Report 75-3

GRAVEL RESOURCES OF THE RED DEER AREA

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GRAVEL RESOURCES OF THE RED DEER AREA

Increasing demands for quality gravel prompted an investigation for additional reserves within central Alberta. For the purpose of this report the area within a radius of approximately 25 miles from the City of Red Deer was chosen for study. In terms of the encompassing townships the area may be described as lying between range 23 west of the fourth meridian and range 3 west of the fifth meridian, and between townships 34 and 42 (Fig. 1). An area of approximately 3,000 square miles is thus included. The major parts of the counties of Red Deer and Lacombe fall within the study region.

The bedrock underlying the entire area belongs to the nonmarine Tertiary and Upper Cretaceous Paskapoo Formation which consists of grey to greenish grey, thick-bedded, calcareous, cherty sandstone; grey and green mudstone; minor carbonate, thin limestone, coal and tuff beds (Green, 1972). The overlying surficial deposits of most of the area have been mapped by Stalker (1956, 1960) and Bayrock, Boydell and Reimchen (1974). A reconnaissance mapping of the southwest portion was carried out by the writer. A simplified composite map of the surficial geology is presented in figure 2.

Investigations for gravel during the summer of 1973 were confined to areas blanketed by preglacial deposits, glaciofluvial deposits (including outwash, deltaic, esker and lag gravel deposits), and recent alluvium and terrace deposits as outlined in figures 3, 4, 5 and 6. Surrounding deposits include tills, lacustrine materials and sand dunes which yield little or no coarse-grained sediments. Topographic base maps on a scale of 1:50,000 were employed for surface control. Air photos were scanned to provide further interpretation with respect to the areal extent of deposits and location of pits and exposures. Prospective areas were visited and bulk sampled. Drilling was undertaken to supplement surface information and as a result approximately 200 auger holes were drilled with a truck-mounted 8-inch auger at regular intervals within promising areas. Drilling was
FIGURE 1. Location of study area.
FIGURE 2. Surficial geology.
commonly confined to depths of less than 25 feet and sites were selected only along road allowances. Satisfactory samples were obtained from drilling although few materials greater than 3 inches in diameter were recovered. Testhole data from records in the files of the Groundwater Division were used in addition to information obtained from the 1973 drilling program.

Location of pits, exposures and testholes are given in figures 3 to 6. The depth of gravel in each occurrence is indicated wherever the thickness exceeds 5 feet. Sample numbers of each are given and the pertinent analyses may be referred to in tables 1 and 2 and in appendices B, C and D of this report.

