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COMMONWEALTH OF AUSTRALIA.

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REPORT No. 1948/41
Geological Series 17.
(Plans Nos. ACT 19/2, ACT 19/3)

PROPOSED DAM SITE ON COREE CREEK.

by

G.M. Burton
Geologist

and

D. Johnstone
Geologist

CANBERRA, A.C.T. 15th July, 1948.

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I SUMMARY.

1. Two possible dam sites were examined on Coree Creek, a quarter of a mile below Condor Creek.

2. The geology of the area comprises steeply dipping folded sedimentary rocks which strike slightly west of north. They are largely tuffaceous in character, show varying degrees of metamorphism and are intruded by quartz-diorite and porphyry.

3. The area is quite suited topographically for a low dam with large storage. No unusual geological difficulty has been revealed by this survey.

4. Of the two sites considered, the higher site, A, (Section AB on plan ACT 19/2) is recommended as the more suitable geologically.

5. Sources of aggregate are acid phases of the quartz-diorite or near by quartzites and granites; and sand could be obtained by crushing these rocks or from the beaches of the Murrumbidgee River.

6. A petrological appendix is included defining petrological terms used and describing the slides made from specimen localities shown on plan ACT 19/2.

II INTRODUCTION.

The area with which this report deals, is situated on the upper reaches of Coree Creek, just below its junction with Condor Creek.

Coree Creek drains into the lower reaches of the Cotter River. Its watershed is the Brindabella Range between Blundell and Coree Trigs.

Access to the dam site is by the Cotter-Brindabella Road. This road is gravel surfaced and is in fairly good condition. About thirteen miles from the Murrumbidgee River Crossing, a fairly poor and somewhat rugged track leads off on the right hand side of the main road and down to the actual dam site, at which a gauging weir is situated.

III MAPPING.

The area in the vicinity of the present gauging weir was studied in detail. An area roughly 1,600' x 1000' was surveyed by plane table (scale 100' = 1") by D. Johnstone and A. Robertson from 3rd to 5th March, and by D. Johnstone and G.M. Burton from 8th to 13th March, 1948.

No regional work except tracing the contact of the quartz-diorite to the west of the area tabled, and studying the trends of the sedimentary series along the Cotter-Brindabella Road to the south of the dam site, was done by this party.

The only reference map used was a contour map showing locations of gauges and botanical and geological data, supplied by Mr. Thornton of the Department of Works and Housing.

IV PHYSIOGRAPHY.

In general the topography of the area is quite rugged, but the relief varies along the creek. Above the dam site the creek winds through a broad valley with levees and terraces poorly developed. At the actual dam site the stream shows rejuvenation as it passes round overlapping spurs in the steep hills. The topography of the site with a broad valley above, and a constriction at the actual position of the dam, is well adapted for impounding a large quantity of water with a low dam.

V GENERAL GEOLOGY.

The main geological units of the area are:

1. A succession of sharply folded sedimentary rocks;

2. An intrusion of quartz-diorite; and

3. An intrusion of porphyry.

The sedimentary rocks are portion of the Franklin Formation. Their strike is roughly north-south and to the north swings to north-west to south-east in the western beds. However, a key bed of shale in the coarse argillaceous sandstone of the eastern sector was found swinging to the north-east at its northern end.

Sedimentary Rocks.

Each sedimentary rock type will now be considered in turn across the strike, and any variation along the strike will be mentioned.

In the most western sector (See Plan ACT 19/2) is a group of metamorphic rocks which still bear most of their sedimentary characteristics. They are termed low-grade hornfels. The ground mass of sericite and chlorite is the recrystallised product of regional metamorphism on the original clay, mica and iron oxide of the sediments. The angular quartz grains show little recrystallisation. Further to the east, these rocks tend to take on schistose structure and pass imperceptibly into a sericite schist on the western wing and into a spotted sericite schist to the east along the strike.

The next rock type encountered is a slightly metamorphosed siltstone. Its western boundary is inferred, due to lack of outcrops. The siltstone shows a marked change along its strike. The outcrops on the ridge to the west is a coarse siltstone, but the extension of the beds beyond the alluvium to the east has become fine in grain-

size, the proportion of matrix has risen and this rock type is a fine argillaceous quartz siltstone. The grains of these siltstones are sub-angular and the matrix is of very fine chlorite and sericite.

