LEIGHTON BENNETT RESUMÉ

• Qualifications:

- BSc, MDP diploma.
- Various SHE courses: NOSA, ILCI, IRCA, DNV, Insurance Institute of America, FPASA
- FAIS commercial insurance, Asset & Maintenance Management, Enterprise Risk Management courses, etc.

• Experience:

- Engineering Geologist: 8 years
- NOSA H&S Advisor & Trainer: 2.5 years
- Loss Control Manager: 11 Years (10 years NOSA 5 Star, 24/7 metal industry, 2000 staff)
- Insurance Brokers' Risk Consultant: 8 years
- Benrisk Consulting: SHE & Risk Management Consultant: since 1999, also "free-lance" Insurance Underwriting Surveyor

Professional Registrations & Affiliations:

- ROSProf, AIRMSA, GradIOSHSA, FIOSM, & a SACPCMP Pr.CHA registration application in progress
- Serves on IOSM OSPB, Safety First Assn, IOSM Prof. Registration Lead Auditor, & has served on ASOSH, MQA (SQCG/SGG)
- Minister of Labour appointed Safety Specialist: has served on the Advisory Council on Occupational Health & Safety established under OHSAct Sections 2 to 4, for a 4 year period
- Author:
 - 2006 'Risk Assessment guide to understanding the basics 'booklet published by Safety First Association -
 - Volume 23, DEAT's Environmental Management Information Series, 2006 publication on 'Risk Management'.
- Specialities:
 - Occupational Safety, Fire, Engineering, Micro Environmental, Insurance Underwriting Surveys (with fire & machinery breakdown EML's), Inspections, Audits, Legal Compliance, Risk Assessments (Baseline, Issue-based, HAZOP, FMEA, etc), Risk Controls, Incident Investigations, Construction Work H&S Specifications, Construction SHE Plans, SHE Inspections & Audits, Excavation Safety, etc

The Role of Client Baseline Risk Assessments in Assuring Health & Safety

Leighton Bennett

(BSC, MDP dip, ROSProf, AIRMSA, GradIOSHSA, FIOSM) SHE & Risk Management Consultant Benrisk Consulting cc 083 325 4182 benrisk@mweb.co.za

Overview

- Roles & Duties of the Client
- Introduction to Risk Assessments
- Project management risks
- Client Assessment of the Project Risks
- Designer Assessment of the Design Risks
- Client Baseline Risk Assessment
- Client H&S Specification & Project Tender

Client Attitude to their Project Roles

- "Calls the shots" as the person for whom the construction work is going to be performed
- Has obligations to the shareholders/financiers
- Has the idea of the project vision or concept
- Has an idea of the project requirements
- Has an duty to establish the concept feasibility study – *ie. possible to build this?*
- To develop the business case for the project
- To select a designer to develop the project design
- Has legal obligations, including Risk Assessments
 & Project Health & Safety requirements (CR 5)

Why Client Risk Assessments?

- Many/most contractors are not H&S compliant
- Clients commission the construction work
- Construction work done on Client sites
- Legislation makes the Clients more involved in construction work H&S (CR 5)
- Client now empowered to call the "H&S shots"
- Risk Assessment is a proactive incident investigation process to avoid fatalities, injuries & diseases.
- **Result:** Client must provide a project Baseline Risk Assessment & H&S Specification to designers & contractors to facilitate reducing injury incidents.

CR 5: Client Duties

CR 5.1: A client must:

- a) Prepare a **Baseline Risk Assessment** for the intended construction work project
- b) Prepare a suitable, sufficient documented & coherent site specific Health & Safety Specification for the intended construction work based on the baseline assessment contemplated in paragraph (a)
- c) Provide the designer with the H&S Specification contemplated in paragraph (b)
- d) Ensure the designer takes the prepared **H&S Specification into consideration** during the design stage. (& CR 6.1.d: the <u>designer to inform the client in writing</u> of any known or anticipated dangers or hazards related to executing the construction design)
- f) Include the **H&S Specification in the tender documents**

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Why are Risk Assessments Important?

- Risk Assessment has become the "BIG" issue term used in King III, the new Company Act, the Occupational & Mines Health & Safety Legislation & in the SANS/ISO 31000:2009 Risk Management & SANS/ISO 31010: 2010 Risk Assessment Standards.
- All project risks that are identified, assessed & mitigated during the various stages of a project should eliminate significant Health & Safety risks, incidents & losses during the project execution.
- While everybody is talking about doing Risk Assessments, just what are they doing & how?

