

1944
VICTORIA

REPORT

OF THE

ROYAL COMMISSION

TO INQUIRE INTO

The Place of Origin and the Causes of the Fires which
commenced at Yallourn on the 14th day of
February, 1944;

The Adequacy of the Measures which had been taken to
Prevent Damage;

AND

The Measures to be taken to Protect the Undertaking and
Township at Yallourn;

Together with Minutes of Evidence.

PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

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To His Excellency Major-General Sir WINSTON JOSEPH DUGAN, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Companion of the Most Honorable Order of the Bath, Companion of the Distinguished Service Order; Governor of the State of Victoria and its Dependencies in the Commonwealth of Australia, &c., &c., &c.

MAY IT PLEASE YOUR EXCELLENCY :

INTRODUCTION.—PART I.

In Gippsland, where the plain country to the north-west of Traralgon breaks into the foothills, the waters of the Latrobe and Morwell rivers meet. Their meeting place is, nearly enough, the north-eastern corner of a tract of timbered, hilly country of about eight thousand acres, over which the State Electricity Commission of Victoria has been given complete dominion. Within that area are the vast undertaking of the Commission and the town of Yallourn. About this domain, to the north and west, lie bushlands which have been left unalienated except for some sparse settlement near the borders of the Commission's property. On the south and east a closer and less haphazard settlement exists. Within the area the greater part is bush land.

The chief purpose of the Commission is the production of electric power and brown coal briquettes for industrial and domestic use. The source of the material for this production is the deposit of brown coal which lies beneath an overburden of soil. The coal is won ingeniously by the method of open-cut mining. There are employed in this industry some two thousand and more people, of whom about eighteen hundred, as it was described to your Commissioner, are wage-workers and the rest staff-employees.

Almost all of the workers of either description live in the town. Housing its population of close upon four thousand people in nearly nine hundred houses, the town rests upon the north-western slope of the basin of the Morwell river. Behind it rise the timbered hills. Before it, to the south-east are distances of plain and undulating lands. Its radial streets are designed to define segments of a semi-circle, the centre of the circle being the entrance to the garden square which lies midway along the eastern boundary of the town. The houses are set each in decency in its own ground. The compactness of the town, with its made, well-kept streets and the space about each house, makes it easier to defend against the invasion of bush fires than it otherwise might have been.

The houses are of various designs. The rents are not high. The domestic services, such as the supply of lighting, power, water, drainage, are good. It is a pleasant town and an asset of very great value, worthy of special fire-protection by the Commission under whose sole management it lies. Here indeed the townsman enjoys all that the heart of man may desire—except freedom, fresh air and independence. He lives his life on a great many days in a fine rain of abrasive coal particles and breathes with them, perforce, the nauseating stench which comes from the neighbouring paper-mill, and against which closed doors and windows offer no defence. Be he never so provident, he can not acquire a home or an equity in a home. He has no authoritative voice in the management of the town, because there is no democratic local government of the town. His wife can not open a shop unless by the unlikely permission of the Commission; nor can she withdraw her custom from a shop unless she be prepared to face the possibility of having to travel some miles to a neighbouring town to do her shopping. There is no competitive spur to the giving of good service by shopkeepers because each has a monopoly in his own field, the most important being the Commission itself. There is no public library. There is no hall where the townspeople may publicly assemble as of right. There is no place where refreshment of any kind may be obtained after six o'clock in the evening. There is a cinema. There is no municipal democracy in Yallourn.

Some of the workers have sought to escape the coal-rain, the stench and the atmosphere of suffocating paternalism by going to live outside the jurisdiction of the Commission. There, your Commissioner believes, they are living comparatively contented but deplorably unplanned lives.

It may perhaps be thought that much of the foregoing is irrelevant to the matters for inquiry. But in your Commissioner's view it has a deep significance and a direct bearing upon the matter of the future safeguarding of the town and the works. In a town of the size of Yallourn and situated as it is, much that can be done for its protection must depend upon the goodwill of its people and their willingness to help wholeheartedly in time of crisis. During the recent bush fires there was evidence of that goodwill and willingness. But a great deal of such help in the future must come from those who are now young and whose social philosophy has not yet formed. It is suggested that a sense of social responsibility does not spring from the soil of dissatisfaction. There is legitimate dissatisfaction in Yallourn.

It is felt by your Commissioner that in the way of living which is offered to the people of Yallourn there is a positive, provocative denial of those things in which, if they were freely granted, would lie the fundamental safeguard of a very valuable national asset.