Outcropping to the east of the siltstone is a distinct body of quartz-hornfels and coarse argillaceous quartz sandstone. These rocks have withstood weathering fairly well and stand out with a scree cover in places. Interbedded in the hornfels are bands of shale. The hornfels consists of mainly quartz with a little mica and has been metamorphosed by the adjacent plutonic mass. However, to the east along the strike the metamorphism has not been as great and the rock type becomes a fine argillaceous quartz sandstone. There is also a change in facies towards the sandstone, resulting in a drop in the proportion of quartz. The matrix is of sericite, chlorite and finely divided quartz.

The remaining rock type to the east is a finely bedded sandstone. It has a number of shaley beds scattered through it, particularly in the area east of the point C. In this area the shale tends to become slatey and, at the river-bank below D, schistose.

The sandstone is an argillaceous quartz sandstone. The grains of quartz show a tendency to angularity. Sericite, from the original argillaceous cement, and fine quartz, form the present cementing material. In grain-size there is a variation across the strike. The beds change from a fine sandstone to a very fine sandstone and finally back to a fine sandstone. Schistosity is noticeable in the beds along the latter part of the section.

Quartz-Diorite.

Quartz-diorite is the name given to these stock-like intrusions occurring to the west of the dam site. As shown in Appendix I-(Petrology) - the body varies in composition tending to increase in acidity to the west.

Porphyry.

The porphyry is a rather coarse transgressive intrusion occurring in the western sector of the area.

VI STRUCTURAL GEOLOGY.

The rock formations of the area have undergone intense folding and as a result dips of up to 85° are quite common. The only evidence to indicate a major anticlinal-synclinal structure is found in the alteration of dip in the sandstone bed in the western portion to form a trough-like structure. The rapid variation of dips in the eastern sector is explained by folding of incompetent slatey beds. The sandstone was apparently a relatively competent bed superimposed on the finer slatey sediments and folded into a broad fold, most of which was destroyed during periods of erosion. The incompetent slatey beds crumpled into a series of acute folds beneath it.

The quartz-diorite intrudes the sediments to the west and has the usual effects of small scale contact metamorphism in the form of silicification and assimilation.

The quartz-diorite becomes more acid and changes to a granodiorite farther from the contact.

The relationship of the porphyry is more difficult to determine. It appeared at first to be concordant with the bedding but mapping and petrographic study show that the porphyry cuts obliquely across the siltstone along the strike.

No evidence of major faulting was found in the area. Signs of minor faulting were noted at:

(a) north of section ACD; and
(b) along the south-west boundary of the siltstone.

The first of these is only a suggested fault. The evidence is slight, and consists of the sudden truncation across the strike of the bold outcrop near the point D and the commencement of a fairly thick soil cover. The second minor fault is even more indefinite. It occurs at the boundary between the schists and siltstone which does not appear to be concordant with the strike. However, as this boundary is only inferred and may really be concordant with the strike, the evidence bears little weight.

Small areas of brecciation, apparently due to shearing, were noticed throughout the area, but none of these was of sufficient size to indicate large movement.

Aerial photographs reveal a marked tendency of the river to follow a south-easterly direction above the proposed dam site, and a north-easterly direction below. The reason for this is apparently due to following weaknessess along the axes of folding.

There appears to be at least two, and possibly three, directions of jointing in the area adjoining the dam sites. The most important of these strikes north-south and dips steeply to the east. The second joint direction strikes N. 60°W. and dips to the south-west at 55°. The final doubtful joint direction strikes N. 25°E. and may only be a slight variation of the north-south system. No age relationship of the jointing was determined.

VII ENGINEERING GEOLOGY.

Two possible dam sites are considered - Site A and Site B. (See plan ACT 19/2).

Site A. Shown as section AB on the plan and about 90 feet upstream from the present gauging weir.

Site B. Shown as section ACD on the plan and about 160-180 feet down-stream from the weir.

There is relatively little difference in storage capacity between Site A and Site B.

Site A is, from the geological aspect, the more suitable. The site conforms to the general strike of the rocks, and would have its walls in a relatively uniform rock type. There is no evidence of lines of weakness through the site. However, it would require a larger structure to span this sector. Costeaning, and the examination of the chlorite and sericite under a higher power microscope objective than was available, would be advisable

to determine the aptitude of the rocks at this site to weather, if further investigations are carried out.

