Nuclear Decommissioning Authority

What information is needed to evaluate a candidate site?

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Background

Without a clear understanding of what information is required, how it will be obtained and how it will be used, there is no rational basis for planning and implementing investigations at candidate sites

Contents

- *Investigation requirements*
- *Factors defining information needs*
- *Discipline-based information needs*
- *Factors influencing information needs*
- *Iterative approach to meeting information needs*
- *Conclusions*

Requirements (1)

- *Site to be characterised at a level of detail sufficient to support:*
  - *A general understanding of the characteristics of the site, including:*
    - *Past evolution*
    - *Probable future evolution over a period of interest regarding safety; and*
  - *Specific understanding of the impact on safety of features, events and processes associated with the site and the facility*

IAEA (2005)

Requirements (2)

- *Characterisation of geological aspects includes:*
  - *Long-term stability*
  - *Faulting and extent of host rock fracturing*
  - *Seismicity*
  - *Volcanism*
  - *Confirmation of volume of rock suitable for construction of disposal zones*
  - *Geotechnical parameters relevant to design*
  - *Groundwater flow regimes*
  - *Geochemical conditions; and*
  - *Mineralogy*

IAEA (2005)

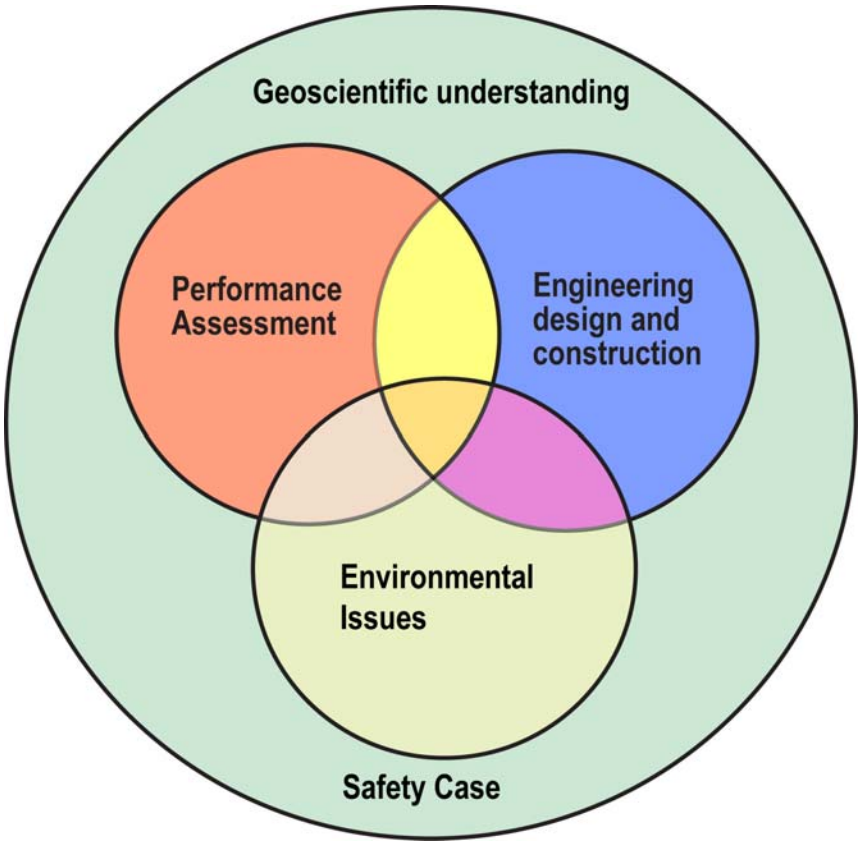
Requirements (3)

The developer/operator of a disposal facility for solid radioactive waste should carry out a programme of site investigation and site characterisation to provide information for:

- *The environmental safety case; and*
- *To support facility design and construction*

Draft Regulatory Guidance (2008)