Table 1. Coal Content of the Sand Fraction (minus #8) of Pit Samples

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Percent Coal</th>
<th>Sample No.</th>
<th>Percent Coal</th>
<th>Sample No.</th>
<th>Percent Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.86</td>
<td>21</td>
<td>0.89</td>
<td>41</td>
<td>0.06</td>
</tr>
<tr>
<td>2</td>
<td>0.35</td>
<td>22</td>
<td>1.58</td>
<td>42</td>
<td>0.43</td>
</tr>
<tr>
<td>3</td>
<td>0.23</td>
<td>23</td>
<td>0.70</td>
<td>43</td>
<td>0.05</td>
</tr>
<tr>
<td>4</td>
<td>0.34</td>
<td>24</td>
<td>2.05</td>
<td>44</td>
<td>0.20</td>
</tr>
<tr>
<td>5</td>
<td>0.08</td>
<td>25</td>
<td>1.11</td>
<td>45</td>
<td>0.29</td>
</tr>
<tr>
<td>6</td>
<td>0.09</td>
<td>26</td>
<td>0.26</td>
<td>46</td>
<td>0.33</td>
</tr>
<tr>
<td>7</td>
<td>0.05</td>
<td>27</td>
<td>0.31</td>
<td>47</td>
<td>0.43</td>
</tr>
<tr>
<td>8</td>
<td>0.30</td>
<td>28</td>
<td>0.04</td>
<td>48</td>
<td>0.41</td>
</tr>
<tr>
<td>9</td>
<td>0.04</td>
<td>29</td>
<td>0.15</td>
<td>49</td>
<td>0.18</td>
</tr>
<tr>
<td>10</td>
<td>3.18</td>
<td>30</td>
<td>0.33</td>
<td>50</td>
<td>0.16</td>
</tr>
<tr>
<td>11</td>
<td>0.45</td>
<td>31</td>
<td>0.77</td>
<td>51</td>
<td>0.22</td>
</tr>
<tr>
<td>12</td>
<td>0.61</td>
<td>32</td>
<td>0.42</td>
<td>52</td>
<td>0.14</td>
</tr>
<tr>
<td>13</td>
<td>0.37</td>
<td>33</td>
<td>0.14</td>
<td>53</td>
<td>0.23</td>
</tr>
<tr>
<td>14</td>
<td>0.91</td>
<td>34</td>
<td>0.22</td>
<td>54</td>
<td>0.42</td>
</tr>
<tr>
<td>15</td>
<td>0.38</td>
<td>35</td>
<td>0.37</td>
<td>55</td>
<td>0.10</td>
</tr>
<tr>
<td>16</td>
<td>1.22</td>
<td>36</td>
<td>0.58</td>
<td>56</td>
<td>0.19</td>
</tr>
<tr>
<td>17</td>
<td>0.61</td>
<td>37</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>0.93</td>
<td>38</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>0.31</td>
<td>39</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>1.38</td>
<td>40</td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Coal Content of the Sand Fraction (minus #8) of Exposure Samples

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Percent Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.54</td>
</tr>
<tr>
<td>B</td>
<td>0.51</td>
</tr>
<tr>
<td>C</td>
<td>0.13</td>
</tr>
<tr>
<td>D</td>
<td>2.69</td>
</tr>
<tr>
<td>E</td>
<td>0.10</td>
</tr>
<tr>
<td>F</td>
<td>0.29</td>
</tr>
</tbody>
</table>

As coal is a particularly undesirable material in gravel aggregate, coal contents were determined for the minus #8 sieve fraction of pit and exposure samples, according to the Alberta Highways and Transport laboratory procedures.

Sieve analyses were run on all samples and deviate from ASTM and Alberta Highways and Transport procedures only in the use of a slightly different nest of coarse sieves.

Pebble counts were run on the minus 1 1/4-inch and plus 5/8-inch fraction of pit and exposure samples. Quartzite pebbles were counted independently of metamorphics, which normally consist of gneisses. The chert typically shows very little indication of erosional deterioration and, although some workers discourage the use of chert-bearing gravels (Price, 1958), there appears to be little concern for its effects in regular usage. The sandstones vary considerably from soft Paskapoo-derived rock to well-cemented Lower Cretaceous materials. Deposits which contain high percentages of igneous and metamorphic rock are of good quality except in areas where weathering has produced friable pebbles. Vein quartz was arbitrarily counted with igneous pebbles. Shale and ironstone are normally considered detrimental materials.
Some indication is given of the degree of roundness of the pit and exposure pebbles retained on the 5/8-inch mesh sieve (Plates 1 and 2; Appendices B and C). The ultimate use of the gravel will dictate the roundness desired.

Descriptions of the amount of surface incrustation are provided for pit and exposure samples in appendices B and C, respectively (minus 1 1/4-inch, plus 5/8-inch mesh fraction). Extreme incrustation is applied to gravels including a larger number of pebbles with one-half or greater of their surface covered with a carbonate layer. Moderate incrustation is used to describe gravels with a larger number of pebbles with one-quarter to one-half the surface covered. Gravels having pebbles with small patches of carbonate scale on the surface are classified as having slight incrustation.

Properly graded quartzite-rich gravels are much preferred as a quality product except where crushing costs rise as a result of working harder rock. Preglacial gravels have particularly high contents of quartzite; therefore, those deposits located west of Lacombe in township 41, range 27, west of the fourth meridian are regarded as excellent.

