

Fire research in Sweden for 1997-99

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ABSTRACT

The Swedish Fire Research Board was established in 1979 to initiate and fund relevant fire research efforts. The Board is responsible for a long term research programme revised every third year, and the Board is one of two major Swedish sponsors of all fire research. Beside the Board we also have the Swedish National Rescue Services, funded by the government. BRANDFORSK gives very high priority for the industry and the insurance company and the need they express for fire research. Research that the Rescue Services Board are funding is mainly focusing the need for the fire department.

The Swedish Fire Research Board, BRANDFORSK, is the joint agency of the Swedish government, the insurance industry and the business sector, for the initiation, funding and supervision of different kinds of fire research. Work is directed by a Programme Board and is performed in the form of projects at universities, research institutes, state authorities and private firms. The Secretariat of BRANDFORSK shares the premises of the Swedish Fire Protection Association, SFPA, and the SFPA is the principal and the party which enters into agreement with the State.

The programme for the period 1997-1999 has been drawn up on the basis of both damage development and the trends in society which can be noted, and the evident fire problems of the interested parties and their need for fire research.

The inputs in the programme have been broken down seven problem areas. In every problem area different project areas are set out, and these primarily specify the aim of the work.

Our seven problem-areas are;

- ① Costs and benefits of fire protection measures
- ② The role and behaviour of people and organisations
- ③ Fire in buildings
- ④ Fire in underground facilities
- ⑤ Rescue operations
- ⑥ Fire in industries
- ⑦ Fire and the environment.

In comparison with previous fire research programmes, cost/benefit studies have been accorded higher priority, and this is also reflected in other problem areas. Greater Emphasis has also been given to accident prevention research.

PROBLEM AND PROJECT AREAS

Summary of the different problem areas

The inputs in the programme have been broken down into seven problem areas. For each problem area, a general description is given of the research need on the basis of damage development and trends, and fire problems. The different project areas are then set out; these primarily specify the aim of the work.

Problem Area No 1:

Costs and benefits of fire protection measures

In order that the effects of different fire protection measures may be evaluated and preferably optimised, it must be possible for the costs and benefits of the different measures to be calculated. The aim of the work is to produce "basic tools" so that this analysis may be performed in a technically and economically correct manner.

For the proposed project areas, a pilot study must be performed in order to assess the costs and benefits of fire protection measures in industry, to study the problem due to hidden damage, to produce "tools" for the determination of the benefits of different measures, and to make an in-depth analysis of large fires.

Problem Area No 2:

The role and behaviour of people and organisations

In many contexts, the "human factor" is of decisive significance in connection with accidents, chiefly as regards the causes of an accident. Obviously, human involvement can also have a positive influence in preventing accidents or alleviating their consequences. The aim of these inputs is to systematically improve the knowledge relating to the role of people and organisations in fire protection.

Within the proposed project areas, the way human capabilities can be utilised for the prevention of fires in companies and organisations must be studied, the causes of deliberate fires and the prospects of preventing these investigated, and a study made of the way in which buildings/installations must be designed so as to permit the best possible handling of an accident situation.

Problem Area No 3:

Fire in buildings

To a very large extent, fires are associated with buildings of some kind, and their consequences can in most cases be limited by correctly chosen structural measures. Increased knowledge in the area of fire engineering, and new building legislation, open the way for performance oriented fire protection measures. The aim is to bring about a further increase in the level of knowledge, so that the fire protection measures taken will in future also ensure that the desired safety levels are maintained.

In the proposed project areas, development of existing and new verification methods will be carried out for different types of building construction, "design" fires will be characterised, the reliability of calculation models will be evaluated and specified safety levels will be analysed. With regard to fittings and furnishings, studies will be made of the sources of ignition and the causes of fire, fire spread processes in furnishings and fittings, and the generation and dispersion of fire gases.