Information by use

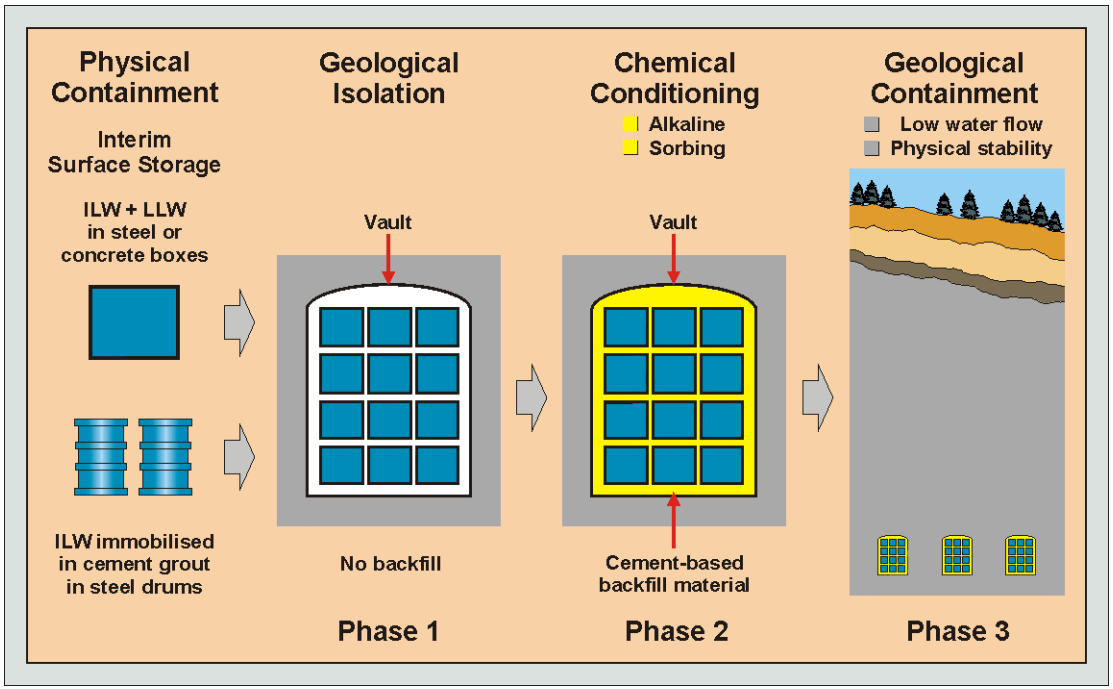


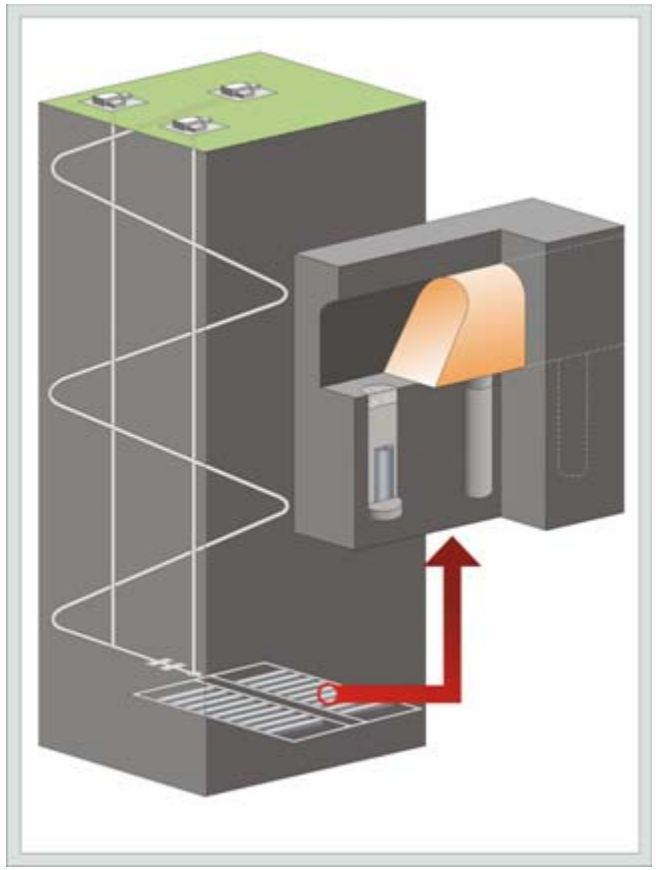
- Understanding needed of:
  - Wastes for disposal
  - Disposal concepts
  - Facility design
  - Safety case
  - Environmental issues
  - Geology