Recent alluvial and Pleistocene outwash deposits normally include good quality gravels, although the former are frequently somewhat inaccessible in deeper river valleys and the latter are more unpredictable in occurrence (for example, major outwash deposits such as those in the Lacombe-Red Deer and Pine Lake areas contain predominantly sand). However, commercial quantities of good quality gravel from this source are outlined in this report. Outwash sheets in the Markerville and Huxley areas appear to be almost entirely devoid of gravel. Localized occurrences of outwash deposits constitute some of the most important gravel sources in many parts of the area (for example, in the Ponoka, Tees and Eckville areas). Lag gravel materials are of poor quality. They typically contain high contents of clay and silt and high percentages of weak and friable pebbles such as shale and sandstones, both probably derived from local bedrock.
Eskers have been important sources of gravel in a few localities but large reserves of coarse sediments are relatively rare within them. Associated kame or outwash complexes, such as the one located in township 41, range 2, west of the fifth meridian, are of considerable importance.

REFERENCES CITED

Surficial geology of the Rocky Mountain House area; Alberta Research Map, scale 1:250,000.


PLATE 1. Pebbles retained on the 5/8-inch sieve

FIGURE 1. Pit 5, SE Sec. 5, Tp. 41, R. 27, W. 4 Mer; quartzite rich, subround and broken, no inorustation.

FIGURE 2. Pit 30, S 1/2 Sec. 27, Tp. 37, R. 24, W. 4 Mer; quartzite and granite, subangular, moderate inorustation.
PLATE 2. Pebbles retained on the 5/8-inch sieve

FIGURE 1. Pit 29, SE Sec. 13, Tp. 37, R. 24, W. 4 Mer; igneous rich, subangular to subrounded, extreme incrustation.

FIGURE 2. Pit 40, NE Sec. 12, Tp. 36, R. 2, W. 5 Mer; carbonate rich, subrounded, very slight incrustation.
APPENDIX A

GLOSSARY
Aeolian: deposited by wind action.

Alluvial/alluvium: pertaining to sediments of relatively recent time deposited by rivers.

Drumlin: oval to elongate hill composed of till, formed beneath flowing ice, with its long axis parallel to the direction of ice movement.

Esker: sinuous ridge of gravel and sand deposited from channels in a decaying glacier or ice sheet through which streams passed.

Glaciofluvial: pertaining to sediment deposited by streams flowing from glacier ice.

Ground moraine: till with nearly level to gently undulating topography.

Hummocky moraine: till forming rolling or hummocky topography.

Kame: a mound commonly composed of gravel and sand whose form is the result of original deposition against or upon melting ice.

Lacustrine: deposits laid down under water on the bed of a lake.

Outwash: sediment deposited by meltwater streams beyond active glacier ice.

Pleistocene: glacial epoch or ice age.

Preglacial: pertaining to or occurring in geologic time before the glacial epoch.

Stagnant ice deposits: pertaining to sediments deposited beneath ice which has ceased to move.

Surficial: unconsolidated materials lying on the bedrock.

Till: nonsorted, nonstratified sediment, composed mainly of a mixture of clay, sand and gravel, deposited by a glacier or ice sheet.
APPENDIX B

RESULTS OF ANALYSES FOR PIT SAMPLES
HISTOGRAMS OF SIEVE ANALYSES

SAMPLE NO.: Pit 1
DEPTH: 0-20
LOCATION: WI/2 23-39-27W4

SAMPLE NO.: Pit 2
DEPTH: 0-10
LOCATION: NW 21-34-2W5

SAMPLE NO.: Pit 3
DEPTH: 0-2
LOCATION: NE 9-35-2W5

SAMPLE NO.: Pit 4
DEPTH: 0-8
LOCATION: NE 6-35-2W5
**Cumulative Wt. %**

**MESH SIZE (U.S.)**

- 64
- 32
- 16
- 8
- 4.8
- 2.4
- 1.2
- 0.6
- 0.3
- 0.15
- 0.07 < 0.07 mm.