The state of affairs which has been described is not altogether to be laid at the door of the State Electricity Commission. Much of it results naturally and inevitably from the legislation under which the Commission has its being and by which its powers and duties are defined. The principal legislation is embodied in the *State Electricity Commission Act 1928* which consolidates previously existing legislation.

PART II.

North-east of the town and in close proximity to it are situate the "open-cut" and the power station. South of the power station and east of the town are the briquette works. The power station is on the southern bank of the Latrobe river, upon the water of which it relies for its vital processes. Across the river, hilly, timbered country extends for many miles to the north and north-west and on either side of the river to the west.

Close by the power station and forming part with it of the enclosed works, is the open cut. Further north of the works is the old brown coal mine and its adjacent township.

The Morwell river runs along and close to the eastern boundary of the enclosed works.

CHAPTER I.

On the 19th day of February, 1944, a Royal Commission issued and was entered in the Register of Patents.

The Terms of Reference embodied in the commission require your commissioner to inquire into and report upon:—

- (1) The place or places of origin and the cause or causes of the devastating fires which commenced on the fourteenth day of February, 1944, and caused damage to the plant, works, open cut workings and buildings of the State Electricity Commission at Yallourn.
- (2) (a) What measures were taken by the said Commission prior to the said fourteenth day of February, 1944, to prevent damage to the said plant, works, open cut workings and buildings and to the township of Yallourn by grass or bushfires;
 - (b) Were such measures reasonably adequate having regard to all the circumstances including the character of the Commission's undertaking.
- (3) What further measures, if any, should be taken to prevent a recurrence of such damage and to protect the said undertaking and the said township in the future.

THE PLACE OR PLACES OF ORIGIN AND THE CAUSE OR CAUSES OF THE FIRES.

The Place.—The place of origin was a farm about 3 miles distant from the town and approximately north-west of the town, outside the boundary of the Commission's territory and on the edge of a tract of timbered country which extended from such farm to the fences of the houses on the north and west borders of the town.

The Cause.—The cause was the lighting of a fire by the occupier of such farm for the purpose of burning off dead, cut scrub on his farm. Your Commissioner is unable to say with certainty whether such burning was done legally or illegally. At a time shortly before the burning occurred, the farmer had received from an employee of the Forests Commission what he believed to be a proper permission to burn. Whether the farmer lit the fire in accordance with the terms of that "permission" and whether that "permission" was lawfully given, your Commissioner, having regard to the possible consequences of a definite finding on the matter and to the absence of satisfactory evidence, is unable to determine with safety. It is clear that having regard to the dry weather and to the proximity of growing scrub and timber nearby neither party acted with a proper degree of caution.

A further cause and one upon which the abovementioned causes depend was the spread of the fire to and through the timbered country which lay in an unbroken tract between the said farm and the town and up to the very fences of the houses on the western and northern boundaries of the town.

The fires on the open cut were caused by air-borne burning material from the bush fire igniting the coal dust in the workings.

CHAPTER II.

THE MEASURES TAKEN TO PREVENT DAMAGE. WHETHER SUCH MEASURES WERE REASONABLY ADEQUATE.

Before proceeding to consider the measures taken to protect each separate component part of the Commission's undertaking and property, there arises the question whether there was a general plan to protect the asset as a whole against damage by the incursion of bush fires.

It may be shortly stated at the outset that there was no general plan which was of any real value. When one speaks of a general plan, one has in mind one which is under the supreme control of one person or body: which is to be set in motion and directed by that supreme person or body; which has one clear purpose to be achieved by clearly defined methods; which is understood by all persons who are to take part in its working; and which demands of all those persons the recognition that they are subject to the discipline by which the plan is to be made real and practicable.

No such plan was in existence, nor was there any plan in which there was any one of the elements above enumerated.

The absence of any plan such as one might reasonably have expected to find is attributable in your Commissioner's view to the structure of the organization of the undertaking and activities of the Commission. The main components of the undertaking are the open cut, the power station, the briquette factory, the town and the forest country within the boundaries of the Commission's territory. The management of each is conducted by its own separate department. Those in charge of the departments are engineers or scientists. They are not foresters. Each head of a department naturally and with justification considers his department to be one of great importance. Again naturally, some of the heads of departments have been overtaken, one thinks unconsciously, by a conviction of a reflected personal importance. Within some departments is a perhaps too ready recognition of personal status. There is a reluctance to engage in a common endeavour. There is diffidence in making to another department a suggestion for the common weal. There is still greater diffidence in pressing upon a superior officer of one's own department a suggestion of which that officer does not approve or which he thinks might not receive the approval of those higher up. It is the natural result of the method of organization by departments and of the too remote control exercised by the supreme governing body. Had not the word "bureaucracy" recently taken upon itself an offensive connotation, it might well have been used by your Commissioner to describe more succinctly what has been so laboriously set down in other terms.