Baseline inventory

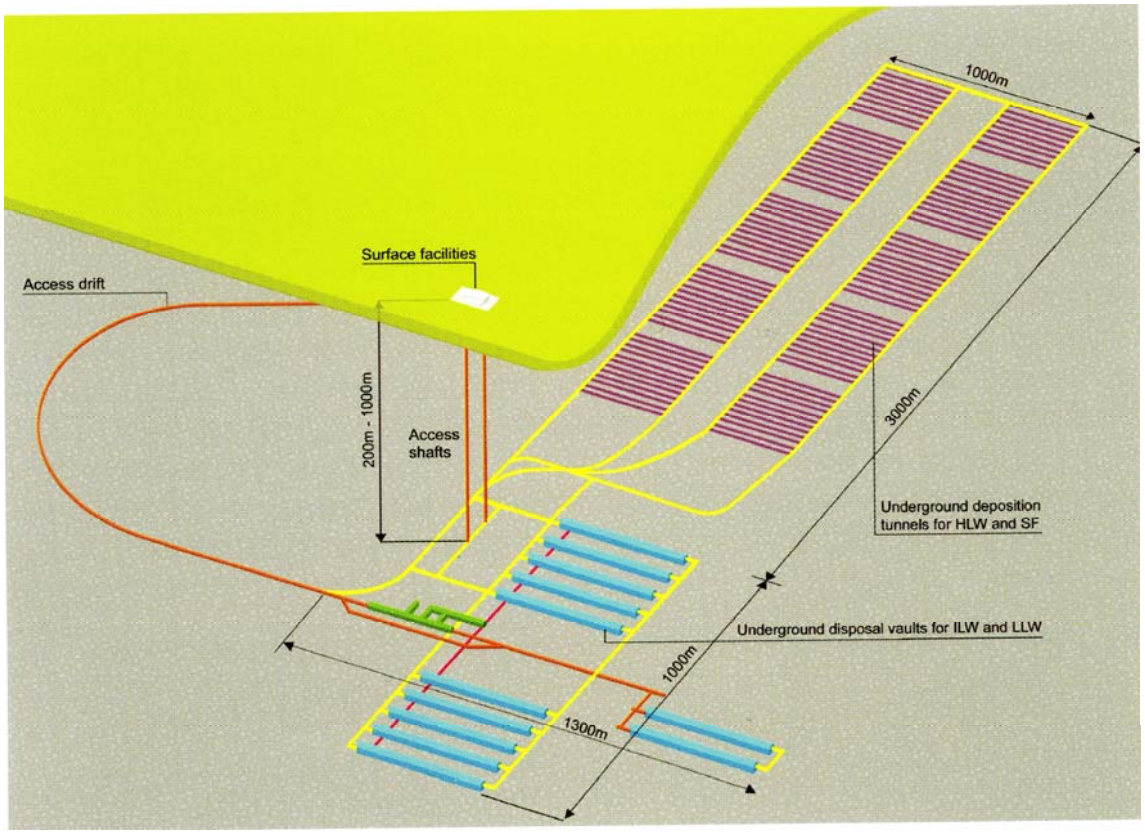
Materials	Packaged volume		Radioactivity	
	m^3	%	Terabequerels	%
HLW	1,400	0.3%	36,000,000	41.3%
ILW	364,000	76.3%	2,200,000	2.5%
LLW (not for LLWR)	17,000	3.6%	<100	0.0%
Spent fuel	11,200	2.3%	45,000,000	51.6%
Plutonium	3,300	0.7%	4,000,000	4.6%
Uranium	80,000	16.8%	3,000	0.0%
Total	476,900	100%	87,200,000	100%