An Actual Angle Grinder Risk Assessment - Really?

| What can go wrong ? | What do we do to stop getting hurt ? | What will happen when we do not control it ? | Ŧ | S | Severity Rating | H/M/L | Can we do anything more to prevent this ? |
|----------------------------------|--|---|---|----|--------------------|-------|---|
| Electrical shocks | Regular checks | Electrical shock | * | 12 | 12 | Н | Before and after use inspection |
| Cut body with grinder wheel | P.P.E | Injuries | * | 12 | 12 | н | Concentrate on work while working |
| Chippings in eyes | Eye protection | Injuries | * | 8 | 8 | М | Discipline |
| Disk can brake | Inspection of disk | Injuries | * | 12 | 12 | н | Discipline |
| Grinder slipping out of hands | Use both handles | Injuries | * | 16 | 16 | Н | Discipline |

What about these H&S issues?

- Holding 2 handles gyroscopic starting effects
- Disc guarded correctly for L/R-handed operator?
- Grinder & disc RMP correct
- Flying sparks injury & fire risk
- Dust generation eye & respiratory protection
- Falling cut-off items foot injury
- Work piece securing disc rupture risk
- Noise hearing impairment

Risk Assessments by competent people?

The Construction Regulation 9: Risk Assessment Requirement

- **CR 9.1:** A **risk assessment must be performed**, in writing, & be part of the Contractor H&S Plan, & must include:
- a) the **identification of the risks & hazards** to which persons may be exposed to (& ergonomics aspects)
- b) An **analysis & evaluation of the risks & hazards** identified based on a documented *(published?)* method

<---- Client H&S Specification</pre>

- c) A documented (H&S) plan & applicable safe procedures to mitigate, reduce or control the risks & hazards that have been identified or are new or changed while working
- d) A monitoring plan during the construction work execution
- e) A review plan during the construction work execution

The unpublished 2015 OHSAct Amendment Bill draft

'Risk Assessment' means, the process of evaluating the risks to an employee's health & safety from workplace hazards & is a systematic assessment of all aspects of work that considers:

- a complete hazard identification;
- identification of all who may be affected by the hazard;
- how the person is affected;
- the analysis and evaluation of the risks; and
- prioritisation of risks;

A New Term:

'Risk Management' means the identification and mitigation of risks by the application of appropriate control measures"

Inferring that a Risk Management Process is necessary

RISK ASSESSMENT - Defined

THE **IDENTIFICATION** OF UNDESIRED EVENTS, THEIR CAUSES &

ANALYSING THEIR LIKELIHOOD & POTENTIAL CONSEQUENCES - CONSIDERING EXISTING CONTROL MEASURES - IN ORDER TO

> MAKE AN EVALUATION AS TO THE

RISK EVENT'S ACCEPTABILITY

SANS /ISO 31000: 2009 Risk Management Process



What Risk Assessment Context?

• What is the RA's scope:

- Health & Safety only?
- The Client's Baseline the concept & design?
- A Project's risks all the project stages?
- Enterprise—wide risks all operations risks? etc
- The Context to include:
 - Internal aspects only?
 - Both internal & external impact aspects?
- What type of Risk Assessment?

What Type of Risk Assessment?

- BASELINE: to <u>determine the wide range & current</u> <u>status of risks</u> associated with a company, a business or a project, with a set of <u>risk profiles being obtained</u>
- ISSUE-BASED: to distinctly & clearly delineate & quantity <u>risks associated with particular aspects of an</u> <u>activity, a process, a hazard, job-task or an area</u>?
- CONTINUOUS: the <u>ongoing assessment or schedule</u> of periodic reviews, by <u>supervision</u>, to verify good practice compliance & to monitor the extent to which the static or dynamic changes of risk, impacts on the workplace conditions, processes or activities.

Any new or changed risk noted is then to be re-assessed

RISK ASSESSMENT EXAMPLES

Assessment Types:

Baseline

Issue Based

Continuous

Type Examples

- New plant or construction work project
- General operation H&S analysis
- Project impact on the public
- Machinery safeguards
- Operation process change
- Working at heights
- Chemicals handling & use
- Confined space working
- Planned inspections
- Critical task analysis
- Planned job observations or BBS
- Toolbox talk compliance

More Advanced Risk Assessments

- Preliminary Hazard or Screening Level Risk Analysis
- **HAZOP** (hazard & operability analysis)
- FMEA/ FMECA (failure mode & effects criticality analysis)
- What-if Analysis &/or Checklist Analysis
- FTA (fault tree analysis)
- **ETA** (event tree analysis)
- MORT (management oversight & risk tree), ... etc SANS/ISO 31010:2010 lists some 32 Risk Assessment Techniques

Bowtie Analysis

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SACPCMP's Project Management Stages

- STAGE 1 PROJECT INITIATION AND BRIEFING
- STAGE 2 CONCEPT AND FEASIBILITY
- **STAGE 3 DESIGN DEVELOPMENT**
- STAGE 4 TENDER DOCUMENTATION AND
 PROCUREMENT
 CHSA, CHSM
 CHSO
- STAGE 5 CONSTRUCTION DOCUMENTATION
 AND MANAGEMENT
- STAGE 6 PROJECT CLOSE OUT

Pr.CHSA

Project Management Lifecycle Phases



Project Management Lifecycle Phases



Construction Project Risk Assessments

(OHSAct's Construction Regulations based)



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Who are the Designers?

