" are tackled in groups and not individually so that tasks 1.1 to 2.1 are carried out simultaneously in the task analysis stage. Likewise, all of the points which are raised under section 4 are considered together in a single "package" in the form of a questionnaire/interview technique.

Finally, the concept of the project is reviewed on page 11 in terms of the four basic questions with an indication

as to which specific question each of the preceding sections refers.

The anticipated budget requirements for the project are dealt with on page 12 this will require the approval (or otherwise) of this committee before the proposal is submitted to the IFRA Technical Committee on June 30th. Quite clearly, the overall requirements of ca 800,000 DM lies outside the scope of IFRA's immediate budgeting possibilities so alternative sources of funding will have to be sought. Several possibilities seem to exist in this respect and these we ought perhaps to consider in some detail, during our meeting.

WELCOME TO HAMBURG!

Yours sincerely,

David J. Hart
Darmstadt 1977-06-02

P.S. The final decision about the go-ahead for the project will be taken by the IFRA-Board in the next meeting, which will not be before August 18th. Because of the preliminary nature of this compilation, the IFRA-Board is, as of this day, not informed about the details of the project.

FACTORS TO BE EXAMINED

1. Mode of working, i.e. task definition.

   what does the job involve, how is it done, what tools are used, how and how often are they used etc.

2. Individual modes of working, i.e. detailed taks analysis studies of time spent at keyboard and keying, time spent viewing, time distributions etc.

3. Subjective reactions to
   - the terminal and system
   - the workplace
   - type of work, i.e. responsibility, creativity, attitude etc.
   - mode of working
   - pressure at work

4. Medical history

   i.e. frequency and types of complaints, eyesight defects, corrective medicine, etc.

5. The working environment

   e.g. lighting levels, workplace layout, noise levels, provision of manuscript holders etc.

6. Ways of combatting complaints

   by design/ workplace specifications, lighting requirements, eyesight tests and frequency, manuscript holder design etc., time allotment, etc.

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
1. TASK ANALYSIS		
1.1 General task analyses of the selected categories		By examining, in general terms, the content of the work, the tools which are used and the time spent at work, to determine a) the essential characteristics of the work in these categories and b) to determine the changes in working methods which the new techniques have resulted in.
1.2 Individual task analyses		By quantitatively examining the behaviour of the eyes and other parts of the body at work, to determine: a) the physiological demands on the individual at work, and b) to provide a bases for a comparitive description of this behaviour in a form which can be interpreted from the "health" point of view.
2. PHYSICAL MEASUREMENTS		
2.1 In-plant measurements of local and ambient lighting, workplace configuration etc.		To provide a description of and to compare individual working conditions in order to identify the "environmental" factors which might be responsible for discomfort among individuals at work.

3. PERSONAL FACTORS:	
3.1 measurement of visual function	To determine: a) the types and frequencies of uncorrected sight defects among these working categories, and b) to develop a standardised procedure for eye-sight testing for screening and routine control of VDT operators.
3.2 review of individual medical histories	To better describe the "occupational" ailments to which these working categories are prone, and to determine the relative frequencies with which these ailments occur in the traditional and new technique environments.
3.3 individual characteristics, e.g. age distribution, smoker etc.	By examining e.g. the age distribution, smoking habits etc., to better define those personal factors which might have a "synergistic" effect on discomfort at work.

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
4. SUBJECTIVE REACTIONS		
4.1 attitude to work being performed	4.1. attitude of work being performed	By examining individual attitudes as regards creativity, levels of responsibility and satisfaction at work, to determine. a) the impact which the new techniques may have had or be having on attitudes to work being performed, and b) the extent to which negative reactions in this respect, if they are detected, might contribute to the incidence of complaints at work.
4.2 attitude to the way the work is performed	4.2 attitude to the way the work is performed	To compare attitudes to the way the work is performed and to more specifically determine: a) the extent to which these attitudes might contribute to feelings of stress, frustration etc. at work, and b) the extent to which individuals themselves see room for improvement in the working methods being used.

4.3 prior attitudes to "new techniques"		a) to <u>better define</u> the attitude of individuals now working with conventional techniques to the "coming" technology and b) to more specifically <u>determine</u> which factors might be responsible for personal fears or anxieties as regards the introduction of new techniques.
	4.3 experience reactions to the new vs old methods	By examining the experiences of those who have made the transition from more conventional to new techniques, to <u>determine:</u> a) if individuals feel that their work has become "better or worse" as the result of the introduction of new techniques, and b) to determine which factors individuals may have become "negatively aware of" after the introduction of new techniques and of which they were not aware beforehand.
	4.4 attitude to the terminal workplace and environment	To <u>determine:</u> a) which of the design and operating features of VDTs and ancilliary equipment, e.g. manuscript holders etc., have the greatest impact (1) method of working and (2) likelihood of discomfort in these different categories and b) to provide a basis for establishing minimum design/operating facility specifications for VDTs in these working categories.

THE QUESTIONS TO BE RESOLVED

1. Does the VDT represent a significant hazard to operator health and well being at work?

   See Sections: 1.2; 3.2; 4.1; 4.2

2. Are these risks significantly different from those which are associated with the more traditional methods of working?

   See Sections: 1.1; 1.2; 3.2; 4.1; 4.2; 4.3; 4.4;

3. Under what conditions or to which personal factors, features of the device and environment can these risks be attributed.

   See Sections: 2.1; 3.1; 3.3; 4.2;

4. What steps can be taken to minimise or eliminate these problems?

   See Sections: 3.1; 3.3; 4.4

BUDGETING REQUIREMENTS

Task/Notes		Cost DM	Total DM	Start	End
1. TASKS 1.1 - 2.1, "TASK ANALYSIS"					
a) Preparation: It is expected that devising and testing the measurement and observation techniques will require ca 8 man/months of effort in each of the three groups. In addition, a limited amount of equipment purchasing is expected.	...labour	96.000		June '77	Oct '77
	...equipment	15.000			
b) In-plant studies: It is proposed that these techniques be applied in 18 plants. This will involve ca 24 man/days of effort in each plant and a further 40 man/days per plant in analysis.	...labour	225.000		Oct '77	Dec '78
	...travel, etc.	25.000			
		361.000	361.000		
2. TASKS 3.2, 3, 4; 4.1 - 4.4, "EXPERIENCE SURVEY"					
This will be tackled by a questionnaire/interview technique with some prior experience to draw upon in setting up the techniques and methods of analysis.					
a) Preparation:	...labour	8.000		June ' 77	Oct '77
	...travel, etc.				
b) In-plant studies: The costs for running this package in the above mentioned 18 plants are included above. If as it is hoped, these techniques are applied on a broader basis additional labour, travelling and analysis costs would be incurred. Assuming, as a guide, a requirement of 5 man/days per plant in a further 20 plants, the following costs might be expected. (These costs would be representative for an extended study in the United States.)	...labour	(45.000)		Oct '77	Dec '78
	...travel, etc.	(25.000)			

SUMMARY OF COSTS

Based on the foregoing cost estimates, an overall budgeting requirement of ca 800,000 DM is envisaged in the period extending to the summer of 1979. In arriving at this figure, provision has been made for an extension of the "experience survey" to include an extensive period of study in newspaper and news agency offices in the United States, i.e. in the one national sector where there is a relatively long period of experience to analyse.

- - - - - -

prière de répondre à ma place ——→
Jean Hunly merci JANKOUSKY

Inca-Fiej research association

THE INTERNATIONAL RESEARCH ASSOCIATION FOR NEWSPAPER TECHNOLOGY

WASHINGTONPLATZ 1 – 61, DARMSTADT (WEST GERMANY) – TELEPHONE 76057 TELEX 0419273

INVITATION

TO THE SECOND MEETING OF THE IFRA PROJECT GROUP DEALING WITH:

"THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS IN THE NEWSPAPER INDUSTRY"

This invitation is cordially extended to the following members of the group or their representatives:

Prof. A. Armbruster	T.U. Berlin, Abt. für Arbeitswissenschaft (D)
Mr. P. Jaume	Entreprise de Presse No.1, Chassieu (F)
Mr. J. May	Mirror Group Newspapers, London (GB)
Dr. T. Pohlert	Deutsche Presse Agentur, Hamburg (D)
Mr. J. Saint-Cricq	La République du Centre-Ouest, Tours (F)
Dr. T. Stewart	University of Loughborough (GB)
Prof. A. Wisner	C.N.A.M., Laboratoire d'Ergonomie, Paris (F)

1. Background

Since our first meeting in August of last year, a number of individual studies have been made by several members of the project group, and the results from these investigations have helped greatly in clarifying IFRA's objectives and approach to the project as a whole.

In order to synthesise these experiences into a proposal concerning the continuation of the IFRA project, a special meeting of the three university representatives on the committee will be held in London on May 26/27.

The outcome of this meeting will hopefully lead to a more definite proposal as regards the methods which can be applied in carrying out this project, and the objective of our meeting

in Hamburg will be:

a) to review the results from the various studies which have been made to date, and

b) to consider the working methods which can be applied in continuing the project.

A more formal working agenda for this meeting will be presented at the meeting itself.

2. Meeting place and date

Thanks to the kind invitation of Dr. Pohlert, the meeting will take place at the offices of:

Deutsche Presse Agentur, DPA,
Mittelweg 38,
D-2000 Hamburg 36
West Germany

on Tuesday, June 14th starting ca 09.30hrs.

3. Accommodation

Single rooms have been reserved at:

Hotel Intercontinental
Fontenay
Hamburg 13,
Tel.: 44 10 81

for the night June 13/14. Accommodation is also available at the same hotel for the Tuesday night, June 14/15 in the event that some participants may wish to remain in Hamburg during the evening after the meeting.

Would all participants please confirm their accommodation requirements as soon as possible.

WELCOME TO HAMBURG!

Yours sincerely

David J. Hart
Research Director

Addendum

In order to remind ourselves once again of the main objectives of this project, the note which is attached to this invitation has been prepared for the benefit of the IFRA members and has also been circulated to employers and trade union organisations throughout Europe.

THE WORKING FUNCTIONS TO BE STUDIED

1. Wire story selection and editing

2. Direct input journalism

3. Story and make-up editing

4. Direct input from manuscripts (production)

5. Direct input classified and display ads = advertisements.

6. Proofreading and correction (production)

FACTORS TO BE EXAMINED

1. Mode of working, i.e. task analysis.
   what does the job involve, how is it done, what tools are used, how and how often are they used etc.

2. Individual modes of working, i.e. detailed task analysis studies of time spent at keyboard and keying, time spent viewing, time distributions etc.

3. Subjective reactions to
   - the terminal and system
   - the workplace
   - type of work, i.e. responsinility, creativity, attitude etc
   - mode of working compared with traditional techniques
   - pressure at wotk

4. Medical history
   i.e. frequancy and types of complaints, eyesight defects, corrective medicine etc

5. The working environment
   e.g. lighting levels, workplace layout, noise lebels, provision of manuscript holders etc.

6. Ways of combatting complaints
   by design/ workplace specifications, lighting requitements,

1. THE TERMINAL AND THE SYSTEM

1.1 Character legibility
- size, spacing, resolution, clarity

1.2 Screen colours

1.3 Screen reflectivity .

1.4 Display capacity

1.5 Scrolling mode and capacity

1.6 Refresh rate

1.7 System response time

1.8 Screen luminance

1.9 Screen angle tilt

1.10 Keyboard physical data
- size, spacing, feel

1.11 layout

1.12 Complexity
- provision of programmable keys

1.13 Coulour scheme/reflectivity

1.14 Detachable/fixed keyboard

2. WORKPLACE

2.1 Local lighting conditions

2.2 Desk configuration

2.3 Chair configuration

2.4 Equipment configuration

- direct/oblique viewing, telephones etc

2.5 Provision for manuscript holder

2.6 Other objects of attention

- documents, telephones, printers

3. ENVIRONMENT

3.1 Ambient lighting level

3.2 Noise

- otehr equipment, colleagues etc

3.3 Office layout

-roomy/cluttered, light/dingy

3.4 Colour schemes

3.5 Point light sources

- lamps, windows and relative siting of terminals

4. WORKING METHODS

4.1 Day/night work

4.2 Working time at the terminal

4.3 Viewing concentration

4.4 Rest periods

4.5 Mixed working

4.6 Individual freedom to break from work

4.7 Responsibility

4.8 Creativity

4.9 Pressure of work

5. PERSONAL FACTORS

5.1 Age

5.2 Smoker / non-smoker

5.3 Individual character

5.4 "Transient" personality

5.5 Eyesight defects

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
1. TASK ANALYSIS		
1.1 General task analyses of the selected categories		By examining, in general terms, the content of the work, the tools which are used and the time spent at work, to determine a) the essential characteristics of the work in these categories and b) to determine the changes in working methods which the new techniques have resulted in.
1.2 Individual task analyses		By quantitatively examining the behaviour of the eyes and other parts of the body at work, to determine: a) the physiological demands on the individual at work, and b) to provide a bases for a comparitive description of this behaviour in a form which can be interpreted from the "health" point of view.
2. PHYSICAL MEASUREMENTS		
2.1 In-plant measurements of local and ambient lighting, workplace configuration etc.		To provide a description of and to compare individual working conditions in order to identify the "environmental" factors which might be responsible for discomfort among individuals at work.

3. PERSONAL FACTORS:	
3.1 measurement of visual ~~acuity~~ functions	To determine: a) the types and frequencies of uncorrected sight defects among these working categories, and b) to develop a standardised procedure for eye-sight testing for screening and routine control of VDT operators.
3.2 review of individual medical histories	To better describe the "occupational" ailments to which these working categories are prone, and to determine the relative frequencies with which these ailments occur in the traditional and new technique environments.
3.3 individual characteristics, e.g. age distribution, smoker etc.	By examining e.g. the age distribution, smoking habits etc., to better define those personal factors which might have a "synergistic" effect on discomfort at work.

STUDIES TO BE PERFORMED		OBJECTIVES
CONVENTIONAL METHODS	NEW TECHNIQUES	
4. SUBJECTIVE REACTIONS		
4.1 attitude to work being performed	4.1. attitude of work being performed	By examining individual attitudes as regards creatively, levels of responsibility and satisfaction at work, to determine. a) the impact which the new techniques may have had or be having on attitudes to work being performed, and b) the extent to which negative reactions in this respect, if they are detected, might contribute to the incidence of complaints at work.
4.2 attitude to the way the work is performed	4.2 attitude to the way the work is performed	To compare attitudes to the way the work is performed and to more specifically determine: a) the extent to which these attitudes might contribute to feelings of stress, frustration etc. at work, and b) the extent to which individuals themselves see room for improvement in the working methods being used.

4.3 prior attitudes to "new techniques"	a) To better define the attitude of individuals now working with conventional techniques to the "coming" technology and b) to more specifically determine which factors might be responsible for personal fears or anxieties as regards the introduction of new techniques.
4.3 experience reactions to the new vs old methods	By examining the experiences of those who have made the transition from more conventional to new techniques, to determine: a) if individuals feel that their work has become "better or worse" as the result of the introduction of new techniques, and b) to determine which factors individuals may have become "negatively aware of" after the introduction of new techniques out of which they were not aware beforehand
4.4 reactions to working with a terminal	To better define the attitude of those individuals now working with conventional techniques to the coming technology and to more specifically define the factors which might be responsible for personal anxieties as regards the pending introduction of these techniques.

THE QUESTIONS TO BE RESOLVED

1. Does the VDT represent a significant hazard to operator health and well being at work?

   See Sections: 1.2; 3.2; 4.1; 4.2

2. Are these risks significantly different from those which are associated with the more traditional methods of working?

   See Sections: 1.1; 1.2; 3.2; 4.1; 4.2; 4.3; 4.4; 4.5

3. Under what conditions or to which personal factors, features of the device and environment can these risks be attributed.

