

Dr Morgan Rees's report to the Local Government Board on the sanitary circumstances and administration of the Urban District of Blaenavon.

Contributors

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REPORTS

TO THE

LOCAL GOVERNMENT BOARD

ON

PUBLIC HEALTH AND MEDICAL SUBJECTS.

(NEW SERIES No. 62.)

Dr. Morgan Rees's report to the Local Government Board on the Sanitary Circumstances and Administration of the Urban District of Blaenavon.



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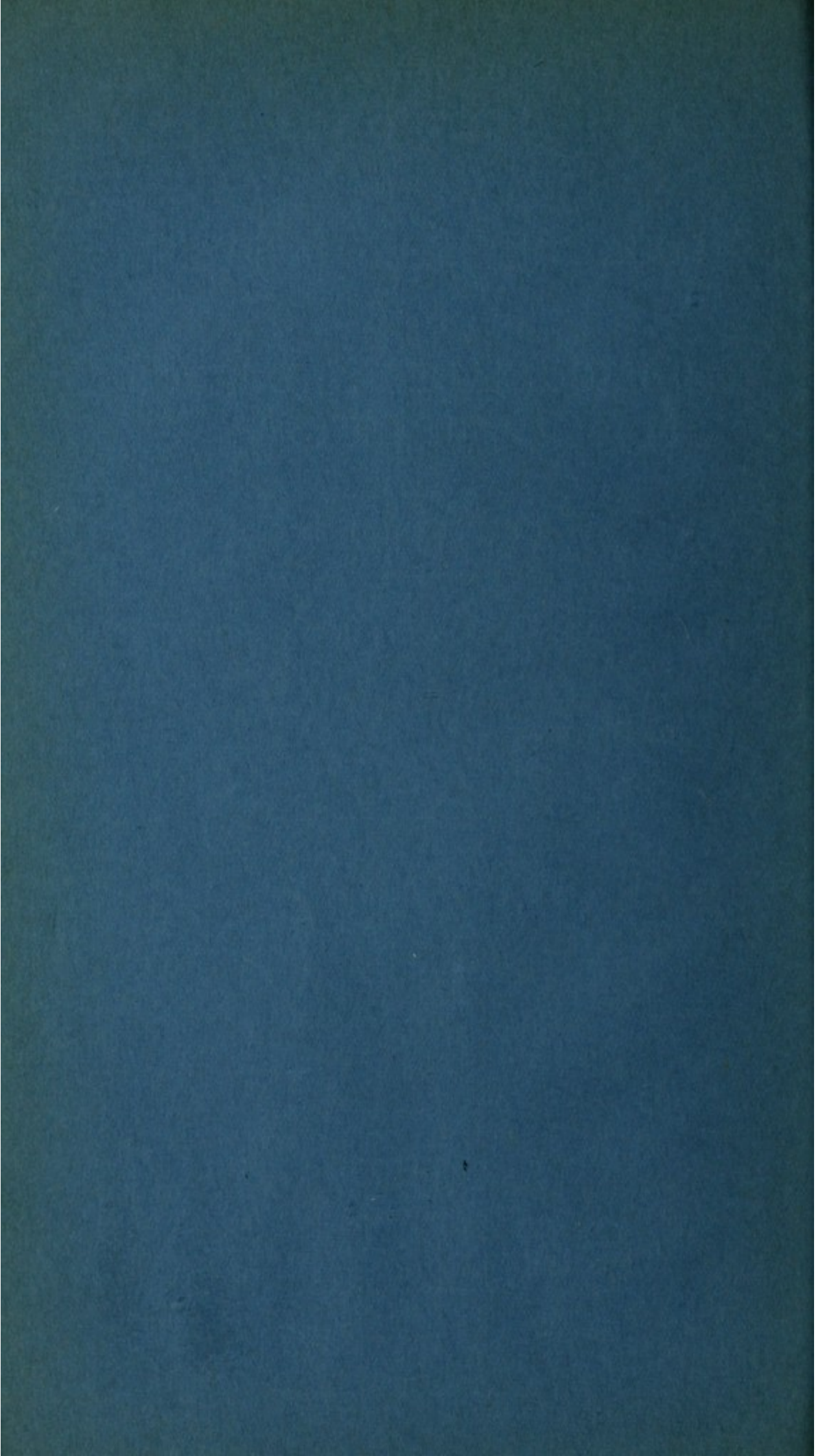
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Dr. Morgan Rees's report to the Local Government Board on the Sanitary Circumstances and Administration of the Urban District of Blaenavon.

ARTHUR NEWSHOLME,
Medical Officer.

23rd December, 1911.

In accordance with the Board's instructions that I should inquire into the sanitary circumstances of the Blaenavon Urban District, I visited Blaenavon for that purpose in July and on two subsequent occasions, and now report as follows:—

In 1895, Blaenavon was visited by a medical inspector of the Board, the late Mr. T. W. Thompson, in connection with his inquiry "Upon an inspection of certain Valleys in the Counties of Monmouth and Glamorgan with special reference to Sewerage and Drainage Arrangements and the Pollution of Streams." Appendix VI. of his report dealt briefly with the sanitary condition of the Blaenavon Urban District in that year, and it may here be said that I found that his observations with respect to the unsatisfactory state of the sewerage and house drainage, sewage disposal, excrement and refuse disposal, and water supply might very well be applied to present-day conditions.

GENERAL DESCRIPTION.

The Blaenavon Urban District is situated at the upper end of the valley of the Afon Lwyd in the north-western part of the County of Monmouth. It is surrounded by one rural and four urban districts—on the north by the Brynmawr Urban District and Abergavenny Rural District, on the south by the Abersychan Urban District, on the east by the Abergavenny Rural District, and on the west by the Nantyglo and Blaina, Abertillery, and Abersychan Urban Districts.

The district is divided into three wards, viz.:—Western, Central, and Eastern, and is governed by an urban district council of 18 members who are elected triennially.

The area of the district, including inland water, is 4,612 acres. The population at the 1901 census was 10,869, whereas at the last census, 1911, it was 12,010. The rateable value is £32,338, and the assessable value £25,804. The total rates for the year ending March 31st, 1911, were 9s. 10d. in the pound, and were apportioned as follows:—Poor rate, 5s. 4d.; general district rate, 3s.; and water rate, 1s. 6d.

The sums borrowed by the District Council amount to £24,594, of which £12,036 were outstanding on 31st March, 1911; of the amounts borrowed, that of £4,082 was in regard to roads, while the remainder, amounting to £20,512, has been for purposes of water supply.