**SAMPLE NO.:** PH 5  
**DEPTH:** 0 - 10  
**LOCATION:** SE 5-41-27W4

**Cumulative Wt. %**

**MESH SIZE (U.S.)**

- 64
- 32
- 16
- 8
- 4.8
- 2.4
- 1.2
- 0.6
- 0.3
- 0.15
- 0.07 < 0.07 mm.

**SAMPLE NO.:** PH 6  
**DEPTH:** 3 - 15  
**LOCATION:** W 1/2 4-41-27W4

**Cumulative Wt. %**

**MESH SIZE (U.S.)**

- 64
- 32
- 16
- 8
- 4.8
- 2.4
- 1.2
- 0.6
- 0.3
- 0.15
- 0.07 < 0.07 mm.

**SAMPLE NO.:** PH 7  
**DEPTH:** 3 - 20  
**LOCATION:** SE 16-41-27W4

**Cumulative Wt. %**

**MESH SIZE (U.S.)**

- 64
- 32
- 16
- 8
- 4.8
- 2.4
- 1.2
- 0.6
- 0.3
- 0.15
- 0.07 < 0.07 mm.

**SAMPLE NO.:** PH 8  
**DEPTH:** 2 - 5  
**LOCATION:** SW 27-41-27W4
SAMPLE NO.: Plt 17  
DEPTH: 2-6  
LOCATION: N1/2 31-40-23W4

SAMPLE NO.: Plt 18  
DEPTH: 2-5  
LOCATION: S1/2 29-40-23W4

SAMPLE NO.: Plt 19  
DEPTH: 0-5  
LOCATION: NW12-41-28W4

SAMPLE NO.: Plt 20  
DEPTH: 3  
LOCATION: S1/2 25-41-24W4
**Cumulative Wt. %**

**WEIGHT (%)**

**WEIGHT (%)**

**MESH SIZE (U.S.)**

64 32 16 8 4.8 2.4 1.2 0.6 0.3 0.15 0.07 <0.07 mm.

**SAMPLE NO.:** Pit 21
**DEPTH:** 3–6
**LOCATION:** W 1/2 36–40-24 W 4

**Cumulative Wt. %**

**WEIGHT (%)**

**WEIGHT (%)**

**MESH SIZE (U.S.)**

64 32 16 8 4.8 2.4 1.2 0.6 0.3 0.15 0.07 <0.07 mm.

**SAMPLE NO.:** Pit 22
**DEPTH:** 2–5
**LOCATION:** NW 33–38-23 W 4

**Cumulative Wt. %**

**WEIGHT (%)**

**WEIGHT (%)**

**MESH SIZE (U.S.)**

64 32 16 8 4.8 2.4 1.2 0.6 0.3 0.15 0.07 <0.07 mm.

**SAMPLE NO.:** Pit 24
**DEPTH:** 0–15
**LOCATION:** SW 18–38-23 W 4
SAMPLE NO.: P1 45
DEPTH: 1-7
LOCATION: SE 14-35-23W4

SAMPLE NO.: P1 46
DEPTH: 4-11
LOCATION: N1/2 12-36-28W4

SAMPLE NO.: P1 47
DEPTH: 0-7
LOCATION: NW 27-38-27W4

SAMPLE NO.: P1 48
DEPTH: 0-7
LOCATION: NE 20-39-27W4
SAMPLE NO.: Pt 49
DEPTH: 4-16
LOCATION: W1/2 11-41-2W5

SAMPLE NO.: Pt 50
DEPTH: 4-8
LOCATION: NE 14-35-3W5

SAMPLE NO.: Pt 51
DEPTH: 3
LOCATION: NE 11-35-3W5

SAMPLE NO.: Pt 52
DEPTH: 6-10
LOCATION: S1/2 43-43W4
SAMPLE NO.: Pi 53
DEPTH: 3-6
LOCATION: NE 34-34-2SW4

SAMPLE NO.: Pi 54
DEPTH: 10-19
LOCATION: NE 8-36-28W4

SAMPLE NO.: Pi 55
DEPTH: 9-12
LOCATION: SE 5-39-27W4

SAMPLE NO.: Pi 56
DEPTH: 4-6
LOCATION: W1/2 29-35-28W4
SAMPLE NO.: Plot 57
DEPTH: 2 - 3
LOCATION: NE 10-38-27W4
SAMPLE NO.: Pit 5
DEPTH: 0 - 10
LOCATION: SE 1/4 41-27W4