   See Sections: 2.1; 3.1; 3.3; 4.2; 4.4

4. What steps can be taken to minimise or eliminate these problems?

   See Sections: 3.1; 3.3; 4.5

RESOURCES AND WORKING METHODS

SECTION	TECHNIQUES	COMMENTS
1.1	Observation, measurement	In-plant observations
1.2	Observation, measurement	In-plant observations, (laboratory studies (?))
2.1	Physical measurements, e.g lighting, temperature etc	In-plant measurements
3.1	Physical examinations of individuals	Medical studies
3.2	Questionnaire, interview	
3.3	Questionnaire	
4.1	Questionnaire, interview	
4.2	Questionnaire, interview	
4.3	Questionnaire, interview	
4.4	Questionnaire, interview	
4.5	Questionnaire, interview	

The above techniques to be applied in all or a cross section of a sample comprising 100 newspapers and newsagencies in Europe and the United States.

DESCRIPTION OF THE IFRA RESEARCH PROJECT "THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS"

1. Background

The visual display terminal (VDT) is the key element in any electronic text processing or typesetting system.

Already in the USA, this "second generation" approach to handling editorial text and advertising material (by means of computer systems with direct entry from VDTs) forms an integral part of the production system in many newspaper publishing houses. And within the next few years, VDTs will have become as commonplace and indispensible in European newspaper production as the conventional electric typewriter.

To the manufacturers, the development of systems is complicated by the wide diversity of requirements among different national and language groups and between individual newspapers. For this reason, equipment manufacturers have tended to focus their attention on the design of hardware and software "packages" for specific functional requirements. But the development of systems is being stimulated not only by a better appreciation of the functional requirements of the equipment, but also by a better appreciation of the human requirements.

Ever since the introduction of computer based business systems in industry during the 1960's, the subject of "operator comfort" has received growing attention. Much of this has been stimulated by reports that under certain adverse circumstances, the operators of visual display terminals may be prone to eye strain or visual fatigue, and excessive tiredness at work. But it should be kept in mind that in essence, the ailments which can beset the operator of a visual display terminal are little different from those which are common among many categories of office personnel.

As far as the terminal itself is concerned, it is now well established that for both of the key elements of a visual display unit - the screen and the keyboard - there are certain requirements which must be satisfied if the operator is to be able to do the job effectively and with the least risks of repeated errors, frustration, strain or discomfort. The same is true of the configuration of the individual workplaces and the layout of the terminal office as a whole. In fact, many authorities are of the opinion that the most frequent causes of complaints about physical discomfort from visual display terminal operators are due less to the characteristics of the terminal itself, but more to incorrect workplace configuration, adverse lighting conditions and to a poor working posture. It is for this reason that these factors - once considered secondary in nature - have now become a prominent theme in attempts to improve the working conditions of office personnel in general and VDT operators in particular.

It is only within the last few years that sufficient knowledge and experience has been accumulated with which to better understand the causes of operator discomfort at work. And from the user point of view, it is reassuring to learn that almost without exception, problems of this type can be traced to certain adverse and usually readily identifiable - and controllable - features of the workplace or methods of working.

However, with the full interests of health, safety and satisfaction at work in mind, studies of this type should be continued and IFRA has taken a leading role in furthering an investigation related to the use of VDTs in the newspaper industry.

2. Scope of the project

The principal objectives of the IFRA Project are directed towards two goals:

1. the establishment of minimum specifications for the design and display characteristics of VDTs for text processing in the newspaper industry, and
2. to provide minimum specifications relating to the layout of the individual terminal workplace, and the terminals office as a whole.

The criteria which have been adopted in seeking these specifications are those of ensuring individual freedom from feelings of strain, excessive tiredness and visual impairment at work. In essence, the setting of these "minimum specifications" will rest upon the answers to a number of basic questions, i.e.

1. Does the VDT represent a significant hazard to operator health and well-being at work, and
2. are these risks significantly different from those commonly associated with the more traditional methods of working?
3. Under what conditions or to which features of the device can these risks be attributed, and
4. what steps can be taken - by attention to equipment design and workplace layout - to minimise or eliminate these problems?

These are the basic questions which the IFRA Project Group is trying to resolve, and this will be tackled with the aid of three of Europe's leading university faculties of ergonomics and industrial engineering (the members of the project group are listed in the appendix).

3. Project activity

The initial activities of this project group are directed towards the following studies:

1. Review of known work and knowledge concerning the human aspects of working with visual display terminals.

   (The initial review was completed during 1976 and the results were published in IFRA Research Report 76-02. This report has been widely circulated throughout Europe and the United States.)

2. A critical examination of the question as to whether or not the operator of a visual display unit is exposed to any form of harmful radiation. (This study is now complete and the results will be published in IFRA Research Report 77-02, July 1977. This work has been supported by national occupational health and radiation safety authorities in Europe and the U.S.A. and by a large number of equipment manufacturers, some of whom have commissioned x-radiation measurements on IFRA's behalf. The main conclusion is that the operator of a VDT is exposed to no form of measurable radiation from the terminal.)

3. A review of the types and characteristics of visual display devices being introduced into the newspaper industry for editing and typographical work.
   (A large scale survey is now in progress and, with the help of the equipment manufacturers, the results will be published in IFRA Research Report 77-04 later in the summer of 1977. This document will take the form of a handbook highlighting the principal features of the VDT and their practical significance from the functional and operational points of view.)

4. Task analysis of journalistic, editing and typographical working methods using (a) conventional and (b) terminal text processing techniques.

5. Analysis of the ergonomic principles of display terminal design and work place layout and the known or suspected relationships between these characteristics and adverse physiological/psychological reactions among terminal operators.

6. Medical and experience survey among the working groups whose mode of working was previously examined.

(Points 4, 5 and 6 are the main themes of this project and will be primary activities during the period 1977-1978. During the first half of 1977, the emphasis has rested on the development of a methodology with which these activities can reliably be undertaken. Of necessity, this has required several pilot investigations which have been carried out with the help of a smaller number of newspaper houses working in cooperation with the expert members of the project committee. To date, the mode of working with visual display terminals in both the editing and journalistic modes has been or is being studied in 5 French provincial newspapers, Nottingham Post (UK), Stars and Stripes (FRG), WAZ (FRG), and the Deutsche Presse Agentur in Hamburg.

The approach in these studies has differed somewhat, but the results will be analyzed at a special meeting on May 26/27 in London, and the final method will be presented to the project committee early in June 1977. Subject to approval at this

stage, the study will be put into effect in Germany, France, Benelux, Scandinavia, U.K., Austria and Switzerland.)

7. Analysis of requirements concerning eyesight testing procedures for terminal operators. (This work is aimed at the development of a common approach to the undertaking and reporting of VDT operator eyesight control tests and is due to begin in the Autumn of 1977.)

8. Preparation of a minimum set of specifications concerning the configuration of the terminal work place and terminal centre, taking into account e.g. lighting conditions, office furniture and layout etc.

9. Preparation of a minimum set of specifications concerning the design and functional characteristics of text processing VDTs for the newspaper and allied industries.

   (Points 8 and 9 will represent two basic end points of this study)

4. Times frame and priority

This study has been given the highest priority by the IFRA Management, and it is rewarding that three of Europe's leading expert authorities have shown their willingness to partake in these activities. There is no doubt at all that this study is unique, both as regards its scope and level of authority, and no efforts are being spared to investigate the likelihood that the operator of a VDT might be subject to some form of health risk. The objectivity with which this problem is being tackled is in the very best interests of both management and staff

THE QUESTIONS TO BE RESOLVED

1. Does the VDT represent a significant hazard to operator health and well being at work?

   See Sections: 1.2; 3.2; 4.1; 4.2

2. Are these risks significantly different from those which are associated with the more traditional methods of working?

   See Sections: 1.1; 1.2; 3.2; 4.1; 4.2; 4.3; 4.4; 4.5

3. Under what conditions or to which personal factors, features of the device and environment can these risks be attributed.

   See Sections: 2.1; 3.1; 3.3; 4.2; 4.4

4. What steps can be taken to minimise or eliminate these problems?

   See Sections: 3.1; 3.3; 4.5

RESOURCES AND WORKING METHODS

SECTION	TECHNIQUES	COMMENTS
1.1	Observation, measurement	In-plant observations
1.2	Observation, measurement	In-plant observations, (laboratory studies (?))
2.1	Physical measurements, e.g lighting, temperature etc	In-plant measurements
3.1	Physical examinations of individuals	Medical studies
3.2	Questionnaire, interview	
3.3	Questionnaire	
4.1	Questionnaire, interview	
4.2	Questionnaire, interview	
4.3	Questionnaire, interview	
4.4	Questionnaire, interview	
4.5	Questionnaire, interview	

The above techniques to be applied in all or a cross section of a sample comprising 100 newspapers and newsagencies in Europe and the United States.

DESCRIPTION OF THE IFRA RESEARCH PROJECT "THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS"

1. Background

The visual display terminal (VDT) is the key element in any electronic text processing or typesetting system.

Already in the USA, this "second generation" approach to handling editorial text and advertising material (by means of computer systems with direct entry from VDTs) forms an integral part of the production system in many newspaper publishing houses. And within the next few years, VDTs will have become as commonplace and indispensible in European newspaper production as the conventional electric typewriter.

To the manufacturers, the development of systems is complicated by the wide diversity of requirements among different national and language groups and between individual newspapers. For this reason, equipment manufacturers have tended to focus their attention on the design of hardware and software "packages" for specific functional requirements. But the development of systems is being stimulated not only by a better appreciation of the functional requirements of the equipment, but also by a better appreciation of the human requirements.

Ever since the introduction of computer based business systems in industry during the 1960's, the subject of "operator comfort" has received growing attention. Much of this has been stimulated by reports that under certain adverse circumstances, the operators of visual display terminals may be prone to eye strain or visual fatigue, and excessive tiredness at work. But it should be kept in mind that in essence, the ailments which can beset the operator of a visual display terminal are little different from those which are common among many categories of office personnel.

As far as the terminal itself is concerned, it is now well established that for both of the key elements of a visual display unit - the screen and the keyboard - there are certain requirements which must be satisfied if the operator is to be able to do the job effectively and with the least risks of repeated errors, frustration, strain or discomfort. The same is true of the configuration of the individual workplaces and the layout of the terminal office as a whole. In fact, many authorities are of the opinion that the most frequent causes of complaints about physical discomfort from visual display terminal operators are due less to the characteristics of the terminal itself, but more to incorrect workplace configuration, adverse lighting conditions and to a poor working posture. It is for this reason that these factors - once considered secondary in nature - have now become a prominent theme in attempts to improve the working conditions of office personnel in general and VDT operators in particular.

It is only within the last few years that sufficient knowledge and experience has been accumulated with which to better understand the causes of operator discomfort at work. And from the user point of view, it is reassuring to learn that almost without exception, problems of this type can be traced to certain adverse and usually readily identifiable - and controllable - features of the workplace or methods of working.

However, with the full interests of health, safety and satisfaction at work in mind, studies of this type should be continued and IFRA has taken a leading role in furthering an investigation related to the use of VDTs in the newspaper industry.

2. Scope of the project

The principal objectives of the IFRA Project are directed towards two goals:

1. the establishment of minimum specifications for the design and display characteristics of VDTs for text processing in the newspaper industry, and
2. to provide minimum specifications relating to the layout of the individual terminal workplace, and the terminals office as a whole.

The criteria which have been adopted in seeking these specifications are those of ensuring individual freedom from feelings of strain, excessive tiredness and visual impairment at work. In essence, the setting of these "minimum specifications" will rest upon the answers to a number of basic questions, i.e.

1. Does the VDT represent a significant hazard to operator health and well-being at work, and
2. are these risks significantly different from those commonly associated with the more traditional methods of working?
3. Under what conditions or to which features of the device can these risks be attributed, and
4. what steps can be taken - by attention to equipment design and workplace layout - to minimise or eliminate these problems?

These are the basic questions which the IFRA Project Group is trying to resolve, and this will be tackled with the aid of three of Europe's leading university faculties of ergonomics and industrial engineering (the members of the project group are listed in the appendix).

3. Project activity

The initial activities of this project group are directed towards the following studies:

1. Review of known work and knowledge concerning the human aspects of working with visual display terminals.

   (The initial review was completed during 1976 and the results were published in IFRA Research Report 76-02. This report has been widely circulated throughout Europe and the United States.)

2. A critical examination of the question as to whether or not the operator of a visual display unit is exposed to any form of harmful radiation. (This study is now complete and the results will be published in IFRA Research Report 77-02, July 1977. This work has been supported by national occupational health and radiation safety authorities in Europe and the U.S.A. and by a large number of equipment manufacturers, some of whom have commissioned x-radiation measurements on IFRA's behalf. The main conclusion is that the operator of a VDT is exposed to no form of measurable radiation from the terminal.)

3. A review of the types and characteristics of visual display devices being introduced into the newspaper industry for editing and typographical work.
   (A large scale survey is now in progress and, with the help of the equipment manufacturers, the results will be published in IFRA Research Report 77-04 later in the summer of 1977. This document will take the form of a handbook highlighting the principal features of the VDT and their practical significance from the functional and operational points of view.)

4. Task analysis of journalistic, editing and typographical working methods using (a) conventional and (b) terminal text processing techniques.

5. Analysis of the ergonomic principles of display terminal design and work place layout and the known or suspected relationships between these characteristics and adverse physiological/psychological reactions among terminal operators.

6. Medical and experience survey among the working groups whose mode of working was previously examined.

(Points 4, 5 and 6 are the main themes of this project and will be primary activities during the period 1977-1978. During the first half of 1977, the emphasis has rested on the development of a methodology with which these activities can reliably be undertaken. Of necessity, this has required several pilot investigations which have been carried out with the help of a smaller number of newspaper houses working in cooperation with the expert members of the project committee. To date, the mode of working with visual display terminals in both the editing and journalistic modes has been or is being studied in 5 French provincial newspapers, Nottingham Post (UK), Stars and Stripes (FRG), WAZ (FRG), and the Deutsche Presse Agentur in Hamburg.

The approach in these studies has differed somewhat, but the results will be analyzed at a special meeting on May 26/27 in London, and the final method will be presented to the project committee early in June 1977. Subject to approval at this

stage, the study will be put into effect in Germany, France, Benelux, Scandinavia, U.K., Austria and Switzerland.)

7. Analysis of requirements concerning eyesight testing procedures for terminal operators. (This work is aimed at the development of a common approach to the undertaking and reporting of VDT operator eyesight control tests and is due to begin in the Autumn of 1977.)

8. Preparation of a minimum set of specifications concerning the configuration of the terminal work place and terminal centre, taking into account e.g. lighting conditions, office furniture and layout etc.

9. Preparation of a minimum set of specifications concerning the design and functional characteristics of text processing VDTs for the newspaper and allied industries.

   (Points 8 and 9 will represent two basic end points of this study)

4. Times frame and priority

This study has been given the highest priority by the IFRA Management, and it is rewarding that three of Europe's leading expert authorities have shown their willingness to partake in these activities. There is no doubt at all that this study is unique, both as regards its scope and level of authority, and no efforts are being spared to investigate the likelihood that the operator of a VDT might be subject to some form of health risk. The objectivity with which this problem is being tackled is in the very best interests of both management and staff

groups, and it is hoped that through studies of this kind, a spirit of cooperation can be promoted between both groups.

The main bulk of the work is expected have to have reached completion during 1978, and significant results will be published as they are obtained. The final report is expected to be issued at the end of 1978.