- Any person who prepares, checks or approves a design, temporary works or related specifications or articles i.e.:
 - Clients who specify
 - Architects (Technicians & those supervised)
 - Civil engineers
 - Structural engineers
 - Mechanical engineers
 - Electrical engineers
 - Building services engineers i.t.o fixed plant
 - Those specifying or purchasing materials
 - Contractors doing design work as part of a design

The three aspects of a Client's Project Risk Assessment

- 1. The risks the client faces in terms of the project concept & during the project phases
- 2. The risks (including H&S risks) the client & designer faces in & from the project design
- 3. The residual risks the client & designers have not resolved that influence construction & H&S

The Client Baseline Risk Assessment should contain risk & H&S information on the 3 aspects listed above & which should be carried through to the Client's H&S Specification

Construction Project Risk Assessments

(OHSAct's Construction Regulations based)



Construction Project Risk Assessments

(OHSAct's Construction Regulations based)



CHS Agent's Experience & Knowledge

- Identifying & developing an appropriate health & safety legal framework for a construction project ...Quote OHSAct & Construction Regs &/or use SANS OHSAS 18000 (ISO 45001) or SANS 31000 risk management based?
- Principles of cause & effect analysis & its application to hazard identification & risk management on a construction project HIRA vs the Risk Management Plan-Do-Check-Act & its RMP Risk Assessment Format
- Identifying leading construction health & safety practice & applying such to a construction project Method Statements &/or Safe Working Procedures?
- Construction project health & safety risk profiling from an OHS BRA (internal focus) vs Project BRA (internal & external focus) & its risk profile
- Designing & developing a construction project health & safety management system How & what is to be managed on the project?
- Construction project health & safety policy & standards OHSAct or OHSACT plus Client's World Class Requirement
- Design risk management ... How with SANS OHSAS 18000, no risk based
 approach
 Ex SACPCMP CHS Agent's Scope of Services

Client's Project Risk Assessment Categories

| | KEY | RISK CATEGORY | | | | | | |
|--------|------|--|--|--|--|--|--|--|
| | FR | FINANCING RISK - This includes risks related to funding, loans, guarantees and budgets as well as any other risks relating to the financing objective ("E" above). | | | | | | |
| | SEDR | SOCIO ECONOMIC DEVELOPMENT RISK - This includes risks relating to black economic empowerment, procurement policy and developing human capital (not own staff). | | | | | | |
| | BSR | BUSINESS SUSTAINABILITY RISK – This includes risks relating to the political environment, source of supply, reputation, Strategic objectives and any other risks as it relates to the core business objective, binding constraints and leadership interventions. ASSET PRESERVATION RISK – This includes risks relating to overloading, design and construction as well as research and development and other risks as it relates to the core business objective. | | | | | | |
| | APR | | | | | | | |
| | GR | GOVERNANCE RISK – This includes risks relating to the corporate management, administrative management, legal environment and other risks relating to the corporate management objective. | | | | | | |
| | ITR | INFORMATION TECHNOLOGY RISK – This includes risks relating to internal and external information technology processes such as SAP, Toll Plazas, AVCs (Automatic Vehicle Classifier), MIS, IT IS (Intelligent Transport Information Systems) etc. | | | | | | |
| | HRR | HUMAN RESOURCE RISK – This includes risks relating to all aspects of human resources - & OHS? ENVIRONMENTAL RISK - This includes risks relating to SANRAL's environmental policy, generic Environmental Management Plan and other environmental objectives. | | | | | | |
| | ER | | | | | | | |
| | RR | REPUTATION RISK – This includes risks that would affect SANRAL's reputation, credibility among investors and other stakeholders and will question SANRAL's ability to deliver on mandate | | | | | | |
| CH5A | CFR | CONCEPT & FEASIBILITY RISKS - Project idea or concept must be possible & realistic to achieve & also fulfils the corporate vision (objectives), values (risk level, governance), requirements (quality, continuous improvement) & business case (cost benefit, risk analysis, ROI) | | | | | | |
| oγ th€ | DCR | DESIGN RELATED CONSTRUCTION RISKS - Safety, health & environmental risks introduced by the construction work required to achieve the design requirements. Apply a Protection through Design (PtD) approach | | | | | | |
| dded t | CWR | CONSTRUCTION WORK RISK – Safety, Health & Environmental risks anticipated to occur during the construction work phase of the project. The risks associated with performing the construction work, highlighted by the Client, but also the risk that Contractors identify during their coOnstruction work. H&S Plan & ongoing contractor risk assessments | | | | | | |
| ₹ | OR | OPERATIONAL RISK – This includes risks relating to road safety and routine road maintenance and other risks as it relates to the core business objective. | | | | | | |

What are the Pr.CHS Agent's Project Issues?