This report now proceeds to a consideration of the measures which were taken to protect the particular component parts of the undertaking. Those measures will now be considered in the light of their application to:—

- (1) The country outside the Commission's territory.
- (2) The unoccupied country within the Commission's territory.

- (3) The works, which include—
 the open cut,
 the power station,
 the briquette factory.

- (4) The town.

So that what follows may be better understood, it is necessary to say at this point that the fire fighting bodies of the Commission were the town fire brigade, the Air Raid Precautions organization, certain of the men engaged in each of the several departments of the works, the forestry gang, and volunteers who might help in time of emergency.

At this point your Commissioner has attempted to construct a chart of the organization of the general fire services, so that its construction might be readily and easily understandable. He has been forced to abandon the attempt because the vagueness and lack of definition which he has encountered render it impossible to present the matter in any definite and clear-cut form. This much may be said. The responsibility for the general fire services of the territory rests upon the General Superintendent. The forest fire service is under the control of the Resident Engineer, as is the co-ordination of the town and forest services. The Resident Engineer is responsible to the General Superintendent. The captain of the town brigade, which is a Country Fire Brigade, is answerable to the Resident Engineer insofar as he is employed by the Commission but apparently does not feel himself to be subject to the direction of the Resident Engineer in matters of fire-fighting. The Air Raid Precautions body appears to be under the direct control of the General Superintendent. Each department of the undertaking, namely, the power station, the open cut and the briquette works, is individually responsible for its own services. The General Superintendent has an over-riding authority "in emergency" but this is limited to an emergency caused by enemy action. Volunteers who might wish to lend assistance have not been organized. On the 14th of February, many of them did not know to whom they should offer assistance.

Because the fundamental principle of any plan of defence against bush fire is the prevention of fire, the first and most important step is to try to make safe the place at which fire will probably originate. Generally speaking, fire comes from outside its victim's territory. The strong probability is that any fire which may threaten Yallourn will come from beyond the Commissions' boundaries and from the north or west.

1. THE COUNTRY OUTSIDE THE COMMISSION'S TERRITORY.

The Commission's territory is surrounded by protected forests and fire protected areas. The country to the north-east, north and north-west is hilly and timbered. It is the kind of country in which there is always in the summer season danger of outbreak and spread of fire. It constitutes a real menace to Yallourn. This fact was recognized by the Resident Engineer and his forest officer. Representations were made to the appropriate forest officer of the Forests Commission in the district, but it was at all times realized that the Forests Commission was practically powerless to put prevention works in hand in the vicinity of Yallourn because of the very small number of men whom the forests Commission had available for the purpose and because of the urgent necessity to employ those men in another part of the large forest in question.

The State Electricity Commission has acquired a strip of land which theretofore had been outside its territory and has performed certain protective works upon it. It employs a forest gang of about twelve men and to a limited extent has with the permission of the Forests Commission officer performed some protective works outside the State Electricity Commission's boundaries. It may be said that the work which has been done outside those boundaries by either of the Commissions is negligible insofar as it is to be regarded as affording protection for the Yallourn undertaking.

2. THE UNOCCUPIED COUNTRY WITHIN THE COMMISSION'S TERRITORY.

The works and the town of Yallourn are situate well within the boundaries of the Commission's territory, except where the open cut lies close to the eastern boundary, and are surrounded by thickly timbered country. The immediate responsibility for fire precaution in the unoccupied country, as in the town, rests upon the Resident Engineer, Mr. Norman Ernest Westmore. Mr. Westmore is an engineer and has worked as such for many years. He has a multiplicity of duties to perform. One of those duties is to assume the responsibility, already described, for fire protection of part of the Commission's estate. He is not a forester and has been able to devote only part of his time to questions of forestry. In the discharge of his duty

of fire protection he has made a sincere attempt to give the best service of which he has been capable. He has not been at liberty to give a great deal of his time to study or research. What he has accomplished or has tried to accomplish in practice is in accord with principles which were being accepted by skilled foresters a few years ago, but which have been rejected or modified by them since the fires of the year 1939.

Under the Resident Engineer's direction the Commission has carried out, to some extent, protective works and measures as follows:—

Firebreaks.—Both narrow and wide firebreaks have been made and others are yet to be made in accordance with the Commission's plan. It appears to your Commissioner that the valuable purpose of the firebreak, namely, that of providing a means of transit for men and equipment and as a base from which to fight a fire, has not been fully recognized and that it has to too great extent been regarded, wrongly, as being of itself a means of arresting the progress of a fire. It is considered by your Commissioner that a great deal of the time and money expended on this work would have been better spent on the construction of good roads and tracks.