David J. Hart

IFRA Research Director

Darmstadt, 1977-05-09

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David J. Hart

IFRA Research Director

Darmstadt, 1977-05-09

Research Memorandum 76/7
September 11th, 1976

MINUTES FROM THE FIRST MEETING OF THE IFRA PROJECT GROUP DEALING WITH:

"THE HUMAN ASPECTS OF WORKING WITH VISUAL DISPLAY TERMINALS IN THE NEWSPAPER INDUSTRY"

Date : August 24th, 1976

Venue : IFRA Institute
Washingtonplatz 1, D-6100 Darmstadt

Participants: (Full addresses are given in APPENDIX 1)

Prof. Armbruster	Institut für Arbeitswissenschaft, T.U. Berlin, F.R.G.
Mr. P. Jaume	Entreprise de Presse No.1, Chassieu, France
Mr. J. May	Mirror Group Newspapers, London, England
Dr. T. Pohlert	Deutsche Presse Agentur (DPA) Hamburg, F.R.G.
Mr. J. Saint-Cricq	La Nouvelle République du Centre-Ouest, Tours, France
Dr. T.F.M. Stewart	Dept. of Human Sciences, Univ. of Loughborough, England
Prof. A. Wisner	Conservatoire National des Arts et Métiers, Paris, France
Mr. H. Werthauer	University of Delft, Delft, Holland

Copies to:

Mr. C. Detjen	Bundesverband Deutsche Zeitungs-verleger, Bonn-Bad Godesberg, F.R.G
Dr. A. Oster	Bundesministerium für Arbeit und Sozialordnung, Bonn-Bad Godesberg, G
Dr. Stammler	Bundesministerium für Forschung und Technik, Bonn-Bad Godesberg, G
IFRA Management Board	
IFRA Technical Committee	

Participating IFRA staff:

Dr. F.W. Burkhardt	Executive Director
Mr. D.J. Hart	Research Director

The objectives of this first meeting were as follows:

1) to review the current status of the utilisation of VDT based equipment in newspaper production in Europe,
2) to review the current status of research aimed at improving our understanding of:
   - the ergonomic principles of visual display terminal design and construction
   - requirements as regards the configuration of the individual terminal work stations and the terminal centre
   - the physiological and/or psychological consequences of working with VDTs in relation to the characteristics of the device itsself and the environment in which the terminal is to be worked with,
3) to identify those areas in which there is a need for new or renewed research efforts, and
4) to propose a common or coordinated programme of research which is specifically oriented towards the conditions in the European newspaper industry.

The notes which were taken during the meeting and which are reproduced below have been arranged so as to follow each of these four major themes.

1) Current status of VDT utilisation in European newspapers

Beginning with the situation in the U.K., J.May indicated that the introduction of new techniques in the newspaper industry is the result of a growing economic pressure which is especially acute in the national daily press. But as regards the pace at which new techniques are being introduced, one must distinguish clearly between the national and provincial press. Among the smaller newspapers which go to make up the regional press, there is a greater degree of flexibility as regards the freedom and ability to make use of techniques such as the use of computerised photo-typesetting.

In the national press on the hand, the scale of operation is very much bigger - in fact collectively it is the biggest in the world - and the economic and technical problems

involved in introducing new production methods are very much larger. This has lead to a cautious - perhaps even a conservative - attitude on the part of management to modern technology.

But within the next ten years it can be expected that most newspapers in the U.K. will have introduced photocomposition, many with direct input from visual display terminals but most using these devices in a variety of modes. In contrast with the situation in the U.S.A. where often editorial text is input directly into the computer from a display terminal the use of terminals in the U.K. will involve two input modes; (a) direct input from editors and jounalists, and (b) input from manuscripts in the composing room.

Within the next 2 to 3 years, Mirror Group Newspapers plans to convert the production of all its publications (ca 40 million copies each week) to photocomposition. One of these publications, Sporting Life, was the first to make the conversion to photocomposition with direct input.

In Germany, like the U.K. and most other countries in Europe, the use of VDTs in newspaper production is still at a very early stage. But according to Dr. T. Pohlert, one of the primary hindrances to the introduction of these new techniques into many West German newspapers may well be the possibility of conflict between management and labour unions as regards conditions of working. Because of this conflict, labour opposition to modern techniques has often been grounded on emotional rather than factual arguments. It was emphasised therefore that it is of paramount importance that factual studies of the type here being discussed be carried out in order that management and labour can work together to improve the status of the industry.

At the Deutsche Presse Agentur, where visual display terminals have now been in use for some time, experiences have so far shown that editing personnel prefer to use display terminals rather than typewriters, teletypes etc. Quality of work has noticeably improved with less fatigue after normal working hours. The normal working day for editorial staff is 7 hours

which, in combination with other duties, usually means no more 3 to 4 hours actual working at the screen.
In the U.S.A. too, experience has so far shown that the reactions of journalists and editing staff to working with display terminals have, for the most part, been very positive.

According to J. Saint-Cricq, there is a certain similarity between the situations in France and England as regards the introduction of new production methods. There is a strong economic pressure - both in the Paris and provincial press - to convert to phototypesetting but the introduction of these techniques has not yet reached a scale that has prompted any negative reactions from the labour unions. This fact alone makes it still more important to carry out studies of this type in order to contribute to a more effective, less costly and more humane introduction of new techniques.
In Holland too, the change-over to photocomposition is a gradual one and H. Werthauer indicated that some newspapers simply change out the older line-casters and replace them with small photocomposing units, whilst others install - or are currently planning to install - VDTs and electronic typewriters which are linked with the central computer for direct input. Already, one of the large Dutch national newspapers has introduced VDTs for display advertisement layout and proofreading.
In summary then, the introduction of photocomposition and the use of VDTs for on-line addressing of the computer from editorial, advertising, composing and other departments which is becoming increasingly more necessary in the European newspapers but one which, for the time being, is still at a very early stage. This is in contrast to the situation in the U.S.A. where many of the larger, metropolitan newspapers have made the conversion from "hot" to "cold-type" production, many with direct entry from VDTs, during the past five years.

In Europe, the pressure to change is primarily an economic one. But getting the fullest economic advantages out of these new production methods depends upon the ability and freedom of the newspaper to introduce the techniques and use them to their fullest extent. This is supported by one of the conclusions which was drawn by the U.K. Royal

Commission on the Press which was set up recently to examine the status of the national press in the U.K.:

> "The financial position of the industry is poor .... and there is no immediate prospect of increasing revenue sufficiently to change this position for the better. The only adequate means of cost-saving is to secure higher productivity through reductions in manpower and the introduction of new technology. These changes can only be made quickly and effectively if socially-acceptable terms can be agreed."

But the introduction of these new techniques poses a number of problems - for both management and labour. The high costs of hardware coupled with the high costs of creating the necessary software and organisation emphasise the need for a rational choice of equipment and careful attention to the planning and introduction of these new techniques.
From the labour point of view, older and more traditional skills have to be set aside in favour of the new skills which the technology requires. This and the reduction in manning requirement is the prime source of labour opposition to new technology - a conflict which has been expressed in terms of both factual and emotive argument.

The development of the industry, the economic viability of which depends to so large an extent on these new techniques, can only be assured by a greater degree of mutual understanding and cooperation between management and labour.

2. Current status of research concerning:

2.1 The ergonomic principles of VDT design

A number of investigations concerning the ergonomic principles of keyboard layout and, more recently, display screen and terminal characteristics have been made by equipment manufacturers and specialised authorities. But it is only during

the past few years, as computers with direct addressing from typewriter and visual display terminals have been introduced into business administration and works control, e.g. banks, insurance companies, manufacturing stock and process control, that some authorities have attempted to compile all of this information into one coherent form.

One such attempt has been made by Dr. T. Stewart of the Department of Human Sciences at the University of Loughborough in England who also acted as an adviser on computer terminal ergonomics to the recently completed study of terminal design and layout which was organised by the Swedish Agency for Administration Development (Statskontoret).

The results of this work have been compiled in book form with the title "Computer terminal ergonomics" and were used as one of the main sources of reference in preparing the IFRA Report 76/02 "Human aspects of working with visual display terminals", copies of which were distributed during the meeting.

Earlier this year, Prof. Armbruster and his co-workers at the Faculty of Industrial Engineering with the University of Berlin received a grant from the West German Ministry of Works (Bundesministerium für Arbeit und Sozialordnung) to carry out a comprehensive study of display terminal ergonomics and utilisation. This study will take the form of a full inventory of all aspects of terminal keyboard, screen and display characteristics and will culminate in the proposal of thirteen standards recommendations to the West German standards organisation, the DIN.

These recommendations will eventually become binding to all West German manufacturers and suppliers of equipment to the West German market and may, at a later date, become the basis for ISO standardisation.

2.2 The layout of terminal work stations

The layout of the terminal work station includes such aspects as type and selection of office equipment, office lighting and the siting of the individual items of equipment -

including the terminal itself - relative to the operator and other features of the office environment.

It was generally agreed that, whilst the specific design and operating characteristics of terminal devices have some bearing on the reaction of the operator to working with VDTs, insufficient attention to the layout of the individual work places and the terminals centre probably exerts a still greater influence. This is particularly true as regards the problem of "glare" which is heavily dependant on the conditions of illumination in the room and the siting of the terminal in relation to sources of daylight (windows) and artifical lights (lamps).

Working posture and discomfort while working with keyboard equipment has also been the subject of several investigations. But the problems of discomfort while working with visual display terminals has been specifically investigated by the National Board for Occupational Safety and Health in Sweden whose findings were that glare and reflections were the main sources of discomfort. This aspect was also brought out in the Statskontor investigation and these, and other results and recommendations were summarised in the IFRA report after contact with Dr. Stewart and other authorities.

The effects of work cycle, working conditions and environment will also be investigated during Prof. Armbrusters and Prof. Wisners studies.

2.3. The physiological effects of working with VDTs

Direct studies of the physiological effects of working with VDTs are few but there are two aspects to this question. Firstly there are effects which are related to the reaction of the eye to viewing the screen, e.g. eye strain, headaches, impaired visual acuity etc. Secondly there is the more general aspect of work posture and here, the results of posture and discomfort investigations among secreatrial staff, teletypists etc are probably equally relevant to the use of VDTs.

Among the more recent investigations of visual reaction to working with visual display devices has been the study carried out by the University of Vienna at the request of the Austrian Gewerkschaft der Privatangestellten. The results from this investigation have been used by the West German trade unions as supporting evidence for claims for reduced working hours with VDT equipment but the study has come under sharp attack from newspaper management as having been made under conditions which are in no way representative of conditions in the newspaper industry. This study has also been criticised from other authorities in this field.

Prof. Wisner emphasised that his experience both in industry and in the academy has proven that studying the human factors of technology in industry, whether physiological or psychological, can only be done in direct contact with the industry. He also indicated that the borderline between physiological and psychological reactions at work is not as distinct as is commonly assumed. And his own testing programme was centred on studying mental activity in new and former working situations. He has observed, for example that feelings of stress at work tend to increase with the duration of eye fixation. For these reasons, task analysis - i.e. an analysis of mode of working - must be central to realistic investigation of human reactions at work.

2.4 Psychological reactions

Psychological reactions to technical innovation can be categorised in different levels which correspond to different conflict or stress situations. On the one hand, there is a collective reaction - often a resistive reaction - on the part of labour groups in the face of a threat to existing skills. Prof. Wisner indicated that the sudden change-over to computer operated systems in some sectors of French industry has resulted in emotional problems between labour and management. The sometimes aggresive attitude of management in introducing new techniques has caused some labour groups to feel threatened and to clash with management. This type

of collective reaction can be expected in most parts of the European newspaper industry has the traditional skills of the compositor become threatened by modern production equipment and methods.

This has already occurred in the U.K. and West German newspaper industries.

Problems also occur at the management level. Having earlier indicated that the magnitude of the problems of introducing modern techniques into large-scale operations tended to result in a conservative or cautious attitude on the part management, Mr. May went on to assert that any change that occurs within an organisation results in some measure of uncertainty among managment which is felt throughout the organisation and this fact, in itself, causes stress.

Furthermore, as Dr. Stewart indicated, modern computer systems are so complex that management often lacks the facility to fully understand the consequences of the change over and "retreats" to those aspects which management is better geared to comprehend, naley the financial aspects. In this way too the human aspect is sometimes overlooked but which may later inhibit the most economic use of the technology.

At the individual level, psychological reactions to working with the equipment, in this case VDTs, more usually concern feelings of stress at work and, as Prof. Wisner, earlier indicated the distinction between the purely psychological and the purely physiological is not a clear one.

At this level, therefore, Prof. Wisner again emphasised the basic importance of task analysis. From this standpoint, it was generally agreed that the goals should be directed towards defining what can be done to use the VDT as a tool for reducing the work cycle and to offset results such as those from the Vienna study which are not compatible with the working routines in a newspaper application. The conclusions should then relate to the organisation, human and sociological aspects, economic possibilities and consequences.

3. The need for research

It was generally agreed that not only is there a need for active research efforts of this kind in the newspaper industry but that there is an urgent need for these efforts.

And because of this urgency, this group should concentrate its efforts and attention on the main points of concern rather than become involved in too much detail.
There is a need for facts. And as Mr. Saint-Cricq and Dr. Pohlert indicated, we should give prior attention to task analysis - how are VDTs used in the newspaper industry? - and the definition of terminal design requirements We should identify which parameters are the important ones, classify them and work on them.

The immediate goals of this work can be expressed in three points:

1. does the introduction of VDTs introduce any form of health hazard to the operator and if so, under what conditions are they most likely to arise and what form do these hazards take?
2. are claims that the introduction of VDTs creates situations of increased stress justified and, if so, under what conditions can these problems arise, and how can they be eliminated?
3. under the conditions of use in the newspaper industry, would claims regarding bonusses, reduction of working hours etc, be justified on the basis of (1) and (2)?

Prior to this meeting, a seven-point proposal was distributed to the participants of this meeting as IFRA Memorandum 76/04 The following suggestions were made:

1) review of know work concerning the human aspects of working with visual display terminals.
2) review of the ergonomic principles of display terminal design and known or suspected relationships between the

design/operating characteristics of the devices and physiological and/or psychological reactions.

3) review of the types and characteristics of visual display devices being introduced in newspaper editing and typographical departments.
4) Task analysis (now replaces "work study") of journalistic, editing and typographical work using (a) conventional and (b) terminal text processing.
5) medical and experience survey among working groups whose mode of working was examined and quantified in preceding phase.
6) preparation of a checklist of factors related to eye-sight and other medical checks if necessary, work place layout, lighting conditions, provision for rest periods etc.
7) preparation of a minmum set of specifications for compliance by manufacturers.

These seven points were discussed in the light of the preceding goals before the following conclusions were made:

4. Conclusions - initial work of this project group

1) Defining how, and in what modes, VDTs are used in the newspaper industry is of central importance to the work of this project group. However, making this analysis is complicated by the fact that very few newspapers in Europe are using VDTs, and by the fact that it is not yet clear how such a "task analysis" should be made. Prof. Wisner however, has applied some techniques in his work in some French plants which could be adaptable to this particular study and he agreed to set out the form of a suitable questionnaire and circulate this for comments and additions by Prof. Armbruster, Dr. Stewart and IFRA. Dr. Pohlert then invited this group to come to the Deutsche Presse Agentur offices in Hamburg (after the beginning of October) to carry out a pilot study among his staff. This study would involve measurements of time

spent at work, at the terminal, viewing the screen, operator reactions etc.

2) Based on the information which has been compiled so far, IFRA and Mr. Werthauer would prepare the draft of a "minimum set of specifications for suppliers of VDTs to the newspaper industry" and circulate this draft to Profs. Wisner, Armbruster and Dr. Stewart for their comments, modifications and approval. Once established, this document will be tendered to the suppliers for their comments.

3) Again based on available information, IFRA and Mr. Werthauer will compile a draft concerning "a guide to newspaper management concerning the use of VDTs in newspaper production and the layout of the terminal work place". This draft will also be submitted to the three authorities prior to publication.

4) To put the question of "radiation from VDTs" into the correct and quantitative perspective, a review will be made of current restrictions regarding exposure to radiation at work and approved methods for measuring radiation emission from display devices. With this background, a comprehensive series of measurements will be made of the radiation emission from the types of terminal being used in newspaper production taking into account the age and condition of the equipment. Hans Werthauer will make a preliminary assessment of these tests and Prof. Wisner agreed to supply a report which has been prepared in France (Prof. Avan) dealing with this subject..