Project : The Client has requested this pipe bridge across the Johannesburg-Pretoria M14 freeway to be demolished



What needs to be required & done to demolish this bridge safety?

What are the Pr.CHS Agent's Project Issues?

Project : The Client has requested this pipe bridge across the Johannesburg-Pretoria M14 freeway to be demolished



- 1. Which contractor competent enough to do this project?
- 2. Isolate & drain the pipeline flood risk ...Crane to remove pipe sections?
- 3. Construct traffic carriageway median crossovers for traffic carriageway detours
- 4. What demolition plan? demolition ball, plant wrecking or drill & blasting or?
- 5. What bridge section collapse risk? Temporary works access/support required?
- 6. What existing road surface protection required?
- 7. Pipe metal cutting sparks & flying bridge debris risk & management use shielding?
- 8. Traffic visibility demolition dust, worker visibility jackets
- 9. Accommodate the traffic onto opposing left & right sides during demolishing
- 10. Accommodate traffic for tower demolishing
- 11. Debris management & removal slow vehicle access onto freeway risks
- 12. Impact on the Gautrain & cell phone tower ?..... Etc

What Client Vision & Concept Risks?

- Client's Vision Build an Opera House in 1957
- Requirements Interlocking vaulted shell roofs
- Business case NSW Govt. funding the building
- Feasibility Believes it is possible to build, but safely, in time & on budget?
- Design The build method & project schedules
- Project Plans Baseline plan of knowledge areas & building processes required
- Project Tender

Client's Vision & Concept Impact

Project Idea - vision & values

Idea - requirements

2

3

4

5

6

8

9

- Idea business case
- Concept & feasibility study
- Design & Plan definition
- Implementation & execution
- Commissioning & hand over
- Operational life benefit period
- **Termination & disposal**





The Project Lifecycle Phases Client's Vision & Concept Impact

But, what are the construction safety & health goals & the hazard & risk issues? concept & feasibil **Design & plan definition** 5 **Implementation & execution** 6

8





Sidney Opera House Construction

- Danish architect Jorn Utzon & engineers Ove Arup.
- Work started in 1959, with **10,000 employed**.
- 67m high (=22 floors), 185m long & 120m wide.
- 3 x tower cranes, on tracks, with 10t SWL.
- Roof has 2194 pre-cast concrete sections, tension cabled together.
- Roof covered with >1 million white Swedish tiles.
- Original estimated cost (in 1957) AUS \$7 million.
- Final construction cost (in 1973) AUS \$102 million.
- Project completed ten years late & 1,457% over budget.
- Fortunately only 1 fatality, a crane driver, although no safety belts were used & hook riding occurred.
- Opera house opened in October 1973 (after 14 years).
- Declared a UNESCO world heritage site in 2007.
What is the Designer/Engineer's Health & Safety Plan?

The placing of a 11 metre long, 1.3t heavy steel "I" beam on wall pillars to support the roof trusses on the inside of an existing building, so the steel beam can act as a lintel type beam, to allow the wall pillars to be removed to facilitate making a large open room area.

Issues: 1. Man handling the beam into the building.

- 2. Raising & placing the beam at lintel level in essentially a limited access space.
- 3. So make-shift lifting measures were used (Acrow props & chain blocks)

What is the Designer/Engineer's Health & Safety Plan?



Absolutely no H&S consideration was designed in here

Client's Project Risk Assessment

This Conference's Theme is: "A TEAM APPROACH TO ZERO FATALITIES, INJURIES & DISEASE"

Consider the concept thought of *Fatalities, Injury & Disease* PREVENTION Through DESIGN

Project Lifecycle Phases



Prevention through Design (PtD) Process

- Establish PtD expectations
- Include construction and operation perspective
- Identify PtD process and tools



What are the H&S Incident reduction considerations in the project

- Client attitude to H&S
- Client open to H&S influences on the design
- Use PtD to facilitate good design which is important to project & H&S no injuries success
- Use PtD where smart planning minimizes hazards and risks to workers.
- Client establishes a detailed project specific H&S Specification - *Injury reduction focused?*

What is Prevention through Design?

