

Exposure Assessment and Risk-based Medicals

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Exposure Risk Assessment Strategy

An approach to health exposure assessment as the foundation of preventive and protective occupational health practice

- Workplace assessments conducted and evaluated by competent professional hygienists using recognised standard methodology
- Initial observation, interview with operational personnel and professional judgement leads to basic characterisation and qualitative assessment
- Through quantitative assessment, statistical analysis and interpretation of data, a baseline exposure risk profile is established
- The baseline exposure risk profile directs
 - exposure control initiatives
 - periodic review /re-evaluation
 - health surveillance programmes

Exposure Risk Assessment Strategy

Basic characterisation

- A comprehensive inventory of all workers, tasks and potential exposure agents thus defining Similar Exposure Groups

Qualitative Exposure Risk Assessment (example)										
SEG	Inhalable Dust	Resp Dust	Fluoride	HF	SO2	CTPV	B(a)P	Cryst Silica	Heat	Noise
Anode changing										
Metal tapping										
Crane driver										
Measurement Operator										
Metal Transport										
Anode Butt Transportation										
Ladle Workshop Operator										
PotStart Operator										
Pot Delining Operator										
Potlining Operator										
Electrical Maintenance										
Mechanical Maintenance										
Supervisor										
Office Staff Only										

Exposure Risk Assessment Strategy

Qualitative exposure assessment and prioritisation

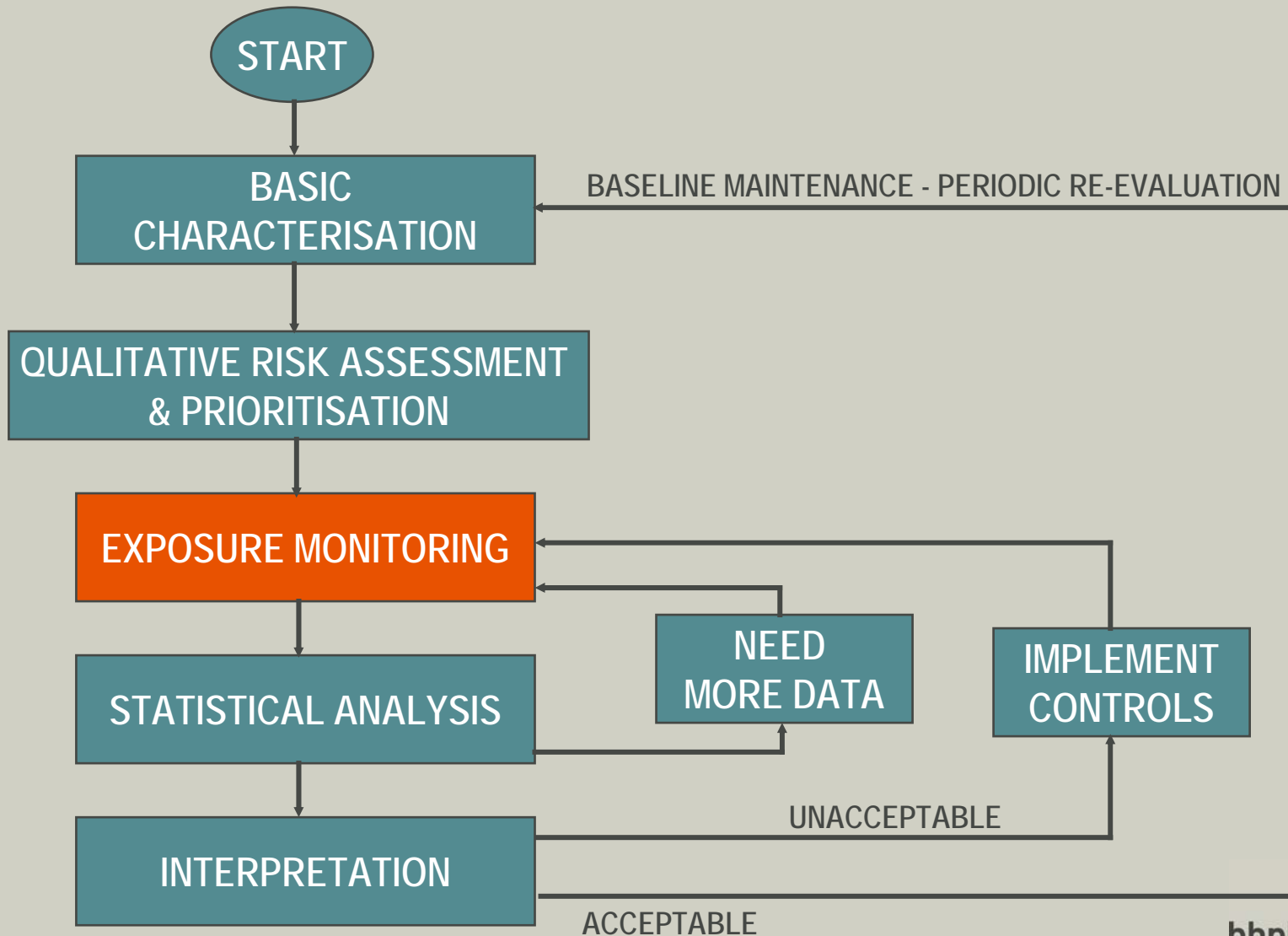
- SEGs ranked based on exposure potential and health effects of agents in order to establish monitoring priorities