Disposal concepts



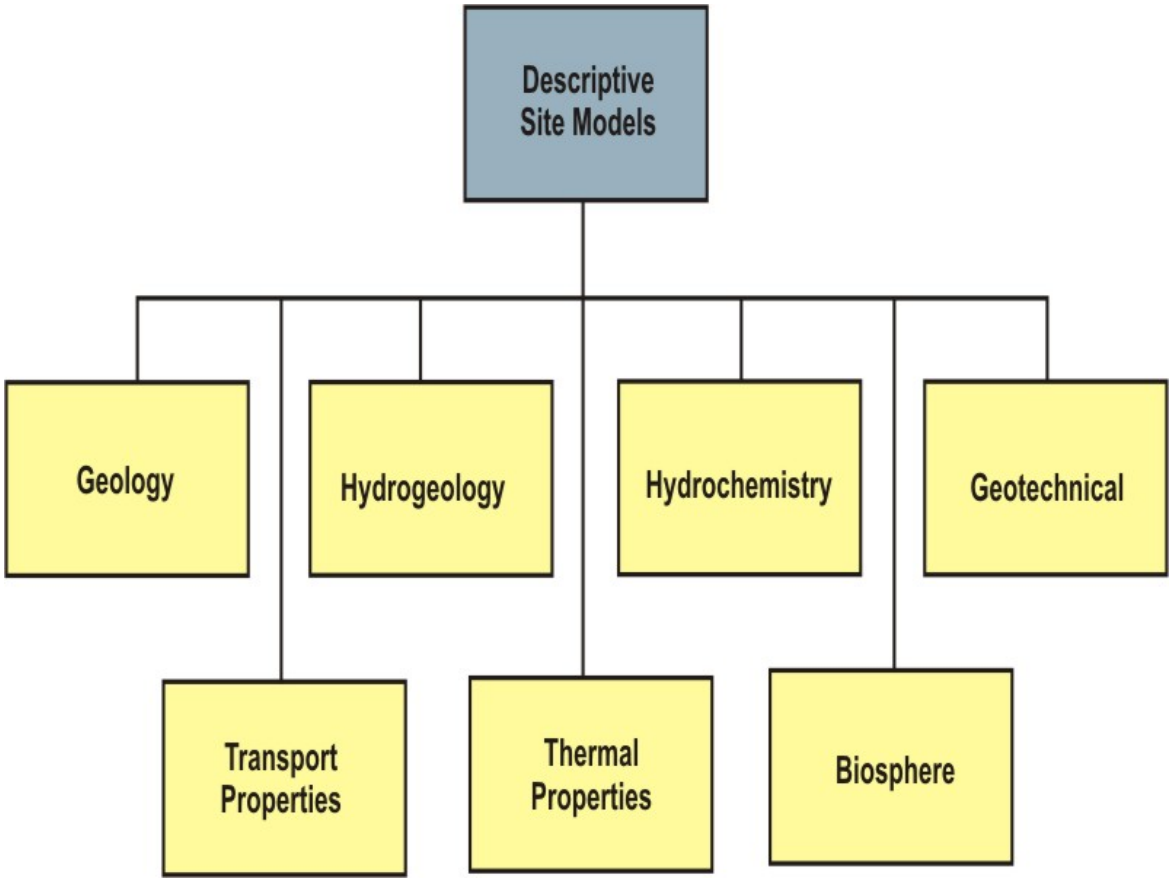


Generic facility



- *Preference for single facility for all wastes*
- *Disposal units could be on more than one level*

Descriptive Site Models



- *Volume of ground included in model*
- *Subdivision into geometric units (to describe spatial heterogeneity*
- *Assignment of parameters (values and/or statistical distributions)*

Geology Model (1)

- *Topography – to provide framework;*
- *Geomorphology – aid to interpreting Quaternary history;*
- *Nature, distribution and properties of soils;*
- *Nature, distribution and properties of cover sequence;*
- *Nature, distribution and properties of host rock;*
- *Nature and characteristics of structural geological features and assessment of how they will be described (stochastically or deterministically)*

Geology Model (2)

- *Qualitative and quantitative assessment of spatial heterogeneity of geological units*
- *Assessment of how heterogeneity can be represented in models*
- *Geological evolution of area utilising, for example:*
  - *Geochronological studies*
  - *Genesis of fracture-filling materials*
  - *Studies of movements along faults and fractures*
- *Tectonic stability (e.g. using seismological monitoring)*
- *Nature, extent, distribution and history of mineral deposits*