Eliminating or reducing work-related hazards & illness, & minimizing risks associated with:

- Design
- Construction
- Manufacturing
- Maintenance
- Use, reuse, recycle & disposal of materials & equipment
- Refurbishment upgrades with less risks & PPE?
- Facility disposal lifespan end demolition

Why Prevention through Design?

- Moral & Ethical reasons
- Legislation reasons (CR 5)
- Construction dangers
- Design-related safety issues
- Construction dangers mitigation
- Financial & non-financial benefits
- Practical benefits

Construction Worker Hazards

- Cuts & wounds
- Electrocution
- Falls & fall risks
- Falling objects
- Manual handling risks
- Heat/cold stress
- Musculoskeletal disease
- Physical contacts
- Slipping & tripping
- Noise & vibration
- Chemical Stress Factors
- Physical Stress Factors









Hierarchy of Controls

per ANSI/AIHA Z10-2005



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Design Considerations

- Site Location & access
- **Prefabrication** yes/no?
- Site activities:
 - Cranes
 - Working at heights
 - Demolition total to partial
 - Excavations
- Building elements:
 - Avoid sharp edges, access/space problems, temporary bracing
 - Roofs & roof work fragility, fall risks, safeguarding, 'green' roofs
 - Maintenance access eg. Lighting, window/atrium cleaning, etc
- Materials Handling manual vs aided handling
- Surface coatings & finishes w.r.t. compatibility, pre-treat, application method, working space, access, ventilation, PPE?



A Construction Design Consideration: Fall & back injury risk potential reduced by changing the design & construction method



Plank & hollow-block composite slab construction, Plettenberg Bay (Hamp-Adams, 1994)

The physical risks here have been reduced by applying a **PREVENTION through DESIGN** (PtD) process



Pre-cast pre-stressed hollow core slab sections construction (SA Builder Bouer, 2004b)

Designing out risk-An example of what can be done

Simple design measure to reduce risk





Designing out risk: An example of what **not** to do



Manufacturing Considerations Prefabrication

- Off-site prefabrication is often faster & so less costly than site field work
- Prefabrication & preassembly will likely increase worker safety by reducing fall risk exposure time (eg. bolted splices, base plates, safety anchors & lifelines, beam widths)
- Prefabrication reduces the work at height time because of beam seats & fewer connections & a "common" bolt size
- Prefabrication may reduce cold/heat stress
- Off-site fabrication often more controlled & so with better quality
- Prefabrication increases heavy lifting; possible access and transportation issues
 - Managing risks is the key



Maintenance Considerations

Change the design to make the maintenance & refurbishing work easier & safer ...

For example:

- Fittings & anchors provided for rope access window cleaning.
- Design lighting away from high ceiling places to walls that allow access by ladder, so scaffolding is not required.
- Provide vertical caged ladder access to roof top plant.
- Provide plant room crawl beams for plant lifting heavy.
- Provide machine guarding & lock-outs to avoid injury.
- Design maintenance access space around machinery.

Environmental considerations ...

Environmental design aspects may not impact on H&S but are still important:

For Example:

- Use recyclable, reusable type construction materials.
- Design with "greening" objectives & goals.
- Design ergonomic adjustable work stations.
- Design to reduce heat, noise & vibration risks.
- Design in controls & protection measures to limit or to avoid emissions, discharges & pollution events or incidents.

Design Residual Hazards & Risks

- The designer must inform the client in writing of any residual hazards or risks which could not be designed out in the design or when the design construction work is performed.
- Some of these residual risks may be:
 - Working at heights,
 - Demolition, excavation or water risks,
 - Manual handling,
 - Health exposure risks (dusts, noise, substances),
 - A design construction method, etc.

Safety Payoff During Design



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Client & Project Scope Risks

- Scope creep-— most damaging type of change risk , especially to technical based projects, where an ongoing requirement to make it "better" often results in schedule timing slips & delays, & which may be without significant benefits
- Scope gaps resulting from commitment to a project before the project requirements are completed, understood or are rushed....now do free?
- Scope dependencies due to external factors, like no permission, legal or regulatory change, infrastructure stability, other projects priority, periodic installation & maintenance reviews, & technology upgrades

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So what is a Baseline Risk Assessment?

- It is a very wide-ranging process to determine all the potential risk exposures related to the processes & activities related to the business, a project or the work performed
- The risk assessment process involves risk identification, risk analysis & risk evaluation, with a set of risk profiles obtained as an outcome.