Places of probable origin and spread of Fire.—The principle of preventing fire at its probable source has been recognized and conferences with the Forests Commission have taken place for the purpose of attempting to deal with the danger. Because of the Forests Commission's shortage of men and of what appears to have been a lack of initiative or of confidence on the part of the State Electricity Commission's employees, practically no protective works at the probable source have been done. Although the probable source is outside the territory, it is so closely linked with the internal precautions policy as to be appropriately dealt with under the present heading.

Graziers.—The danger created in the areas north of Yallourn by grantees of grazing licences has been recognized, and, in this particular area, the uneasiness of the Commission has been fully justified. The Forests Commission has been aware of the danger, but has no power to prevent the issue of such licences to persons who are notorious as fire-law breakers, or at all. There have been regular fires in this area which have been illegally lit and which your Commissioner finds were lit by holders of grazing licences. The Lands Department still has the right to grant, and does grant, licences to persons who are known to informed persons to be fire-law breakers and who from time to time cause many thousands of pounds worth of damage to the forests by their wanton and illegal behaviour. The licences in question have been granted in respect of the territory north of and outside the Commission's territory. But that fact must be linked with the question of the Commission's internal precautions as it is in the north that one of the chief dangers to Yallourn lies.

Tracks and Roads.—The importance of tracks and roads has been recognized and good tracks and roads have been made.

Vehicles and Equipment.—The Commission has had an adequate provision of vehicles and equipment.

Men Available.—The Commission's men available for work in the forest have been of a sufficient number to have enabled a great deal more really valuable work to be done than has been done. This is due largely to what your Commissioner considers to have been the mistaken policy of the Commission.

Water Supply.—The Commission has available plentiful stocks of water for transport to such places in its territory as may require water. It has constructed more than forty dams. These are useless for fire-fighting, because, being mere holes in the ground, they are dry by the time the dangerous fire season sets in. They could be constructed in such a way as to make them valuable storages for fire-fighting purposes. At present they have a value as storages for water which may be required in connexion with precaution work done at a time other than that of the dangerous season.

Char.—Great quantities of unburned coal, known as "char", escape from the smoke stacks of the power station and briquette factory and are deposited upon the surrounding territory of the Commission and upon the country beyond it. This char does not add to the risk of outbreak of fire in the forest, it being combustible and not inflammable. But it does constitute an added, grave risk by the fact of its adding intensity to a fire once started. Your Commissioner is not by any means satisfied that full and proper measures have been taken to abate or combat this source of danger.

Protective Burning.—Not nearly enough protective burning is carried on on the Commission's territory. In particular, to the north and west of the town and works neglect of this form of precaution has conduced to a condition of serious danger. It was because of the failure to take this ordinary precaution that the town of Yallourn came so close to being destroyed or materially damaged on the 14th of February last. The effectiveness of this form of defence is made manifest by the fact that parts of the forest which had been burned within the last year or so and which lay in the path of the bush fire, were unscathed. They are now standing as green oases in a wilderness of destruction.

Marginal Protection of the Town.—No real marginal protection of the town was in existence on the 14th of February last. In many places timber and scrub grew up to the fences of the houses built on the boundary of the town. The danger had been realized by at least two employees engaged in branches of the general fire service. They did not mention the danger to responsible officers of the Commission. The reason for their not doing so is to be found in your Commissioner's remarks which appear earlier in this chapter and which touch upon the inter-departmental diffidences which arise in the organization of the Commission's undertaking. Your Commissioner insists that in the circumstances neither of the employees in question can justly be blamed for his reticence.

Observation Tower.—To the west of the town is a steel observation tower which is manned in hazardous weather. It is connected by telephone with the general works telephone system.

3. THE WORKS.

The Open Cut.—The grass-level orifice of the open cut is of an area of about 400 acres. The cut, at its lowest level, is about 200 feet deep. The descent from grass-level to the lowest level is by three steps. The first descending step is from the unbroken surface of the natural overburden of soil (the grass level) to a level surface or berm of coal. This step is fronted by a face which regarded from the berm consists of overburden at the top and coal below and which extends down to the point where the face meets the berm. Along the outer edge of this berm and overhanging the next downward step a dredge passes winning coal from the next face by buckets which scrape the coal from the face. This face fronts the second descending step, is almost perpendicular, and is about 90 feet in depth. At the outer edge of the berm at the foot of the second face is another dredge which is similarly employed. This third face is also about 90 feet in depth. The berm at its foot is the worked out and lowest area of the mine. The mine is busy with men, machines, motor vehicles and electrically driven railway trains of trucks which carry the won coal to the place of its distribution. Its surfaces are covered with a layer of highly inflammable coal dust. The whole mine is open to the sky.