Site B would require less building material. However, factors against it are:-

(a) It cuts across a hetrogeneous rock succession and leakage might occur along the strike of the beds; and

(b) talc has been detected in the rock outcropping along the river bank near D.

The effect of jointing on leakage would be about the same for both sites; but as the jointing passes through the various beds, it dies out, and commences again and thus, as it stands, tends to seal itself against leakage.

VIII AGGREGATE AND SAND.

None of the sediments at the actual dam site are practicularly suitable for use in aggregate. They are either too close to the dam, too small in area, or contain a mixture of rock types, some of which contain unsuitable minerals, such as sericite and chlorite.

The quartz-diorite towards the west, has a calcic felspar (labradorite) and this would be likely to weather unless a low alkaline cement was used. More acid phases of this body appear further west and these are probably suitable. However, although in petrographic study one slide showed no pyrites, a hand specimen from nearby contained large pyrite crystals and if it is intended to use this rock, a more thorough study should then be made.

Alternative sources of aggregate would be nearby quartzites and granites.

As a source of sand, the alluvium is unsuitable due to possible content of weathered felspar from nearby granite and porphyry. Sand could be obtained by grinding and screening the western acid phases of the granite providing pyrite is absent.

Alternative sand sources would be from crushing and screening nearby granites and quartzites or preferably from the beaches of the Murrumbidgee River.

G.M. Burton

(G.M. Burton)
Geologist.

15th July, 1948.
CANBERRA, A.C.T.

D. Johnstone
for G.M.B.

(D. Johnstone)
Geologist.

APPENDIX I.

PETROLOGY

The sedimentary rocks of this report bear a marked resemblance to one another. There is a considerable variation across the area in grain size and ratio of matrix to cemented grains, but the angularity of the grains and the constancy of composition of grains and matrix, mark them as having been laid down under very similar conditions, with the change in grain size due to fairly frequent changes in facies both across and along the area of sedimentation.

The angularity of the quartz suggests a tuffaceous origin for the rocks. However, the rounding of some of the grains and the absence of glass fragments indicate that, if they were of an eruptive origin, then they have since been redistributed.

The metamorphic effects on the rocks are of both regional and contact types. The sericite matrix common to most of the beds is apparently the result of regional meta - morphism on the earlier fine argillaceous groundmass of the sediments. The contact effect of thermal metamorphism is most noticeable in the western sector near the quartz-diorite intrusion and also on the river bank below D, where numerous veins of quartz occur.

The definitions of the terms sandstone and silt-stone are in accordance with Alling's Metric Scale.

This defines a sandstone as having grain size 0.10-1.00mm., and a siltstone from 0.010-0.10mm. In each slide of the sandstone and siltstone there is a remarkable variety of grain size. In determining the grain size for any slide an attempt has been made to choose the most important suite.

The adjective argillaceous has been used to describe the cementing material, even though this has now been converted to sericite and associated minerals.

The quartz-diorite body, as shown by Slides 1, 2, and 3, varies in composition. It ranges from a granodiorite in the west to quartz-diorite near the contact.

DESCRIPTION OF ROCK SLIDES AND HAND SPECIMENS.

Specimen 1.

Name : Quartz-diorite.

Locality : Three hundred feet west of the Coree Creek-Condor Creek junction.

Hand Specimen : Dark holocrystalline rock containing felspar and black femic minerals.

Slide : Plagioclase forms 55 per cent of the rock. Crystals show saussuritisation. Composition is 60 per cent anorthite, 40 per cent albite and hence is a labradorite. Zoning is pronounced in a number of crystals.

Augite is 27 per cent of the rock and fairly weathered.

Quartz is interstitial and 7 per cent of the rock.

Biotite makes up 7 per cent of the slide and is probably formed by reaction from the pyroxene.

Magnetite, chlorite, epidote, zoisite and apatite are present in small amounts.

Specimen 2.

Name : Granodiorite

Locality : A quarter of a mile south-west of Specimen 1.

Hand Specimen : Light-coloured holocrystalline rock comprised of quartz, pink felspar and brown femic minerals.

Slide : Plagioclase is 65 per cent of the rock, saussuritised and has a composition of $Ab_{65}An_{35}$ (i.e. Andesine). Grain size is 1.4 mm.

Quartz forms 10 per cent of the slide. It is interstitial and has a grain size up to 0.53 mm.