Client's, Contractor's or Any Baseline Risk Assessment Requirements

Risk Assessment means, the process of evaluating the risks to an employee's health and safety from workplace hazards and is a systematic assessment of all aspects of work that considers:

- a complete hazard identification;
- identification of all who may be affected by the hazard;
- how the person is affected;
- the analysis and evaluation of the risks; and
- prioritisation of risks;

Risk Management means the identification and mitigation of risks by the application of appropriate control measures ex 2015 unpublished OHSAct Amendment draft

WHAT BUSINESS OR PROJECT RESOURCES ARE 'AT RISK'?

P = People

P

- E = Equipment
 - = Process/ Procedures/ Practices
- M = Materials
- E = Environment macro & micro
- L = Legal & Liability
- F = Finances

Good for risk identification brainstorming

Brainstorm the PEPMELF Risks

Identify the **who, what, where, when, which,** why, how ... that could impact on the **PEPMELF** resources 'at risk'? People Equipment Process, Practices, Procedures & Policies Materials Environment (macro/micro) Legal &/or Liability Finances

What Client or Contractor H&S Protection in Each Risk Assessment ?

What are the Safety & Incident Protection Needs for

- **P** People ?
- **E** Equipment ?
- P Procedures/ Practices/ Processes ?
- M Materials ?
- E Environment (macro & micro) ?
- L Legal & Liability ?
- **F** Financial ?

Ref: "Risk Assessments – Guide to Understanding the Basics" Author: L Bennett. published in 2007 by the Safety First Association (<u>www.safety1st.co.za</u>)



People at Risk? - example

Illness,

Injury

Fatal,

Fall Risk,

Loss/lack of ...

Poor design,

Unrest,

Stress & strain,

Poor training,

From wildlife?

- Employees (permanent &/or casuals)
- Supervision / Management
- Contractors
- Engineer / Designer
- Operators / Drivers
- Service Providers / Suppliers
- Clients / Customers / Users
- Shareholders, stakeholders, investors
- Others?...Visitors, Public, ...

What H&S Protection measures are now required?

The Safety & Health Protection Needs for P – People

- Identify all the People that will be involved or exposed during the project or construction work
- Establish the project baseline & People Job Task Risk Assessments
- Provision of a People safety working environment
- Provision of People safe machinery & equipment
- Ensure safe People job task designs & methods
- Established People Safe Working Procedures
- Ensure People safety induction & job task trained
- Ensure the People have & use "suitable" PPE
- Continuous People risk assessment by supervision

The Safety & Health Protection Needs for E – Equipment

- Project & Equipment Risk Assessments
- Provision of safe guarded machinery & Equipment
- Having "fit for purpose" Equipment available
- Equipment operator training & daily inspections
- Machinery/Equipment defects reporting
- Ongoing machinery/Equipment maintenance
- Having the required Equipment parts/spares
 available
- Provision & maintenance of PPE for the residual Equipment exposure risks
- Continuous Equipment risk assessment by supervision

The Safety & Health Needs for P – Procedures/ Practices/ Processes

- Project & Risk Assessment Procedures & Policies
- Provision of a safe working (production) Processes
- Provision of a safe working (operational) Practices
- Provision of a safe working Procedures
- Ensure the Policies are implemented & sustained
- Review Policies regularly & especially after any incidents.
- Ensure a safety training Policy is implemented & maintained
- Retrain if any safety Policy changes are made
- Continuous Policies risk assessment by supervision

The Safety & Health Protection Needs for M – Materials

- Project & Materials Risk Assessments
- List all the Materials & substances used
- Obtain & evaluate the MSDS's for these Materials & substances
- Establish which Materials are hazardous, toxic, etc
- Establish Safe Working Procedures for these Materials
- Ensure safety training for the handling, use, storage & disposal of Materials
- Provide & ensure use of PPE for these used Materials
- Ensure safety disposal methods for these Materials
- Continuous Materials risk assessment by supervision

The Safety & Health Protection Needs for E – Environment (macro & micro)

- Project & Environmental Risk Assessments
- Evaluate the macro Environment location, workplaces, working at heights, air/ground/water emissions/discharges & pollution, etc
- Evaluate the micro Environment workstations, ergonomics, noise, lighting, temperature, ventilation, radiation, confined spaces, etc
- Evaluate the operation's Environmental impact on & from the community & the fauna (wildlife) & flora (plants)
- Establish which Environmental impacts are not sustainable
- Establish & implement Environmental Safe Working Procedures
- Provide Environmental safety training to avoid impairment incidents
- Provide & ensure use of PPE for the Environmental exposures.
- Ensure safety disposal methods for all Environmental contaminants
- Continuous Environmental risk assessment by supervision