Fire is an almost unavoidable concomitant of brown coal open cut mining. Inflammable dust is created by the mining process and by the necessary traffic in the mine. No very elaborate internal protection against fire caused by bush fires is necessary if sufficient protection is given against the normal, industrial fire risk. A great deal has been done to safeguard the open cut against fire. The fact that on the 14th of February last a great fire did develop in the open cut and that strenuous and prolonged efforts were necessary to be expended before it was extinguished points strongly to the fact that the protective measures which had been previously taken were not reasonably adequate. But your Commissioner is far from finding that the officers responsible for the safety of the cut ought to have been aware of that inadequacy. Furthermore, if the officers in question did believe that the protection system fell short of being perfect, there is something of weight to be said for them. Water is inimical to successful brown coal mining. At Yallourn, the coal won in normal circumstances must be dehydrated before it is fit to serve its industrial purpose. Therefore there must always be something of compromise in the management of the mine—a compromise between the providing of a greater safety by the use of more water and the providing of an inferior coal which must be treated, at extra cost, to bring it to a state of industrial fitness. So much for the general principle. In the practical observance of this compromise at Yallourn it is highly probable that the engineer in charge of coal supply and those associated with him have leaned too far in favour of production. To have done so would have been the natural result in the case of engineers whose greatest aim is to produce as high and economical a quality of coal as it is reasonably possible to do. That some of the measures taken for protection during the last two or three hours before the fire started were by no means adequate is beyond doubt. That minor failure is, again, open to explanation. The majority of experienced officers who were watching over the mine from about half-past two o'clock in the afternoon (half an hour before the fire reached the town) until about half-past four (the time when fire appeared in the mine) were of opinion that the fire would pass to the south of the town and that the mine would be safe. The first main thrust of the fire did pass south of the town; but later thrusts passed to the north. It is most probable that the mine caught fire from flying embers blown from the northern thrust of the fire.

The protective measures which had been taken before the 14th of February were elaborate and intricate. They are exhaustively described in the evidence of Mr. Robert John McKay, engineer in charge of coal supply. The basis of the system of fire protection in the open cut is the providing of water for use at all parts of the three berms and at the faces. This provision is made by a pipe system of reticulation. The water is obtained from four separate sources. Those sources are two main pipes from the town reservoir, the pond or sump at the lowest level of the mine, the Morwell river. On each berm are main pipes. From the mains are led 1½-inch sprinkler pipes which run across the berms at right angles to the faces. The sprinkler pipes are led off the main at intervals of 150 feet. Each sprinkler pipe is pierced at intervals so that it emits a spray of water. The result intended to be achieved is the division of the berm into compartments, each compartment being 150 feet wide and of the distance between face and face in length, so that when the system is put in action the berm is divided by lines of wetness on its surface as the result of the emission of sprays of water along the length of the sprinkler pipes. By this method it is intended, not that the whole berm surface should be wetted, but that fire starting in any of the compartments will be prevented from spreading before stronger measures for its extinguishment can be applied.

Those stronger measures consist in the use of hoses from hydrants set in the mains which feed the sprinkler pipes. There are, on the berms, a great many such hydrants and supplies of hose made to admit of several lengths being joined, if it is necessary to do so. From these mains a good volume and pressure of water for the suppression of fire on the berms is available. For fires on the faces, the volume and pressure are quite inadequate, it being impossible to throw a jet more than about half the height of the face. This cannot be offset by hosing from the berm above the face. In general it will be found that operations from above the face will not be practicable because the flame, heat, and smoke rising over the top of the face and probably driving across the berm will either totally defeat the fighters on the berm or reduce them to undirected hosing over the edge of the berm in a blind search for a target which is invisible. Therefore, despite the expert evidence of a gentleman who is not employed by the Commission and whose concern appeared to be to assist the Electricity Commission rather than to assist your Commissioner, your commissioner's finding is that the water pressure available to the open cut is inadequate for the quelling of major fires on the faces of the open cut.

Future Measures.

(a) Disposition of Equipment.—It is your Commissioner's opinion that better provision ought to be made for the better tactical distribution of equipment to the various parts of the mine during a time of emergency so that the changing and unpredictable vagaries of the fire may be better opposed. Upon this point your Commissioner stops short of making a positive finding that what had been done in this respect was not reasonably adequate.