5. Next meeting

The next meeting of this group will take place in conjunction with the tests to be made at the DPA Hamburg.

6. Closing word

On behalf of IFRA, I would like to thank all of the participants at this meeting for their active interest and contributions which helped to make this meeting as enjoyable - and fruitful - as it was.

IFRA Institute, Darmstadt
September 11th, 1976

David J. Hart
Research Director

APPENDIX 1. ADDRESSES OF PARTICIPANTS OF THE PROJECT GROUP

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Au Professeur Dr. A. WISNER
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F r a n c e

9020 Gent, le 15 novembre 1977

Monsieur le Professeur,

Comme convenu lors de notre entretien téléphonique d'hier, je viendrai vous voir dans vos laboratoires, le lundi 28 novembre prochain à 10 h 30.

Entretemps, je vous prie d'agréer, Monsieur le Professeur, l'expression de mes sentiments les meilleurs.

Dr. Th. Van Peteghem

NEWSLETTER

National Board of Occupational Safety and Health · Arbetarskyddsstyrelsen · Sweden
Mailing address: Fack, S–100 26 Stockholm · Telephone: 46-8-54 02 60 Publisher: Gunilla Warnbeck

No. 2 1977

TRAINING AND EDUCATION IN OCCUPATIONAL SAFETY AND HEALTH IN SWEDEN

The following text is extracted from a report written by Kaj Elgstrand, Director of training and education at the National Board of Occupational Safety and Health. The report - and the summary here presented - covers the training and educational activities of occupational safety and health at the Board, within the trade unions and the factories, in the secondary school and at the universities. It goes into detail only when dealing with the training of the occupational safety and health specialists.

SPECIALIST TRAINING AT THE NATIONAL BOARD OF OCCUPATIONAL SAFETY AND HEALTH

The postgraduate training of industrial physicians, industrial nurses and industrial safety and hygiene engineers started in Sweden 20-30 years ago. The training was systematized, coordinated and further expanded when the National Institute of Occupational Health was created 10 years ago and took over responsibility for it. The Institute merged with the National Board of Occupational Safety and Health in 1972, and the Board has since then been the sponsor of the specialist training courses concerned. As previously, course management and most of the teaching staff are recruited from the Institute, which now forms the Board's Occupational Health Department.

About ten years ago, it was estimated that a fully operational occupational health service in Sweden would demand the following numbers of full time specialists:

1 500 safety and hygiene engineers
(+1 500 other technicans)
1 500 industrial physicians
2 300 industrial nurses.

On this basis and in view of the small number of specialists who had been trained and the anticipated expansion rate of industrial health services, the Riksdag (the Swedish Parliament) resolved in 1971 on the following annual training quotas for the period between 1971 and 1976:

50 safety and hygiene engineers
45 industrial physicians
60 industrial nurses.

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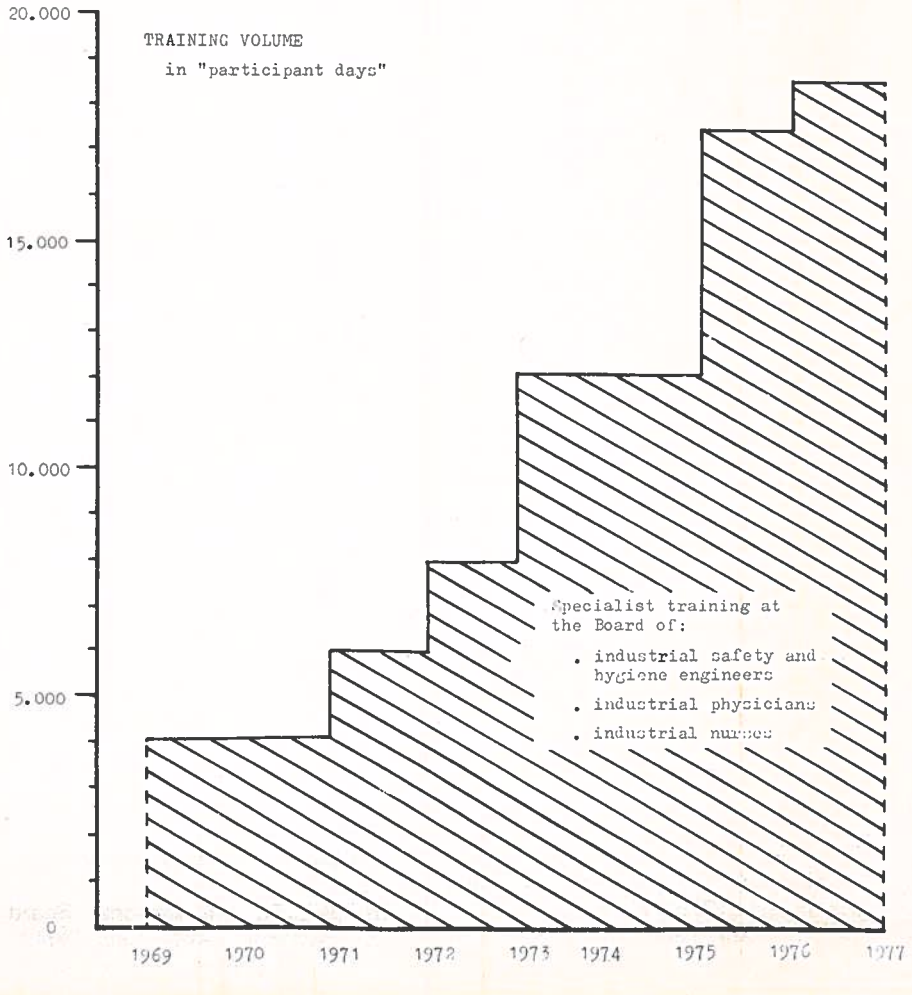

NEWSLETTER

National Board of Occupational Safety and Health · Arbetarskyddsstyrelsen · Sweden
Mailing address: Fack, S–100 26 Stockholm · Telephone: 46-8-54 02 60 Publisher: Gunilla Warnbeck

No. 2 1977

TRAINING AND EDUCATION IN OCCUPATIONAL SAFETY AND HEALTH IN SWEDEN

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SPECIALIST TRAINING AT THE NATIONAL BOARD OF OCCUPATIONAL SAFETY AND HEALTH

The postgraduate training of industrial physicians, industrial nurses and industrial safety and hygiene engineers started in Sweden 20-30 years ago. The training was systematized, coordinated and further expanded when the National Institute of Occupational Health was created 10 years ago and took over responsibility for it. The Institute merged with the National Board of Occupational Safety and Health in 1972, and the Board has since then been the sponsor of the specialist training courses concerned. As previously, course management and most of the teaching staff are recruited from the Institute, which now forms the Board's Occupational Health Department.

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(+1 500 other technicans)
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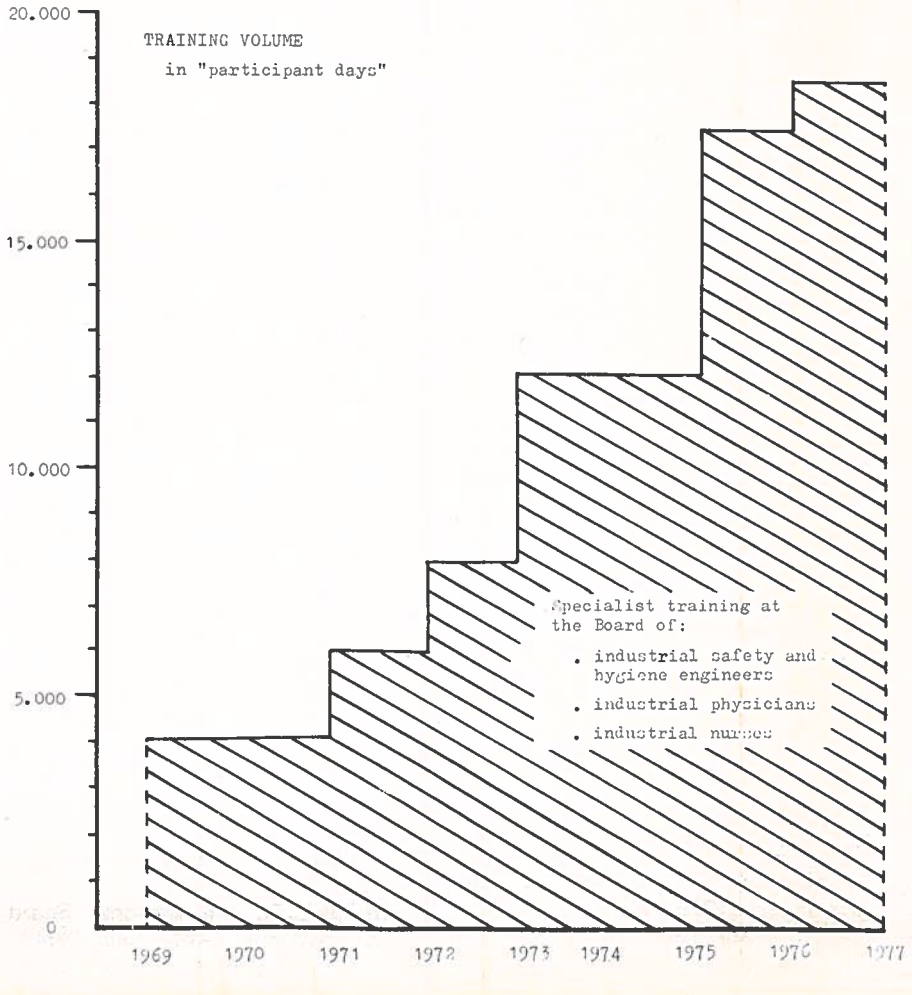

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At present the amounts payable are as follows:

trainee safety and hygiene engineer:
1 070 US dollars/month
trainee industrial physican:
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trainee industrial nurse:
830 US dollars/month.

Thus, the training courses are of two kinds. One kind is for practising safety and hygiene engineers, industrial physicians and industrial nurses. This course consists of a number of one, two, three or four-week periods spread over a total period of up to one year. The course totally comprises 8-15 weeks of theoretical lectures, group discussions, practical tasks, written examinations, etc, in subjects as ergonomics, occupational medicine and hygiene, work safety, occupational health service, information technique, etc. The other kind is for the training of prospective safety and hygiene engineers, industrial physicians and industrial nurses. In addition to the theoretical part - essentially identical with the above mentioned course - this training consists of 3 (nurse training) or 6 (engineers and physicians) month's practical service under supervision at a unit for occupational health services.

During the past few years the number of applicants for the industrial physician training courses run by the Board has been well up to the number of places available, i.e. 90 per annum. The number of applicants for the nurses' training courses has exceeded the number of places available. The following situation applied when the last admissions were made:

training course for practising industrial nurses (1977/78)

applicants	places available
301	144

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applicants	places available
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The number of applicants for the safety and hygiene engineer training courses has risen from year to year:

	applicants	places available
1971	84	50
1972	196	50
1973	324	100
1974	423	100
1975	546	100
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A closer analysis of the applicants for safety and hygiene engineer training during the past two years revels the following.

practising safety and hygiene engineers

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Great interest in work environment questions on the part of engineers. Interesting job opportunities.

Favourable financial terms attaching to the training

Scarcity of job opportunities in other fields of engineering

Safety and hygiene engineer training is at present one of the most advanced forms of training available to engineers in Sweden in the work environment sector.

In 1974 the National Board of Occupational Health and Safety arranged for the first time two "occupational safety and health contact days" for persons who had previously attended the above mentioned courses for occupational health service personnel. Two hundred people took part. In April this year, contact days of this kind were arranged for the fourth time in succession. This time 1 000 people took part. In addition certain further training courses are arranged every year for smaller groups: industrial hygienic dust sampling, industrial hygienic gas and solvent sampling, technical acoustics, assessment of warm work places, epidemiology for industrial physicians, occupational ophthalmology etc. Most of the courses last for 3-6 days and involve groups of 15-40 participants.

In 1975/76 the National Board of Occupational Safety and Health arranged a special five week course on occupational safety and health for senior safety delegates, regional safety delegates and some trade union representatives in work environment questions. Although they have not received any more extensive basic education in the technical or medical field these representatives have to communicate in occupational safety and health questions with the occupational safety and health specialists, company management, etc. To provide a basis for other, advanced courses on occupational safety and health for workers' representatives, a thorough evaluation of the experiences of the course was undertaken and presented in a written report.

In addition to the above described external training of occupational safety and health personnel the Board also arranges an extensive training program for the Board's own staff, e.g. specialist training of inspectors at the Labour Inspectorate.

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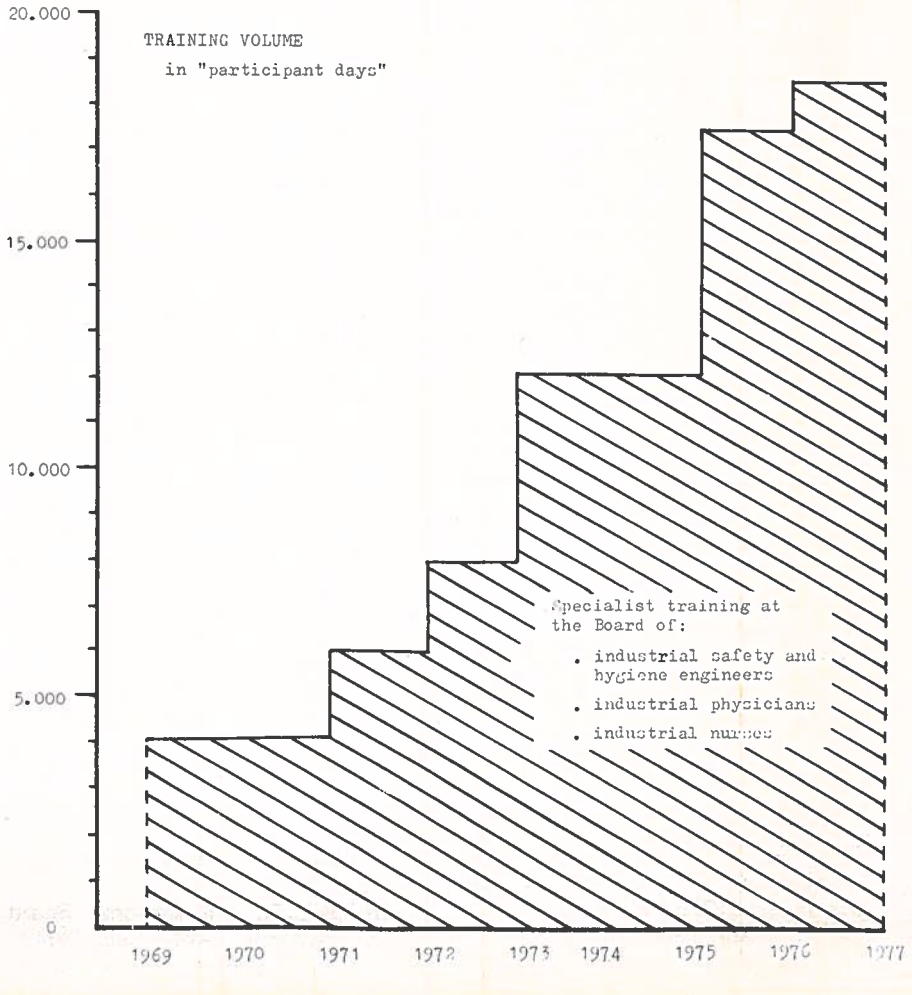

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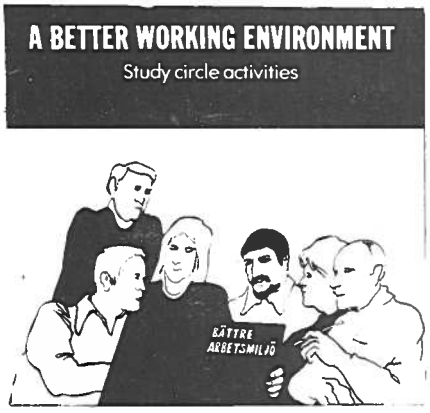
faction, the origins and prevention of accidents, safety legislation etc. A course based on "A Better Work Environment" can be completed in 30 to 40 hours. The material is intended for use in the training of safety delegates and supervisors in all sectors of commerce and industry. It has been given a certain amount of flexibility, so that emphasis can be laid on different parts, depending on those aspects of the work environment which the participants are most anxious to deal with. In addition, special adaptations have been made to the material so as to bring it more closely in line with conditions applying in particular sectors.