The Safety & Health Protection Needs for L – Legal & Liability

- Project & Legal Liability Risk Assessments
- Ensure Legal OHS compliance to avoid liability risks
- Ensure the management are informed & trained as to their Legal responsibilities, duties & liabilities
- Ensure all Legal appointments concerning the prescribed safety & protection measures are made
- Ensure the Legally required safety & protection measures are implemented & maintained
- Ensure all employees are informed & trained as to their Legal responsibilities & duties related to the safety & protection measures
- Ensure proof of safety & protection information & measures training is kept for proof of Legal compliance purposes
- Establish Legal compliance of the Safe Working Procedures
- Provide & ensure the Legal compliance of the use of PPE
- Continuous Legal liability risk assessment by supervision

The Safety & Health Protection Needs for F – Financial

- Project & Financial Risk Assessments
- Ensure Financial OHS compliance to avoid non-compliance liability risks
- Ensure Financial provisions are made for OHS compliance
- Ensure Financial provisions are made for safe workplace establishment & maintenance
- Ensure Financial provisions are made for machinery/equipment safety & maintenance
- Ensure Financial provisions are made for employee safety & health, & job task training
- Ensure Financial provisions are made for the free provision & maintenance of PPE
- Ensure Financial provisions are made for the safe handling, use & disposal of hazardous materials & wastes
- Ensure Financial provisions are made for safety during new & for project changes or other/scope creep projects
- Continuous Financial risk assessment by supervision (re. wastage)

The St Helena Project Issues

- Location
- Access
- Utilities
- Layout
- Materials
- Workers
- Equipment

HMS St Helena ship nearing life end

Need replacement way to provide for the people on the island & to develop the economy

Concept: Build an Airport = Allows Provisions Delivery & Tourism

- Public / Pedestrians
- St Helena health protection re. TB , HIV ?
The St Helena Airport Project



The St Helena Project Lifecycle Phases

Project Idea - vision & values 2 Idea - requirements Idea - business case **Concept & feasibility study Design & plan definition – Design & Logistics Implementation & execution – Utilities & construction** 6 **Commissioning & hand over – Early 2016** This St Helena Project could not be done without doing Risk Assessments for each aspect of the project & project phases

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A Generic Hazards Identification List

| Hazard Category | Hazard category - examples |
|---|--|
| Explosions | Overpressure, fire, fabrication/materials defect, vessel rupture, flammable liquids or gasses, protection failure, etc |
| Mechanical failure | Guarding failure, safety limits/valve failure, part failure, abuse, impact damage, lubrication failure, poor maintenance, brake failure, etc |
| Fire | Bad housekeeping, combustible or flammable materials ignition, electrical faults, lightning, arson sparks or friction, etc |
| Electrical | No lockout or isolation, cable damage, power failures, no or inadequate earthing , temporary wiring, short circuits, wrong or blown fuses, wiring incorrect (polarity), etc |
| Gas or liquid Release | Poor maintenance, mechanical failure, corrosion, control system failure, human error, valve leakage, etc |
| Design or Structural failure | Wind loading, foundation/structure collapse, earthquake, explosion, rupture, impact, overstressed, design/fabrication/modifications/repair failure, etc |
| Substance / chemical exposures | Toxic, corrosive, flammable, reactive, biological, asphyxiants, particulates (dusts & vapours), radiation (welding, sun, radioactive, x-rays), contact/inhaled/ingested exposures, waste management, etc |
| Moving parts | Unguarded, nip points, guard failures, entanglement, trapping, maintenance, operator protection, no lock- out, brake failure, etc |
| Ergonomics | Load/manual lifting, awkward body postures, repetitive motions, forceful motions, mechanical stresses, vibration, bending, reach, switch/gauge designs & layout, tool adjustment, no mechanical aids, fatigue, etc |
| Environmental | Air emissions, pollution (ground & water), waste management, spills, leakages, raw materials & energy consumption, habitat destruction, macro/micro, inadequate lighting/ventilation/sanitation, noise, etc |
| Working surfaces, height & water risks | Uneven/slippery/wet surfaces, slips, trips & falls, no edge & opening protection, working at heights, fall risks, flood risks, drowning, no/inadequate PPE, PPE not or incorrectly used, wrong PPE used, etc |
| Weather exposures | Heat stroke, heat exhaustion, cold hypothermia, wind, rain & hail storms, floods, lightning, seismicity, etc |