The district depends mainly upon coal mining, which is controlled by the Blaenavon Company, Limited. The company own also iron and steel works, which, owing to depression of trade and other circumstances, have not been working to their full extent for the last twelve years. In this respect the district has been unfortunate, but there appears to be a prospect that the company will in time be able to open the works to their full extent. It ought to be mentioned that this long-continued depression in the local iron and steel works is frequently urged in reply to criticism of the inaction of the Blaenavon Urban District Council as a sanitary authority.

Geologically, the district lies mainly on the coal measures, but in the Bloreng Mountain on the eastern side of the Afon Lwyd the millstone grit outcrops in an escarpment on the height of the mountain, while along the course of the Afon Lwyd there is alluvial deposit.

HOUSING CONDITIONS.

A very large proportion of the houses in the district is occupied by people belonging to the working classes. Last March 2,377 houses were on the rate-collector's books, of which 2,234 were of or below the rental value of £16 per annum, while of this number 1,813 did not exceed £8 per annum in rental value.

The number of inhabited houses at the census of 1901 was 2,241, so that, according to the rate-collector's returns, there has been a net increase of 136 houses during the last ten years. In that period according to the last census returns the population increased 1,146. It appears, therefore, that building enterprise has not kept pace with the increase in population, which has tended to overcrowding of people in houses.

From the quarterly report, dated July 16th, 1909, of the county medical officer of health it appears that 91 houses were built in the district between 1901 and 1908, and I am informed by the surveyor to the Blaenavon Urban District Council that 82 houses were built in the two years 1909 and 1910, making a total of 173 houses for the 10 years. During this time some 40 houses were closed and demolished.

From the above figures, more than nine-tenths of the house property in the district would come within the limits of rent specified in section 14 of the Housing, Town Planning, &c. Act of 1909. It consists largely of property of a poor character, much of which has become unwholesome and insanitary owing to faults in original construction and to dilapidations that have been allowed to occur without any attempt at repair being made. At the time of my inspection there were no unoccupied houses in the district. This fact has been advanced locally as a reason why the local authority have not taken any decided action with regard to the closing of the large number of houses that had been declared unfit for human habitation by Dr. Avarne, the late medical officer of health.

Rents paid in the district afford no clue to the sanitary condition of dwelling-houses. Owing to the demand for houses, comparatively high rents are being paid for dilapidated dwellings, while decent houses, recently built, are being rented at moderate prices. As an instance of the former class, a house consisting of five rooms is rented at 23*s.* a month. Here the rooms on the ground floor are paved with stones, many of which are broken, exposing the bare earth, while upstairs the head-room of the bedrooms is barely seven feet, and the window area one-twentieth of the floor area in the one case and one-thirtieth in the other. The yard is unpaved and the roof is not completely troughed, while there is also no separate water-closet accommodation.

Another instance of high rents being paid for insanitary property is that of "Beddoes Castle," an "over-and-under" house. The "under" portion has two walls, back and side, built against the earth and is consequently damp and without through ventilation. The upper portion, consisting of four rooms, is dilapidated; the head-room of the two rooms upstairs being only a little over six feet, while the walls in places are devoid of plastering. They are also without through ventilation. The yards are undrained. There is no proper water supply, as, although these houses are practically in the town of Blaenavon, they have not been connected to the public service and are dependent upon a spring which at the time of my visit was almost dry. These two dwellings pay a total rent of 32*s.* a month, which sum is equally apportioned between the tenants of the upper and lower portions.

The back-to-back houses of Bond's Row, George Street, and Anne Street, are rented at 12*s.* to 14*s.* a month each, while those known as Nos. 2 and 4, Tump Cottages, are rented at 18*s.* and 12*s.* per month respectively.

On the other hand, recently-built and relatively satisfactory houses consisting of six rooms are being rented at 21*s.* and 24*s.* per month, whilst others of a smaller size, and comparatively new, are available at 18*s.* a month.

Many cases of overcrowding exist in the poorer class of houses, of which the following may be given as instances:—At Slope Cottage, a family of five members, consisting of man and wife, two sons, 16 and 13 years of age, and one daughter, 18 years of age, occupy the one bedroom. This room is entirely in the roof and is without through ventilation. The house is very dilapidated, and was, by a resolution of the council on June 22nd, 1910, ordered to be closed. Evidently the resolution has been without effect, for the house was occupied by the above family on August 24th, 1911.

Other cases of overcrowding will be mentioned later in connection with the description of the sanitary condition of some of these houses.

Owing to the conditions of labour in the district, many men are employed at night in the colliery who are obliged to rest and to sleep in the day. Consequently, in such cases, bedrooms and beds are rarely vacated for many hours before they are again

occupied by other members of the family. When it happens that rooms which are small, without through ventilation, and provided with low head-room and small windows, are thus occupied, the conditions of living must become specially unhealthy. It is noteworthy that the people who have become accustomed to these conditions often appear callous and indifferent towards them.

The houses in the district are substantially built of local stone, but a large number are without damp-proof courses and proper foundations. Generally speaking, they consist of four or five rooms with, in the better class of house, a pantry. The rooms on the ground floor are paved with stone flags laid directly on the earth, whilst those on the upper floor are sometimes dark owing to insufficient window area, and badly ventilated owing to absence of through ventilation.

Yard areas are seldom well-paved and usually paving is either absent or deficient. As a rule the roofs are provided with eaves-gutters, more particularly in the town portion of the district. The down-spouts sometimes terminate two or three feet from the ground, so that when the paving is deficient the ground near the houses is liable to flooding in wet weather.

One serious defect with regard to the houses generally is the scarcity of water-closet accommodation. One thousand houses in the district are said to be without separate closet accommodation, one closet being shared by two or three houses. Some houses are without closet accommodation of any kind. These will be referred to later in the report.

The following houses may be specified in illustration of dilapidated, back-to-back houses and over-and-under houses:—

Cockerel Row.—This is a row of five houses situated on the outskirts of the town close to the Great Western Railway. All the houses are dilapidated. With the exception of No. 1 all are partly back-to-earth. They are rented at 8s. a month each.

No. 1:—This house is occupied by a family of man and wife and five children whose ages range from two to 11 years. It has a back door and consists of four rooms, two on the ground floor and two upstairs. The back lower room is used as a store for food, coal, lumber, &c. Its floor is practically unpaved and is made of the bare earth, the surface of which is uneven and irregular. From this room a broken staircase leads to two rooms above, of which the back one is very dilapidated. In the floor there is a big hole looking directly into the back downstairs room, while the walls are broken and cracked. There is no ceiling, so that the room is entirely in the roof, which slopes from 8 ft. 2 ins. to 4 ft. 2 ins. from the floor, giving a mean height of little over six feet. There is a small window about one-twentieth of the floor area which affords the only means of ventilation. In this room, three boys sleep. The other room is also dilapidated, the walls being cracked and bare of plaster in places. The roof is entirely exposed and is leaky, and the floor is broken.

