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INTRODUCTION

This report discusses the results of a Fracture Analysis Survey carried out within, and in the immediate vicinity of, Petroleum and Natural Gas Permit No. 5067. This Permit is located in the Northwest Territories and is held under the Canada Oil and Gas Land Regulations and is located between $121^{\circ} 15'$ to $121^{\circ} 30'$ longitude and $64^{\circ} 10'$ to $64^{\circ} 20'$ latitude. The Permit is 790 miles northwest of Edmonton and 275 miles northwest of Yellowknife.

The Yellowknife Highway serves Fort Providence which is 220 miles southeast of the Permit and is the closest road to the area. Access to the Permit itself is by helicopter or on foot during the summer or by vehicle during the months when the ground is frozen. However, there are no roads in the area and considerable road construction would be required to reach any particular area.

The surface of the Permit is quite flat-lying and total relief does not exceed 150 feet. There is a poorly developed drainage pattern within this area and most of the stream flow into the Johnny Hoe River which flows through the Permit. Most of the streams are small and intermittent. A layer of very soft muskeg covers this part of the Northwest Territories and this muskeg is so soft that it is impassable to all but specialized vehicles.

Vegetation consists of thick stands of thin evergreen trees interspersed with many open areas. These open areas are covered by muskeg grass and scrub deciduous growth. The evergreen trees show up as a medium gray tone on the mosaic and the open areas are a lighter gray. A few small patches of deciduous trees are present.

There is no topographic form or aerial photo feature present which immediately suggests the presence of any geologic structure.

The results of this survey are illustrated on the Total Fracture Map, the Mega Fracture Map plus the mosaic with the fractures superimposed. In addition there are three hypothetical cross-sections. All the above can be found in the folder at the back of this report.

STRATIGRAPHY

GENERAL STATEMENT

The stratigraphic discussion presented herewith is based on a study of the area covered by Petroleum and Natural Gas Permit 5059 and Permits 5062 to 5081 inclusive. The north limit of this area is located along the south shore of the Keith Arm of Great Bear Lake and it trends southeast to about 64° 00' - 121° 00'. No wells have been drilled in this area and surface outcrops are rare and widely scattered. Therefore, it has been necessary to study the regional geology of the whole Northwest Territories and make many projections of data and, admittedly, some of these projections are rather long-ranged. However, when combined with such subsurface information as is available an accurate picture of the sedimentary stratigraphy can be presented.

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west of the acreage under study. The section exposed consists of interbedded quartzites and black, silty shales. The shales which are black, silty, bituminous as well as green and clay shale colored, are contained in interbeds within the quartzites. The quartzites are generally buff, rusty and white in outcrop. The top of the Katherine is placed at the base of a clay shale colored shale succession while the base was not seen in outcrop leaving the total thickness unknown for this area. The Katherine Group has not been penetrated by any drill holes in this region to date, which means the subsurface section is unknown. While reservoir beds are not described in outcrop it must be assumed that sand bodies such as offshore bar beach sands and long shore bars will eventually be found in this group of sediments. Another sands are found to be prolific in the west of the East Creek area of north. The thickness of prospective sands and supporting earth sands is dependent

on a knowledge of present Pre-Cambrian structure as well as its topographical expression, when the sands were being deposited. A gravity meter and airborne magnetometer survey could be used to good advantage in locating areas for more detailed exploration. Source rocks for hydrocarbons should be no problem since the outcrop section previously described would appear to contain an adequate source within its bituminous shales. This section should be considered in any exploratory plans for this area.

CAMBRIAN

MACDOUGAL GROUP

The type section of the Macdougall Group is located about 130 miles west of this area in the Dodo Canyon of the Macdougall River. At the type section the Macdougall is divisible into a number of formations which total 997 feet in thickness. The base is placed at the bottom

of a 110 foot thick chocolate brown shale which the top is placed above 50 feet of evenly bedded limestone with shale partings. The lithology is made up of interbedded limestones, sandstones, reddish coloured gypsum, black, petroliferous shales, red and green shales as well as chocolate coloured shales. The Imperial River section which was mapped by Laudon lies 30 miles to the northwest of the type section. The section, which is 1,839 feet thick with the base not exposed, consists of alternating sandstones, limestones, gypsum and vari-coloured shales. The lower part consists of sandstones with minor shale interbeds which appear to be a shallow water deposit since they are ripple marked and cross-bedded. The section becomes increasingly shaly upwards. The gypsum content is also greater near the top. A 146 foot thick bed of black to dark grey, laminated, algal limestone is located near the top of the section. Calcareous algae up to three feet in diameter are present. At

1. The first section of the report is a general description of the area. It includes a map of the area and a description of the geology and topography. The second section is a description of the water resources of the area. It includes a description of the rivers and streams and a description of the groundwater resources. The third section is a description of the land use and land cover of the area. It includes a description of the agricultural land and a description of the forested land. The fourth section is a description of the population and the economy of the area. It includes a description of the population and a description of the economy. The fifth section is a description of the environmental problems of the area. It includes a description of the air pollution and a description of the water pollution. The sixth section is a description of the proposed water management plan for the area. It includes a description of the proposed water management plan and a description of the proposed water management plan.

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creates the possibility of salt structures in the overlying carbonate banks similar to those found to be productive in southeast Saskatchewan and at Rainbow Lake in northwestern Alberta. The algal laminate at Imperial River indicates some organic activity in the Macdougall seas and this coupled with underlying salt features, could give rise to hydrocarbon bearing reservoirs within this sequence. The petroliferous shales within the Macdougall should be adequate source material. The Macdougall has been reached by very few of the wells drilled in this region and no where has it been fully penetrated. Imperial Vermilion Ridge No. 1, drilled 3,177 feet of Macdougall beds without reaching the underlying Katherine Group. To date no reservoirs have been tested in the wells which have drilled to the Macdougall.