Hazard Type Examples

| Hazard Type | Examples of Hazard Type Sources |
|-----------------------------------|---|
| Human Error | Untrained, incorrect procedure, unsafe placement or position, no or wrong PPE use, wrong manual handling, poor housekeeping, slipping/tripping & falling, suffocation, poor ergonomics |
| Entanglement | Long hair/clothing/glove/jewellery materials caught & drawn into moving parts |
| Crushing | Falling off or under plant, uncontrolled movement of plant, plant/equipment collapsing or turning over, moving part contact |
| Cutting, stabbing & puncturing | By sharp or flying object contact, contact with moving parts, item being ejected or disintegrating, |
| Shearing | A body part between a moving & fixed item or plant, or between two moving parts of a plant or item, guillotining, |
| Friction | Heat generation sources, hot surfaces or moving parts which can burn or hot materials being handled. |
| Striking/Struck by | Mobile or uncontrolled or unexpected plant/equipment or materials being handled, plant/equipment /parts or work piece disintegration, ejection or falling, |
| High Pressure | Contact with high pressure fluids due to plant/equipment failure, rupture or misuse, rock bursts, seismicity |
| Electrical | Live conductor contact, overloaded circuits, damaged or poorly maintained leads & cables, no lockouts, damaged switches, use near water, inadequate earthing, electrocution |
| Explosion | Gas, vapour, liquids, dusts of other substance explosion, triggered by plant/equipment operation, materials handling or human error, exothermic reactions |
| H/C Temperatures | High/cold temperature surfaces/objects/materials contact or environmental exposures, fire, solidification |
| Other Hazards | Materials handling, chemicals, toxic gasses/vapours/fumes, dusts, noise , vibration, radiation, suffocation (lack of O ₂ or atmospheric contamination), environmental impairment (hazardous wastes handling & disposal, spillages, leaks, & stress factors generation), pollution, fauna(wildlife) & flora |

Ref: Eskom Medupi

Risk Analysis

Risk Analysis is the process of analysing the FREQUENCIES (& EXPOSURES) **CONSEQUENCES** of risk occurrences of a hazardous nature, activity or exposure

What level of risk is acceptable?



© BENRISK

Overview

- Roles & duties of the client
- What is risk?
- Introduction to Risk Assessments
- Project management risks
- Client Assessment of the Project Risks
- Designer Assessment of the Design Risks
- Client Baseline Risk Assessment
- Client H&S Specification & Tender

The Client H&S Specification

- CR 1 Definitions: A "H&S specification" means a site, activity or project specific document prepared by the client pertaining to all health and safety requirements related to construction work.
- This means all the OHSAct & its Regulations legal requirements plus any Client specified or additional H&S measures to address the risks identified in the Client's Baseline Risk Assessment

St Helena Management of Health & Safety

3. CLIENT CONSIDERATIONS AND MANAGEMENT ARRANGEMENTS

- 3.1 PROJECT TEAM STRUCTURE
- 3.2 CDM (Construction, Design & Management) RESPONSIBILITIES
- 3.3 HEALTH AND SAFETY OBJECTIVES
- 3.4 MONITORING AND REVIEW ARRANGEMENTS
- 3.5 PERMITS AND AUTHORISATION
- 3.6 SITE RULES EMPLOYER REQUIREMENTS
- 3.7 ESSENTIAL RULES FOR SAFE WORKING
- 3.8 ACCESS AND EGRESS
- 3.9 TEMPORARY SITE ACCOMMODATION
- 3.10 UNLOADING AND STORAGE AREAS
- 3.11 EXISTING WELFARE FACILITIES
- 3.12 INDUCTION TRAINING-EMPLOYER SPECIFIC REQUIREMENTS
- 3.13 CONCURRENT ACTIVITIES
- 3.14 COMMUNICATION AND LIAISON
- 3.15 REQUIREMENTS FOR THE CONSTRUCTION HEALTH AND SAFETY PLAN
- 3.16 SECURITY ARRANGEMENTS

4. EXISTING ENVIRONMENT HAZARDS AND RESTRICTIONS

• 4.1. SITE & DETAILS OF SAFETY/HEALTH HAZARDS AND RESTRAINTS

5. THE DESIGN

- 5.1 SIGNIFICANT DESIGN AND CONSTRUCTION HAZARDS
- 6. HEALTH AND SAFETY FILE Requirements



Construction Project Risk Assessments

(OHSAct's Construction Regulations based)



Health & Safety Assurance Through Client Baseline Risk Assessments

Client is responsible for the concept, design & construction of a project & its H&S aspects

RECAL

- Client to prepare a Baseline Risk Assessment incorporating the concept & design risk issues
- Use Prevention through Design to reduce H&S risks & incidents
- Consider the PEPMELF approach to develop Baseline Risk Assessments & to identify the H&S risks & needed controls to assure health & safety on Client projects.
- Client to prepare a H&S Specification which the contractor must incorporate & apply in his H&S Plan & during the construction work phase