No. 2 is occupied by a family of eight, viz., man and wife, three sons, 21, 19, and $4\frac{1}{2}$ years, and three daughters, 16, 8, and $2\frac{1}{2}$ years of age respectively. This house is very similar to No. 1, except that it has no back door and is back-to-earth.

On the ground floor the paving of the back room is broken, exposing the bare earth, and the walls are damp. The staircase is broken and dangerous, with one step missing. It leads to two rooms, of which the back one has no means of ventilation whatever. This room has one small window, which is fixed and looks directly into an old disused and broken-down pail closet. There is a big hole in the floor, through which one can almost fall into the room below. The mean height of the room is about six feet whilst the floor dimensions are 9 ft. by 8 ft. 6 in. The proportion of window space to floor area is as $1:25\frac{1}{2}$, the window area being $1\frac{1}{2}$ ft. by 2 ft. Two men, 21 and 19 years of age, sleep in this room. The other bedroom is likewise dilapidated, with walls bare of plaster and a roof that leaks. The other members of the family sleep in this room.

No. 5.—This house is occupied by eight people, viz., a man and wife, two sons, 14 and 8 years of age, and four daughters, 17, 12, 2, $1\frac{1}{2}$ years of age respectively. It is very dilapidated. On the ground floor, the stones paving the floor are broken, scarcely one being whole, and the earth is exposed throughout; the walls are cracked and bare of plaster in places. The staircase is broken and dangerous. There are two bedrooms upstairs, in one of which sleep the man, wife and four children, including the daughter aged 17 years, and in the other a girl aged 12 and a boy age 14. These rooms are also in a bad state of repair.

The other houses in this row are similar. At one time the whole of the five houses in the row were provided with two pail closets, which at present are broken down, the receptacles being full of dirt, stones, &c. The occupiers have consequently no closet accommodation and are obliged to resort during the day to the ruins of what, I am told, was at one time a Wesleyan chapel and at night to the fields. There is also no water supply. At ordinary times water is obtained from a spring, but at the time of my visit it was dry, and the people were obliged to carry water from a stand-pipe in the town. There is no drainage of the yards, all slops being disposed of by being thrown on the ground, finding an outlet in a hole in the embankment wall of the Great Western Railway.

North Street and Staffordshire Row consists of a row of "over-and-under" houses. The "under" houses, which are in North Street, are back-to-earth and are damp and deficient in ventilation. They consist each of two floors with two rooms each, all more or less dilapidated.

The "over" houses are in Staffordshire Row and also have two floors with two rooms each. Those that were inspected were likewise dilapidated. In one of these houses a man and wife and two daughters 24 and 12 years of age occupied the same bedroom.

In *George Street* and *Annie Street* there are 10 back-to-back houses, each of which consists of a living-room and pantry (which is also used for storing coal) on the ground floor, and two rooms

on the upper floor. They are without exception in a very bad state of repair. The bedrooms are small and generally without through ventilation. The houses are dirty and in some the walls of bedrooms are covered with red stains, the remains of squashed bugs. Many cases of overcrowding were met with in this group of houses, the average number living in each house being six. In one house there were two families; in another, in addition to a family of six, there was a lodger; in a third house two girls, 17 and 10 years of age, and two boys, 13 and 3 years of age, occupied the same bed; while in a fourth house, five persons, 19, 15, 11, 10, and 5 years of age, occupied the same bedroom. In one of these house there was a woman ill with "consumption."

Bond's Row, likewise, consists of eight back-to-back houses; each of which contains three rooms, one on the ground floor and two small ones on the upper. These houses are also dilapidated and overcrowded. The average number of people living in each house was 5.25.

In one house two families were living, one bedroom being occupied by a man and wife and four boys 13, 11, 7, $\frac{1}{2}$ years of age, the other by a man and wife and young infant. These bedrooms have a floor area of 12 ft. \times 6 ft. 6 ins. and a height of 6 ft. 9 ins. There were no fireplaces nor any other means of through ventilation. In another house in *Bond's Row* a family of eight were living, consisting of one old woman, man and wife, and five children, one of whom was only a day old.

The areas of these houses are unpaved and are not provided with proper means for drainage. The floors of the ground floor rooms in at least four of these houses are below the level of the adjoining ground and consequently are liable to be flooded in very wet weather.

Other illustrations of insanitary property and of overcrowding can be given, but the above will suffice to show the pressing need for action by the council. The council are well aware of the conditions of housing in their district, for their attention has been drawn to the existence of overcrowding and of the condition of many of the houses not only by their own medical officer of health, the late Dr. Avarne but by Dr. Rocyn Jones, the county medical officer of health, who reported to the Monmouthshire County Council on July 16th, 1909, as follows:—

"During our inspection we found no unoccupied houses in any part of the district, and it can accurately be stated that there is a scarcity of decent dwelling-houses in the town portion of the district. A large number of instances of over-crowding came to our notice, and we are informed that this state of affairs is fairly general. Although it cannot be stated that there is an over-crowding of houses upon area, yet the district has a good legacy of insanitary houses, the result of the erection of back-to-back houses, so characteristic of the building era of the first half of the nineteenth century. Some of these houses are dark and damp, dirty and squalid, and can be characterised as slum property. In other instances we came across houses—cellar dwellings and two-roomed tenements—unfit for human habitation, and yet again we were surprised and astonished at the contrivances adopted for increasing bedroom accommodation in some of the older houses of the district—wooden partitions being erected to divide into two compartments rooms already none too large as judged by modern and decent sanitary standards. In one case the portion of the room screened off was cramped, unventilated, and badly lit by borrowed light.

"In the older portions of the district there are also a fair amount of houses which are doubly tenanted, the basement and back portions being let to one party, and the upper and front portion to another and different party. In these houses we came across several instances of over-crowding.

"We were informed during our visit that the attention of the urban district council had already been drawn to certain portions of the insanitary property of the town, but for various reasons the necessary remedial action has been put off."

In the same year the late Dr. Avarne, when medical officer of health, made a house-to-house inspection of the district and in a special report dated November 15th, 1909, recommended that closing orders should be made for 112 houses, through ventilation provided in the case of 28 back-to-back houses, and back-doors insisted upon in another 168 houses.

