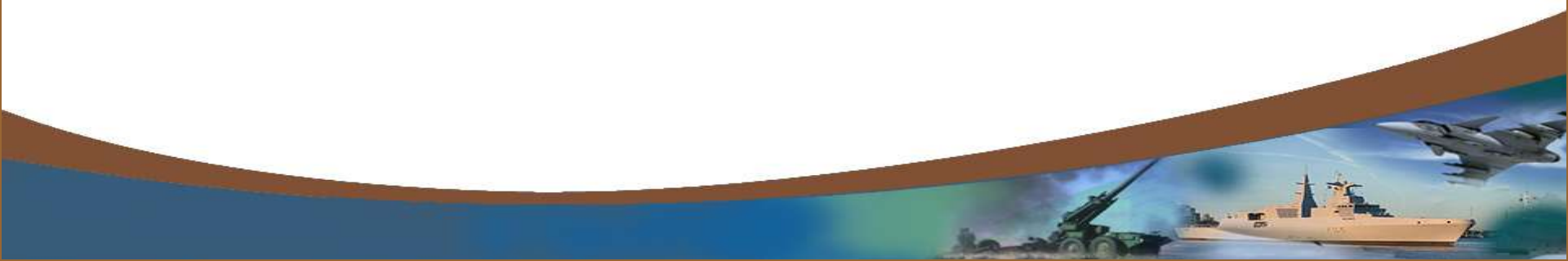
COLLECTIVE PROTECTION

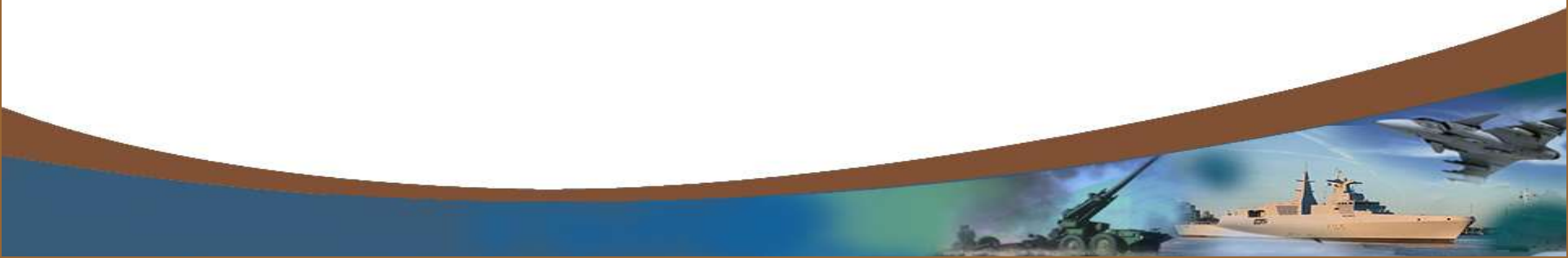
INTRODUCTION - Protechnik

- Protechnik is a research, development and implementation company performing project work in the field of chemical and biological defense, contract analytical work, as well as testing of respiratory equipment;
- Protechnik perform all chemical and biological related work for the SANDF;
- South Africa's Single small scale facility;
- ISO 17025 accredited.



INTRODUCTION - Protechnik

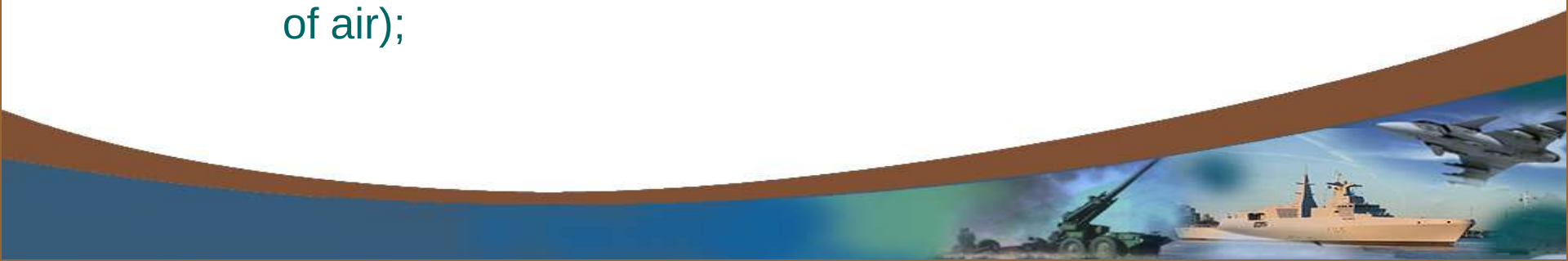
- Protechnik Divisions:
  - **Synthesis**
  - **Verification**
  - **Materials Evaluation**
  - **Filtration**
  - **Decontamination**
  - **Biomedical**