(b) Revision of Reticulation.—It is recommended that a more constant, running revision of the main and sprinkler system be maintained in future so that the service which it is intended to convey shall be closely and efficiently available to all parts of the berms and faces. It is emphasized that the reticulation system in the berms is fixed and stationary, whereas the faces are continually receding as their surfaces are scraped away by the dredges.

(c) Water Pressure.—It is recommended that the water pressure be improved so that a greater volume and jet may be available for the suppression of fires on the faces and also for the purpose of wetting the berms more widely and thoroughly when necessary. It is suggested that there should be variable control of the pressure so that production need not be adversely affected in times of normal danger.

(d) Training of Fire-Fighters.—It is recommended that a large proportion of men employed in and about the open-cut be systematically trained in the use of equipment and in the tactical disposition of it.

The Power Station.

The power station has, by reason of the nature of its operations, an inherent and ever-present danger from fire. But this report is concerned only with the question of danger from bush fires. It is, therefore, sufficient to say that the power station stands no more in danger than the town or the other parts of the works. The remarks which have been made concerning the danger which resides in the hills to the north and west of the town and works are applicable to the matter of danger to the power house. Within its immediate neighbourhood, proper measures have been taken to safeguard it, in that it is surrounded by green lawns and open, cleared spaces. These, of course, would afford no real protection if a strong fire were to rage in a southerly direction from and through the heavily timbered hilly country which lies north of the works.

The Briquette Factory.

The briquette factory stands in open, cleared country. It is built of fire-resisting material. As in the case of the power station, the risk of internal fire is inherent in the nature of its operations. The country about it has been cleared and kept clean. It appears to your Commissioner that the measures which had been taken to prevent damage by grass or bush fires were reasonably adequate.

4. THE TOWN.

The site and surroundings of the town have been described.

The chief agencies of protection of the town were the town's Country Fire Brigade, the Air Raid Precautions body, the forest gang (if circumstances permitted), such of the workers in other departments as might be available and be called to the service of the town, and volunteers whose services might be accepted by those in authority.

The measures which had been taken and which did not rely upon human activity in time of danger were the provision of a water supply, of a water reticulation system in the town, of the availability of water from the system, of wide and clean streets, and of the wide spacing of the houses.

The Fire Brigade.

The Fire Brigade, which is a Country Fire Brigade, is under the captaincy of Mr. Joseph George Smith, who is the fire officer of the Commission. Mr. Smith is an experienced fire brigade officer. His brigade numbers 20 members, 8 reserve members, and 4 nominal members. The brigade gave valuable and efficient service on the 14th of February last. This it was able to do because it had been well trained. The account of its behaviour on that day gives an impression of swift, orderly, and co-ordinated action. It is adequately equipped.

Future Measures.—It is recommended that it endeavour and be encouraged to add to its reserve of members, and that the reserves be fully and efficiently trained. Should fire on a wide, unbroken front attack the town, the brigade, if limited to its present numbers, could not be expected to be able to save the town.

The Air Raids Precautions Body.

This is a voluntary body which has received instruction and a considerable amount of equipment. It was not called into action until after the fires had passed the town. Some of its members individually assisted to fight the fires which broke out in the town. Its services as a co-ordinated body acting in concert were not utilized. Your Commissioner fails to understand why fires caused by Australians should not be fought by a body which was brought into existence for the purpose of resisting fires which might be caused by our enemies.

Future Measures.—It is recommended that the services of this body be used in future if to do so be thought desirable.

The Forest Gang.

There was before the 14th of February an understanding between the forest gang and the Resident Engineer that the gang should, in time of danger, assist the town brigade if it were able to do so. The gang, having been driven out of the forest by the ferocity of the fire, did assist the town brigade on that day.

Other Workers and Volunteers.

Other workers responded to calls made for their services. Many volunteers gave their assistance. There was no effective plan for the marshalling of these two classes at any pre-arranged place or places, or for the reception of requests for their services.

Future Measures.—It is recommended that workers and volunteers generally be instructed in accordance with a pre-arranged plan, as to what they should do in future times of emergency. Since the fighting of fires is for the greater part a matter of voluntary action, some estimate could perhaps be made, after investigation, of the numbers of men in each department who would be willing to volunteer. It would be necessary that each department should become a component part of an over-riding scheme and that it and its members should be fully instructed in the matter of whistle or siren warnings, places of assembly, reception of messages from the director of proceedings, use of equipment, and the various details which would necessarily be parts of an effective scheme. The training need not be onerous. If given once or twice at the beginning of possible danger periods, it would make for some degree of order and efficiency instead of a probable state of confusion.

Water Supply.—The water supply was adequate.