Qualitative Risk Rating	Chemical Exposure	Noise Exposure
A	$\geq 100\%$ OEL	$\geq 105\text{dB(A)}$
B	$\geq 50\%$; but $<100\%$ OEL	$\geq 85\text{ d(B)A}$; but $< 105\text{dB(A)}$
C	$\geq 10\%$; but $<50\%$ OEL	$\geq 80\text{ d(B)A}$; but $< 85\text{dB(A)}$
D	$< 10\%$ OEL	$< 80\text{dB(A)}$
E	Exposure negligible (eg office workers)	Exposure negligible (eg office workers)

Exposure Risk Assessment Strategy

Qualitative Exposure Risk Assessment (example)										
SEG	Inhalable Dust	Respirable Dust	Fluoride	HF	SO2	CTPV	B(a)P	Crystalline Silica	Heat	Noise
Anode changing	C	D	A	B	C	D	D	E	C	B
Metal tapping	C	D	C	C	D	D	D	E	D	C
Crane driver	D	D	C	C	C	D	D	E	D	C
Measurement Operator	C	C	C	C	C	D	D	E	C	B
Metal Transport	D	D	C	D	D	D	D	E	D	C
Anode Butt Transportation	C	C	C	C	C	D	D	E	D	C
Ladle Workshop Operator	B	C	B	C	D	D	D	E	D	B
PotStart Operator	B	B	B	B	C	B	C	D	B	B
Pot Delining Operator	A	B	C	D	D	D	D	C	D	A
Potlining Operator	C	D	D	D	D	C	D	D	D	B
Electrical Maintenance	C	D	C	D	D	D	D	E	D	C
Mechanical Maintenance	C	D	C	C	D	D	D	E	D	C
Supervisor	C	D	C	C	C	C	D	E	D	D
Office Staff Only	E	E	E	E	E	E	E	E	E	E