ORDOVICIAN-SILURIAN

RONNING FORMATION

Rocks of Ordovician Age have not, as noted by various authors, been definitely identified in this region; however, it seems to be generally accepted that they are present in the Norman Wells region. The contact with the underlying Macdougall is unconformable. Stelck mapped 1,500 feet of shales and argillites at outcrops in the Upper Peel River area, which lies some 300 miles to the west of these Permits. About 150 miles west of the Permits, at the Keele and Twitya River confluence, the Ordovician section was mapped by Keele as 4,000 feet of alternating beds of argillite, dolomite and limestone with 1,500 feet of sandstone overlying and separated from them by a 100 foot thick diabase sill. He mapped this same sandstone 35 miles to the east as being 4,500 feet thick with only occasional shale partings. The sections described in outcrop by Keele

and Stelck along with the scattered subsurface control available have been used to establish some regional lithofacies trends for the Ordovician.

The Upper Peel River section is mapped as an open marine basinal sequence of shales and argillites. Flanking this basin are shelf-edge carbonates which are reefal in part. These shelf-edge carbonates are found along the MacKenzie Mountains and on the Peel Plateau. Back of the shelf-edge carbonates are the shelf carbonates proper, which are generally clean, finely crystalline carbonates with variable porosity. They are present over most of the interior plains and should underlie the Permits under discussion

The distribution of Silurian Age strata covers a much wider area than do the beds of Ordovician Age. Lithologically the Silurian rocks are very similar to the underlying

Ordovician beds and for this reason as well as ease of working with them, they have been grouped together as the Ronning Group. The sedimentary pattern for the Silurian is very similar to that established in the underlying Ordovician. In the Norman Wells area the Ronning Group can be divided into two formations, a lower unit named the Franklin Mountain and an upper unit named the Mount Kindle. The Franklin Mountain Formation is generally composed of limestones and dolomites with abundant irregular shaped chert nodules. The Mount Kindle is usually found to consist of a sequence of chert poor limestones and dolomites which tend to thin in a southerly and easterly direction.

The Franklin Mountain Formation should be approximately 800 feet thick in the area covered by these Permits. It should consist of clean, finely crystalline shelf carbonates with abundant chert inclusions and

quite variable degrees of porosity

At the nearest outcrop section of the Ronning, which is found about 10 miles west of the Permits at Mt. St. Charles on Great Bear River, the Franklin Group is about 865 feet in thickness. This section consists of limestones with the basal 210 feet described as cavernous, and including in this section is 75 feet of cherty limestone. The upper 470 feet is a grey, dolomitic limestone. The base of the Franklin Group is not exactly clear as various dolomite beds are interbedded beneath those described in the Ronning Group as well. They consist of dolomitic conglomeratic limestone with small sub-spherical pebbles and highly crystalline limestone. The latter seems more like Macdonald than the Ronning. The Mount Kindle consists of 480 feet of dolomite, the basal 210 feet is a dolomitic limestone containing corals and other fossils. The upper 90 feet of limestone and other beds.

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(b) As outlined previously, low reef fronts or carbonate banks may be present and coupled with a seal provided by overlying Bear Rock evaporites could present an extensive trap. Lateral facies changes from porous to semi-evaporitic carbonates also provide a potential trap of considerable areal extent.

(c) Selective solution of the underlying Cambrian Saline River salt may give rise to one or two stage salt solution structures such as are found to be productive of oil in the Hummingbird area of south-east Saskatchewan. Partial solution of the salt prior to or during Mount Kindle deposition would have served to provide local elevations on the sea bottom where the salt was not removed. These local elevations

would provide the loci for reef and/or carbonate banks to grow on. Traps of the Hummingbird type would involve early local solution of the salt. This may have occurred in late Cambrian or early Ronning time. The depressions created would receive an extra fill of sediments over that being deposited where the salt was not removed. Once sedimentation within the sink caught up, subsequent sediments would be deposited on a normal sea floor. The second stage in the formation of the Hummingbird type trap would involve the removal of the salt surrounding the original sink at some time subsequent to Mount Kindle deposition. This would leave the Mount Kindle reservoirs overlying the site of the

original salt solution structurally high. The Bear Rock evaporites should provide an effective reservoir seal. Evidence to support one or two stage salt removal in this region is present in the brecciated nature of the sediments composing the Lower Ronning and Bear Rock sediments in known sections.

(d) Gentle to tight anticlinal folds may have been formed by some of the numerous periods of structural activity which have occurred in this region.

MIDDLE DEVONIAN

BEAR ROCK FORMATION

The Bear Rock Formation overlies the Ronning Group and is separated from it by a

Mountains continues southeast along the western side of the MacKenzie Mountains. The basinal shales are flanked by a belt of shelf-edge limestones and dolomites along their eastern side. Porosity is developed within these carbonates. Adjacent to the shelf-edge carbonates and covering much of the Interior Plains and Peel Plateau area are the shelf limestone and dolomite facies. In the Peel Plateau they attain a thickness of some 2,000 feet and consist of micritic, pellet and micritic skeletal limestone with intervals of finely crystalline, porous dolomite in the lower part. The shelf carbonates are in turn replaced by a relatively narrow belt of shelf dolomites. This takes place in the MacKenzie Mountains and extends in a line north through the Fort Good Hope region and south into the Camell and Nahanni Ranges. The shelf dolomites in turn are replaced by an evaporite facies along their entire length. This facies change begins to the west of Norman Wells. In the Norman

Wells area and also in the area of the Permits under discussion the basal portion of the Bear Rock is commonly evaporitic while the upper portion consists of carbonate breccias. The evaporite facies extends southward into northern Alberta where it is known as the Chinchaga Formation. South of Norman Wells a strong depositional feature called the Camsell Basin occurs. Thickening from 2,000 feet to more than 5,000 feet, accompanied by facies changes from evaporites through shelf carbonates to basinal sediments takes place into this basin. The shelf carbonates are cryptocrystalline to microcrystalline dolomites while the shelf-edge facies is reefal with some of it at least being porous.