Neither of the above reports can be said to have erred on the side of severity, yet the council can scarcely have considered them in any practical spirit. For, on June 15th and 22nd, 1910, special meetings were held at which "the council discussed the late Dr. Avarne's house-to-house inspection report at great length" . . . and . . . "it was resolved that the following houses be closed as unfit for human habitation: Nos. 1 to 8, Bond's Row, Nos. 1 to 5, Cockerel Row, Nos. 1 to 11, North Street, Slope Cottage, and Burford's two houses at rear of No. 80, King's Street." Of these houses those of Bond's Row, Cockerel Row, North Street, and Slope Cottage were still occupied at the time of my inspection in August last. In at least one of these properties the house agent or rent-collector is a member of the local council; and in the case of Slope Cottage I am told that this house has changed owners since the council passed the above resolution.*

Since the time the council considered Dr. Avarne's report and visited the houses mentioned by him no further systematic house-to-house inspection as required under the Housing Regulations has been attempted.

WATER SUPPLY.

The waterworks belong to the local authority. They comprise four reservoirs, three filter beds, a hardening filter, and a small storage tank. The water is collected and stored in the reservoirs and tank, from which it is supplied by gravitation in a practically unfiltered condition to the district. Three reservoirs, Nos. 1, 2, and 3, and the storage or "Bunker's" tank, are situated at different points on the Bloreng Mountain on the millstone grit, while the remaining reservoir, called "Forge Side" after the portion of the district which it supplies, is situated on the Coity Mountain on the coal measures.

The reservoirs Nos. 1, 2, 3 and the filter beds were acquired by the local authority from the Blaenavon Gas and Water Company in 1899 for £10,250, while the Forge Side reservoir and Bunker's tank were constructed by the local authority in 1895.

* While this report is in the press, I have been informed by the Clerk to the Council that since my inspection the particular houses referred to in this paragraph have been or are being dealt with under the Housing Acts. Some have been closed; in others, alterations are being made or are promised by the owners.

The entire water supply of the district is derived from springs, nearly all of which issue from the millstone grit and are thence piped to their respective reservoirs. The gathering ground is uninhabited mountain land which is used chiefly for grazing purposes. In the neighbourhood of the reservoirs, more particularly of reservoir No. 3, the soil is very peaty in character. At the time of my first visit the peat had fired near this reservoir and was still burning when I visited again early in September.

The following is a description of the condition of the waterworks at the time of my inspection* :—

Bunker's Tank.—This is a covered tank, having a depth of 10 feet and a capacity of 60,500 gallons, surrounded by a fence of iron railings. When I saw it its cover was broken and it contained about 4 feet of water. It is supplied by a spring the water of which is collected in a covered brick-lined chamber before going to the tank. The chamber is similarly fenced round with iron railings, but when uncovered some stones and what appeared to be pieces of tin and a broken bottle were seen at the bottom. The water is supplied direct to 301 houses, viz.: The Garn, Rifle Green, Bunker's Green, and Garnyrerw portions of the district, and to Upper and Lower Woodland Terrace. Occasionally part of the water from the Bunker's is diverted to supply reservoir No. 1.

No. 1 Reservoir.—This reservoir has a nominal capacity of 500,000 gallons, but owing to a leak it cannot hold water to a depth of more than eight feet, so that the effective capacity is only 260,000 gallons. It is in a filthy and dirty condition and it appears not to have been cleaned during the last 14 years. The sides, which have given way in several places, were covered with decaying vegetable matter and the water was thick with weeds. The overflow is on a level with the top of the banks, on which were many patches of cow manure, old and recent. In wet weather manure thus deposited would readily be washed into the reservoir. At the time of my visit the reservoir contained about two feet of unwholesome looking water.

Above and behind the reservoir is what is termed a filter bed. As such it is useless. The water pours on to the sand without any contrivance for regulating the flow and it collects on the surface in pools.

The water supplying this reservoir comes from several small springs which are tapped by means of small collecting chambers. One of these appeared somewhat dirty and required cleaning.

From the reservoir the water is supplied direct without further treatment to 547 houses situated mainly in the central ward of the district.

No. 2 Reservoir is fed by two springs known as "Esquire's" and "Martin's" springs respectively, each protected by a fence of galvanised iron enclosing an area measuring 52 ft. × 77 ft. The fencing of Martin's spring is insufficient, inasmuch as the spring appears just outside the fence, so that at this point it is liable to be polluted. A red deposit of oxide of iron is given by this water which is to be seen in the neighbouring soil and in

* These notes embody information obtained by my colleague, Mr. Ekin, with whom I visited the waterworks on September 11th.

the collecting chambers and settling tank through which it passes before reaching the reservoir. The condition of the reservoir is fair. It is lined with pitching and covered with two layers of three-inch concrete with an intervening layer of bitumen sheeting. In several places the concrete shows small cracks which as yet have not impaired the capacity. The depth of the reservoir is about 11 feet measuring from the overflow, and at the time of my inspection the reservoir contained six feet of somewhat opalescent water. The total capacity of this reservoir is 1,000,000 gallons.

At this reservoir there are two sand filter beds where the water of reservoirs Nos. 2 and 3 is filtered. Each filter measures 41 ft. \times 20 ft. 6 ins. in area and is provided with two inlets from which the water pours on to the bed. The depth of the filters is unknown, but each is supposed to contain four or five feet of limestone beans and some two feet of sand. The filters were charged nearly two years ago with fresh sand, which is replenished from time to time as occasion requires, the last occasion being six months ago. Both were in use and the water in each appeared very turbid. After passing through these beds the water is supplied to 1,080 houses situated in the eastern ward of the district.

No. 3 Reservoir is supplied with water from three springs. From one of these the water passes along an open ditch for about 400 yards before it is piped to the reservoir. At the time of my inspection there was an accumulation of vegetable matter and other debris at the intake in the ditch and the water was deeply coloured with peaty matter.

One side of this reservoir has partially caved in and the pitching has fallen into the reservoir. Decaying vegetable matter was also to be seen in places on the sides. Unfiltered water can be supplied from this reservoir, but it is rarely ever done, all the water passing directly to the filter beds situated at No. 2 reservoir. The capacity of this reservoir is said to be 2,000,000 gallons.

Edmund's Tank is a small tank 14 ft. 8 ins. square and contains limestone chippings for hardening the water of a spring. It has no storage capacity. The water, which appeared quite clear, is supplied to 39 houses.

Forge Side Reservoir.—The water is collected at the spring in a closed chamber which is fenced round with iron railings. Within the same enclosure is another chamber which was full of filthy looking water, but has no connection with the former. It should, however, be emptied and filled up to prevent any risk.