Exposure Risk Assessment Strategy

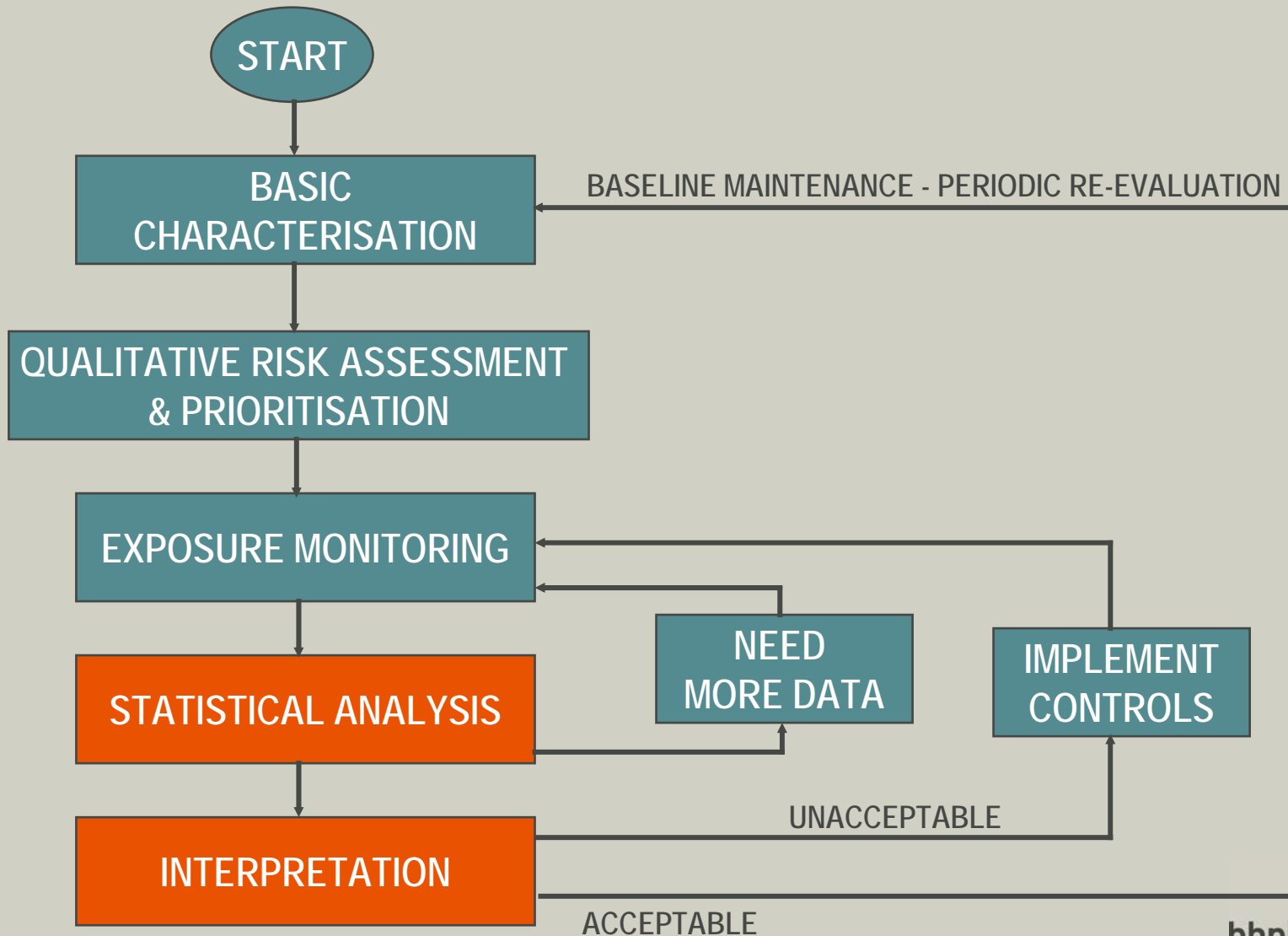


Exposure Risk Assessment Strategy

Actual exposures monitored to establish exposure baseline

Baseline Monitoring Plan (example)												
SEG	# People in SEGs	# Samples Required	Inhalable Dust	ResP Dust	Fluoride	HF	SO2	CTPV	B(a)P	Cryst Silica	Heat	Noise
Anode changing	40	21	21	D	21	21	21	D	D	E	21	21
Metal tapping	38	20	20	D	20	20	D	D	D	E	D	20
Crane driver	20	16	D	D	16	16	16	D	D	E	D	16
Measurement Operator	38	20	20	20	20	20	20	D	D	E	20	20
Metal Transport	12	9	D	D	9	D	D	D	D	E	D	9
Anode Butt Transportation	15	12	12	12	12	12	12	D	D	E	D	12
Ladle Workshop Operator	16	12	12	12	12	12	D	D	D	D	D	12
PotStart Operator	20	16	16	16	16	16	16	16	16	D	16	16
Pot Delining Operator	14	11	11	11	11	D	D	D	D	11	D	11
Potlining Operator	20	16	16	D	D	D	D	16	D	D	D	16
Electrical Maintenance	15	12	12	D	12	D	D	D	D	E	D	12
Mechanical Maintenance	15	12	12	D	12	12	D	D	D	E	D	12
Supervisor	10	9	9	D	9	9	9	9	D	E	D	D
Office Staff Only	16	12	E	E	E	E	E	E	E	E	E	E

Exposure Risk Assessment Strategy



Exposure Risk Assessment Strategy

Statistical analysis and data interpretation

- Evaluate exposure data using appropriate statistical techniques to facilitate decision regarding 'tolerability' of exposure
- Statistical tools available (eg LogNorm2, IHSTAT)
- Lands 95% UCL (for lognormal distribution) or 95% UCL (for normal distribution) used as decision making criteria for risk assessment

