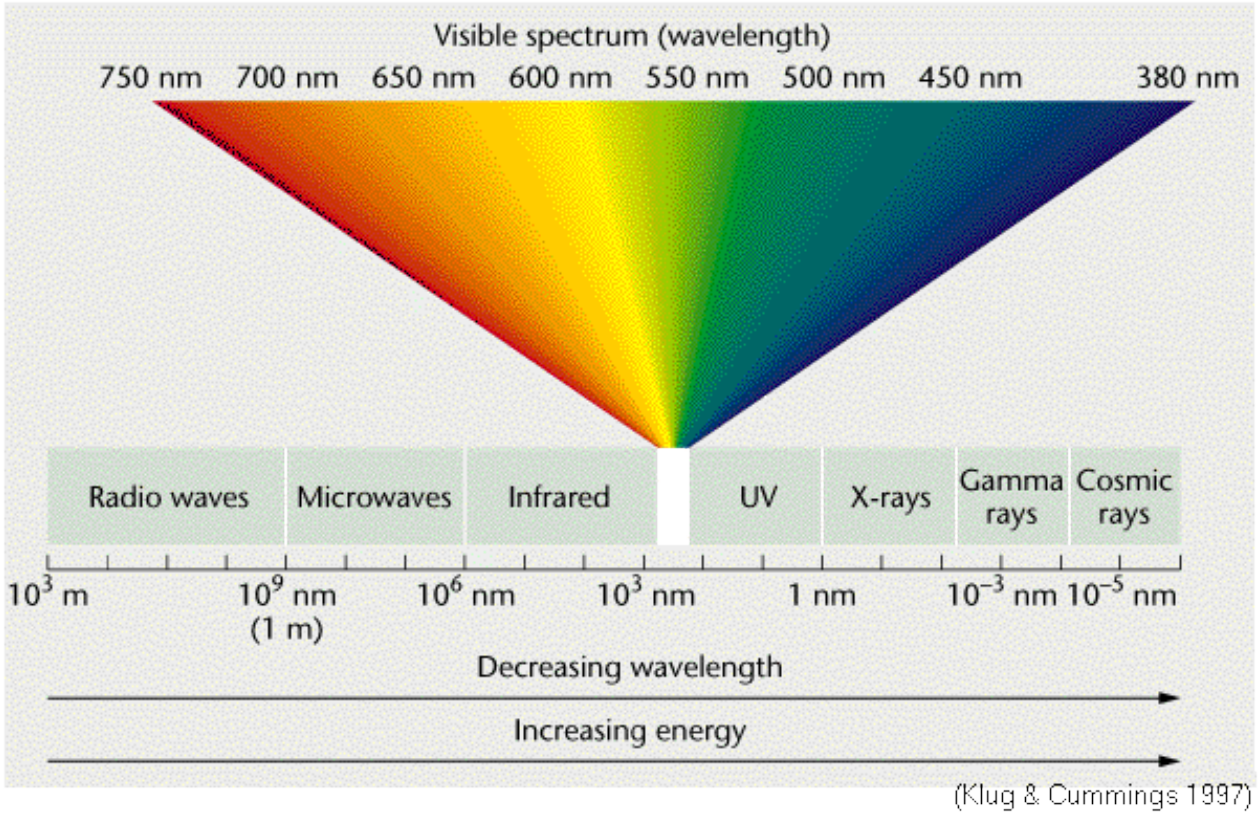
UV-Exposure DUS 2013

Report of the measurements

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Introduction

UV-radiation
UVA - 315 nm to 400 nm
UVB - 280 nm to 315 nm
UVC - 100 nm to 280 nm



Source: http://www.mun.ca/biology/scarr/Fg14_17.gif

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Effects

Effects

- Energy, light, warmth, growth
- Initiation of the formation of vitamin D
- Killing of germs
- Photosynthesis

Major risk factor for

- Acute damages (tanning, sunburn (UV-B))
- Long term damages ((premature) skin aging, skin cancer (UV-A/B))
- Eye damages (flash burn, conjunctivitis, cataract)
- Embrittlement, aging of colours/plastic components

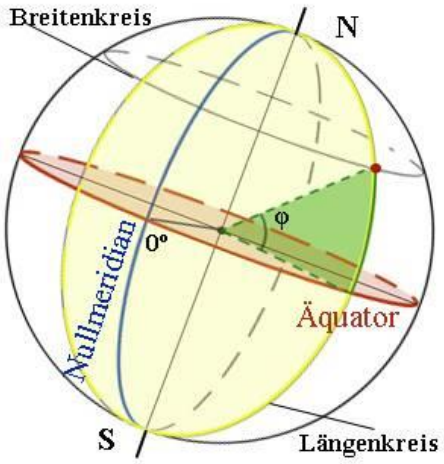
....the dose makes the difference and the skin will never forget.....