Hornblende has hypidiomorphic to idiomorphic crystals. Two directions of cleavage at 120° are shown. Weathering to epidote and chlorite is apparent.

Biotite forms about the same percentage of the rock as biotite in slide 1.

Chlorite shows an anomalous brown colour.

Sphene is present as a by-product of alteration of hornblende to epidote and chlorite.

Zircon and epidote are present in small proportions.

Specimen 3.

Name :Andesite

Locality : North of locality for Specimen 1, near quartz-diorite boundary.

Hand Specimen : Dark grey rock showing light coloured felspar and brown spots representing an altered femic mineral.

Slide : Plagioclase is anorthite and forms not less than 35 per cent of the slide.

Chlorite surrounds felspar in many cases.

Epidote with chlorite have replaced the original femic mineral.

Leucoxene is present as an alteration of ilmenite.

The matrix is very fine consisting mainly of plagioclase and has a felt-like appearance.

Specimen 4.

Name : Medium quartz-sericite hornfels.

Locality : Up Condor Creek a quarter of a mile from its junction with Coree Creek.

Hand Specimen : Megascopically it appears as a dark fine-grained rock.

Slide : Quartz forms 70 per cent of the rock and its grains are sub-angular.

Sericite is also present in fine needles.

Limonite, leucoxene and iron ore are found in small amounts.

The matrix consists of fine quartz sericite and a little chlorite.

Specimen 5.

Name : Quartzite

Locality : Between the road and Condor Creek about ¾ mile from the weir and gauge, in a fairly small outcrop.

Hand Specimen : It appears as dark hard rock containing clear quartz crystals.

Slide : Quartz forms 90 per cent of the slide. The grains are rounded and show secondary crystallisation.

Chlorite is only 4.5 per cent of the whole and is found interstitially.

Sericite, magnetite, biotite, limonite and zircon are present in small quantities.

Specimen 6.

Name : Fine-grained spotted sericite schist

Locality : As shown on Plan ACT 19/2.

Hand Specimen : The rock appears yellow with linearly arranged dark spots.

Slide : Quartz is very fine

Sericite is also very fine and forms a high proportion of the slide. Selective limonite staining gives rise to the spotted appearance, which was probably originally due to concentrations of a metamorphic mineral.

Specimen 7.

Name : Low-grade sericite quartz hornfels.

Locality : It was found 70 yards west of the porphyry alluvium junction.

Hand Specimen : The rock is light coloured, fine-grained and shows laminated structure.

Slide : Quartz has small grain size being 0.12 mm. and is mainly confined to thin bands of even-grained sandstone.

Sericite forms approximately 60 per cent.

Chlorite and limonite staining appears in small proportions.

Specimen 8.

Name : Low-grade sericite-quartz-chlorite hornfels.

Locality : Is found 60 yards east of Point E.

Hand Specimen : Very similar to Specimen 7.

Slide : Similar to Slide 7 but contains a little more chlorite.

Specimen 9.

Name : Brecciated fine argillaceous quartz sandstone.

Locality : This rock type occurs near the hornfels-porphyry contact.

Hand Specimen : It appears fairly weathered with veins of quartz.

Slide : Quartz has a grainsize of 0.20 mm. and forms 70-80 per cent of the slide.

Sericite is very fine and forms 20 per cent of the composition

Limonite, leucoxene and black iron ore are present in small proportions.

Specimen 10.

Name : Medium argillaceous quartz sandstone.

Locality : Found on the 2460' contour near the contact with the siltstone.

Hand Specimen : The rock appears grey in colour, with small quartz veins through it.

Slide : Quartz forms 60 per cent of the rock and has grains of sub-angular shape and up to 0.33 mm. in diameter.

Zircon, leucoxene, and iron ore are present in small quantities.

The matrix is of fine-grained quartz and sericite.

Specimen 11.

Name : Coarse argillaceous quartz siltstone.

Locality : Near sericite schist and siltstone contact.

Hand Specimen : This is a light coloured fine-grained rock with a somewhat spotted appearance.

Slide : Quartz is fine, being up to 0.08 in diameter and sub-angular in form.

Chlorite, sericite, magnetite and leucoxene are present in very fine form.

The rock is similar to specimen 13 but with smaller grain size which is very uneven. The bedding is shown by the alignment of the axes of elongated quartz grains.

Specimen 12.

Name : Very fine-grained sericite schist.