RISK ASSESSMENT CRITERIA	
ACCEPTABLE	< 50% OEL
ALARP	>/= 50%; < 100% OEL
UNACCEPTABLE	>/= OEL

Exposure Risk Assessment Strategy

Exposure Risk Assessment (example)											
SEG	# People in SEGs	Inhalable Dust	Respirable Dust	Fluoride	HF	SO2	CTPV	B(a)P	Crystalline Silica	Heat	Noise
Anode changing	40	40	D	40	40	40	D	D	E	40	40
Metal tapping	38	38	D	38	38	D	D	D	E	D	38
Crane driver	20	D	D	20	20	20	D	D	E	D	20
Measurement Operator	38	38	38	38	38	38	D	D	E	38	38
Metal Transport	12	D	D	12	D	D	D	D	E	D	12
Anode Butt Transportation	15	15	15	15	15	15	D	D	E	D	15
Ladle Workshop Operator	16	16	16	16	16	D	D	D	D	D	16
PotStart Operator	20	20	20	20	20	20	20	20	E	20	20
Pot Delining Operator	14	14	14	14	D	D	D	D	11	D	14
Potlining Operator	20	20	D	D	D	D	20	D	D	D	16
Electrical Maintenance	15	15	D	15	D	D	D	D	E	D	15
Mechanical Maintenance	15	15	D	15	15	D	D	D	E	D	15
Supervisor	10	10	D	10	10	10	10	D	E	D	D
Office Staff Only	16	E	E	E	E	E	E	E	E	E	E

RISK ASSESSMENT CRITERIA	
ACCEPTABLE	< 50% OEL
ALARP	>/= 50%; < 100% OEL
UNACCEPTABLE	>/= OEL

Exposure Risk Assessment Strategy

Exposure risk management

- Immediate intervention where exposure is assessed as 'unacceptable'
- Interim measures may include the use of respiratory protective equipment under a well controlled programme
- 'Unacceptable' SEGs investigated to identify root causes of over-exposure
- Application of hierarchy of risk control principles and action to reduce exposure risk
- Where the estimate of the mean exposure exceeds 50% OEL, PPE is recommended, investigation of cause of exposure conducted and prioritised for control

Exposure Risk Assessment Strategy

Successful implementation requires the following:

- Identification / characterisation of health hazards
(qualitative assessment >95% complete)
- Quantification of exposure risks: ranked A-C (baseline >95% complete)
- Number of **unacceptable** SEGs identified by agent and number of employees impacted
- Control of unacceptable health risks through engineering, substitution, PPE etc
- Implementation of exposure risk-based health surveillance
- Annual review of programme effectiveness

Medical Assessment Strategy

A systematic process designed to ensure that the employee is not adversely affected by work exposure and is fit to safely perform the functions of his job