The spring and reservoir are situated on the Coity Mountain on the coal measures. It is a question, as yet undecided, whether any undermining has occurred at the reservoir to affect the capacity which, in practice, is only 600,000 gallons, though nominally 1,500,000 gallons. It is said that the bottom of the reservoir is quite sound and that the defect is to be found in the banks. The level of the water never rises above 6 feet. This reservoir supplies 259 houses in the Forge Side area of the district.

Quality of the water.—Samples of water, taken from the taps in houses, were forwarded for analysis to Mr. G. R. Thompson, the Public Analyst for Monmouthshire, in August of the present year. He reported that the waters are polluted with animal matter and are quite unfit for drinking purposes. In the month of August cases of enteric fever were notified from 6, Upper Hill

Street, 2, Greenfield Place, and 6, Ellick Street, in each of which the water was found on analysis to be polluted. During the same month diarrhoea was prevalent in the district, both in adults and infants. Although the customary causes of summer diarrhoea were no doubt operative in Blaenavon, it is possible also that the state of the water containing animal and vegetable matter in suspension and solution was also concerned with this prevalence.

The results obtained by Mr. Thompson from an examination of samples taken from the above-mentioned houses and reservoir, together with his remarks on the same, are as follows:—

TABLE I. GIVING THE RESULTS OF ANALYSES OF WATER BY MR. G. R. THOMPSON IN THE YEAR 1911.

Results stated in parts per 100,000.

	No. 1 Reservoir.	6, Ellick Street, supplied from No. 1 Reservoir.	6, Upper Hill Street, supplied from Edmund's Tank.	2, Greenfield Place, supplied from Nos. 2 and 3 Reservoirs.	Spring, bottom of Barnfield.
Date collected ...	23.8.11	28.8.11	8.8.11	24.8.11	24.8.11
Total solids ...	15	11.6	8.5	10	20
Organic matter (by ignition).	heavy trace	trace	trace	heavy trace	heavy trace
Suspended matter	heavy trace	trace	trace	heavy trace	heavy trace
Chlorine ...	1.21	1.21	1.14	1.14	2.2
Oxygen absorbed in four hours.	.0757	.06	.0328	.188	.16
Nitrites ...	none	none	none	trace	none
Nitrogen as nitrates	.0814	.02	.047	.031	.385
Phosphates ...	heavy trace	heavy trace	heavy trace	heavy trace	very heavy trace
Free ammonia12	.12	.10	.12	6.28
Albuminoid ammonia.	.82	.74	.60	.66	1.60
Total hardness (in degrees).	6.2	4	4.2	—	6.8
Free acid and heavy metals.	—	—	none	none	none
Total organisms per cc., including	380	350	370	1,400	over 10,000
Liquefiers ...	55	180	280	120	„ 5,000
Organisms growing on agar at 37°C.	14	9	10	33	„ 7,000
Organisms of "Coli" group.	present in 10 cc.	present in 10 cc.	present in 10 cc.	present in 1 cc.	present in less than 1 cc.
Bacillus enteriditis sporogenes.	present in 50 cc.	present in 50 cc.	present in 100 cc.	present in 1 cc.	present in less than 1 cc.
Appearance ...	When received, this sample carried a well marked suspended matter and possessed a strong yellow-brown tint.	When received, this sample was quite opalescent.	When received, this sample was cloudy from suspended matter.	This sample, when received, possessed a full brown colour.	This sample was very brown when received, and carried heavy traces of suspended matter.

No. 1 Reservoir:—"This sample is heavily polluted by animal matter, and is not fit for drinking purposes."

6, Ellick Street:—"This water is unfitted for drinking purposes by reason of pollution by animal matter."

6, Upper Hill Street:—"I regard this as a most unsatisfactory sample of water proposed for drinking purposes. Upon purely chemical grounds one must take exception to the high figure for albuminoid ammonia with distinct traces of phosphates, which point to animal pollution, and this is most strongly corroborated by the bacteriological results, which, in my opinion, are very unsatisfactory.

"The presence of 'coli-like' organisms in so small a volume of water as 10 cc. is distinctly dangerous, and the total organisms and high number of agar growths show animal pollution, and, further, that the filtration of the water (if supposed to be filtered) is very far from efficiently done.

"If, however, the water be not filtered, I regard this water as a possible source of great danger; the sample is far from pure or clean, and I would direct attention specially to the filtration, which is clearly very ineffective or in abeyance.

"With a continuance of the hot weather and consequent diminution of supply, it is of the utmost importance to reduce the organisms present, and especially to do this in such an efficient manner as will very materially reduce the 'coli-like' organisms, for unless serious steps be taken in this direction I apprehend serious consequences.

"I am not in a position to absolutely condemn the sample as totally unfitted for drinking, but it borders very closely upon this extreme, and is certainly, in my opinion, a highly undesirable water to be used for domestic purposes in its present condition."

2, Greenfield Place:—"This sample is absolutely unfitted for drinking purposes, being most heavily polluted by animal matter."

Spring, bottom of Barnfield:—"This water is positively beastly. I have analysed many samples of actual sewage which have been cleaner and less dangerous than this one. Unhesitatingly I condemn it as totally unfitted for any domestic purpose, and further consider it a most dangerous sample to be exposed to the possibility of anyone drinking it."

As the samples taken at the houses and at one of the reservoirs were found to be unfit for drinking purposes, it was necessary that the quality of the waters at the various springs should be determined. Accordingly, Mr. Edwards, the surveyor to the district council, took samples from 11 springs on September 13th and 14th, and forwarded them to Dr. Schölberg, of the Pathological Laboratory, Cardiff, for analysis. His results are tabulated as under:—