Locality : It is found adjacent to the siltstone.

Hand Specimen : Dark, fine-grained rock exhibiting laminated structure.

Slide : Quartz forms 10 per cent of the rock, is sub-angular, and has a grain size of 0.1 mm.

Sericite is fine-grained and forms a fair portion of the slide.

Iron ore is found in aggregates in small amounts.

The rock is essentially similar to Slide 22. However, the quartz fragments are more abundand but smaller.

Specimen 13.

Name : Very fine argillaceous quartz sandstone.

Locality : Near gauging-weir.

Hand Specimen : This is a dark grey fine-grained rock containing grains of quartz and mica.

Slide : Quartz is often very angular, up to 0.15 mm. in diameter and forms 80 per cent of the rock.

Muscovite is detrital and makes up 5 per cent of the rock.

Plagioclase, chlorite, and leucoxene are present in small amounts.

This slide is essentially similar to Slides 14, 15, 18 and 19 although the matrix is not as abundant as in one ortwo of these.

Specimen 14.

Name : Fine argillaceous quartz sandstone.

Locality : In the vicinity of the Point D on the section ACD.

Hand Specimen : Coarse grains of light grey rock containing greasy quartz and mica.

Slide : Quartz forms 90 per cent of the rock, and is usually angular and has a grain size of 0.23 mm.

Sericite, chlorite, plagioclase and detrital muscovite are present in small quantities.

Leucoxene and limonite staining are seen in the slide.

The rock has all the appearance of having been derived from the erosion of tuff soon after deposition.

Specimen 15.

Name : Fine argillaceous quartz sandstone.

Locality : Found 30 yards west of the Point B on the section line AB.

Hand Specimen : Similar to specimen 14 but not so coarse-grained (grain size .22mm.).

Slide : Similar to Slide 14 with a little less chlorite.

Specimen 16.

Name : Fine argillaceous quartz sandstone.

Locality : On the 2440' contour, about 45' east of the sandstone-siltstone contact.

Hand Specimen : Light grey uneven-grained rock which contains a number of quartz veins.

Slide : Quartz forms 80 per cent of the rock. The grain size is 0.25 mm. and the grains are sub-angular.

Iron ore, muscovite, zircon and detrital chlorite are present in small quantities.

The matrix which forms 20 per cent of the rock consists of fine quartz and sericite.

Specimen 17.

Name : Shale.

Locality : Found on 2380' contour, 90 ft. west of coarse-sandstone-medium-sandstone boundary.

Hand Specimen : This specimen is light in colour showing fine smooth planes in places.

Slide : Half of the slide contains fine-grained quartz, sericite, and chlorite. Slight slatey cleavage is shown and limonite staining is common. Veins and pockets are found throughout.

Specimen 18.

Name : Fine schistose argillaceous quartz sandstone.

Locality : This specimen occurs on the 2380 contour about 15 ft. north of the section line CD.

Hand Specimen : Fine-grained light-grey rock containing quartz and much white mica.

Slide : Quartz grains are angular to sub-angular with a grain size of 0.20 mm.

Sericite and chlorite appear both as detrital and metamorphic minerals.

Plagioclase and leucoxene are present in small amounts.

Fine matrix is made up of chlorite, sericite and quartz with a rough directional structure.

This slide is similar to Slide 14 except that the grains are better sorted and much smaller and probably has a similar origin to Specimen 14.

Specimen 19.

Name : Shale and cleavable argillaceous sandstone.

Locality : It is at the intersection of 2350 ft. contour, and the line CD on the right bank of creek.

Hand Specimen : Very fine-grained rock with white mica as the only mineral observable.

Slide : Partly shale or very low-grade argillaceous schist with sericite, quartz, and probably chlorite and partly like Slides 18 and 20 except that proportion of fine-grained matrix is a little greater.

Probably derived from erosion/tuff. /of

Quartz grain size is 0.23 mm.

Specimen 20.

Name : Very fine schistose argillaceous quartz sandstone.

Locality : Near sandstone-siltstone-alluvium junction.

Hand Specimen & Slide : The rock closely resembles Slide 18 but the average grain size (0.10mm.) is somewhat smaller.

Specimen 21.

Name : Quartz-hornfels.

Locality : Intersection of 2370' contour and Coree Creek.

Hand Specimen : This is an iron-stained grey rock containing clear quartz and quartz veins.