The Bear Rock carbonates in the Norman Wells area have been found to be very porous in some wells while in others the porosity has been plugged by anhydrite and gypsum. Considerable bitumin has been en-

countered in places. Drill stem test results vary from mud recoveries to water flowing to surface. While the wells drilled by Western Decalta at Rond Lake are about 250 miles to the northwest of the Permits under review the oil shows in these wells is significant in that they establish the presence of hydrocarbons in beds of Bear Rock Age. Decalta et al Rond Lake # 2, located in $67^{\circ} 5' 27''$ N., and $128^{\circ} 25' 42''$ W., lost circulation near the top of the Bear Rock and sulphur water was bailed from this interval. Decalta et al Rond Lake # 1, located in $67^{\circ} 04' 51''$ N., and $128^{\circ} 28' 18''$ W., flowed sulphurous water on a test conducted about 900 feet below the top of the Bear Rock. Subsequent to the completion of drilling, a plug was set to 1,046 feet. The hole was bailed to 600 feet with oil cut sulphurous water being recovered. Three weeks later the hole was again bailed with oil cut sulphurous water recovered again. Indicative of the stratigraphic trap possibilities, is the

fact that the Rond Lake # 1 well was located downdip to the # 2 well and recovered oil cut water near the base of the Bear Rock, while # 2 well only recovered sulphurous water from the top of the formation. The Bear Rock could be placed in trap position by any of the various structural conditions outlined in the preceding discussion of the Ronning Group.

The Bear Rock is present in outcrop along the Hare Indian River about 140 miles northwest of the acreage under review. It consists of typical brecciated limestone and gypsum. The brecciated nature of the Bear Rock was previously mentioned as being a probable product of the solution of the Cambrian Saline River salt. A more conventional theory for the origin of the breccia is that it is a product of the sharp disconformity separating the Ronning Group from the overlying Bear Rock Formation. This theory is doubtlessly true for the basal portion of the Bear Rock

Formation. The section exposed at St. Charles which is about 10 miles west of the subject Permian, may be considered as supporting evidence for the theory that the brecciation of the Bear River was caused by the solution of Saline River and during Bear Rock deposition. The section is described by Williams, as, '250 feet of coarse grained, brown detrital sandstone by 1,000 feet of thin bedded, brown detrital sandstone, in part brecciated'. The top of the Bear River was not seen in addition to the brecciation and in the Bear River section, the great thickness of sandstone mapped as Bear River might be interpreted suggestive of greater subsidence during its deposition. The thickness of Bear River section is the type section is about 100 feet. The sandstone thickness might also be the of several feet, as the Bear River is described the section and not being a continuous layer.

related diachronously with the lower portion of the Keg River Formation of northern Alberta. The correlation is based on ostracod zones within the Hume and Lower Keg River Formations. The Hume has been found as far north as the Anderson River. The thickness of the Hume is quite variable as is readily apparent if the type section is compared to the section at Schooner Creek, which is four miles north of Norman Wells. The Hume here is only 8.5 feet thick and consists of limestone, black, shaly to slaty and fossiliferous. The basal foot is a one foot thick conglomerate indicating a disconformable contact with the underlying Bear Rock.

The Hume Formation is generally encountered as a non-porous rock both in outcrop and in subsurface. The Keg River platform of northern Alberta is also normally a non-porous rock; however, it does develop into marginal shoal along the north flank of the

Peace River Arch. This marginal shoal is very porous, granular, reefy dolomite which yields large quantities of water when drill stem tested. The marginal shoal is in turn replaced by back shoal mud flats, which are the lateral equivalent to shoreline sands. The sands have been found productive of oil in some locales. The facies pattern developed along the north flank of the Peace River Arch should have been repeated in this area along the margins of the Pre-Cambrian Shield. The marginal shoal and the shoreline sands may have been removed by one of the many periods of deep erosion that have occurred in this region; however, the acreage covered by these Permits must be considered as very well placed to evaluate these possibilities.

The Hume has been described at various localities as being very petroliferous in part. This situation is also duplicated in the Keg River platform where it is overlain by the

productive Keg River pinnacle reefs in north-western Alberta. The Keg River platform is almost certainly the source of the oil in these prolific reefs, and because of the similarities outlined above any reservoirs developed in the Hume must be considered as prospective.

HARE INDIAN

The contact of the Hare Indian with the underlying Hume is generally sharp and probably represents a sudden influx of mud into a clean well aerated sea. It appears to represent a mud bank deposit with the source area lying to the northeast, partially filling a large basin. The contact of the Hare Indian with the overlying Kee Scarp is somewhat diachronous, since it is generally placed at the point the section changes from predominant shale to predominant limestone. Facies changes thus account for the diachronous nature of the contact as well as having been the cause of some of the confusion which has

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The oil in the Norman Wells Field is trapped in the updip end of a discrete Kee Scarp reef. The thickness of the reef ranges up to a total of 495 feet. Reserves in the reef have been estimated as high as 60,000,000 barrels while the productive area of the field is placed at 2,600 acres.

The platform unit of the Kee Scarp is undoubtedly the correlative of the Upper Ramoarts limestone unit mapped by Hume. This fact, as mentioned above, means the Kee Scarp is a widespread unit. Since the Kee Scarp reef grows upwards from the platform unit any well drilled in this area and any acreage held, must be considered as possibly containing discrete Kee Scarp reefs. Maximum reef growth, regionally, has generally been found on the margins of Hare Indian thicks, however, the presence of them does not ensure Kee Scarp reefs. The margins of the two Hare Indian thicks, which were described

under the discussion of that formation, have not yet been found to contain reefs; however, they have not been adequately explored either.