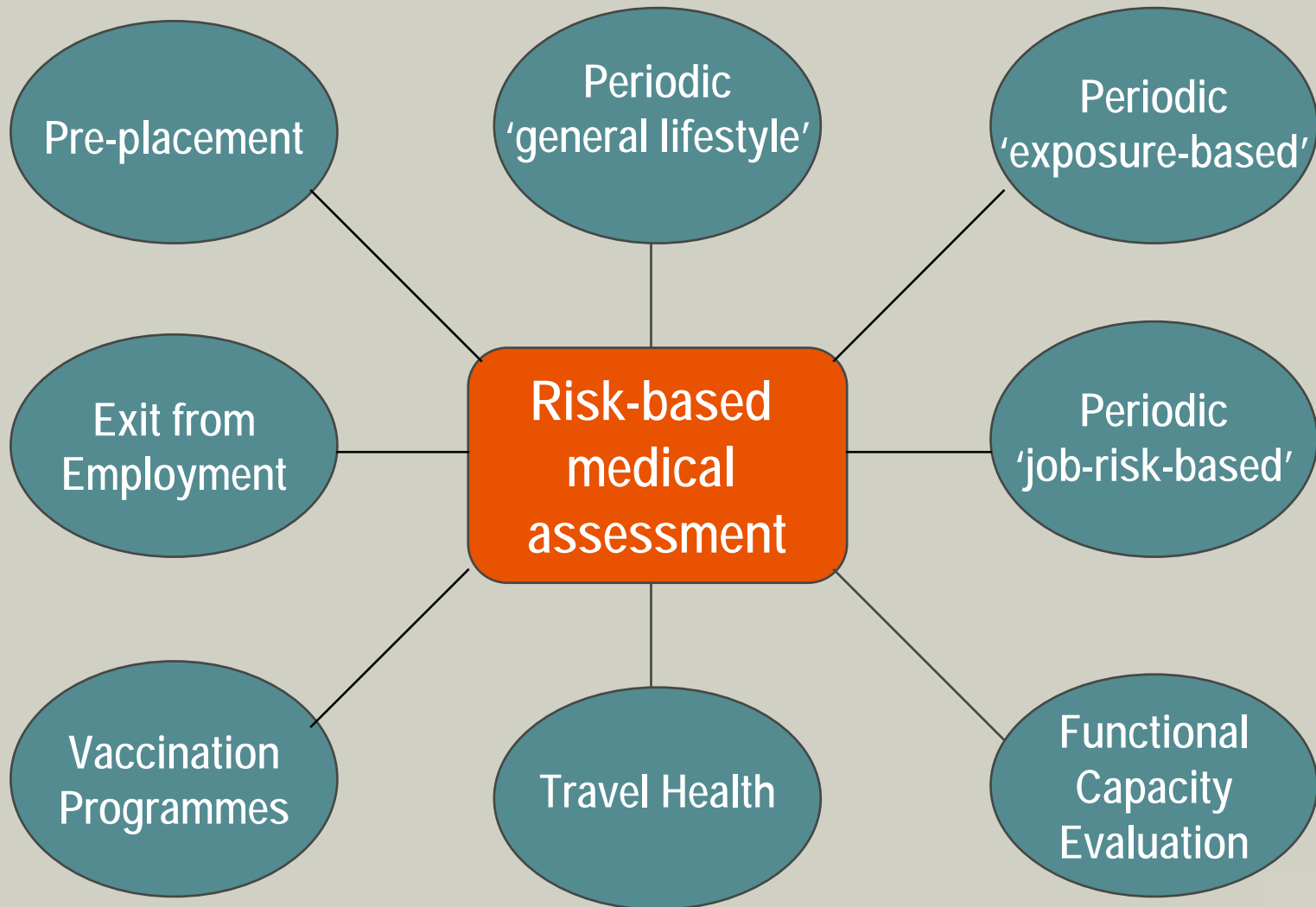
- Based on exposure risk profile (health surveillance)
- Accounts for specific job-related risks (fitness for duty)
- Ensures that medical confidentiality is maintained
- Guards against unlawful discrimination
- Aligns with statutory, corporate requirements and industry best practice
- Referenced to international standards

Medical Assessment Strategy

A successful medical assessment programme is one that addresses the unique needs of the operation in which it will be implemented, is integrated into normal operations, and encourages active participation.

Critical elements for consideration in a medical assessment programme are as follows:

Medical Assessment Strategy



Medical Assessment Strategy

Pre-placement Assessment

A pre-placement assessment involves a medical and/or physical assessment that determines an individual's capabilities and limitations with respect to the physical demands or requirements of a specific job.

- based on the job description that includes capabilities required of the employee, minimum standards of fitness as well as abnormalities that will prevent proper performance of the job
- applies to pre-employment, transfer to a new role, changed environment, or changed individual health status

Medical Assessment Strategy

Periodic health surveillance: based on exposure-risk

- Exposure-based medicals implemented for workgroups where exposure exceeds 50% of the Occupational Exposure Limit (OEL)
 - Includes exposure to chemical agents, noise, heat etc

Periodic medical assessment: based on job-risk

- Job-risk-based medicals implemented for employees in specific jobs for the purpose of identifying their fitness to safely perform the functions of that job
 - Includes mobile equipment operators, people working at height, fire and rescue officers or those employees required to wear respiratory protection

Medical Assessment Strategy

Considerations for implementation:

- Risk matrix developed for each department (exposure risk example)
- The number of required periodic medical exams calculated and scheduled for implementation
- Progress against target tracked and reported regularly
- Results of individual exams communicated to employees
- Annual site summary of results (without individual attribution) presented to management with appropriate follow-up of identified trends

Occupational Health Programme - metrics and targets

Successful implementation and continuous improvement requires:

- Senior management involvement / commitment
- Professional resources for programme oversight
- Programme objectives incorporated into business plan
- KPIs / metrics / targets cascade to all organisational levels, eg
 - compliance to scheduled monitoring programme
 - exposure reduction in 'unacceptable' SEGs
 - compliance to risk based medical assessment programme
 - compliance with PPE requirements
- Regular audit and review