No.	Description of Sample.	Date Collected.	Number of Organisms per cc.		Relative Abundance of B. Coli.	Appearance, 2 foot Tube.	Reaction.	Total Hardness.	Chlorine	Free Ammonia.	Albuminoid Ammonia.	Nitrogen as Nitrates.	Nitrogen as Nitrite.	Acidity.	Plumbo-solvent Action.	Dissolved Iron.	Sediment.
			at 20°C.	at 37°C.													
1.	Penford-goch ...	13.9.11	42	80	Flaginac in 10 cc.; absent from 0.1 cc, 0.5 cc., 2 cc.	Pale green, clear.	—	—	1.05	0.0014	0.0024	Nil	Nil	—	—	—	—
2.	Bunker's Spring	13.9.11	552	598	Flaginac type present in 0.1 cc.	"	Faintly alkaline.	8.3°	1.0	0.0014	0.0050	Appreciable amount.	"	Nil	.06	Nil	Fair amount vegetable debris. Algae animalculæ fairly numerous.
3.	Spring to Reservoir No. 1.	13.9.11	508	410	Flagina(c) type present in 50 cc.; absent from 10 cc.	Yellowish green, turbid.	Neutral	2.0°	1.0	0.0102	0.0054	Traces	"	"	Nil	0.08	Fair amount, chiefly oxide of iron, animalculæ rare.
4.	Spring to Edmund's Tank.	13.9.11	165	176	Flaginac type present in 10 cc. Flagina(c) type present in 2 cc. B. coli absent from 0.5 cc.	Pale green, clear.	Faintly acid.	1.7°	1.0	0.0018	0.0034	Nil	"	1.0	0.28	Nil	Traces only. Animalculæ rare.
5.	Esquire's Spring	13.9.11	58	47	Flaginac type absent from 50 cc. Flagina(c) present in 10 cc.	"	"	2.0°	1.0	0.0020	0.0048	Traces	"	1.2	0.44	"	Traces only. Few animalculæ.
6.	Martin's Spring	14.9.11	2	22	Absent from 50 cc.	Yellowish green, rather turbid.	Distinctly acid.	4.3°	1.1	0.0020	0.0046	Nil	"	3.6	0.60	0.40	Considerable amount, chiefly Fe ₂ O ₃ . Animalculæ rare.
7.	Spring No. 1, Reservoir No. 3, Upper Coed Cae.	14.9.11	106	108	"	Yellowish, turbid.	Acid	2.2°	1.15	0.0110	0.0326	"	"	2.4	1.50	0.10	Fair amount of oxide of iron. Vegetable debris, few animalculæ.

8.	Spring No. 2, Reservoir No. 3, Upper Coed Cae.	14.9.11	156	76	"	"	"	1.4°	1.1	0.0074	0.0210	Appreciable amount.	1.8	0.68	0.18	Considerable amount Fe ₂ O ₃ vegetable tissue. A few animalcules.
9.	Spring No. 3, Reservoir No. 3, Llanover Road.	14.9.11	94	24	"	"	Yellowish, fairly clear.	3.8°	1.5	0.0208	0.0462	Nil	3.6	1.60	0.05	Small amount of vegetable tissue and debris. A few animalcules.
10.	Coity Mountain, Coity Canol.	14.9.11	2	24	Flagina(c) type present in 50 cc.; absent from 10 cc.	Faintly green colour.	Very faintly acid.	3.4°	0.9	0.0008	0.0618	"	1.2	0.08	Nil	Traces only. Animalcules rare.
11.	Coity Mountain, Forge Side.	14.9.11	4	34	Flagina(c) type present in 50 cc.; absent from 10 cc.	Faintly green, clear.	Faintly alkaline.	2.2°	0.9	0.0010	0.0016	"	Nil	—	"	Traces only. Animalcules rare.
12.	Penford-goch ...	15.9.11	—	6	Flaginac type present in 10 cc.; absent from 2 cc.	—	—	—	—	—	—	—	—	—	—	—
13.	Bunker's Spring	15.9.11	—	4	"	—	—	—	—	—	—	—	—	—	—	—

NOTE.—In the above table chemical results are in parts per 100,000; acidity is expressed in terms of acetic acid; plumbo-solvency as lead dissolved from lead shot after 3 minutes contact.

Referring to the bacteriological examination, Dr. Schölberg says: "There were further qualitative tests carried out as regards the presence of the *B. enteritidis sporogenes* and streptococci. With regard to the former it may be said at once that up to a volume of 10 cubic centimetres this organism was not present, and that streptococci were absent from 50 cubic centimetres of the sample"

In conclusion he adds: "The spring waters share in analysis a reasonable prospect of yielding a satisfactory water for the consumer *if efficiently filtered* and treated on the lines indicated. The best method to pursue with regard to the chemical treatment of the waters with a view to removing the undesirable iron content and plumbo-solvent properties would only be decided on with confidence after an experimental laboratory trial on the lines of known and approved procedures adopted by waterworks engineers as efficacious."

Of the 11 springs from which samples were taken for the purposes of analysis by Dr. Schölberg, at least nine supply water to the Blaenavon waterworks. Of these, seven have a plumbo-solvent action and should undergo treatment before distribution.

With regard to the bacteriological examination, four samples from springs were declared to be free from the *bacillus coli communis*, whilst the others contained this organism and its modifications in greater or lesser number. Having regard to the uninhabited character of the gathering ground, it appears to me probable that the contamination indicated by these results has been derived from animals grazing in the vicinity, or otherwise brought about by insufficient protection of the springs.

Owing to the prolonged drought of 1911 the public service failed to give a constant supply of water, and it was necessary early in the summer to economise. It should be mentioned that the supply has failed in former years, and in his annual report for 1909 Dr. Avarne very strongly urged the council "to repair reservoirs Nos. 1 and 3, and to have the latter cleansed" and "to increase your storage supply." For at least four months, from May to September, 1911, only a restricted supply was available. In the first half of this period the eastern ward—comprising 1,080 houses—was supplied only for 12 hours a day, whilst during the second half, with the exception of Forge Side, water was only available to the whole of the district for 3 hours a day.

Owing to the shortage, people were obliged to supplement their water supplies by reverting to other springs independently of the public water service. Some of these springs were very inconveniently situated, people being obliged to go long distances.

From some of these, samples were sent for analysis; the reports received being unfavourable, *e.g.*, "the spring, bottom of Barnfield" included in Table I.

Some houses, not connected to the public service, were obliged to make use of shallow surface water wells which could not be considered safe sources of supply.

It is obvious from the foregoing that the supply although at its worst both in quantity and quality at the date of my inspection,

owing to the prolonged drought, is even in normal periods liable to serious pollution and to shortage. Responsibility for the scantiness and bad quality of the water rests primarily with the sanitary authority, who have for many years been fully aware that their reservoirs were leaky and improperly protected, and that the filtration was valueless. In 1907 a report was made to the district council by Mr. Percy Griffith, M.I.C.E., who estimated that £6,400 was needed for works of repair to the reservoirs and the provision of new storage. Only a portion of the scheme proposed in Mr. Griffith's report was carried out. The policy of leaving matters to drift has caused serious inconvenience to the public in the present year. Following on the report of Dr. Martin, the present medical officer of health, and on an exposure of the present state of affairs in the press, the council appear to have at last decided upon some more active measures. At the time of writing, another engineer, Mr. Gomer Morgan, has been invited to assist their surveyor and to advise them with regard to their water supply.

It is evident that the District Council will have to face a considerable expenditure in the matter, whether they decide to continue the use of the local springs or to resort to a new source of supply. In the latter connection the fact that the mains from the Grwyne Fawr reservoir of the Abertillery and District Water Board pass through the upper portion of Blaenavon should not be overlooked. It should be added that the water mains in the town probably need renewal in many instances and that the "dead ends" need attention.