UPPER DEVONIAN

CANOL FORMATION

The Canol Formation was defined by Basset to include the black to very dark brown, non-calcareous, bituminous shales which overlie the Kee Scarp, or, in its absence, the Hare Indian Formation. The Canol is overlain by the Imperial Formation. The Canol may be the equivalent of the lower part of the Bear River shale of northeastern British Columbia. The Canol thickness ranges from zero (0) feet in the Norman Wells area. The thickness varies in relation to the underlying Kee Scarp reef much in the same manner that the Ireton thickness is related to Leduc reefs within the Province of Alberta, i.e. the Canol thins over the reefs to nil in places and thickens in the off-reef direction. The Canol Formation should

INTERNAL FORMATION

9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043

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● 2019年1月1日起，企业发生的符合条件的广告费和业务宣传费支出，不超过当年销售(营业)收入15%的部分，准予扣除；超过部分，准予在以后纳税年度结转扣除。
































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of the 1980s, the 1990s, and the 2000s.

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一、總論

1. 研究之目的及意義

本研究之目的，在於探討我國企業之經營管理，在當前經濟環境下，所面臨之挑戰與機遇。並分析企業經營管理之現狀，以及未來之發展趨勢。本研究之意義，在於為企業經營管理之改進，提供理論與實務之參考。本研究之範圍，將涵蓋企業經營管理之各個面向，包括經營策略、組織設計、人力資源管理、財務管理、行銷管理、生產管理、品質管理、資訊管理、法律管理、社會責任等。本研究之方法，將採用文獻分析法、訪談法、問卷調查法、個案分析法等。本研究之結論，將根據研究結果，提出具體之建議，以供企業經營管理之改進參考。

2. 研究之範圍與對象

本研究之範圍，將涵蓋我國企業經營管理之各個面向，包括經營策略、組織設計、人力資源管理、財務管理、行銷管理、生產管理、品質管理、資訊管理、法律管理、社會責任等。本研究之對象，將為我國企業經營管理之現狀，以及未來之發展趨勢。本研究之範圍與對象，將根據研究之目的與意義，進行具體之界定。本研究之範圍，將涵蓋我國企業經營管理之各個面向，包括經營策略、組織設計、人力資源管理、財務管理、行銷管理、生產管理、品質管理、資訊管理、法律管理、社會責任等。本研究之對象，將為我國企業經營管理之現狀，以及未來之發展趨勢。本研究之範圍與對象，將根據研究之目的與意義，進行具體之界定。

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this erosion is very difficult to make. North of Norman Wells this erosion has in places removed the entire Upper Devonian sequence, leaving the Middle Devonian Formation at subcrop.

TERTIARY

The Tertiary sediments in the Norman Wells area are not subdivided. They consist of conglomerates, gravels, shales, lignites, soft, coarse, carbonaceous sands and soft clays. The Tertiary is exposed south of the Permits under review in the Mt. St. Charles area along the Great Bear River. Plants collected from the exposures along the Great Bear River indicate an Eocene Age. The thickness is approximately 600 feet at these exposures. At exposures on the Little Bear River, 1,600 feet of Tertiary sediments have been mapped. Near the headwaters of the East Fork River beds up to 1,200 feet

have been mapped with coal seams eight feet to ten feet thick. The sections mentioned form part of a basin which dips to the southwest in this area

It is recommended that further evaluation of the Permits under review consist of gravity meter and/or airborne magnetometer surveys. They should be of great assistance in outlining the distribution of the Saline River salt and any salt structures associated with it. The present structure of the Pre-Cambrian Basement could probably be mapped by this method, also, as well as providing a better idea of the drilling depth to it.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

REPORT NO. 100

BY

JOHN H. SCHWARTZ

AND

ROBERT H. SCHWARTZ

CHICAGO, ILLINOIS

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● 2017 年 12 月 1 日起, 凡在境内销售货物或提供应税劳务、服务、无形资产、不动产的单位和个人, 均应按照《增值税暂行条例》和《营业税改征增值税试点实施办法》等有关规定缴纳增值税。

姓名：____ 学号：____ 班级：____

Figure 1. The effect of the concentration of the inhibitor on the rate of polymerization of α -methylstyrene in the presence of SnCl_4 at 25°C .