Slide : Quartz forms 80 per cent of the rock excluding the veined quartz. Grain size is 0.50mm.

Chlorite forms about 15 per cent of the rock.

Limonite, black iron ore, sericite and zircon form small amounts of the total slide.

The matrix consists of fine-grained quartz and chlorite. Secondary recrystallisation of the quartz has taken place.

Specimen 22.

Name : Shale.

Locality : Near porphyry-quartz-hornfels contact.

Hand Specimen : Light-coloured fine-grained rock with slight lamination developed.

Slide : Quartz makes up 5 per cent of the rock. Grain size is 0.13mm. and the grains are sub-angular.

Sericite forms a high proportion of the slide and is the product of very low-grade metamorphism.

Limonite staining is present.

Specimen 23.

Name : Granodiorite-porphyry.

Locality : Between the siltstone and quartz-hornfels.

Hand Specimen : Specimen appears to have phenocrysts of greasy quartz white felspar and black femic minerals set in a fine groundmass.

Slide : Quartz is rounded and cracked. The grain size is 1.31mm.

Plagioclase is $Ab_{64}An_{36}$ and is saussuritised. Grain size is 1.2mm. There is about four times more plagioclase than quartz.

Epidote and chlorite are present in small amounts.

Chlorite, sericite and iron ore are present as alteration products of hornblende or biotite.

Specimen 24.

Name : Fine argillaceous quartz siltstone.

Locality : Near creek bend on 2360 ft. contour.

Hand Specimen : Cleavable, fine-grained rock with a micaceous surface.

Slide : Quartz forms 70 per cent of the slide and has a grain size of 0.02 mm.

Sericite forms 30 per cent of the rock and is generally stained by limonite.

G.M. Burton

(G.M. Burton)
Geologist

15th July, 1948.
CANBERRA, A.C.T.

D. Johnstone
for G.M.B.

(D. Johnstone)
Geologist

CONDOR CK.

COTTER R. DIST.

A.C.T.

PROPOSED DAM SITE.

SCALE 1" = 100'.

M. N.

Condor Creek

Coree Cr.