INTRODUCTION – Chemical warfare

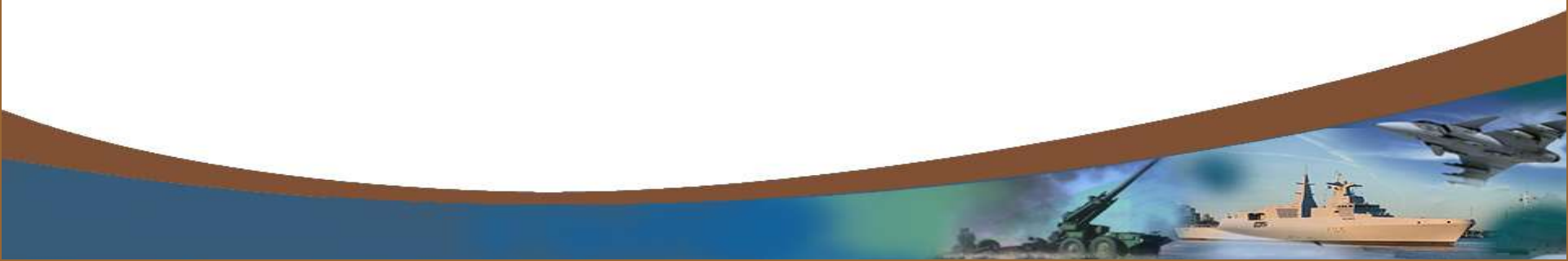
- Inflict Mass Casualties – indiscriminant;
- When agent detected; personnel must be protected in order to continue with their tasks.

- **PROBLEMS:**
  - Some CW agents are colourless and odourless and tasteless;
  - Therefore not normally detected by the senses;
  - Can be disseminated as vapours, droplets, liquids, aerosols or smoke;
  - In the field, concentrations are very low (large volume of air);



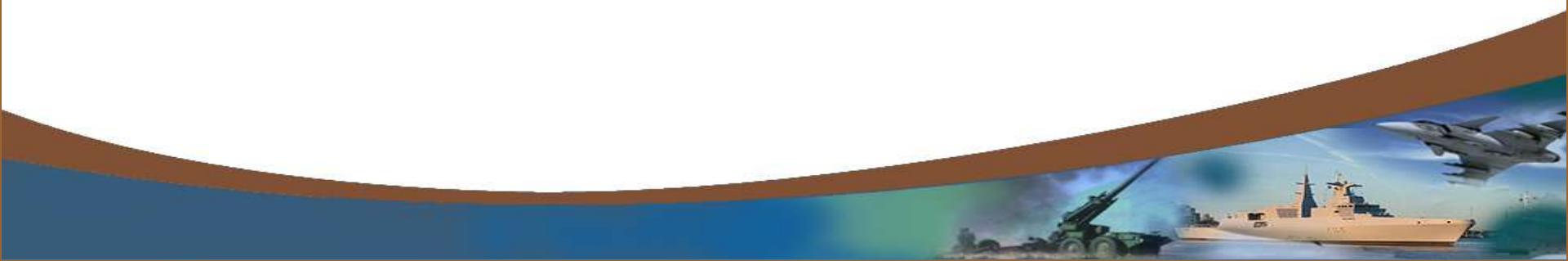
INTRODUCTION – TIC's

- Emerging threat as a result of the Chemical Weapons Convention;
- Easy to obtain, store, transport and use than classical CW;
- Widely used in chemical industry;
- Poor security;
- Easily used on a large scale in an urban environment;
- Includes common chemicals such as chlorine, ammonia, insecticides