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二、基本理论

1. 定义：在平面内，由一个定点引出若干条射线，这些射线所组成的图形叫做角。

2. 表示方法：角可以用三个大写字母表示，也可以用一个大写字母表示，还可以用一个小写字母表示。

3. 度量：角的度量单位是度，符号为°。1度等于60分，1分等于60秒。

4. 比较：角的大小可以通过度量来比较，也可以通过叠合的方法来比较。

5. 平分：从一个角的顶点出发，把这个角分成两个相等的角的射线叫做这个角的平分线。

6. 补角：如果两个角的和等于180°，那么这两个角叫做互为补角。

7. 余角：如果两个角的和等于90°，那么这两个角叫做互为余角。

8. 对顶角：两个角有一个公共顶点，且一个角的两边分别是另一个角的两边的反向延长线，这样的两个角叫做对顶角。

9. 同位角：两条直线被第三条直线所截，在截线的同旁，被截两直线的同一侧的角叫做同位角。

10. 内错角：两条直线被第三条直线所截，两个角分别在截线的两侧，且夹在两条被截直线之间，这样的两个角叫做内错角。

11. 同旁内角：两条直线被第三条直线所截，两个角分别在截线的同旁，且夹在两条被截直线之间，这样的两个角叫做同旁内角。

12. 平行线：在同一平面内，不相交的两条直线叫做平行线。

13. 判定：同位角相等，两直线平行；内错角相等，两直线平行；同旁内角互补，两直线平行。

14. 性质：两直线平行，同位角相等；内错角相等；同旁内角互补。

15. 垂线：当两条直线相交所成的四个角中，有一个角是直角时，就说这两条直线互相垂直。

16. 垂足：两条互相垂直的直线的交点叫做垂足。

17. 点到直线的距离：从直线外一点到这条直线的垂线段的长度，叫做点到直线的距离。

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Figure 1

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人口	126583	127583	128583	129583	130583	131583	132583	133583	134583	135583	136583	137583	138583	139583	140583	141583	142583	143583	144583	145583	146583	147583	148583	149583	150583	151583	152583	153583	154583	155583	156583	157583	158583	159583	160583	161583	162583	163583	164583	165583	166583	167583	168583	169583	170583	171583	172583	173583	174583	175583	176583	177583	178583	179583	180583	181583	182583	183583	184583	185583	186583	187583	188583	189583	190583	191583	192583	193583	194583	195583	196583	197583	198583	199583	200583	201583	202583	203583	204583	205583	206583	207583	208583	209583	210583	211583	212583	213583	214583	215583	216583	217583	218583	219583	220583	221583	222583	223583	224583	225583	226583	227583	228583	229583	230583	231583	232583	233583	234583	235583	236583	237583	238583	239583	240583	241583	242583	243583	244583	245583	246583	247583	248583	249583	250583	251583	252583	253583	254583	255583	256583	257583	258583	259583	260583	261583	262583	263583	264583	265583	266583	267583	268583	269583	270583	271583	272583	273583	274583	275583	276583	277583	278583	279583	280583	281583	282583	283583	284583	285583	286583	287583	288583	289583	290583	291583	292583	293583	294583	295583	296583	297583	298583	299583	300583	301583	302583	303583	304583	305583	306583	307583	308583	309583	310583	311583	312583	313583	314583	315583	316583	317583	318583	319583	320583	321583	322583	323583	324583	325583	326583	327583	328583	329583	330583	331583	332583	333583	334583	335583	336583	337583	338583	339583	340583	341583	342583	343583	344583	345583	346583	347583	348583	349583	350583	351583	352583	353583	354583	355583	356583	357583	358583	359583	360583	361583	362583	363583	364583	365583	366583	367583	368583	369583	370583	371583	372583	373583	374583	375583	376583	377583	378583	379583

[illegible]

TABLE 1. *Continued*

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1990年12月10日

1. 姓名: 王 明 (141) 性别: 男 (142) 年龄: 35 (143) 职业: 教师 (144) 电话: 138-1234-5678 (145) 地址: 北京市朝阳区

1990 年 11 月 10 日 星期一 晴 11 月 10 日 星期一 晴

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(d) 1. (i) 1991 年 12 月 31 日 1992 年 1 月 1 日 1992 年 12 月 31 日 1993 年 1 月 1 日

കുറ്റം ചെയ്തവർക്കു നൽകേണ്ട ശിക്ഷ തീർത്താൽ അതിൽ ഒരു വർഷം മാത്രം

അധികം വേണ്ട. ഇതിൽനിന്നും മറ്റൊരു വർഷം കൂടി ക്രമമായി ക്രമമായി ക്രമമായി

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On the eastern shore there are two main systems of fractures. The first system and the second system. In both systems the fractures are sub-parallel and in general, the two systems are at approximately right angles to each other. Within the eastern and western the Permit No. 1007 the principal near direction of the first system is north 35 degrees west and the principal near direction of the second system is north 55 degrees east. A third minor system, have termed the sub-parallel system, trends nearly north-south.

The principal fractures of great length can be seen and as these are considered to originate within the basement, it is assumed that all fractures plotted on the map are originated within the sedimentary section. Furthermore, as the fractures are short for this area it is very likely that they originate in the upper two thirds of the sedimentary section. As the surface of the Permit is relatively flat-lying no azimuth correction is necessary for this study. It has been demonstrated that the low incidence

anomalies on a mosaic are considerably larger than the subsurface feature which causes them.

There are two areas on the mosaic where the fractures are less intense than the surrounding area. Some fractures are always present within these areas but they always have a lower incidence than the surrounding area. These low intensity areas are important and it is quite likely that they are due to some subsurface feature. The type of feature will be discussed in the next section of this report.

STRUCTURE

Petroleum and Natural Gas Permit No. 5067 is located on the interior plain of the Northwest Territories about 60 miles west of the edge of the Pre-Cambrian Shield. The strike of the sedimentary rocks is about north 30 degrees west and the units dip to the southwest at a few tens of feet per mile.

Structural features which could be present and which could cause the low incidence anomalies mentioned in this report are discussed in order of probability.

(1) PRE-CAMBRIAN TOPOGRAPHY

Basement topography under Permit No. 5067 is thought to be much the same as it is today along the southwest edge of the Shield. Low rounded hills separated by gentle to abrupt valleys are seen on the Shield and these

features are undoubtedly present under the subject Permit. The effect of this Basement relief on the overlying sedimentary rocks is often great. The Granite Wash sand is usually present in the topographic "lows" on the Basement but absent on the "highs". The Granite Wash is an excellent potential reservoir.

Further effects of Basement topography on beds higher than the Granite Wash is gentle folding present over Basement hills. These folds are anticlines in every sense and could form traps for oil or gas.

Many small faults have been reported by A.W. Norris (1965) in the Basement and immediately overlying rocks and these features could cause closure within the sedimentary units.

2. DECONIAN REEFS

Deconian reefs strongly affect the
fracture pattern and control the distribu-
tion of gas and oil in the underlying
beds. Deconian reefs are present
west of the Permian and where could
well be present under the subject area

3. TECTONIC FOLDING & FALTING

The presence of tectonic folds is very
unlikely, but some normal faulting is
probably present.

4. TOPOGRAPHY RELIEF ON AN INTRA-SEDIMENTARY UNCONFORMITY

Unconformity, is a possible cause
of fracture intensity anomalies. But within
the Permian area it is unlikely that the
relief or any unconformities within the
sedimentary section is great enough to
affect the fracture pattern.