The following table gives a rough estimate of the total costs of the education based upon the study material "A Better Work Environment" during the period between August 1974 and May 1977 (in the monetary value of May 1977:

Material costs Skr	15.000.000
Costs for circle leaders	10.000.000
Study grants	52.000.000
Loss of production	325.000.000
Skr	**402.000.000**
US $	**92.000.000**

Estimated number of participants: 200.000 (240.000 study materials sold)

The heaviest part of the costs is borne by industry which has to cover the loss of production. The second heaviest part is carried by the Swedish Work Environment Fund, which has paid most of the costs of material, training of study circle leaders, etc.

As a continuation of the basic training based on "A Better Work Environment", the Joint Industrial Safety Council is now preparing further training for safety delegates and supervisors by compiling further training material on Noise, Lighting, Chemical health hazards, Ergonomics, Planning and projecting in the working environment, and other subjects.

UPPER SECONDARY SCHOOL INSTRUCTION IN MATTERS CONCERNING THE WORK ENVIRONMENT

In the technical lines of upper secondary school, matters concerning the work environment are covered in a special subject, ergonomics. This subject was introduced in the technical lines of upper secondary school about ten years ago. The term ergonomics is used here in its broadest sense and includes power and information ergonomics, industrial hygiene, safety techniques etc. Altogether the teaching of ergonomics comprises 60 hours in all technical lines of upper secondary school.

The National Board of Education, in consultation with the employer and trade union organizations, the National Board of Occupational Safety and Health and others, has compiled a special curricular supplement concerning instruction in matter relating to work environment, the aim being to strengthen the position of such matters in theoretical (i.e. not directly vocational) lines of upper secondary school within the framework of such timetable subjects as social science, biology etc.

The conduct of this teaching can be expected to run into considerable difficulties, owing to the congestion involved by other material which has to be taught to the pupils, the shortcomings of in-service teacher training on the occupational environment and problems of coordination regarding teaching materials and the planning of instruction.

OCCUPATIONAL SAFETY AND HEALTH SCIENCE STUDIES AT UNIVERSITIES AND COLLEGES

During the past five years, particular attention has been paid in Sweden to questions concerning **OSH-science** (= occupational safety and health science), education and research and the role of universities in this connection. Various inquiries were carried out in 1973-75 by consultation groups at the Chancellor's Office of Universities and Colleges and the different faculties. The reports presented proposed a build up of the resources and organization of OSH-science studies and research at universities and colleges. OSH-science being pre-eminently an interdiciplinary subject, it was considered inappropriate for a specific instutition of faculty to be established at the universities or for "OSH-science" to be introduced as a new research and teaching subject in its own right.

Concerning basic **medical training**, it was observed that elements of training relating to matters of OSH-science were already quite extensively represented in the teaching of both theoretical and clinical subjects. The following aspects of OSH-science were recommended for inclusion in basic medical education in order to strengthen and systematize instruction on the subject:

1) Environmental, factors capable of affecting the individual, their effect and prevention of the same
   - work involving physical exertion
   - exposure to substances of various kinds
   - physical agents
   - mental factors
2) The functioning of working life.

Hitherto there has been a very limited supply of research physicians in OSH-science. This shortage of competent researchers inhibits developments because it also implies a shortage of competent tutors. Measures must therefore be taken to stimulate recruitment. For example, clinical research appointments must be established, as well as special research assistant appointments in OSH-science. A measure of this kind was taken recently with the promotion of occupational medicine to a medical speciality in its own right. Various research training courses have been started in recent years in the OSH-science context (industrial physiology, industrial toxicology, occupational medicine etc), but they are till too few in number in relation to existing needs and interests.

Concerning **engineers** a target has been set whereby some 4 per cent of the duration of all education programmes in technical faculties should be devoted to aspects of OSH-science. Today such aspects are included to various extents in a number of subjects of an applied nature. In most educational programmes their scope falls considerably short of the above stated target. Mechanical engineering can generally be said to include the largest proportion of OSH-science at present.

The most recently established of Sweden's colleges of technology, in Luleå, started by including a compulsory element, roughly 10 per cent, of non-technical subjects in its engineering studies. Most of this compulsory element comprised aspects of OSH-science. Students taking mechanical engineering and geotechnology are also at liberty during their final year to choose a OSH-science speciality from among the following: physical factors in the environment, organization theory (the social psychology of working life), mining

The new directions stipulate that new saws delivered as from the day on which the directions enter into force must be of a design approved by the Board. Such approval can only be given to saws which have passed a design test carried out at a national testing station and which have been examined by the Board. The points covered by design testing will include noise level, handle vibrations and the braking time etc. of the chain brake.

New stipulations particularly worth mentioning are that the vibrations in the handles will not be allowed to exceed 40 N (as against 50 N at present) and that chain brakes will be made compulsory.

The directions contain special provisions concerning saws delivered before they come into force.

Please note that all the directions mentioned in this issue are published in Swedish only.

Other directions published by the Board since the previous issue of Newsletter.

Notice No. 1977: 1 Application of Supplement 1 to the Gas Cylinder Code 1967 issued the Pressure Vessel Commission.

Notice No. 1977: 2 Cleaning devices for snow-blowing machines.

Notice No. 1977: 3 Plasma cutting.

Notice No. 1977: 4 Double mounting of wheels on agricultural tractors and machines.

Notice No. 1977: 5 Modified regulations in the Directions concerning spray-painting.

Notice No. 1977: 6 Airless spraying of paint, rust preventive, etc.

Notice No. 1977: 7 Pneumatic bimanual control of hydraulic and pneumatic presses.

Notice No. 1977: 8 Installation of certain plastic tube systems at temporary working sites.

Notice No. 1977: 9 Plastic receptacles to certain air filters and similar devices.

Notice No. 1977: 10 Application of the Hot Water Code II issued by the Pressure Vessel Commission.

Notice No. 1977: 11 Change of the operative date of item B 25 in the Directions No 90, Excavators.

Notice No. 1977: 12 Safety shoes while working with rider trucks or leading trucks.

Notice No. 1977: 13 Inspection of cranes and certain other lifting devices.

Single copies of the publications of the Board mentioned in this Newsletter are submitted free of charge to foreign addresses on request. See order form.

NEW ISSUES OF " ARBETE OCH HÄLSA"

The Board's scientific series "Arbete och hälsa" contain results of the research carried out within the Board's Occupational Health Department. As a rule the issues *appear in Swedish with a summary in English.*

Summaries of the latest issues follow below.

Arbete och hälsa 1976 : 13

Bo Holmberg and Margareta Winell: Occupational hygienic standards - an international comparison.

The contemporary work performed in fourteen countries, Sweden included, to establish occupational standards for air contaminants is reviewed and compared. Work -room air standards for common industrial agents in different countries are presented in tables.

The occupational standards are established on biomedical criteria, technical feasibility and general political decisions and according to differences in technical development and in the political goal of the societies. The differences in the numerical values of air contaminants are largely due to differences in definitions and biomedical criteria.

Arbete och hälsa 1976 : 14

Jan-Erik Hansson and Bengt-Olov Wikström:
Exposure to whole -body vibrations among drivers of forest machines.

This report summarizes measurements, made according to ISO 2631, of whole-body vibrations, to which drivers of forest machines are exposed. The studies have been conducted during the years 1973 - 76. Vibration characteristics of altogether 66 working sites have been studied. The studies show that drivers of slashers and cutters are exposed to vibrations only to a small extent Heavy vibrations occur in forwarders, skidders, loaders, trimmers and on certain occasions in processors. For these machines vibrations are of such a magnitude, related to ISO standard 2631, that fatigue and work - proficiency are influenced during a working day of 8 hours. In 4 out of 66 machines studied, vibrations constituted a health hazard according to the above - mentioned standard for an exposure time of more than 8 hours.

The greatest energy content of the vibrations lies for horizontal directions in the frequency region of 1 - 3 Hz, and for the vertical direction in the frequency region of 1,5 - 6 Hz. Comparison between 1/3 - octaveband analysis and narrowband analysis shows that the former is narrow enough for the resonances to show up in the analysis.

Vibrations in horizontal directions are usually more critical to the driver than those in the vertical direction. The heaviest vibration load is represented in forwarders and skidders when driving without load. A lower driving - speed will give a considerable reduction of the vibration load on the driver. The extent to which the seat reduces the vibration load on the driver has been studied. Of 16 seats studied only 2 reduced the vibration load according to ISO 2631.

Arbete och hälsa 1977 : 1

Lars Olander:
Analytical model for the circulation of air from exhaust hoods.

A model is proposed for the relations between air-flows, hood capture efficiencies in recirculation of exhaust air. The model is applicable to both general ventilation systems and point suction systems. The model is used to illustrate the changes of the mean concentration, when a point suction system with recirculation of exhaust air is introduced in a room with an air-contaminating process.

Arbete och hälsa 1977 : 2

Åke Swensson:
Experimental investigations on the fibrogenetic power of chromite ore.

Intratrecheal injection on rats of 40 mg chromite particles suspended in 1 ml Ringer's solution caused a moderate cellular reaction that culminated after two months and then decreased. After eight months the lung weight was within normal limits. Only insignificant increase of fibrils was observed. The tissue reaction in regional lymph nodes was minimal.

contaminated area. Blood- and urine samples were taken from thousands of exposed and worried people and more than 20 chemical analysis were performed on them. In addition women were tested for pregnancy.

Specialists in dermatology, gynecology, internal medicine as well as family counselors began working in the school. A great number of minor skin affections were registered but the causal relationship was not always clear. Children with early unspecific symptoms developed chloracne after 1-2 months. In the end of February 1977 there were more than 300 children with chloracne. 30 legal abortions have been performed. Our present knowledge of the toxicity of TCDD suggests that late effects can be expected and an extensive epidemiological survey is being prepared. Morbidity, mortality and terrata were planned to be followed closely for a long time.

OTHER NEW REPORTS PUBLISHED BY THE BOARD

Investigation report 1977 : 1, 19 pages.

Ingvar Skare:
Evaluation of indicator tubes Part IV: Carbon dioxide. *In Swedish.*

A summary in English from the report is reproduced below.

This report — the fourth in a series concerning evaluation of indicator tubes — deals with those tubes for carbon dioxide which are available on the Swedish market and have a measuring range suitable for air-control of working places.

Seven types of indicator tubes from five manufacturers (Auer, Bacharach, Dräger, Gastec and MSA) have here been tested for accuracy and affects from variations in temperature and humidity.

Generally, it was obvious that the indicator tube-technique is well suited to carbon dioxide analysis. The *accuracy* was acceptable for nearly all types of tubes and furthermore the high working level of carbon dioxide concentration dominates at real cases any possible influence from *other gases.*

Two types of tubes (Dräger-0,1%/a and Gastec-2L) are adopted in US in accordance to US Fed Reg 38:88 § 84 and are permitted to be labelled with a NIOSH-certification. However, it must be noticed that Gastec evidently has performed a modified type without changing their typenumber.

extremely high humidities all types of tubes gave plus errors. The minus errors for Auer and Dräger at low temperatures should be eliminated by tempering the tubes before analysis.

Investigation report 1977 : 2, 14 pages.

Jan Rudling :
Determination of fluorides and hydrogen fluoride in air. *In Swedish.*

A summary in English from the report is reproduced below.

In the present study methods for sampling and analysis of particulate fluorides and hydrogen fluoride (gas) has been evaluated and to some degree modified.

Tests have confirmed that for sampling an excellent collection efficiency is achieved by using midget impingers with H_2O, $NaHCO_3$- or NaOH-solution as absorptionsolution.

In order to separate particulate fluorides and hydrogen fluoride the so-called double filter method has been studied and slightly modified.

The double filter method is based on the principle that fluorides (particulate) is collected on a filter and hydrogen fluoride is collected on the filter pad which is impregnated with sodiumformate. After treatment of the samples in an oven at 60°C for 20 hours the separation is completed.

Two different methods for analysis has been tested (ion specific electrode and the lantanalizarinfluorineblue method).

Both methods are acceptable, but the ion specific electrode is superior due to its greater tolerance against interfering ions.

As a result of the study four different methods for sampling and analysis has been proposed, two methods that determines particulate fluorides and hydrogen fluoride as a sum, one method that is suitable for the direct evaluation in the field and one method that separates hydrogen fluoride and particulate fluorides.

Investigation report 1977:3, 9 pages.

Aage R. Møller:
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On 9 trucks the maximal impact forces were over 800 N, though on the other 13 the maximal forces were below 600 N. The conclusion

Besides this the results were used to determine proper weight and falling-height in a falling-test for driver's seats developed on this department.

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The *colour indication* of the tubes was based either on shifts in pH-indicators (Gastec, MSA) or red-ox systems (Auer, Bacharach, Dräger).

Using the highest sensitivity (max number of strokes) all types of tubes fulfill the specification on *measuring range* (0,5-2 TLV) given by resolution No AP-74-4 of the Council of Europe. The requirement for *length of stain* (= 15 mm) was met formally only by Auer and Gastec-5L.

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FROM THE BOARD'S FOREIGN VISITORS FILE

18 - 19 Jan 1977
Mr Heinrich Hoppe, Dipl Engineer, Deutscher Schleifscheibenausschuss, West-Germany, Mr Karl Utzon, Direktoratet for Arbejdstilsynet, Denmark.

March
Mr Donald Hushion, Director General, Occupational Health and Safety Division, Ministry of Labour, Toronto, Canada.

25 March
Messrs Knut Erik Sabroe, Klaus Friche and Mogens Agervold, Psychologists, University of Aarhus, Denmark.

28 March
Messrs Aasbo, Tomten and Tor Skjervagen, Statens Arbeidstilsyn, Norway.

4 April
Quebec Forestry Safety Association. Participants:
Mr and Mrs Jean-Marie Quellet, S/B Quellet, Association de Sécurité des Industriels Forestiers du Quebec Inc. Mr Pierre St-Laurent, Contremaitre General la Cie de Bois de Luceville Ltee, Mr and Mrs Leonard Dancause,, Leonard Dancause & Fils Ltee, Mr Napoleon Roy, La Compagnie Price Ltee, Mr Andre Masson, Consolidated Bathurst Ltee, Mr David Griffith, Quebec Lands & Realty Compagny, Mr Jean-Yves Vadnais, Vadnais & Vadnais Inc, Mr Jean Noel Barriault, Georges Barriault & Fils Ltee, Mr Robert Poirier, Association Cooperative Forestiere de St-Elzear Inc, Mr Michel Huard, Felix Huard Inc, Mr Daniel St-Amand, Les Entreprises A.G.S. Inc, Mr Michel Gagne, Les Cedres Laurentiens Ltee, Mr Hector

No. 2 1977

Please note that, if not otherwise indicated the publications exist in Swedish only.

ORDER FORM

To be sent to

National Board of Occupational Safety and Health
Arbetarskyddsstyrelsen
Publication Service
Fack
S- 100 26 STOCKHOLM SWEDEN

Please send me the following material

Pamphlet about the National Occupational Safety and Health Administration:

☐ in English ☐ in French ☐ in German

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☐ Notice No .....

☐ Arbete och Hälsa No .....

☐ Methods Report No. .....