INTRODUCTION - COLPRO

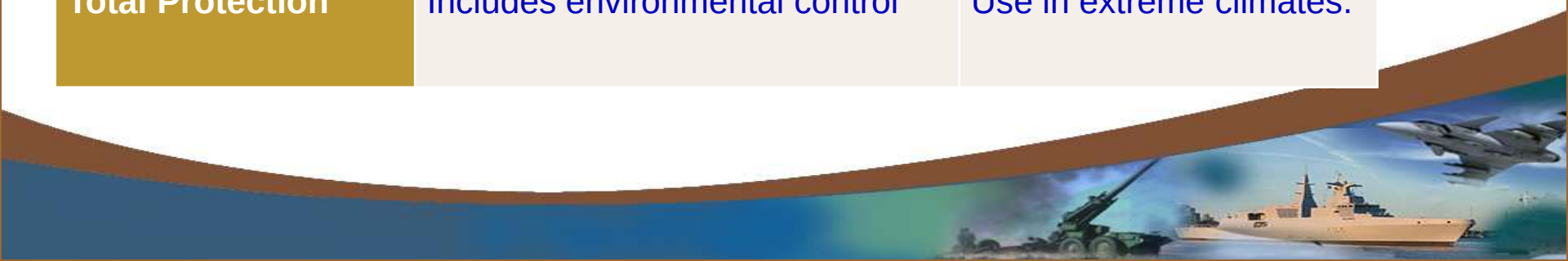
- Working in protective gear > physiological burden;
- Collective protection > overpressure system with purified air;
- Create a safe environment for soldiers to continue tasks without wearing protective gear;
- Operate with no breathing resistance;
- Normally setup upwind out of contaminated area;
- Airflow requirement > 17.5 m^3/h/person



INTRODUCTION - COLPRO

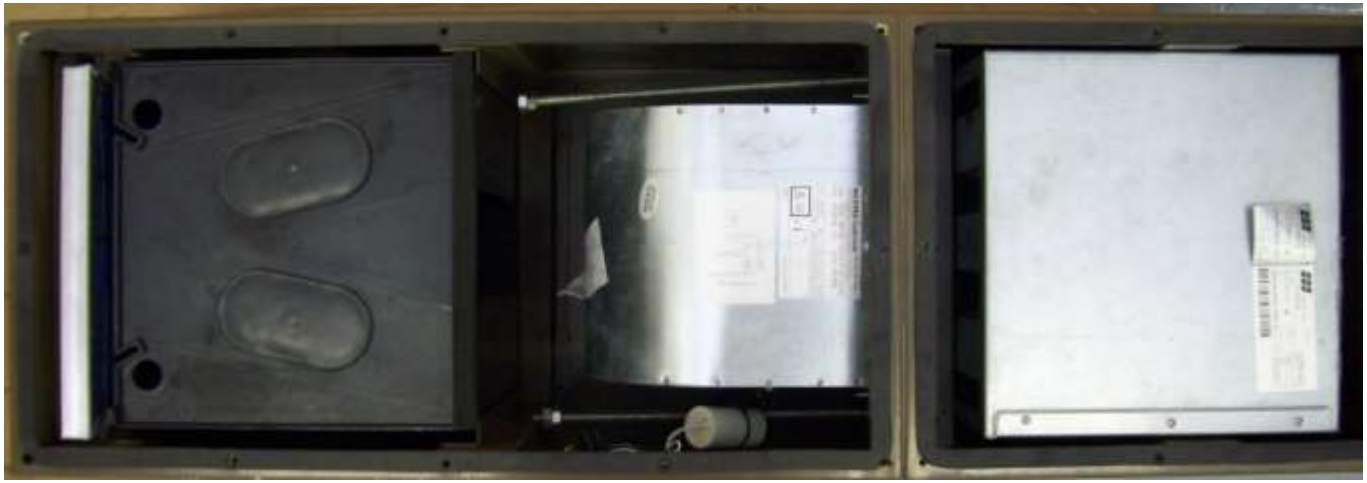
Four types of collective protection:

Protection type	Description	Remarks
Collective facemasks protection	Each member wears a ventilated face mask with combined filtered air	Use mostly in fighting vehicles; No body protection;
Collective Protection	Filtered air is supplied to the crew compartment; overpressure.	For rest and relief; Medical treatment, command centre, etc.
Hybrid Protection	Both overpressure and individual protection	Use mostly in fighting vehicles.
Total Protection	Includes environmental control	Use in extreme climates.