NDA

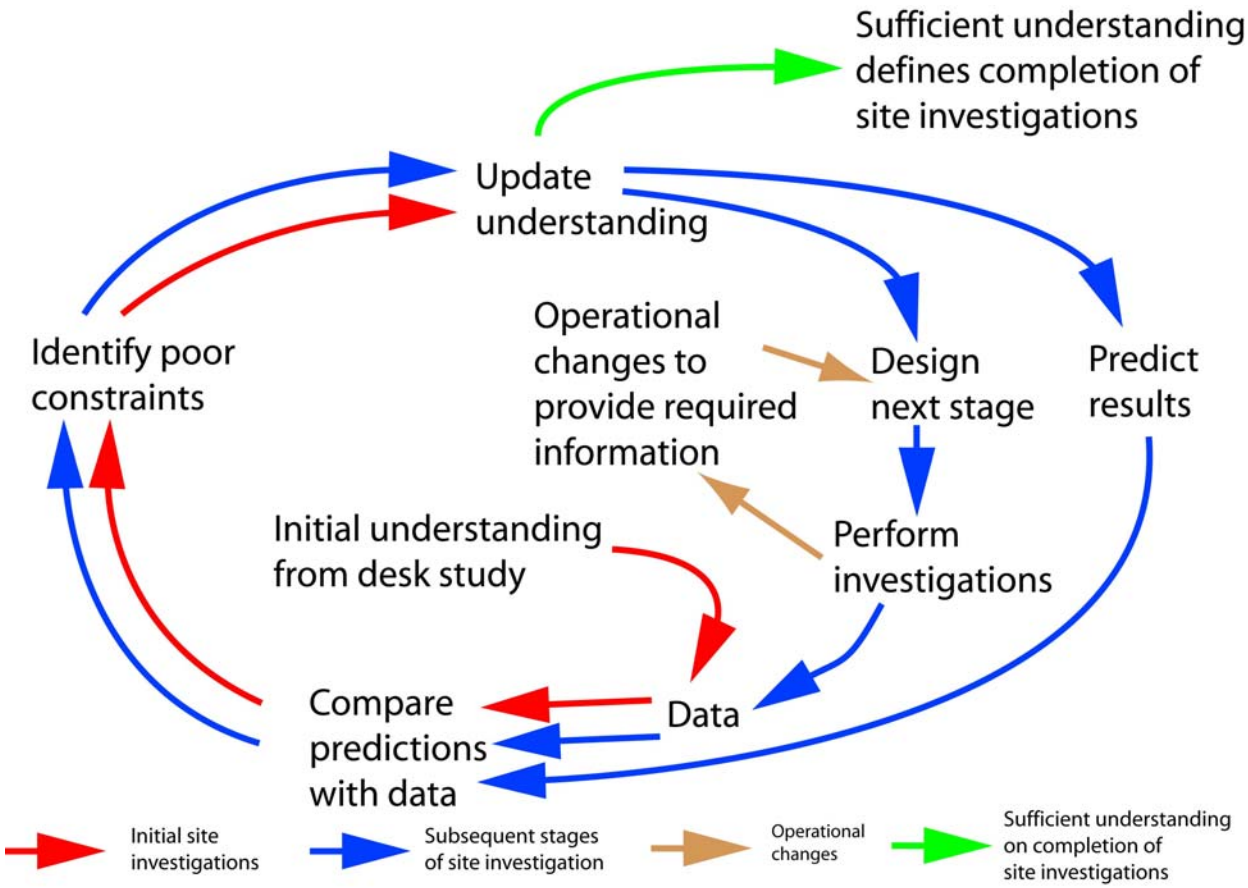
Details of needs

Parameter /Information Need	Method of measurement	Information used for:
In situ Stress Field		
Magnitudes and directions of principal stresses	Hydrofracture tests, overcoring, analyses of seismicity data	Design of underground excavations and support systems