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation

Effects are a function of

- Latitude (equator maximum UV)
- Height above sea level (i. e. elevation)
- Time of the day
- Time of the year
- Weather (cloudiness)
- Surroundings (reflections of water, sand, ...)
- Ozone concentration (atmospheric ozone absorbs UV)



Why do we care about „sunshine“?

- Daily risk
- Natural exposure
- Free time/holiday behaviour (helps us to look good, fit and healthy)
- ....

Riak assessment as per ArbSchG:

Exposure to natural UV-radiation: Consequence

BUT .....

- Street building workers: up to 8x-sunburn dose (University of Osnabrück)
- Agriculture, forestry, fishery, gardeners: 2x – 3x skin cancer risk compared to people in buildings
- About 200.000 new cases of white cancer in GER per year

- Occupational disease # 5103 (since January 1st, 2015)
  „Squamous cell carcinoma (Plattenepithelkarzinom) or multiple actinic keratoses of the skin through natural UV-radiation“

YES, we do have to care about the occupational part of UV

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation

Skin damage as a result of intensive impact of sunlight while driving a truck on american highways.

Source: New England Journal of Medicine

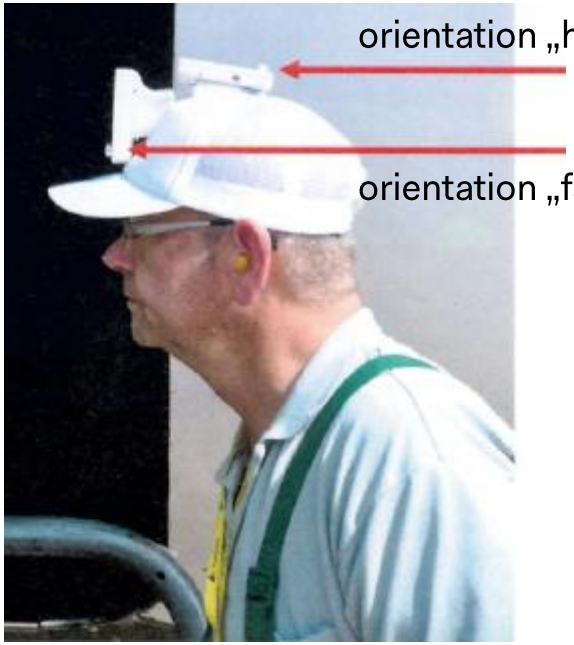
Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measurements

Measurements took place July 2nd and August 23rd, 2013

Organisation: Stabsstelle AS
Carrying out: Measurement division of the BG Verkehr
Personnel: Gardeners, loading personnel
Equipment: Electronic datalogger X-2000-10

personal



stationary V 81, V 83/84

Riak assessment as per ArbSchG:

Exposure to natural UV-radiation: Measurements

Indicator

Sunburn (UV – erythema) as the minimal delayed biological answer

Safety limit (Minimum erythema causing dose MED) for the in Germany mainly represented skin types II and III

Type II: 250 J/m²
Type III: 350 J/m²
Note: MED varies within the groups (fairskinned type II: 250 – 400 J/m²)
(according *Commission Internationale de l'Éclairage*, = International commission on illumination CIE)

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measures

Skin types I – VI (according to Fitzpatrick)

I: Keltischer Typ
(always burns, never tans)
II: Nordischer Typ
(usually burns, tans minimally)
III: Mischtyp
(mild burn, tans uniformly)

IV: Mediterraner Typ
(rarely burns, alw. tans well)
V: Dunkler Typ
(Very rarely burns, tans very easily)
VI: Schwarzer Typ
(never burns, tans very easily)