Problem area No 4:

Fire in underground installations

There is a steady increase in the number of large and complex underground installations, for instance rail and road tunnels and also industrial plants and public premises. The special difficulties in conjunction with fires in these installations are the difficulties in evacuating people and smoke and in carrying out rescue operations. The aim is to make further studies of the effects of various protection systems, mainly ventilation systems, in order to ascertain how these affect both the rescue facilities and the fire process.

In the proposed project areas, studies will be made of the effectiveness of fire gas ventilation, the progress of unventilated fires and the risk of fire gas explosions, and suitable fire damage prevention measures will be collated.

Problem area No 5:

Rescue operations

Fires in most cases call for some kind of rescue operation to save people, property and the environment. This may be done both through the municipal rescue service and by internal company measures. The aim is to develop new knowledge which may result in both better rescue equipment and extinguishing agents, and in improved tactics and leadership.

In the proposed project areas, fundamental and applied work will be done in relation to extinguishing agents, extinguishing equipment and fire fighting methods, studies will be made of operational tactics in large and complex buildings and installations, and guidelines will be drawn up for the design of rescue preparedness in industry.

Problem area No 6:

Fire in industries

A very large proportion of fire damage costs is associated with fires in industrial premises and processes. There is a greater need for protection systems and higher protection levels owing to the large changes which have taken place in industry, through larger concentrations of value, complex plants, a lower manning level, reduced stockholding, new types of packaging, etc. The phasing out of halon must be added to these problems. The aim is to develop further the competence built up in this area and to make knowledge more specific and more applicable for both simple and complex installations.

The proposed project areas comprise work regarding fire growth and "design" fires, spread of smoke, detection problems, smoke control systems and fixed extinguishing systems, as well as problems relating to the interaction between different protection systems, for instance sprinklers and fire ventilation. For each project area, a number of more specific inputs are defined.

Problem area No 7:

Fire and the environment

Environmental aspects are accorded increasing priority in society; this also affects fire engineering, and the key words in future will be "life, health and the environment". There are environmental problems associated with both the extinguishing agents used, such as halon and foam, and the fire itself in the form of the production of toxic and environmentally harmful fire gases. The aim is to "expose" environmental problems so that those interested may view them in the proper manner.

In the proposed project areas, work will be done to facilitate the phasing out of halon. Knowledge will also be developed to enable an objective environmental evaluation to be made of foam compounds, methods will be developed to evaluate the effects of fire in chemicals and to evaluate the environmental aspects of using e.g. building and furnishing materials treated with flame retardants.

ECONOMIC PRIORITIES

The programme relates to fire research over the period 1997-99. It has been produced on the basis of both damage development and the trends in society which can be noted, and the evident fire problems of interested parties and their need for fire research.

The R&D measures proposed in the programme have been related to seven problem areas, and in view of their scope and cost these have been given the following preliminary economic priorities:

* costs and benefits of fire protection measures	270.000 USD
* the role and behaviour of people and organisations	400.000 ”
* fire in buildings	670.000 ”
* fire in underground installations	270.000 ”
* rescue operations	540.000 ”
* fire in industries	800.000 ”
* fire and the environment	270.000 ”

In comparison with previous fire research programmes, cost/benefit studies have been accorded higher priority, and this is also reflected in the other problem areas. Greater emphasis has also been given to accident prevention research.

540.000 USD has been allocated for administration, monitoring, follow up etc in implementing the programme.

INSTITUTIONS

The research proposed has good prospects of being carried out. In an international comparison, we in Sweden have a very high and broad competence in fire research. Several institutions are engaged in this area, the three most prominent being

- * Department of Fire Engineering at Lund University of Technology (LTH)
- * Fire Engineering Section at the Swedish National Testing and Research Institute (SP)
- * Swedish Defence Research Establishment.

SECRETARIAT

The Secretariat of BRANDFORSK shares the premises of the Swedish Fire Protection Association – SFPA - is the principal and is the party which enters into agreements with the State.

The Secretariat of BRANDFORSK consists of:

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