REFERENCES

BLANCHET, P.J. (1951)

"Development of Fracture Analysis as Exploration Method", Amer Assoc Petrol Geol Bull., Vol 41, No. 9, 1956-1959

BLANCHET, P.J. (1955)

"Concepts Applied to Fracture Analysis on Aerial Photographs", West Canadian Research Publications, Series 2, No 2

LAUDON, L.R. (1955)

Imperial River Section
McKenzie Mountains,
Northwest Territories, Canada
Bull., Amer Assoc Petrol
Geol., Vol 40, No 7,
pp 1555-1577

WILLIAMS, H.V. (1953)

Exploration East of McKenzie
River between Simpson and
Angley, Geol Surv Canada,
Bull. 102, pt 2, pp 56-
66 (1953)

WILHE, G.S. (1951)

The Lower McKenzie River
Area, Northwest Territories
and Yukon, Geol Surv Canada,
Bull. 97

NEELE, Joseph (1936)

A Reconnaissance across
MacKenzie Mountains on the
Pelly, Ross and Gravel
River; Geol. Surv. Canada,
Pub 1097, 1936

Formation Names in the
MacKenzie River Valley;
Science, Vol 63, No
2140, pp 14-15

NAUSS, A W

Upper Carcajou - Imperial
River Canal Reports
Lower MacKenzie River,
Canal Reports.

STELCK, C R

Upper Peel River Canal
Reports, Schooner Creek
Canal Reports, Carcajou
and Little Bear River Divide
Area Canal Reports, Bear
Rock and Bluefish Creek
Canal Reports.

MARTIN, L J. (1952)

Stratigraphy and Depositional
Tectonics of North Yukon -
Lower MacKenzie Area, Canada,
Bull. Amer. Assoc. Petrol.
Geol., Vol., 43, No 10, pp.
2399 - 2455.



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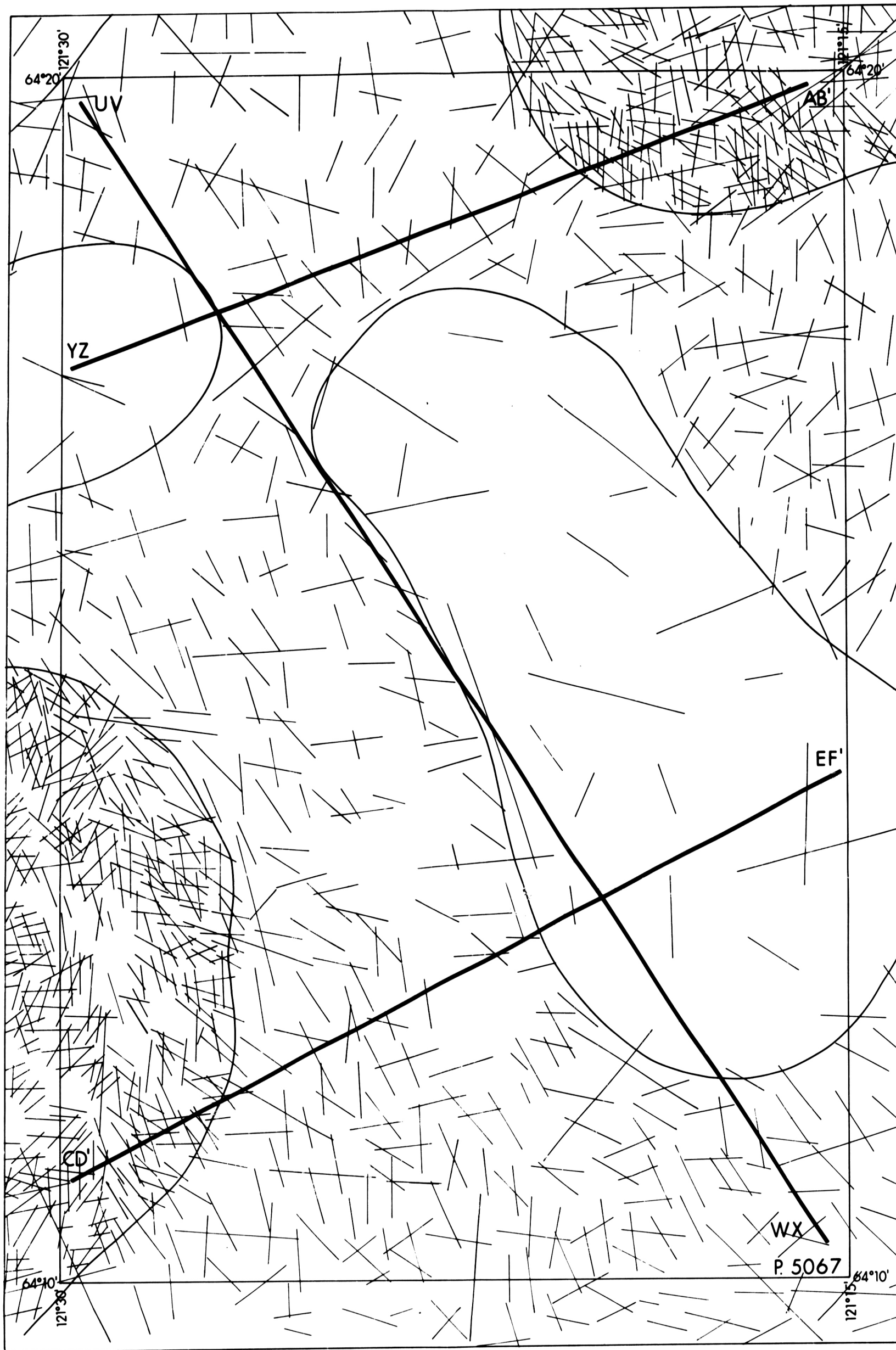