SEWERAGE.

There is no proper system of sewerage or of sewage disposal in the district. The old sewers consist largely of brick and stone culverts which were put down many years ago as occasion required without regard to fall or size. They pass under roads and houses, and as the latter are not protected against the entry of ground air, sewer air is liable to find its way into them. New sewers are constructed of glazed stoneware pipes; no provision has been made for ventilating or for flushing the sewers. For cleansing, the sewers depend upon the good fall usually provided by the steep character of the hills and upon the storm water which they carry away.

The sewage is discharged untreated into streams and water-courses which contribute to the Afon Lwyd. On the eastern side of the district two streams which have been partly culverted receive the sewage of over 1,100 houses; while on the western side another stream receives the sewage of 259 houses, which form the hamlet known as Forge Side. The Afon Lwyd also receives the sewage of the houses situated on its banks. During the prolonged drought the sources of the Afon Lwyd and of many of the contributory streams were dry, so that the bulk of the water flowing in their courses consisted mainly of raw sewage. Along the course of the Afon Lwyd masses of faecal matter were frequently to be seen on its banks near the outlets of the many house-drains which discharge into the river. Complaints are sometimes made of the filthy condition of the river and streams, particularly by the

people whose houses are close to the outfalls. A disgusting stench arises during the hot weather at these places.

Attempts have been made to abolish the primitive methods of sewage disposal in Blaenavon and other districts adjoining the Afon Lwyd. From its source in the Blaenavon Urban District to its entrance into the River Usk the Afon Lwyd is an open sewer, receiving the raw sewage not only of the Blaenavon Urban District but also of the Abersychan, Pontypool, Panteg, Llanfrechfa Upper, Llantarnam Urban, and Pontypool Rural Districts, the total population of these districts being close upon 60,000.

The Monmouthshire County Council endeavoured this year to bring the councils of the above authorities to agree to provide one common system of sewerage and of sewage disposal for the whole valley. This eventually led to the promotion of two rival bills in Parliament last session, and the Local Government Board endeavoured to induce the various authorities to agree among themselves. This they failed to do and, in view of the great cost which a contest in Parliament in connection with these bills would have entailed, and as the combination required could be set up by a provisional order under the Public Health Act, 1875, the Board declined to sanction the promotion of either of the bills.

So far as I could gather, the Blaenavon Urban District Council are satisfied with the present unwholesome arrangements; the reasons advanced for their inaction being the depression in the local steel and iron industry and the already heavy burden of the rates.

It is obvious, however, that combined action for the benefit of all districts in this valley would afford not only the most satisfactory means of meeting this pressing need of Blaenavon, but also may be expected in the long run to be the least expensive method of dealing with the matter.

OTHER SANITARY CONDITIONS.

House-drainage.—The house drains generally are defective. I am informed by the surveyor and inspector of nuisances that these drains consist principally of box-drains and pipe-drains which were laid down with clay joints and imperfect junctions. In new houses and in cases where old drains are replaced, drains are made of glazed pipes fitted with properly trapped gullies. In such cases they are inspected before being covered in and tested with smoke "rockets."

Generally speaking, surface water drainage about the houses is bad. Yards are unpaved or deficient in paving and are without proper channels to carry away water. Old lip-traps, often situated near to the doors of houses, are common. They are generally broken and always dirty. The inspector of nuisances is endeavouring to secure the replacement of all lip-traps by stoneware gullies.

Excrement disposal.—As already said, a large proportion of the houses in the district are without separate closet accommodation. At the lowest estimate, the number of houses that are without such accommodation is said to be 1,000. Isolated houses are generally provided with wooden privies, resembling sentry boxes, the seats in which are placed over holes dug in the ground

or over the course of some brook or ditch. In the town part of the district the type of closet that prevails contains a hand-flushed long-hopper pan, which is frequently dirty and sometimes broken. Although all new houses are provided with tank-flushed water closets, there does not appear to have been much attempt at providing old houses with separate closets nor of introducing flushing tanks into the closets of the older property. This may be due to the inefficient water supply, as the multiplication of flushing tanks would involve a demand for water with which the present supply could not cope.

Refuse disposal and removal.—Except in Garnyrerw and Forge Side, house refuse is removed by the council's employees three times a week. In those parts, comprising altogether about 450 houses, the refuse is removed by contractors. At the houses refuse is deposited in buckets, pails, or boxes, which are then placed in the streets to await removal of their contents in uncovered carts. I observed considerable quantities of house refuse strewn about in some places, particularly in back lanes. In some parts of the town large ash-pits have been provided for public convenience.

The refuse is ultimately disposed of by tipping. There are four tips in regular use, of which at least one is quite close to some dwelling houses and is a source of great nuisance. I am told that there will be some difficulty in the near future in acquiring suitable places for the dumping of refuse, and that the council will be obliged to consider other means of disposing of it.

Hospital accommodation and infectious diseases.—There is no provision for the isolation of cases of infectious diseases in the district other than that to be obtained in ordinary dwelling houses. As these are not suitable and are sometimes overcrowded there is need for the council to cause some provision to be made. Some of the districts adjoining the Blaenavon Urban District have isolation hospitals, and it is desirable that the Blaenavon council should endeavour to come to some arrangement with some adjoining authority to admit cases of infectious disease from their district into their hospital. If, owing to other demands, they are unable to proceed at once to provide isolation accommodation on a large scale, they should at least be able to secure isolation in the cases in which it is most urgently needed.

Owing to the lack of hospital accommodation and the frequent impossibility of isolating a case of infectious disease in the home, other members of the family are exposed to the risk of infection. Between the 1st of January and June 30th of this year 60 cases of notifiable infectious diseases were reported to the medical officer of health, no effective domestic isolation being practicable.

There is no steam disinfectant in the district for the disinfection of infected bedding, clothing, &c. Infected rooms are fumigated with either formalin vapour or sulphur dioxide gas. Disinfectants are also supplied. When a notification of an infectious disease is received, a visit is made by the medical officer of health and inspector of nuisances to the infected house.

Slaughter-houses.—There are eight slaughter-houses in the district, of which seven are in use. Their condition is unsatisfactory. The majority are situated in the town and crowded in by other

buildings. Some are without proper lairs where animals can be kept prior to slaughter. At two slaughter-houses stables were used for the purpose; at a third a temporary structure had been erected; while at a fourth there was no lair whatever, the animals being penned in a corner of the killing room during the process of slaughtering. This slaughter-house was without proper water supply, the water being piped from a stagnant pool to a water butt placed outside the slaughter-house. The floor of the building was also badly paved and there was no means of drainage.