Water Reticulation.—The system provides water at all places where a protective supply is necessary.

Future Measures.—It is suggested that standing hydrants be substituted for ground level hydrants. It is recommended that the A.R.P. dams or earth tanks be kept filled during possible danger periods.

Under the heading "The Town", the protection of the township has been treated as being applicable to a complete entity. Nevertheless, there are two buildings which are not of the town and which ought to be considered separately. They are the Railway Station and the Hospital.

THE RAILWAY STATION.

The railway station is situate about mid-way along the eastern boundary of the town. On the 14th of February last several trucks of briquettes and other railway vehicles and property standing in the station yard were destroyed by fire. The fire was caused either by flying burning fragments from the main bush fire or from a smaller fire which traversed a thickly wooded and overgrown gully which lies in the station yard at a distance of less than 50 yards from the station.

Future Measures.—It is recommended that on days of abnormal danger loads of briquettes be not kept in the station yard. The real danger, which transcends in gravity the danger of the destruction of loads of briquettes, is that the prevailing wind or a change of wind might carry showers of burning embers to the town, which is but the width of a road away, and thereby cause material damage in the town. It is further recommended that the yard and its surroundings be kept clear of scrub and growth; and that special provision be made for quelling fire which may break out in the deposits of inflammable dust which lie in the yard.

THE HOSPITAL.

The hospital is situate some distance to the south of the town. It stands in grounds surrounded partly by timbered land, partly by cleared land. Part of the margin of its grounds had been ploughed. In other parts of the grounds were undergrowth and trees. At parts of the building the trees and undergrowth grew up to the walls. The fire destroyed the growth and nearly set the building alight. One part of the bitumenous roofing was severely scorched. The A.R.P. dam was amongst trees which burned and forced the withdrawal of the mobile pump which was in readiness to pump water from the dam. The wooden supports of a large elevated tank caught fire, thus putting another source of water supply beyond reach.

A perusal of the lease of the premises by the Commission to the Hospital Society, and a consideration of the possibilities which may have arisen under certain provisions leave in doubt the question of responsibility for the state of danger which was permitted to exist in the hospital grounds.

Future Measures.—It is recommended that the question of the future responsibility be made certain and that the body so made responsible keep the grounds of the hospital free from undergrowth and trees wherever their presence may be a possible source of future danger.

CHAPTER III.

FUTURE MEASURES FOR THE PROTECTION OF THE UNDERTAKING AND THE TOWNSHIP.

Some recommendations which were of a particular nature and which might have been made under this heading have already been made. Some, though not specifically made, have already appeared sufficiently by strong implication.

What is to be said under this heading is, on the whole, of more general application.

Organization.—It will have appeared from what has already been said that, although there is an adequate supply of equipment in the hands of the various fire fighting forces at Yallourn, and at present probably a more than adequate number of people willing to lend voluntary assistance, no plan for the efficient organization of these resources exists. Your Commissioner does not wish to be taken as making any more than a mild criticism of Mr. Ralph

Alec Hunt, the General Superintendent. One feels that Mr. Hunt may be over-burdened by the many and varied duties which have been placed upon him, and that he did not feel himself at liberty to admit the fact publicly during the inquiry. Furthermore, he is an engineer, first and foremost. The problem of protecting the various different interests which constitute the whole undertaking is not wholly one of engineering. Because, as has already been said, and it cannot too often be repeated, the first precautions must be taken at the probable source, which is the forest, the matter is one that may best be resolved by a forest fire officer with the advice of engineers upon particular matters which raise particular considerations of engineering. A general recommendation touching this opinion is made later in this report.

Marginal Protection of Town and Undertaking.—It has been shown that no real marginal protection existed. The necessity had been recognized and certain works had been done at places on the borders of the town. These works were unsatisfactorily designed and insufficiently executed. Among the possible methods of providing marginal protection which have been considered by your Commissioner, three appear to be worthy of final consideration:—

- (1) The complete removal of all timber and natural growth over a wide marginal area circling the town and undertaking. The margin contemplated is one of a width of about half a mile or a mile. The area when cleared should be sown with grasses and heavily grazed to avoid the risk of grass fires. Whether such a plan would be practicable would depend upon the advice of agricultural experts on the question of the quality of the soil of the margin.

For the purpose of preserving a setting of beauty for the town, fire-resistant trees might be planted in suitable places.