Gauge

A

B

C

D

E

F

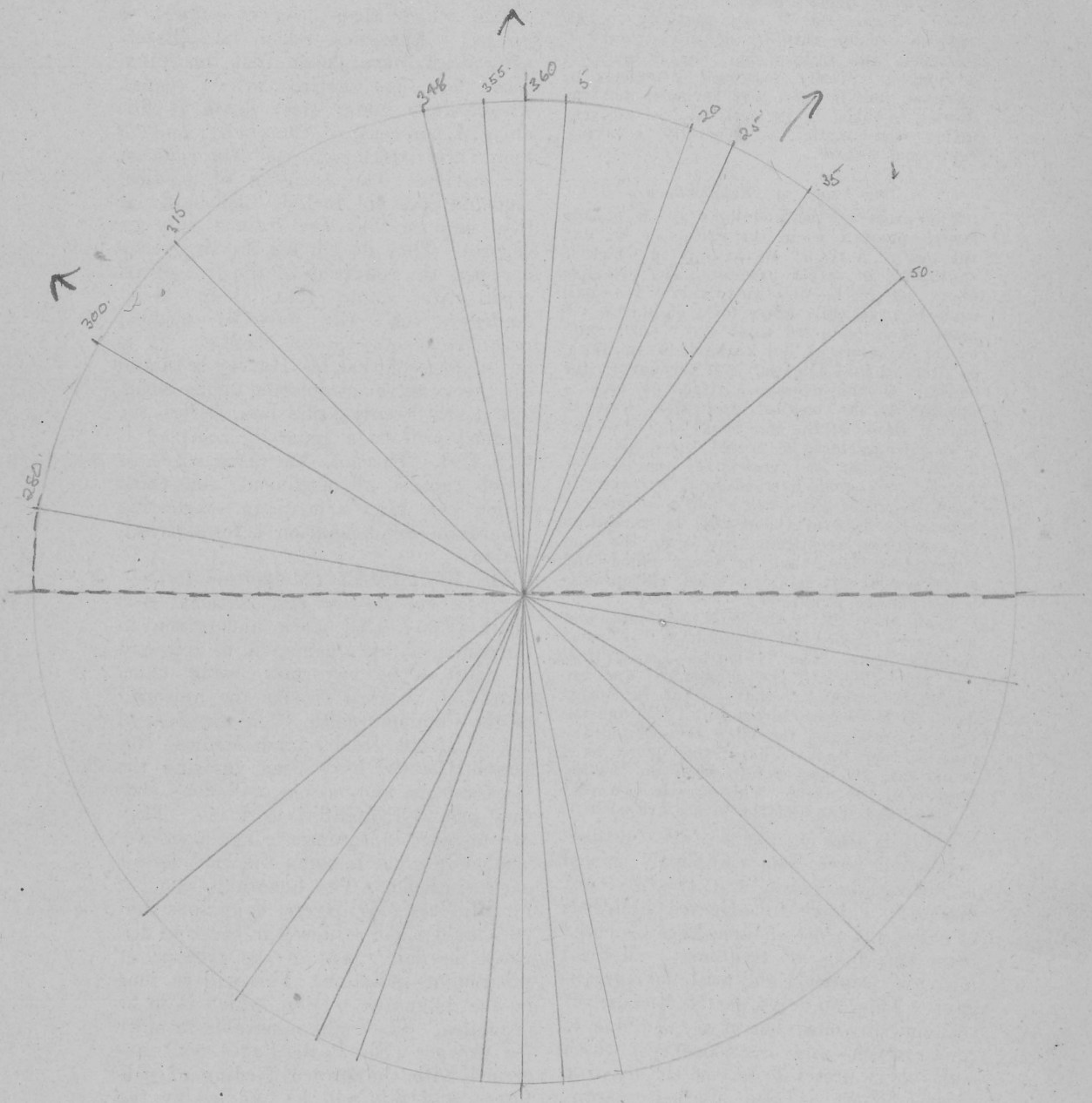
LEGEND

- Alluvium.
- Quartz-diorite.
- Porphyry.
- Quartzite.
- Low Grade Hornfels & Schists.
- Sandstone (S's).
- Finely Bedded Sandstone.
- Spotted Sericite Schist.
- Schistose S's.
- Siltstone.
- Slate.
- Strike - Dip : Joints.
- Strike : Joints.
- Fault (?)
- Approx. Geol. Boundary.
- ⑥ Specimen Locality.

soil cover (s.c).

SECTION EF (APPROX. PERP. TO STRIKE)

ACT.19/2



Condor Creek Dam Site

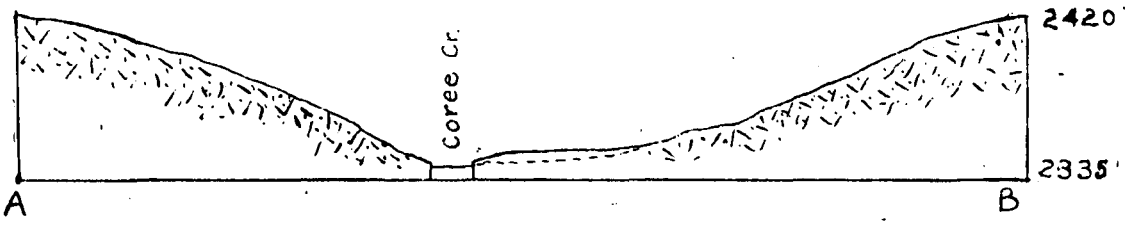
Synthesis of Jointing

G.M.B
9·4·48.

Condor Creek.

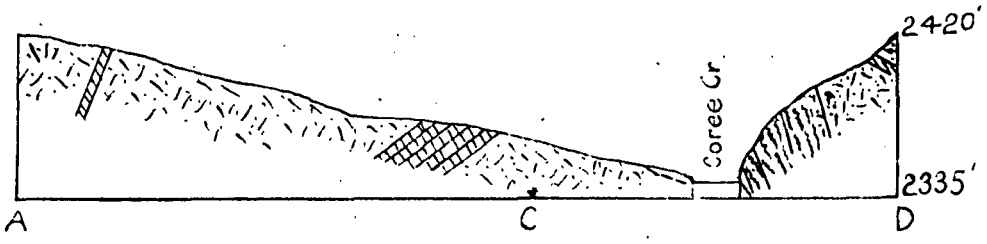
Proposed Dam Sites.

Horizontal & Vertical Scales 1" = 100'.



SECTION AB.

(Parallel to Strike).



SECTION ACD

LEGEND : See ACT 19/2

ACT 19/3

March, 1948.