☐ Investigation Report No .....

☐ Training Report No. .....

☐ List of publications and duplicated reports from the Board's Occupational Health Department. In English.

☐ List of research projects in progress at the Board's Occupational Health Department. In English.

Signature, name _____

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service in the training course has been made possible among other things by the award of grants from the Work Environment Fund to finance the payment of training allowances to participants not already employed in occupational health services. In this way the host enterprise is spared having to meet the trainee's wage costs during the period of practical training. The size of allowances has been determined in such a way that they are to correspond to "going rates", i.e. the pay which the trainee could be expected to receive if he or she were to work as an engineer, physician or nurse instead of taking part in the training course.

At present the amounts payable are as follows:

trainee safety and hygiene engineer:
1 070 US dollars/month
trainee industrial physican:
2 340 US dollars/month
trainee industrial nurse:
830 US dollars/month.

Thus, the training courses are of two kinds. One kind is for practising safety and hygiene engineers, industrial physicians and industrial nurses. This course consists of a number of one, two, three or four-week periods spread over a total period of up to one year. The course totally comprises 8-15 weeks of theoretical lectures, group discussions, practical tasks, written examinations, etc, in subjects as ergonomics, occupational medicine and hygiene, work safety, occupational health service, information technique, etc. The other kind is for the training of prospective safety and hygiene engineers, industrial physicians and industrial nurses. In addition to the theoretical part - essentially identical with the above mentioned course - this training consists of 3 (nurse training) or 6 (engineers and physicians) month's practical service under supervision at a unit for occupational health services.

During the past few years the number of applicants for the industrial physician training courses run by the Board has been well up to the number of places available, i.e. 90 per annum. The number of applicants for the nurses' training courses has exceeded the number of places available. The following situation applied when the last admissions were made:

training course for practising industrial nurses (1977/78)

applicants	places available
301	144

training course for prospective industrial nurses (1976/77)

applicants	places available
55	45

The number of applicants for the safety and hygiene engineer training courses has risen from year to year:

	applicants	places available
1971	84	50
1972	196	50
1973	324	100
1974	423	100
1975	546	100
1976	767	100
1977	838	100

A closer analysis of the applicants for safety and hygiene engineer training during the past two years revels the following.

practising safety and hygiene engineers

	applicants	places
1976	133	50
1977	116	50

prospective safety and hygiene engineers

	applicants	places
1976	634	50
1977	722	50

The following would seem the likeliest explanation for the large number of applicants for safety and hygiene engineer training:

Great interest in work environment questions on the part of engineers. Interesting job opportunities.

Favourable financial terms attaching to the training

Scarcity of job opportunities in other fields of engineering

Safety and hygiene engineer training is at present one of the most advanced forms of training available to engineers in Sweden in the work environment sector.

In 1974 the National Board of Occupational Health and Safety arranged for the first time two "occupational safety and health contact days" for persons who had previously attended the above mentioned courses for occupational health service personnel. Two hundred people took part. In April this year, contact days of this kind were arranged for the fourth time in succession. This time 1 000 people took part. In addition certain further training courses are arranged every year for smaller groups: industrial hygienic dust sampling, industrial hygienic gas and solvent sampling, technical acoustics, assessment of warm work places, epidemiology for industrial physicians, occupational ophthalmology etc. Most of the courses last for 3-6 days and involve groups of 15-40 participants.

In 1975/76 the National Board of Occupational Safety and Health arranged a special five week course on occupational safety and health for senior safety delegates, regional safety delegates and some trade union representatives in work environment questions. Although they have not received any more extensive basic education in the technical or medical field these representatives have to communicate in occupational safety and health questions with the occupational safety and health specialists, company management, etc. To provide a basis for other, advanced courses on occupational safety and health for workers' representatives, a thorough evaluation of the experiences of the course was undertaken and presented in a written report.

In addition to the above described external training of occupational safety and health personnel the Board also arranges an extensive training program for the Board's own staff, e.g. specialist training of inspectors at the Labour Inspectorate.

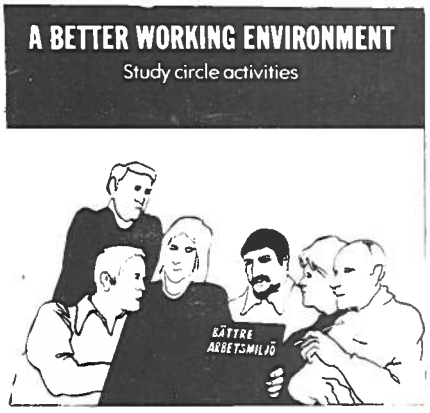
SAFETY AND HEALTH EDUCATION FOR SAFETY DELEGATES AND SUPERVISORS

The most extensive training in Sweden in matters relating to workers' protection and the occupational environment takes place within companies and under the auspices of trade unions in connection with the training of safety delegates, supervisors and employees generally. Safety and health education for safety delegates and supervisors has existed since 1942, as long as these questions have been regulated between the employer and trade union organizations.

A major campaign of basic training for safety delegates and supervisors in matters concerning work safety and work environment was prepared in 1973 and 1974. In its introductory stage this campaign involved the compilation of study material entitled "A Better Working Environment" for use in the basic training. The study material was produced by the Joint Industrial Safety Council, which was assisted by a working group of representatives of employers' associations and trade unions, the National Board of Occupational Safety and Health and other bodies.

"A Better Work Environment" was compiled on the assumption that it would be primarily used by "study circles" and it was made to include practical exercises in the form of work place inspections. The material deals with the following subjects: occupational safety and health services, ergonomics, noise, lighting, chemical health hazards, job satis-

faction, the origins and prevention of accidents, safety legislation etc. A course based on "A Better Work Environment" can be completed in 30 to 40 hours. The material is intended for use in the training of safety delegates and supervisors in all sectors of commerce and industry. It has been given a certain amount of flexibility, so that emphasis can be laid on different parts, depending on those aspects of the work environment which the participants are most anxious to deal with. In addition, special adaptations have been made to the material so as to bring it more closely in line with conditions applying in particular sectors.



The following table gives a rough estimate of the total costs of the education based upon the study material "A Better Work Environment" during the period between August 1974 and May 1977 (in the monetary value of May 1977:

Material costs Skr	15.000.000
Costs for circle leaders	10.000.000
Study grants	52.000.000
Loss of production	325.000.000
Skr	**402.000.000**
US $	**92.000.000**

Estimated number of participants: 200.000 (240.000 study materials sold)

The heaviest part of the costs is borne by industry which has to cover the loss of production. The second heaviest part is carried by the Swedish Work Environment Fund, which has paid most of the costs of material, training of study circle leaders, etc.

As a continuation of the basic training based on "A Better Work Environment", the Joint Industrial Safety Council is now preparing further training for safety delegates and supervisors by compiling further training material on Noise, Lighting, Chemical health hazards, Ergonomics, Planning and projecting in the working environment, and other subjects.

UPPER SECONDARY SCHOOL INSTRUCTION IN MATTERS CONCERNING THE WORK ENVIRONMENT

In the technical lines of upper secondary school, matters concerning the work environment are covered in a special subject, ergonomics. This subject was introduced in the technical lines of upper secondary school about ten years ago. The term ergonomics is used here in its broadest sense and includes power and information ergonomics, industrial hygiene, safety techniques etc. Altogether the teaching of ergonomics comprises 60 hours in all technical lines of upper secondary school.

The National Board of Education, in consultation with the employer and trade union organizations, the National Board of Occupational Safety and Health and others, has compiled a special curricular supplement concerning instruction in matter relating to work environment, the aim being to strengthen the position of such matters in theoretical (i.e. not directly vocational) lines of upper secondary school within the framework of such timetable subjects as social science, biology etc.

The conduct of this teaching can be expected to run into considerable difficulties, owing to the congestion involved by other material which has to be taught to the pupils, the shortcomings of in-service teacher training on the occupational environment and problems of coordination regarding teaching materials and the planning of instruction.

OCCUPATIONAL SAFETY AND HEALTH SCIENCE STUDIES AT UNIVERSITIES AND COLLEGES

During the past five years, particular attention has been paid in Sweden to questions concerning **OSH-science** (= occupational safety and health science), education and research and the role of universities in this connection. Various inquiries were carried out in 1973-75 by consultation groups at the Chancellor's Office of Universities and Colleges and the different faculties. The reports presented proposed a build up of the resources and organization of OSH-science studies and research at universities and colleges. OSH-science being pre-eminently an interdiciplinary subject, it was considered inappropriate for a specific instutition of faculty to be established at the universities or for "OSH-science" to be introduced as a new research and teaching subject in its own right.

Concerning basic **medical training**, it was observed that elements of training relating to matters of OSH-science were already quite extensively represented in the teaching of both theoretical and clinical subjects. The following aspects of OSH-science were recommended for inclusion in basic medical education in order to strengthen and systematize instruction on the subject:

1) Environmental, factors capable of affecting the individual, their effect and prevention of the same
   - work involving physical exertion
   - exposure to substances of various kinds
   - physical agents
   - mental factors
2) The functioning of working life.

Hitherto there has been a very limited supply of research physicians in OSH-science. This shortage of competent researchers inhibits developments because it also implies a shortage of competent tutors. Measures must therefore be taken to stimulate recruitment. For example, clinical research appointments must be established, as well as special research assistant appointments in OSH-science. A measure of this kind was taken recently with the promotion of occupational medicine to a medical speciality in its own right. Various research training courses have been started in recent years in the OSH-science context (industrial physiology, industrial toxicology, occupational medicine etc), but they are till too few in number in relation to existing needs and interests.

Concerning **engineers** a target has been set whereby some 4 per cent of the duration of all education programmes in technical faculties should be devoted to aspects of OSH-science. Today such aspects are included to various extents in a number of subjects of an applied nature. In most educational programmes their scope falls considerably short of the above stated target. Mechanical engineering can generally be said to include the largest proportion of OSH-science at present.

The most recently established of Sweden's colleges of technology, in Luleå, started by including a compulsory element, roughly 10 per cent, of non-technical subjects in its engineering studies. Most of this compulsory element comprised aspects of OSH-science. Students taking mechanical engineering and geotechnology are also at liberty during their final year to choose a OSH-science speciality from among the following: physical factors in the environment, organization theory (the social psychology of working life), mining

The new directions stipulate that new saws delivered as from the day on which the directions enter into force must be of a design approved by the Board. Such approval can only be given to saws which have passed a design test carried out at a national testing station and which have been examined by the Board. The points covered by design testing will include noise level, handle vibrations and the braking time etc. of the chain brake.

New stipulations particularly worth mentioning are that the vibrations in the handles will not be allowed to exceed 40 N (as against 50 N at present) and that chain brakes will be made compulsory.

The directions contain special provisions concerning saws delivered before they come into force.

Please note that all the directions mentioned in this issue are published in Swedish only.

Other directions published by the Board since the previous issue of Newsletter.

Notice No. 1977: 1 Application of Supplement 1 to the Gas Cylinder Code 1967 issued the Pressure Vessel Commission.

Notice No. 1977: 2 Cleaning devices for snow-blowing machines.

Notice No. 1977: 3 Plasma cutting.

Notice No. 1977: 4 Double mounting of wheels on agricultural tractors and machines.

Notice No. 1977: 5 Modified regulations in the Directions concerning spray-painting.

Notice No. 1977: 6 Airless spraying of paint, rust preventive, etc.

Notice No. 1977: 7 Pneumatic bimanual control of hydraulic and pneumatic presses.

Notice No. 1977: 8 Installation of certain plastic tube systems at temporary working sites.

Notice No. 1977: 9 Plastic receptacles to certain air filters and similar devices.

Notice No. 1977: 10 Application of the Hot Water Code II issued by the Pressure Vessel Commission.

Notice No. 1977: 11 Change of the operative date of item B 25 in the Directions No 90, Excavators.

Notice No. 1977: 12 Safety shoes while working with rider trucks or leading trucks.

Notice No. 1977: 13 Inspection of cranes and certain other lifting devices.

Single copies of the publications of the Board mentioned in this Newsletter are submitted free of charge to foreign addresses on request. See order form.

NEW ISSUES OF " ARBETE OCH HÄLSA"

The Board's scientific series "Arbete och hälsa" contain results of the research carried out within the Board's Occupational Health Department. As a rule the issues *appear in Swedish with a summary in English.*

Summaries of the latest issues follow below.

Arbete och hälsa 1976 : 13

Bo Holmberg and Margareta Winell: Occupational hygienic standards - an international comparison.

The contemporary work performed in fourteen countries, Sweden included, to establish occupational standards for air contaminants is reviewed and compared. Work -room air standards for common industrial agents in different countries are presented in tables.

The occupational standards are established on biomedical criteria, technical feasibility and general political decisions and according to differences in technical development and in the political goal of the societies. The differences in the numerical values of air contaminants are largely due to differences in definitions and biomedical criteria.

Arbete och hälsa 1976 : 14

Jan-Erik Hansson and Bengt-Olov Wikström:
Exposure to whole -body vibrations among drivers of forest machines.

This report summarizes measurements, made according to ISO 2631, of whole-body vibrations, to which drivers of forest machines are exposed. The studies have been conducted during the years 1973 - 76. Vibration characteristics of altogether 66 working sites have been studied. The studies show that drivers of slashers and cutters are exposed to vibrations only to a small extent Heavy vibrations occur in forwarders, skidders, loaders, trimmers and on certain occasions in processors. For these machines vibrations are of such a magnitude, related to ISO standard 2631, that fatigue and work - proficiency are influenced during a working day of 8 hours. In 4 out of 66 machines studied, vibrations constituted a health hazard according to the above - mentioned standard for an exposure time of more than 8 hours.

The greatest energy content of the vibrations lies for horizontal directions in the frequency region of 1 - 3 Hz, and for the vertical direction in the frequency region of 1,5 - 6 Hz. Comparison between 1/3 - octaveband analysis and narrowband analysis shows that the former is narrow enough for the resonances to show up in the analysis.

Vibrations in horizontal directions are usually more critical to the driver than those in the vertical direction. The heaviest vibration load is represented in forwarders and skidders when driving without load. A lower driving - speed will give a considerable reduction of the vibration load on the driver. The extent to which the seat reduces the vibration load on the driver has been studied. Of 16 seats studied only 2 reduced the vibration load according to ISO 2631.

Arbete och hälsa 1977 : 1

Lars Olander:
Analytical model for the circulation of air from exhaust hoods.

A model is proposed for the relations between air-flows, hood capture efficiencies in recirculation of exhaust air. The model is applicable to both general ventilation systems and point suction systems. The model is used to illustrate the changes of the mean concentration, when a point suction system with recirculation of exhaust air is introduced in a room with an air-contaminating process.

Arbete och hälsa 1977 : 2

Åke Swensson:
Experimental investigations on the fibrogenetic power of chromite ore.

Intratrecheal injection on rats of 40 mg chromite particles suspended in 1 ml Ringer's solution caused a moderate cellular reaction that culminated after two months and then decreased. After eight months the lung weight was within normal limits. Only insignificant increase of fibrils was observed. The tissue reaction in regional lymph nodes was minimal.

contaminated area. Blood- and urine samples were taken from thousands of exposed and worried people and more than 20 chemical analysis were performed on them. In addition women were tested for pregnancy.

Specialists in dermatology, gynecology, internal medicine as well as family counselors began working in the school. A great number of minor skin affections were registered but the causal relationship was not always clear. Children with early unspecific symptoms developed chloracne after 1-2 months. In the end of February 1977 there were more than 300 children with chloracne. 30 legal abortions have been performed. Our present knowledge of the toxicity of TCDD suggests that late effects can be expected and an extensive epidemiological survey is being prepared. Morbidity, mortality and terrata were planned to be followed closely for a long time.

OTHER NEW REPORTS PUBLISHED BY THE BOARD

Investigation report 1977 : 1, 19 pages.