- (2) The "cleaning" of the present forest on the margin. This should be done by the removal of dead timber throughout the margin, by the removal of all timber from an area a few chains wide and nearest to the town borders, and by the constant, and repeated use of burning to cleanse the forest floor over an area of a width of a mile or more.
- (3) A combination of the burning of the undergrowth over a wide marginal area and the clearing of timber in certain parts of that area. This should be done by the repeated burning of the whole area, and by the clearing of timber on ridges and the "receptive" slopes in hilly country. The purpose of clearing on ridges is to prevent the onrush of burning particles blown from the tree tops in time of bush fire. Fire advances rapidly and gains in ferocity when burning uphill, the reason being that material above the fire is readily inflammable in the upward air current caused by fire. The "receptive" slope in hilly country is the nearer slope of the hill next to be reached by the fire as it pursues its path across hilly country. In many past cases it has been observed that where ridges are cleared the fire will burn to the ridge and will not leap. If it does leap it leaps to the nearer slope of the next hill, avoiding the further slope of the hill to the ridge of which it has just burned its way.

Erosion.—In any of the three methods abovementioned there is the distinct possibility of causing serious erosion of the soil. Erosion is a wasteful and damaging element in any country, and it is to be avoided. More particularly is it to be avoided at Yallourn in country which forms part of the catchment of the Latrobe river. It has already been mentioned that the power station is dependent for its proper working upon a supply of water which is drawn from the river. Nearby a weir has been built across the river. Siltation of the weir would in time seriously affect the supply to and therefore the efficiency of the power station.

Border Settlers.—Outside the Commission's territory and near its borders are the farms and holdings of settlers. It was one of those settlers who caused the February fires. In all years of fire, in many parts of the country, settlers cause bush fires by their illegal or inefficient methods of burning off their lands. It has long been recognized by persons who have studied the causes of bush fires that one of the fundamental safeguards resides in the creation of a state of enlightenment and goodwill in the minds of our rural populace. In a short time, in another part of this State, a course of informal education and assistance by the Forests Commission's officers has brought truly remarkable results. The protection of our forests is of itself a matter of the utmost national importance. The protection of a small area of Gippsland which contains a State asset of a value of many millions of pounds is an end which needs no advocacy.

It is recommended that the State Electricity Commission adopt a policy of conciliation and good will towards its closer neighbours. It is not suggested that its policy has been essentially otherwise. In future that policy can best be assured of success by the conferring of material benefit upon its neighbours at some monetary cost to the Commission. It is suggested, with conviction, that it would prove to be of great advantage to the Commission if it were to take an active part in the clearing and bettering of its neighbours' scrub and timber country at the cost of the Commission. The settler whose land is fully cleared and in production, or who knows that his land will be cleared for him, has no incentive to burn illegally or carelessly. If this suggestion should be adopted, it would be necessary that it should be carried out in all cases in accordance with the settler's convenience, that he himself should take an active part in the operations, and that he should be left, not with a financial obligation, but with a definite material advantage.

This recommendation may appear to be of a too liberal or revolutionary kind. It is suggested that it be considered seriously and upon whatever merit it may have, rather than that it be rejected in the moment of mental recoil which it will provably cause at first sight.

APPOINTMENT OF AN ADVISER.

Your Commissioner trusts that the note of assurance which may be detected in parts of this Report may be attributed to faults of expression rather than to over-confidence in his own judgment. The recommendation which he now makes arises from the belief that some of the problems of fire-protection which urgently confront the State Electricity Commission ought to be considered by an expert or experts of an experience and understanding which your Commissioner has not found in any employee of the Commission. Again it is repeated that such failure as has been experienced at Yallourn is not necessarily to be attributed to culpable negligence on the part of the officers concerned. These gentlemen are engineers and scientists, and are primarily and urgently absorbed in the peculiar problems which their professional attainments fit them to face and solve.

It is therefore recommended that the State Electricity Commission should be advised by someone whose profession it is to consider and devise methods of forest fire protection and suppression; that he should collaborate with others to devise a general scheme of organized protection of the undertaking and township of Yallourn; and that above all, he should have direct access to the Commissioners themselves, lest his advice should lose something of its strength and reality in its journey through the "proper channels" of the Commission's organization.

CONCLUSION.

Many matters which were brought to your Commissioner's notice have not been included in this Report. It has been your Commissioner's aim to discuss only those facts which have appeared to him to be of real importance.

He has already expressed privately his thanks to those people who assisted him in his investigations.

This Report concludes with your Commissioner's acknowledgment that he feels himself to have been honoured by his appointment by Royal Commission to inquire into the matters the subject of this Report.

All of which your Commissioner has the honour to submit for your Excellency's consideration.

As witness my hand this twenty-fifth day of March, One thousand nine hundred and forty-four.

LEONARD E. B. STRETTON.

[Minutes of Evidence are not printed.]