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measurements

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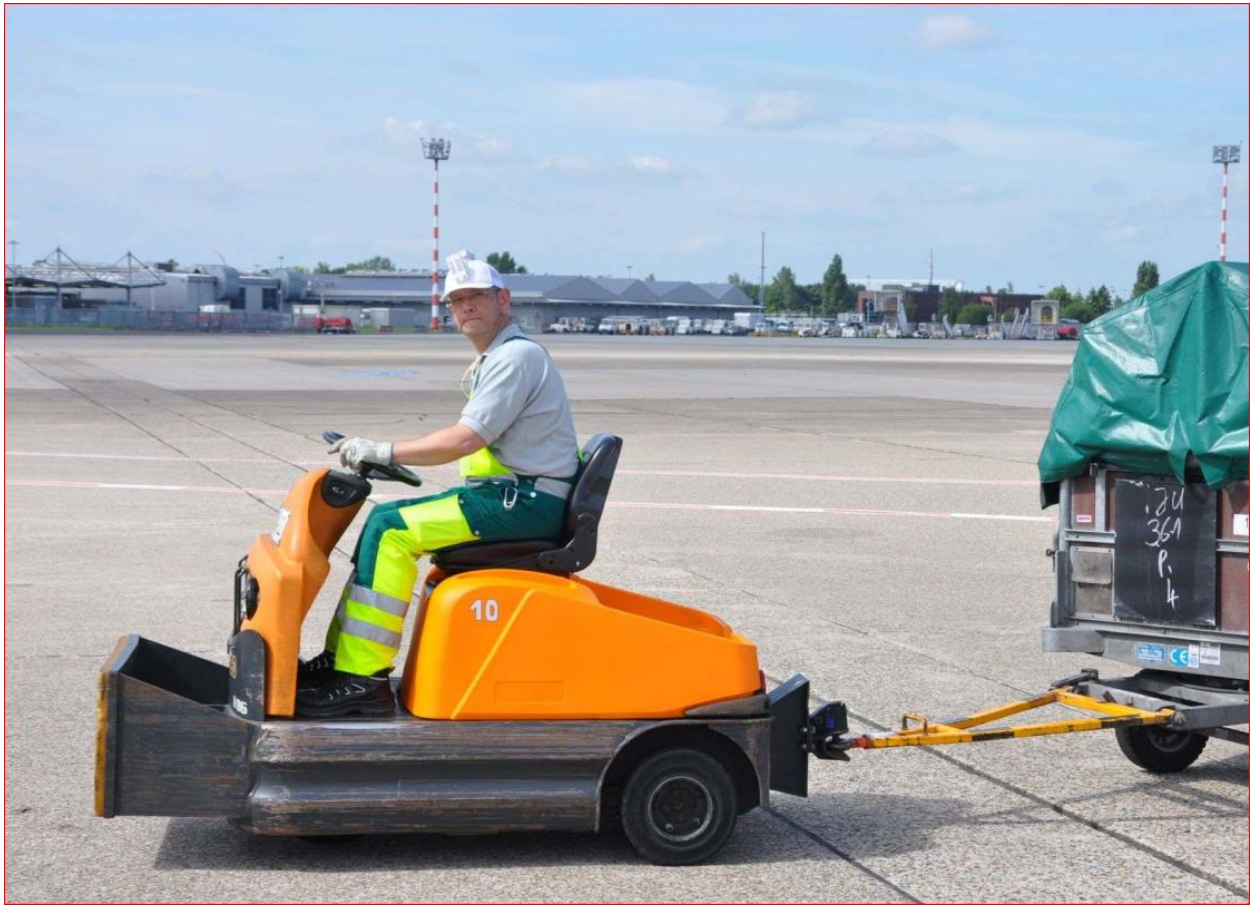

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Results

Results

Erythema radiation strength H_{ery} considering the skin types II und III

Personal	H_{ery} [J/m²]			
	Head up	Face	MED skin type II	MED skin type III
Gardener 02.07.2013	567	673	250	350
Headloader 02.07.2013	1070	463		
Headloader 23.08.2013	741	389		
Loader 23.08.2013	174	78		

Limits exceeded without measures

Limits o. k. without measures

MED = Minimum erythema causing dose

Stationary (worst case)	H_{ery} [J/m²]	
	Tripod „up“	Tripod „down“
Apron west V 81, 02.07.2013	3200	360
Apron west V 83/84, 23.08.2013	1860	388

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Conclusions

Conclusions

- Minimum erythema causing dose (MED) according to CIE exceeded
- Measures (T, O, P) necessary
- H_{ery} depends mainly on the time of exposition, i. e. the unprotected stay in unshadowed places
- Maximum exposition around noonday (measurable based on 1/2-h –averages)

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measures

„S“ quite impossible

Measures I

- T: Whenever possible use of closed vehicles
- T: Carglass with UV- protection (foils, special glass)
- T: Use of awnings, sunshades, tents
- T: Roofs for permanent outside working places

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measures

Measures II

- O: If possible no outside activities around noonday (gardeners)
- O: Standby times in the shadow of vehicles/buildings/AC
- O: Sharing of duties
- O: UVI (UV-Index) –request at the BfS
- O: Instruction

Risk assessment as per ArbSchG:

Exposure to natural UV-radiation: Measures

Measures III

- P: Which is your skin type?
- P: Wearing of UV-protecting clothes
- P: Wearing of caps (with nape protection)
- P: Wearing of sun glasses (UV 400)
- P: Usage of sunprotection lotion
- P: Check your skin regularly (ABCD-rule)

Düsseldorf Airport DUS

Thanks for your attention.

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