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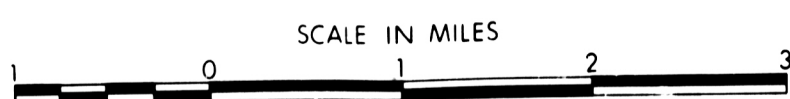







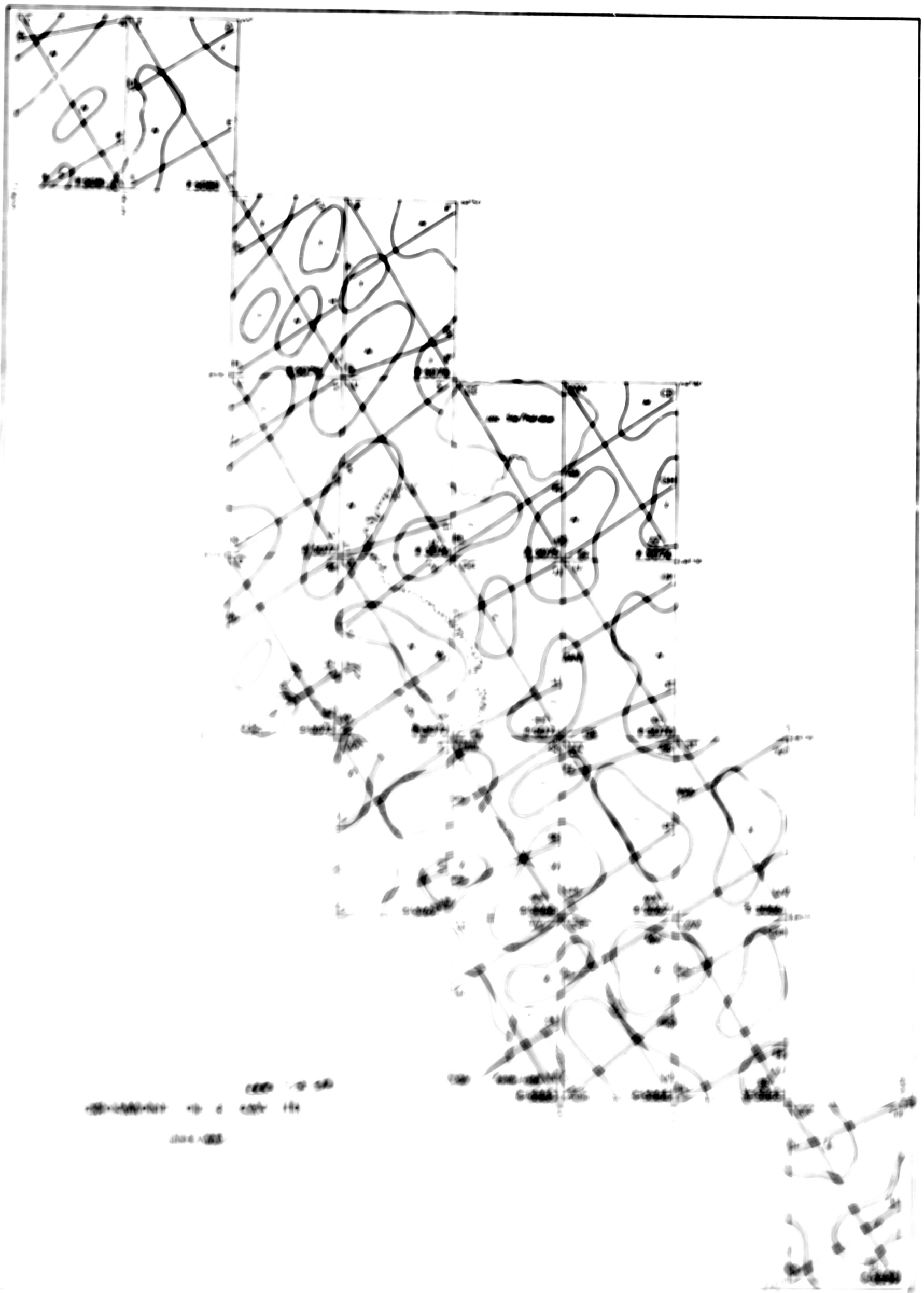
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TOTAL FRACTURE PATTERN