Flies swarmed in many of the buildings. One slaughter-house abutted on the river bank, on which offal had been thrown. No proper provision is made for the storage of manure. At one slaughter-house the manure was kept in an open triangular space, from which it had to be shifted to the yard before it could be raised to a cart for removal.

There is only one *common lodging-house*, the kitchen of which is underground. The height of this room is 6 ft. 5 ins. and its floor is paved with stone flags, many of which are broken, exposing the bare earth.

One room, which is quite dark and unventilated, is a bath room used by the lodgers for washing. At the time of my visit the bath was half full of dirty black water, fresh water being scarce and not available. Other rooms were in a more or less dilapidated condition, and the bed accommodation was more than allowed by the bye-laws.

The yard area was badly paved, while the gully projected above the level of the yard and was thus useless for the purpose of drainage. There were two hand-flushed water-closets which drained directly to an outlet on the river bank, where was seen a heap of excrement, paper, &c. that had been discharged from these closets.

Cowsheds, dairies and milkshops.—Fifteen cow-keepers are entered in the register. On the whole the buildings are substantially built but are deficient in light, ventilation and drainage. Their floors are badly paved and not provided with channels to carry off liquid waste. Some were dirty, the walls being in need of lime-washing.

SANITARY ADMINISTRATION.

Staff.—The medical officer of health, Mr. G. H. Martin, M.B., B.Ch., was appointed in May, 1910, when he succeeded the late Dr. Avarne, at a salary of £50 per annum, part of which is repaid from the county funds. He is also medical officer and public vaccinator for the Blaenavon district of the Abergavenny Union, and is engaged in private practice. During the short time he has been resident in the district Dr. Martin has become acquainted with its needs, and in his first annual report for the year 1910 he pointed out the need for the following sanitary improvements:—

1. The provision of an isolation hospital for infectious diseases.
2. That siphon flushing tanks and proper ware pans be placed in all w.c.'s throughout the district.

3. Additional storage of water for drinking and domestic purposes, so that the present intermittent supply in warm weather may be replaced by a constant supply.

4. That stoneware gullies in lieu of iron traps be placed throughout the district.

5. The provision of a new cemetery.

Dr. Martin did not, in this annual report, refer to the housing conditions of the district or to the existence of overcrowding, but these important matters will no doubt receive attention in subsequent reports on the lines specified by the Board's housing regulations. Quite recently Dr. Martin has also reported specially on the neglected state of the reservoirs.

The inspector of nuisances is Mr. Richard S. Widdowson. Since the end of 1908 he has devoted the whole of his time to the appointment. Prior to this he had held the joint appointments of surveyor and inspector of nuisances since 1896. His salary is £100 per annum, part of which is repaid out of county funds. He has an intimate knowledge of the conditions of the district and is improving its insanitary condition.

The surveyor and water-engineer, Mr. Edward W. Edwards, was appointed in January, 1909, at a salary of £150 per annum. He devotes most of his time to the duties of these offices, but informed me that he is allowed by his council to undertake private practice. He has no assistant, and is responsible for the examination and approval of plans of new houses, &c., and in the preparation of plans for new public works, *e.g.*, sewers, roads, &c.

Adoptive Acts, Byelaws and Regulations.—The Infectious Diseases Prevention Act, 1890, and Parts 3 and 4 of the Public Health Acts Amendment Act, 1890, were adopted at the ordinary meeting of the council held on 30th of January, 1891, and came into force on April 1st, 1891.

The Private Streets Works Act, 1892, was adopted on October 27th, 1910, and came into force on January 2nd, 1911.

Byelaws and regulations have been adopted with regard to:—

1. The cleansing of footways and pavements, the cleansing of earth-closets, privies, ash-pits, and cesspools.
2. Slaughter-houses.
3. Common lodging-houses.
4. Provision of means of escape in case of fire, &c.
5. Tents, vans, sheds, &c.
6. Nuisances, &c.
7. New streets and buildings, the alteration of buildings, and drainage of existing buildings.
8. Offensive trades.
9. Dairies, cowsheds, and milkshops.

Hitherto many of these byelaws have not been enforced, a circumstance which has tended in no small degree to the perpetuation of the objectionable features of the council's administration. Strict application of the byelaws and regulations relating to slaughter-houses, common lodging-houses, dairies, &c., the cleansing of privies and ash-pits, and the drainage of existing buildings are particularly required.

On review of the circumstances referred to in this report it is not too much to say that the urban district of Blaenavon lacks all

those essentials of good sanitary provision and management which, when combined, do so much to make the life of a community happy and contented. The district council has to face many evils that are due to past neglect. Necessary reforms are so many as to encourage the attitude of hopeless acquiescence in existing affairs, of which I met numerous examples, but there is no need for this position to be taken. Rather than that they should consider their duty hopeless and so leave everything unattempted, they should concentrate their attention upon the most urgent needs of their district, viz., housing of the working classes, the abatement of nuisances, water supply, and sewerage and sewage disposal. Many branches of sanitary administration have been neglected in this district. In the following recommendations I have enumerated the matters which, as the result of my inquiry, appear to be most urgent.

1. The council should at once give attention to the due administration of the Housing of the Working Classes Acts, 1890 to 1909, and the Public Health Acts in regard to insanitary or other conditions remedies for which are provided by these Acts. They should also forthwith take into serious consideration the desirability of erecting dwellings for the poorer working classes in their district.

2. The council should obtain a satisfactory scheme whereby their district can be provided with an adequate supply of pure water, and should lose no time in carrying it out.

3. The council should consider the questions of sewerage and sewage disposal, and endeavour to deal with them on satisfactory lines in combination with other local authorities in the eastern valley.

4. The council should enforce the provision of satisfactory and sufficient closet accommodation for all dwellings in the district. For this purpose they should utilize section 36 of the Public Health Act, 1875, and any other powers which they can exercise, including section 39 of the Public Health Acts Amendment Act, 1907.

5. The council should systematically enforce byelaw 59 of the series with respect to "new streets and buildings, the alteration of buildings, and drainage of existing buildings," which relates to the paving of yards and open spaces in connection with dwelling-houses.

6. The byelaws with regard to slaughter-houses, common lodging-houses, and the regulations for dairies, cowsheds, and milkshops should be enforced.

7. The council should endeavour as a provisional measure to arrange with adjoining authorities for the isolation of infectious cases in an infectious diseases hospital.

In conclusion, I wish to express my thanks to Dr. Rocyn Jones, the medical officer of health to the Monmouthshire County Council, and to the officials of the Blaenavon Urban District Council, all of whom afforded me valuable assistance in the course of my investigation.

MORGAN J. REES.