Ingvar Skare:
Evaluation of indicator tubes Part IV: Carbon dioxide. *In Swedish.*

A summary in English from the report is reproduced below.

This report — the fourth in a series concerning evaluation of indicator tubes — deals with those tubes for carbon dioxide which are available on the Swedish market and have a measuring range suitable for air-control of working places.

Seven types of indicator tubes from five manufacturers (Auer, Bacharach, Dräger, Gastec and MSA) have here been tested for accuracy and affects from variations in temperature and humidity.

Generally, it was obvious that the indicator tube-technique is well suited to carbon dioxide analysis. The *accuracy* was acceptable for nearly all types of tubes and furthermore the high working level of carbon dioxide concentration dominates at real cases any possible influence from *other gases.*

Two types of tubes (Dräger-0,1%/a and Gastec-2L) are adopted in US in accordance to US Fed Reg 38:88 § 84 and are permitted to be labelled with a NIOSH-certification. However, it must be noticed that Gastec evidently has performed a modified type without changing their typenumber.

extremely high humidities all types of tubes gave plus errors. The minus errors for Auer and Dräger at low temperatures should be eliminated by tempering the tubes before analysis.

Investigation report 1977 : 2, 14 pages.

Jan Rudling :
Determination of fluorides and hydrogen fluoride in air. *In Swedish.*

A summary in English from the report is reproduced below.

In the present study methods for sampling and analysis of particulate fluorides and hydrogen fluoride (gas) has been evaluated and to some degree modified.

Tests have confirmed that for sampling an excellent collection efficiency is achieved by using midget impingers with H_2O, $NaHCO_3$- or NaOH-solution as absorptionsolution.

In order to separate particulate fluorides and hydrogen fluoride the so-called double filter method has been studied and slightly modified.

The double filter method is based on the principle that fluorides (particulate) is collected on a filter and hydrogen fluoride is collected on the filter pad which is impregnated with sodiumformate. After treatment of the samples in an oven at 60°C for 20 hours the separation is completed.

Two different methods for analysis has been tested (ion specific electrode and the lantanalizarinfluorineblue method).

Both methods are acceptable, but the ion specific electrode is superior due to its greater tolerance against interfering ions.

As a result of the study four different methods for sampling and analysis has been proposed, two methods that determines particulate fluorides and hydrogen fluoride as a sum, one method that is suitable for the direct evaluation in the field and one method that separates hydrogen fluoride and particulate fluorides.

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18 - 19 Jan 1977
Mr Heinrich Hoppe, Dipl Engineer, Deutscher Schleifscheibenausschuss, West-Germany, Mr Karl Utzon, Direktoratet for Arbejdstilsynet, Denmark.

March
Mr Donald Hushion, Director General, Occupational Health and Safety Division, Ministry of Labour, Toronto, Canada.

25 March
Messrs Knut Erik Sabroe, Klaus Friche and Mogens Agervold, Psychologists, University of Aarhus, Denmark.

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NEWSLETTER

National Board of Occupational Safety and Health · Arbetarskyddsstyrelsen · Sweden
Mailing address: Fack, S–100 26 Stockholm · Telephone: 46-8-54 02 60 Publisher: Gunilla Warnbeck

No. 2 1977

TRAINING AND EDUCATION IN OCCUPATIONAL SAFETY AND HEALTH IN SWEDEN

The following text is extracted from a report written by Kaj Elgstrand, Director of training and education at the National Board of Occupational Safety and Health. The report - and the summary here presented - covers the training and educational activities of occupational safety and health at the Board, within the trade unions and the factories, in the secondary school and at the universities. It goes into detail only when dealing with the training of the occupational safety and health specialists.

SPECIALIST TRAINING AT THE NATIONAL BOARD OF OCCUPATIONAL SAFETY AND HEALTH

The postgraduate training of industrial physicians, industrial nurses and industrial safety and hygiene engineers started in Sweden 20-30 years ago. The training was systematized, coordinated and further expanded when the National Institute of Occupational Health was created 10 years ago and took over responsibility for it. The Institute merged with the National Board of Occupational Safety and Health in 1972, and the Board has since then been the sponsor of the specialist training courses concerned. As previously, course management and most of the teaching staff are recruited from the Institute, which now forms the Board's Occupational Health Department.

About ten years ago, it was estimated that a fully operational occupational health service in Sweden would demand the following numbers of full time specialists:

1 500 safety and hygiene engineers
(+1 500 other technicans)
1 500 industrial physicians
2 300 industrial nurses.

On this basis and in view of the small number of specialists who had been trained and the anticipated expansion rate of industrial health services, the Riksdag (the Swedish Parliament) resolved in 1971 on the following annual training quotas for the period between 1971 and 1976:

50 safety and hygiene engineers
45 industrial physicians
60 industrial nurses.

Only two years after the passing of this resolution, however, annual training activities totalled

100 safety and hygiene engineers
90 industrial physicians
140 industrial nurses.

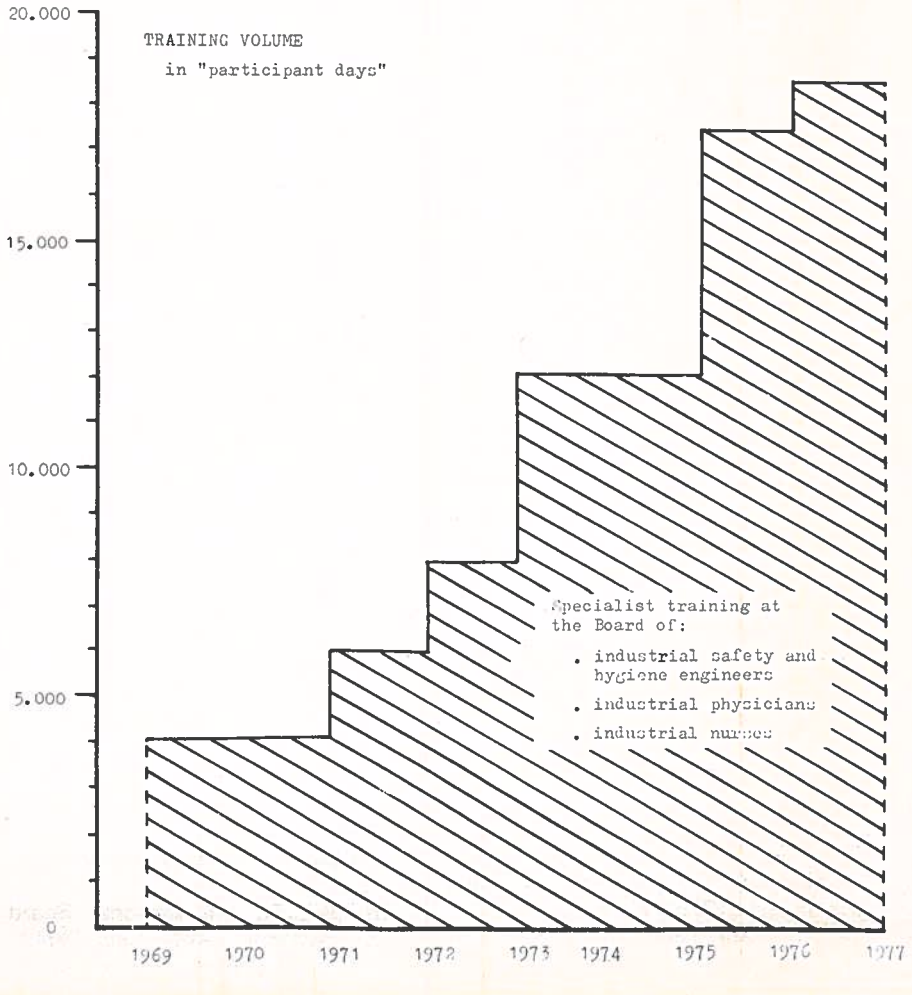
In other words, occupational health services are expanding much faster than the State and the Riksdag predicted at the beginning of the 1970s.

The following have been trained so far:

620 safety and hygiene engineers
675 industrial physicians
940 industrial nurses.

A new Government Commission on Occupational Health Services was appointed last year and should be presenting new figures in a year or so concerning the need for specialists in occupational health services.

Until two years ago, specialist training courses for occupational health service officers were attended almost exclusively by practising safety and hygiene engineers, industrial physicians and industrial nurses with previous experience of occupational health service work. As from 1975/76, certain places on training courses have been reserved for persons not yet employed in occupational health services, and the training undergone by these persons includes, in addition to the theoretical portion, a period of supervised practical service at an occupational health service unit. The inclusion of a period of practical



service in the training course has been made possible among other things by the award of grants from the Work Environment Fund to finance the payment of training allowances to participants not already employed in occupational health services. In this way the host enterprise is spared having to meet the trainee's wage costs during the period of practical training. The size of allowances has been determined in such a way that they are to correspond to "going rates", i.e. the pay which the trainee could be expected to receive if he or she were to work as an engineer, physician or nurse instead of taking part in the training course.

At present the amounts payable are as follows:

trainee safety and hygiene engineer:
1 070 US dollars/month
trainee industrial physican:
2 340 US dollars/month
trainee industrial nurse:
830 US dollars/month.

Thus, the training courses are of two kinds. One kind is for practising safety and hygiene engineers, industrial physicians and industrial nurses. This course consists of a number of one, two, three or four-week periods spread over a total period of up to one year. The course totally comprises 8-15 weeks of theoretical lectures, group discussions, practical tasks, written examinations, etc, in subjects as ergonomics, occupational medicine and hygiene, work safety, occupational health service, information technique, etc. The other kind is for the training of prospective safety and hygiene engineers, industrial physicians and industrial nurses. In addition to the theoretical part - essentially identical with the above mentioned course - this training consists of 3 (nurse training) or 6 (engineers and physicians) month's practical service under supervision at a unit for occupational health services.

During the past few years the number of applicants for the industrial physician training courses run by the Board has been well up to the number of places available, i.e. 90 per annum. The number of applicants for the nurses' training courses has exceeded the number of places available. The following situation applied when the last admissions were made:

training course for practising industrial nurses (1977/78)

applicants	places available
301	144

training course for prospective industrial nurses (1976/77)

applicants	places available
55	45

The number of applicants for the safety and hygiene engineer training courses has risen from year to year:

	applicants	places available
1971	84	50
1972	196	50
1973	324	100
1974	423	100
1975	546	100
1976	767	100
1977	838	100

A closer analysis of the applicants for safety and hygiene engineer training during the past two years revels the following.

practising safety and hygiene engineers

	applicants	places
1976	133	50
1977	116	50

prospective safety and hygiene engineers

	applicants	places
1976	634	50
1977	722	50

The following would seem the likeliest explanation for the large number of applicants for safety and hygiene engineer training:

Great interest in work environment questions on the part of engineers. Interesting job opportunities.

Favourable financial terms attaching to the training

Scarcity of job opportunities in other fields of engineering

Safety and hygiene engineer training is at present one of the most advanced forms of training available to engineers in Sweden in the work environment sector.

In 1974 the National Board of Occupational Health and Safety arranged for the first time two "occupational safety and health contact days" for persons who had previously attended the above mentioned courses for occupational health service personnel. Two hundred people took part. In April this year, contact days of this kind were arranged for the fourth time in succession. This time 1 000 people took part. In addition certain further training courses are arranged every year for smaller groups: industrial hygienic dust sampling, industrial hygienic gas and solvent sampling, technical acoustics, assessment of warm work places, epidemiology for industrial physicians, occupational ophthalmology etc. Most of the courses last for 3-6 days and involve groups of 15-40 participants.

In 1975/76 the National Board of Occupational Safety and Health arranged a special five week course on occupational safety and health for senior safety delegates, regional safety delegates and some trade union representatives in work environment questions. Although they have not received any more extensive basic education in the technical or medical field these representatives have to communicate in occupational safety and health questions with the occupational safety and health specialists, company management, etc. To provide a basis for other, advanced courses on occupational safety and health for workers' representatives, a thorough evaluation of the experiences of the course was undertaken and presented in a written report.

In addition to the above described external training of occupational safety and health personnel the Board also arranges an extensive training program for the Board's own staff, e.g. specialist training of inspectors at the Labour Inspectorate.

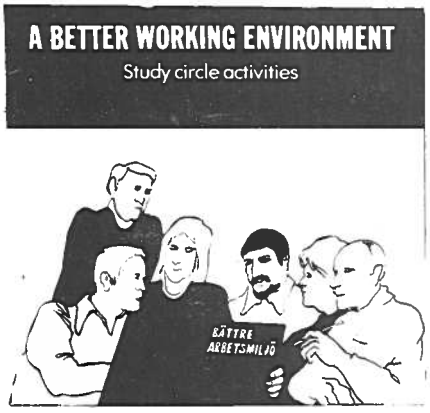
SAFETY AND HEALTH EDUCATION FOR SAFETY DELEGATES AND SUPERVISORS

The most extensive training in Sweden in matters relating to workers' protection and the occupational environment takes place within companies and under the auspices of trade unions in connection with the training of safety delegates, supervisors and employees generally. Safety and health education for safety delegates and supervisors has existed since 1942, as long as these questions have been regulated between the employer and trade union organizations.

A major campaign of basic training for safety delegates and supervisors in matters concerning work safety and work environment was prepared in 1973 and 1974. In its introductory stage this campaign involved the compilation of study material entitled "A Better Working Environment" for use in the basic training. The study material was produced by the Joint Industrial Safety Council, which was assisted by a working group of representatives of employers' associations and trade unions, the National Board of Occupational Safety and Health and other bodies.

"A Better Work Environment" was compiled on the assumption that it would be primarily used by "study circles" and it was made to include practical exercises in the form of work place inspections. The material deals with the following subjects: occupational safety and health services, ergonomics, noise, lighting, chemical health hazards, job satis-

faction, the origins and prevention of accidents, safety legislation etc. A course based on "A Better Work Environment" can be completed in 30 to 40 hours. The material is intended for use in the training of safety delegates and supervisors in all sectors of commerce and industry. It has been given a certain amount of flexibility, so that emphasis can be laid on different parts, depending on those aspects of the work environment which the participants are most anxious to deal with. In addition, special adaptations have been made to the material so as to bring it more closely in line with conditions applying in particular sectors.



The following table gives a rough estimate of the total costs of the education based upon the study material "A Better Work Environment" during the period between August 1974 and May 1977 (in the monetary value of May 1977:

Material costs Skr	15.000.000
Costs for circle leaders	10.000.000
Study grants	52.000.000
Loss of production	325.000.000
Skr	**402.000.000**
US $	**92.000.000**

Estimated number of participants: 200.000 (240.000 study materials sold)

The heaviest part of the costs is borne by industry which has to cover the loss of production. The second heaviest part is carried by the Swedish Work Environment Fund, which has paid most of the costs of material, training of study circle leaders, etc.

As a continuation of the basic training based on "A Better Work Environment", the Joint Industrial Safety Council is now preparing further training for safety delegates and supervisors by compiling further training material on Noise, Lighting, Chemical health hazards, Ergonomics, Planning and projecting in the working environment, and other subjects.

UPPER SECONDARY SCHOOL INSTRUCTION IN MATTERS CONCERNING THE WORK ENVIRONMENT

In the technical lines of upper secondary school, matters concerning the work environment are covered in a special subject, ergonomics. This subject was introduced in the technical lines of upper secondary school about ten years ago. The term ergonomics is used here in its broadest sense and includes power and information ergonomics, industrial hygiene, safety techniques etc. Altogether the teaching of ergonomics comprises 60 hours in all technical lines of upper secondary school.

The National Board of Education, in consultation with the employer and trade union organizations, the National Board of Occupational Safety and Health and others, has compiled a special curricular supplement concerning instruction in matter relating to work environment, the aim being to strengthen the position of such matters in theoretical (i.e. not directly vocational) lines of upper secondary school within the framework of such timetable subjects as social science, biology etc.