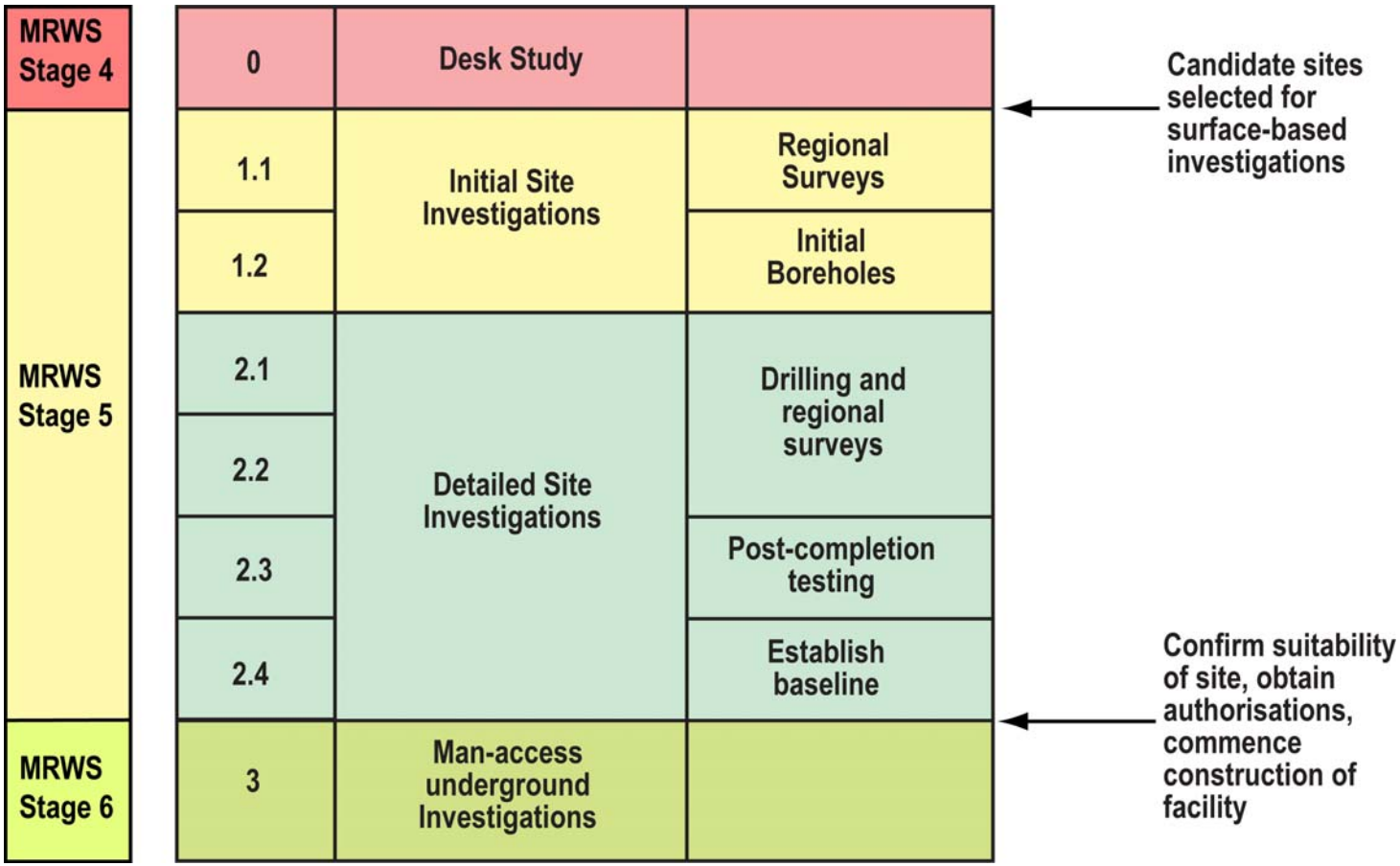
Overview of information needs

- *Overall list of information needs does not change significantly in relation to:*
  - *Geological environment*
  - *Waste inventory*
- *Some changes in list (e.g. diffusion coefficient in mudrocks)*
- *Changes do occur in relation to:*
  - *Relative importance given to certain issues (e.g. thermal, chemical interactions, etc)*
  - *Volume of ground to be investigated (footprint)*
  - *Techniques used for gathering information*

Iterative approach



Investigation stages



Conclusions

- *Definition of information needs is a fundamental aspect of the design of site investigations*
- *Information used for:*
  - *Safety case*
  - *Design of facility*
  - *Environmental assessments*
- *Understanding of the use of the information is essential for design and implementation of investigations*
- *Understanding of site must develop in an iterative manner to ensure investigations address key issues*