COLPRO - Components

- Fan unit- calculate airflow requirement;
- Components to be decontaminable;
- Dust separator – for vehicles;
- Over pressure control unit;
- Pressure release valve;
- Bypass system;
- Carbon filter;
- HEPA filter;
- Pre-filter.

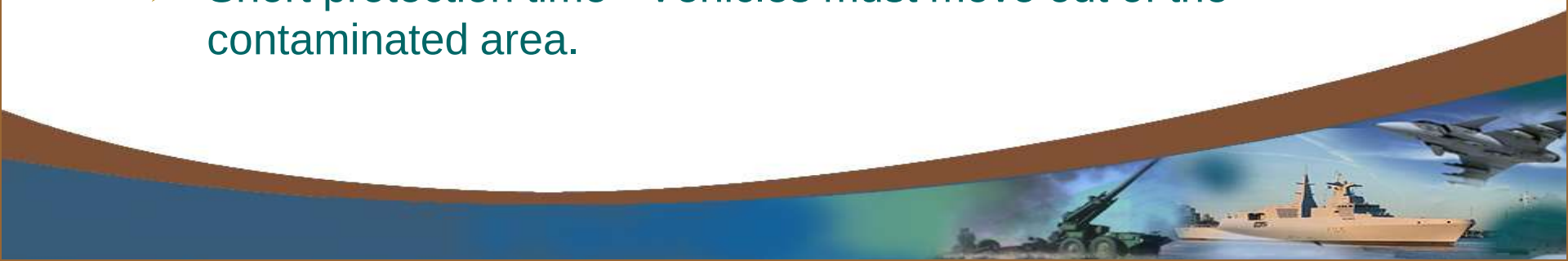


VEHICLE PROTECTION

- Currently no CBW protected vehicles in RSA
- Rooikat prototype filter system
- G6 local filter system exported

Objectives of over pressure system:

- Locally manufactured;
- Aim for over pressure of > 75 Pa;
- Compact, low cost and simple system;
- Short protection time - Vehicles must move out of the contaminated area.



VEHICLE PROTECTION

Over pressure system:

- All mine protected vehicles need a over pressure system;
- Require enough protection time to move out of contaminated area;
- No protective clothing needed;
- If exposed, inside decontamination not necessary;
- Hatches must be closed;
- Air requirement: 180 m^3/h in vehicle.

VEHICLE PROTECTION

Air supply to individual respirators:

- Need special communication systems;
- Using the sights difficult.
- Air requirement: 17.5 m^3/h clean air per person.

SHIP PROTECTION

Likely Maritime Targets:

- Coastal (littoral) operations;
- In harbours;
- River mouths/inland waters
- Should be collective protection – operations on the African East coast.

SHELTER PROTECTION

- Over pressure in special designed tents, containers or buildings;
- Use for medical care, command centre, rest, mobile lab;
- Fill with purified air;
- Consists of thee compartments;
- Entry and exit procedure:
  - Enter airlock
  - Close airlock and remove contaminated items;
  - Enter shelter and close air lock.

SHELTER PROTECTION

- Standard tent too many openings;

Standard tent with purified air and air-conditioning

TEST AND EVALUATION

Lab Ventilation filter test bench:

- Chemical protection;
- Particle filter capability;
- Dust loading;
- Flow resistance of filters.

TEST AND EVALUATION

Field Evaluation of shelters:

- Over pressure;
- Airflows;
- Particle count.

Tear gas test with people inside

Additional considerations

- Detections systems;
- Decontamination;
- Utilities > waste water;

Waste water

Vehicle decontamination

CONCLUSION

- Collective protection can be costly;
- RSA has the capability to evaluate collective protection systems;
- Detection, decontamination and other utilities to be considered.