The conduct of this teaching can be expected to run into considerable difficulties, owing to the congestion involved by other material which has to be taught to the pupils, the shortcomings of in-service teacher training on the occupational environment and problems of coordination regarding teaching materials and the planning of instruction.

OCCUPATIONAL SAFETY AND HEALTH SCIENCE STUDIES AT UNIVERSITIES AND COLLEGES

During the past five years, particular attention has been paid in Sweden to questions concerning **OSH-science** (= occupational safety and health science), education and research and the role of universities in this connection. Various inquiries were carried out in 1973-75 by consultation groups at the Chancellor's Office of Universities and Colleges and the different faculties. The reports presented proposed a build up of the resources and organization of OSH-science studies and research at universities and colleges. OSH-science being pre-eminently an interdiciplinary subject, it was considered inappropriate for a specific instutition of faculty to be established at the universities or for "OSH-science" to be introduced as a new research and teaching subject in its own right.

Concerning basic **medical training**, it was observed that elements of training relating to matters of OSH-science were already quite extensively represented in the teaching of both theoretical and clinical subjects. The following aspects of OSH-science were recommended for inclusion in basic medical education in order to strengthen and systematize instruction on the subject:

1) Environmental, factors capable of affecting the individual, their effect and prevention of the same
   - work involving physical exertion
   - exposure to substances of various kinds
   - physical agents
   - mental factors
2) The functioning of working life.

Hitherto there has been a very limited supply of research physicians in OSH-science. This shortage of competent researchers inhibits developments because it also implies a shortage of competent tutors. Measures must therefore be taken to stimulate recruitment. For example, clinical research appointments must be established, as well as special research assistant appointments in OSH-science. A measure of this kind was taken recently with the promotion of occupational medicine to a medical speciality in its own right. Various research training courses have been started in recent years in the OSH-science context (industrial physiology, industrial toxicology, occupational medicine etc), but they are till too few in number in relation to existing needs and interests.

Concerning **engineers** a target has been set whereby some 4 per cent of the duration of all education programmes in technical faculties should be devoted to aspects of OSH-science. Today such aspects are included to various extents in a number of subjects of an applied nature. In most educational programmes their scope falls considerably short of the above stated target. Mechanical engineering can generally be said to include the largest proportion of OSH-science at present.

The most recently established of Sweden's colleges of technology, in Luleå, started by including a compulsory element, roughly 10 per cent, of non-technical subjects in its engineering studies. Most of this compulsory element comprised aspects of OSH-science. Students taking mechanical engineering and geotechnology are also at liberty during their final year to choose a OSH-science speciality from among the following: physical factors in the environment, organization theory (the social psychology of working life), mining

The new directions stipulate that new saws delivered as from the day on which the directions enter into force must be of a design approved by the Board. Such approval can only be given to saws which have passed a design test carried out at a national testing station and which have been examined by the Board. The points covered by design testing will include noise level, handle vibrations and the braking time etc. of the chain brake.

New stipulations particularly worth mentioning are that the vibrations in the handles will not be allowed to exceed 40 N (as against 50 N at present) and that chain brakes will be made compulsory.

The directions contain special provisions concerning saws delivered before they come into force.

Please note that all the directions mentioned in this issue are published in Swedish only.

Other directions published by the Board since the previous issue of Newsletter.

Notice No. 1977: 1 Application of Supplement 1 to the Gas Cylinder Code 1967 issued the Pressure Vessel Commission.

Notice No. 1977: 2 Cleaning devices for snow-blowing machines.

Notice No. 1977: 3 Plasma cutting.

Notice No. 1977: 4 Double mounting of wheels on agricultural tractors and machines.

Notice No. 1977: 5 Modified regulations in the Directions concerning spray-painting.

Notice No. 1977: 6 Airless spraying of paint, rust preventive, etc.

Notice No. 1977: 7 Pneumatic bimanual control of hydraulic and pneumatic presses.

Notice No. 1977: 8 Installation of certain plastic tube systems at temporary working sites.

Notice No. 1977: 9 Plastic receptacles to certain air filters and similar devices.

Notice No. 1977: 10 Application of the Hot Water Code II issued by the Pressure Vessel Commission.

Notice No. 1977: 11 Change of the operative date of item B 25 in the Directions No 90, Excavators.

Notice No. 1977: 12 Safety shoes while working with rider trucks or leading trucks.

Notice No. 1977: 13 Inspection of cranes and certain other lifting devices.

Single copies of the publications of the Board mentioned in this Newsletter are submitted free of charge to foreign addresses on request. See order form.

NEW ISSUES OF " ARBETE OCH HÄLSA"

The Board's scientific series "Arbete och hälsa" contain results of the research carried out within the Board's Occupational Health Department. As a rule the issues *appear in Swedish with a summary in English.*

Summaries of the latest issues follow below.

Arbete och hälsa 1976 : 13

Bo Holmberg and Margareta Winell: Occupational hygienic standards - an international comparison.

The contemporary work performed in fourteen countries, Sweden included, to establish occupational standards for air contaminants is reviewed and compared. Work -room air standards for common industrial agents in different countries are presented in tables.

The occupational standards are established on biomedical criteria, technical feasibility and general political decisions and according to differences in technical development and in the political goal of the societies. The differences in the numerical values of air contaminants are largely due to differences in definitions and biomedical criteria.

Arbete och hälsa 1976 : 14

Jan-Erik Hansson and Bengt-Olov Wikström:
Exposure to whole -body vibrations among drivers of forest machines.

This report summarizes measurements, made according to ISO 2631, of whole-body vibrations, to which drivers of forest machines are exposed. The studies have been conducted during the years 1973 - 76. Vibration characteristics of altogether 66 working sites have been studied. The studies show that drivers of slashers and cutters are exposed to vibrations only to a small extent Heavy vibrations occur in forwarders, skidders, loaders, trimmers and on certain occasions in processors. For these machines vibrations are of such a magnitude, related to ISO standard 2631, that fatigue and work - proficiency are influenced during a working day of 8 hours. In 4 out of 66 machines studied, vibrations constituted a health hazard according to the above - mentioned standard for an exposure time of more than 8 hours.

The greatest energy content of the vibrations lies for horizontal directions in the frequency region of 1 - 3 Hz, and for the vertical direction in the frequency region of 1,5 - 6 Hz. Comparison between 1/3 - octaveband analysis and narrowband analysis shows that the former is narrow enough for the resonances to show up in the analysis.

Vibrations in horizontal directions are usually more critical to the driver than those in the vertical direction. The heaviest vibration load is represented in forwarders and skidders when driving without load. A lower driving - speed will give a considerable reduction of the vibration load on the driver. The extent to which the seat reduces the vibration load on the driver has been studied. Of 16 seats studied only 2 reduced the vibration load according to ISO 2631.

Arbete och hälsa 1977 : 1

Lars Olander:
Analytical model for the circulation of air from exhaust hoods.

A model is proposed for the relations between air-flows, hood capture efficiencies in recirculation of exhaust air. The model is applicable to both general ventilation systems and point suction systems. The model is used to illustrate the changes of the mean concentration, when a point suction system with recirculation of exhaust air is introduced in a room with an air-contaminating process.

Arbete och hälsa 1977 : 2

Åke Swensson:
Experimental investigations on the fibrogenetic power of chromite ore.

Intratrecheal injection on rats of 40 mg chromite particles suspended in 1 ml Ringer's solution caused a moderate cellular reaction that culminated after two months and then decreased. After eight months the lung weight was within normal limits. Only insignificant increase of fibrils was observed. The tissue reaction in regional lymph nodes was minimal.

contaminated area. Blood- and urine samples were taken from thousands of exposed and worried people and more than 20 chemical analysis were performed on them. In addition women were tested for pregnancy.

Specialists in dermatology, gynecology, internal medicine as well as family counselors began working in the school. A great number of minor skin affections were registered but the causal relationship was not always clear. Children with early unspecific symptoms developed chloracne after 1-2 months. In the end of February 1977 there were more than 300 children with chloracne. 30 legal abortions have been performed. Our present knowledge of the toxicity of TCDD suggests that late effects can be expected and an extensive epidemiological survey is being prepared. Morbidity, mortality and terrata were planned to be followed closely for a long time.

OTHER NEW REPORTS PUBLISHED BY THE BOARD

Investigation report 1977 : 1, 19 pages.

Ingvar Skare:
Evaluation of indicator tubes Part IV: Carbon dioxide. *In Swedish.*

A summary in English from the report is reproduced below.

This report — the fourth in a series concerning evaluation of indicator tubes — deals with those tubes for carbon dioxide which are available on the Swedish market and have a measuring range suitable for air-control of working places.

Seven types of indicator tubes from five manufacturers (Auer, Bacharach, Dräger, Gastec and MSA) have here been tested for accuracy and affects from variations in temperature and humidity.

Generally, it was obvious that the indicator tube-technique is well suited to carbon dioxide analysis. The *accuracy* was acceptable for nearly all types of tubes and furthermore the high working level of carbon dioxide concentration dominates at real cases any possible influence from *other gases.*

Two types of tubes (Dräger-0,1%/a and Gastec-2L) are adopted in US in accordance to US Fed Reg 38:88 § 84 and are permitted to be labelled with a NIOSH-certification. However, it must be noticed that Gastec evidently has performed a modified type without changing their typenumber.

extremely high humidities all types of tubes gave plus errors. The minus errors for Auer and Dräger at low temperatures should be eliminated by tempering the tubes before analysis.

Investigation report 1977 : 2, 14 pages.

Jan Rudling :
Determination of fluorides and hydrogen fluoride in air. *In Swedish.*

A summary in English from the report is reproduced below.

In the present study methods for sampling and analysis of particulate fluorides and hydrogen fluoride (gas) has been evaluated and to some degree modified.

Tests have confirmed that for sampling an excellent collection efficiency is achieved by using midget impingers with H_2O, $NaHCO_3$- or NaOH-solution as absorptionsolution.

In order to separate particulate fluorides and hydrogen fluoride the so-called double filter method has been studied and slightly modified.

The double filter method is based on the principle that fluorides (particulate) is collected on a filter and hydrogen fluoride is collected on the filter pad which is impregnated with sodiumformate. After treatment of the samples in an oven at 60°C for 20 hours the separation is completed.

Two different methods for analysis has been tested (ion specific electrode and the lantanalizarinfluorineblue method).

Both methods are acceptable, but the ion specific electrode is superior due to its greater tolerance against interfering ions.

As a result of the study four different methods for sampling and analysis has been proposed, two methods that determines particulate fluorides and hydrogen fluoride as a sum, one method that is suitable for the direct evaluation in the field and one method that separates hydrogen fluoride and particulate fluorides.

Investigation report 1977:3, 9 pages.

Aage R. Møller:
Occupational hazards of ultrasound - literature review and recommentations for elimination. *In Swedish.*

Investigation report 1977 : 4, 27 pages.

Anders Jansson:
Dust Monitor (or Massometer). *In Swedish.*

A summary in English from the report is reproduced below.

The report contains a description and evaluation of a manufacturer's (GCA Corporation) instruments for measuring air-borne dust. The measuring principle involves absorption of beta-radiation. The instruments are well suited for short sampling periods and when direct results are desired. Total or respirable dust concentrations may be determined. The results are not fully comparable with results from filter sampling techniques, and the instruments should not be used for determinations of personal expositions of air-borne dust.

Investigation report 1977:5, 7 pages

Mats Levin:
Local exhaust systems for cutting machines. The effect of the hoods on optical radiation. *In Swedish.*

Investigation report 1977:6, 28 pages.

Ulf Hallne and Arne Erlandsson:
Occupational health problems in welding.
3. Frequency of welding in aluminium and stainless steel as well as soldering with silver solder within Swedish manufacturing industry. *In Swedish.*

Investigation report 1977:7, 28 pages.

Olov Östberg, Ewa Gunnarsson and Berit Calissendorf:
Assessment of a microimage. System with special reference to visual ergonomics. *In Swedish.*

Investigation report 1977: 10, 10 pages.

Maria Steby:
Occupational exposure of solvents, dust and some metals in spray painting. Report 4. *In Swedish.*

Investigation report 1977 : 11, 17 pages.

Mats Bjurvald:
The determination of the magnitude of the impact-forces to which fork-lift truck drivers are exposed. *In Swedish.*

A summary in English from the report is reproduced below.

This study was made in order to determine the magnitude of impact-forces to which fork-lift truck drivers are exposed and to compare these forces with figures on the mechanical properties of the human spine column found in the literature. To measure the force between the driver's buttocks and the seat-pan it was necessary to construct a special force-gauge. Besides the force the acceleration of the seat was also measured. Studies were made on 22 fork-lift trucks under as normal driving conditions as possible.

The results show the maximal dynamic impact-force was 1570 N (peak-value). This impact-situation occured on a 2-ton truck, driving with rather high speed on an very uneven gravelled road, and this force had a magnitude that was twice as great as the force corresponding to the driver's body-weight. This impact-force comes up to about one third of the tolerance limit of a young human spine.

On 9 trucks the maximal impact forces were over 800 N, though on the other 13 the maximal forces were below 600 N. The conclusion

Besides this the results were used to determine proper weight and falling-height in a falling-test for driver's seats developed on this department.

Investigation report 1977: 12, 20 pages.

Staffan Krantz and Lennart Lundgren: Analysis of mineral fibres with light microscopy. *In Swedish.*

Investigation report 1977 : 13, 24 pages.

Ingvar Skare:
Evaluation of indicator tubes. Part V: Sulphur dioxide. *In Swedish.*

A summary in English from the report is reproduced below.

This report – the fifth in a series concerning evaluation of indicator tubes-deals with those tubes for sulfur dioxide, which are available on the Swedish market and which have a measuring range suitable for occupational hygiene measurements.

Six types of indicator tubes from five manufacturers have been tested for accuracy and influence from variations in temperature and humidity (The long-term tube Dräger 5/aL was not available at time of testing).

The *colour indication* of the tubes was based either on shifts in pH-indicators (Gastec, MSA) or red-ox systems (Auer, Bacharach, Dräger).

Using the highest sensitivity (max number of strokes) all types of tubes fulfill the specification on *measuring range* (0,5-2 TLV) given by resolution No AP-74-4 of the Council of Europe. The requirement for *length of stain* (= 15 mm) was met formally only by Auer and Gastec-5L.

The relative *standard deviation for readers* was less than 10% for all types of tubes. The relative *total standard deviation* for single tubes (within batches) was, however, acceptable only for Gastec-5L, Gastec-5La and MSA, With Dräger it was necessary to use four tubes to get a 25% range for the mean at the TLV-concentration (95% confidence level).

Gastec-5L showed a large deviation in calibration between the two batches tested. Generally the accuracy was strongly dependent on the moisture content of the testing atmosphere. The *humidity* effect was most evident for Auer and Bacharach, but strong also for MSA. For the latter the effect was, however, somewhat dampened

The influence of *temperature* variations was small in the range + 5 – 32°C and was difficult to distinguish from the influence of humidity.

None of the *foreign gases* here tested (ammonia, hydrogen chloride, nitrogen dioxide and hydrogen sulfide) showed any self-response with the red-ox type (pre-layer) tubes. However, these tubes seemed to facilitate surface reactions between sulfur dioxide and other gases (giving low readings) to a greater extent then the acid-base type of tubes. *–NB.* External gas-phases reactions are not regarded as interferences.

The best information on actual interferences should be obtained by performing analyses with tubes from both types of indication system.

FROM THE BOARD'S FOREIGN VISITORS FILE

18 - 19 Jan 1977
Mr Heinrich Hoppe, Dipl Engineer, Deutscher Schleifscheibenausschuss, West-Germany, Mr Karl Utzon, Direktoratet for Arbejdstilsynet, Denmark.

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☐ Investigation Report No .....

☐ Training Report No. .....

☐ List of publications and duplicated reports from the Board's Occupational Health Department. In English.

☐ List of research projects in progress at the Board's Occupational Health Department. In English.

Signature, name _____

Name of Institution _____

Address _____

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