-  LOW DENSITY
-  NORMAL DENSITY
-  HIGH DENSITY



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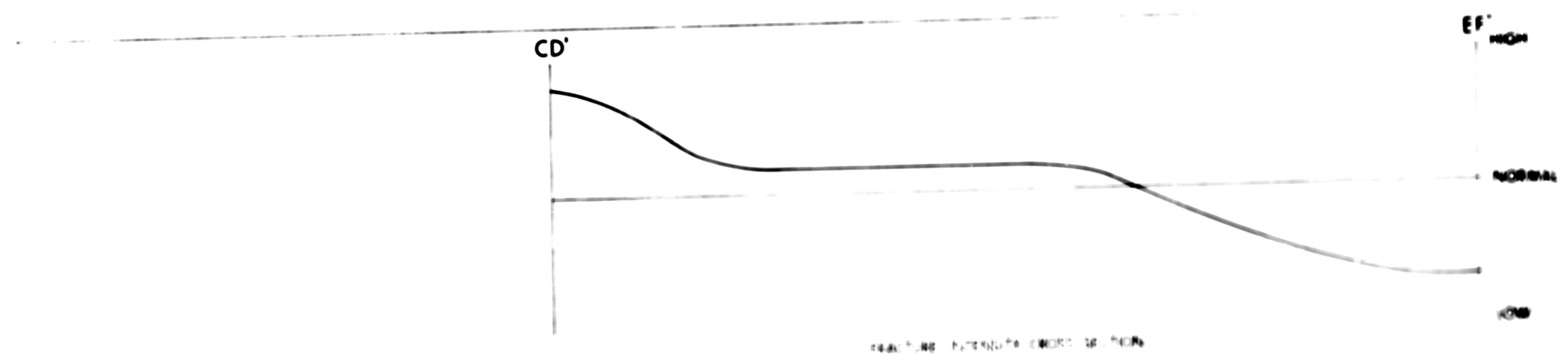
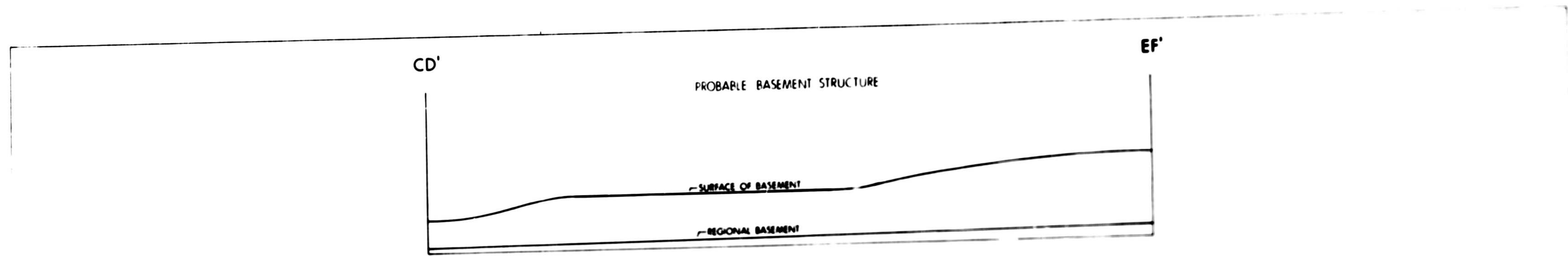
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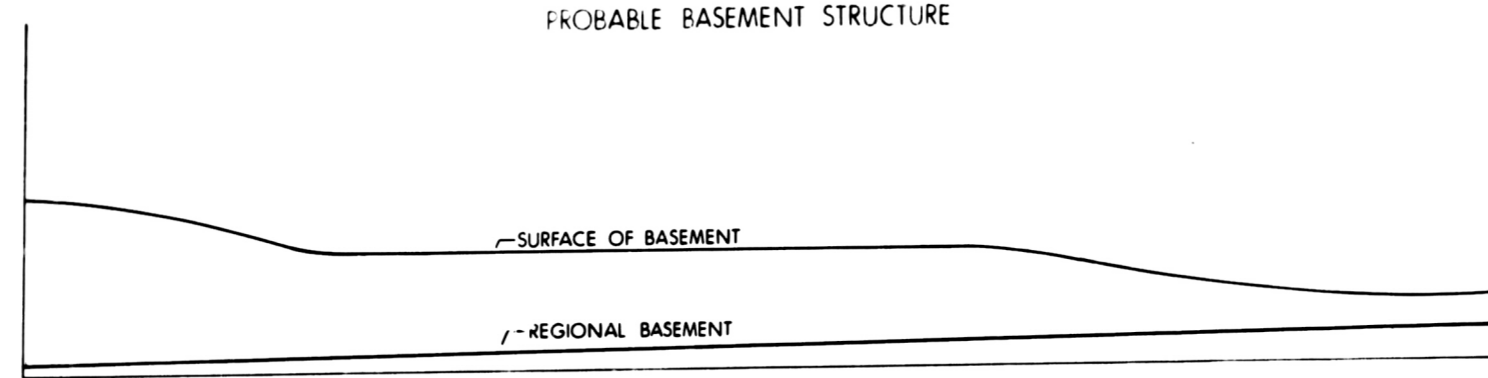
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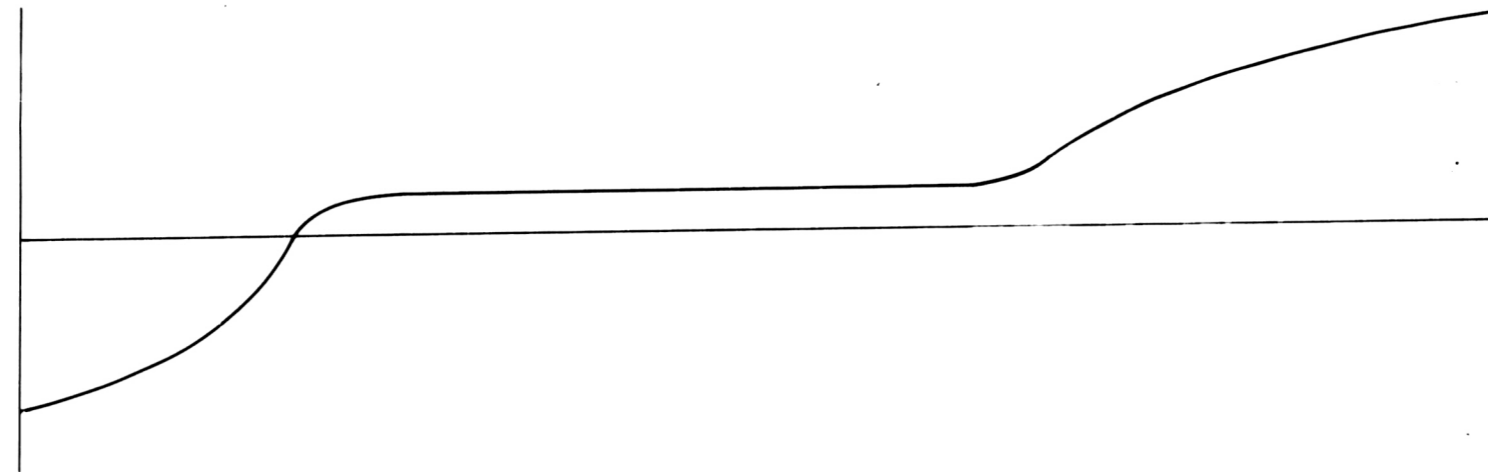
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