SAMPLE NO.: Pit 6
DEPTH: 3 - 15
LOCATION: SW 1/4 41-27W4

SAMPLE NO.: Pit 7
DEPTH: 3 - 20
LOCATION: SE 1/4 41-27W4

SAMPLE NO.: Pit 8
DEPTH: 2 - 5
LOCATION: SW 1/4 41-27W4
SAMPLE NO.: Pit 9  
DEPTH: 1 - 2  
LOCATION: E 1/2 22-41-27W4  

SAMPLE NO.: Pit 10  
DEPTH: 0 - 6  
LOCATION: N 1/2 22-42-36W4  

SAMPLE NO.: Pit 11  
DEPTH: 5  
LOCATION: SW 25-42-26W4  

SAMPLE NO.: Pit 12  
DEPTH: 10 - 15  
LOCATION: SW 35-42-26W4
**SAMPLE NO.:** Ph 13  
**DEPTH:** 4 - 6  
**LOCATION:** SW 27-42-26W4

**SAMPLE NO.:** Ph 14  
**DEPTH:** 0 - 5  
**LOCATION:** N1/2 1-42-25W4

**SAMPLE NO.:** Ph 15  
**DEPTH:** 12 - 15  
**LOCATION:** SE 16-40-1WS

**SAMPLE NO.:** Ph 16  
**DEPTH:** 6 - 10  
**LOCATION:** E1/2 21-39-27W4

Pebble  
*Angularity:* Subangular to Subangular  
*Surface Incrustation:* Slight

Pebble  
*Angularity:* Subangular to Subangular  
*Surface Incrustation:* Slight

Pebble  
*Angularity:* Subangular  
*Surface Incrustation:* Nil

Pebble  
*Angularity:* Subangular to Subangular  
*Surface Incrustation:* Nil
**SAMPLE NO.: PA 33**
**DEPTH:** 0 - 8
**LOCATION:** NE 4-37-25W4

**SAMPLE NO.: PA 34**
**DEPTH:** 0 - 35
**LOCATION:** N1/2 28-36-25W4

**SAMPLE NO.: PA 35**
**DEPTH:** 0 - 3
**LOCATION:** S1/2 5-37-28W4

**SAMPLE NO.: PA 36**
**DEPTH:** 3 - 23
**LOCATION:** SE 29-36-28W4
SAMPLE NO.: Pl 37
DEPTH: 7 - 10
LOCATION: SE 13-40-28W4

SAMPLE NO.: Pl 39
DEPTH: 1 - 5
LOCATION: 51/2 16-39-2WS

SAMPLE NO.: Pl 38
DEPTH: 1 - 4
LOCATION: E 1/2 5-41-3WS

SAMPLE NO.: Pl 40
DEPTH: 3 - 10
LOCATION: NE 12-36-2WS
SAMPLE NO.: Plt 53
DEPTH: 3 - 6
LOCATION: NE 34-34-25W4

SAMPLE NO.: Plt 54
DEPTH: 10 - 19
LOCATION: NE 8-36-20W4

Pebble
Angularity: Subrounded to Subangular
Surface Incrustation: Moderate

Pebble
Angularity: Subrounded to Subangular
Surface Incrustation: Nil
APPENDIX C

RESULTS OF ANALYSES FOR EXPOSURE SAMPLES
HISTOGRAMS OF SIEVE ANALYSES

**SAMPLE NO.:** Exposure A  
**DEPTH:** 2-5  
**LOCATION:** SE 5-42-26W4

**SAMPLE NO.:** Exposure B  
**DEPTH:** 0-4  
**LOCATION:** NE 7-41-24W4

**SAMPLE NO.:** Exposure C  
**DEPTH:** 30-40  
**LOCATION:** SE 24-39-27W4

**SAMPLE NO.:** Exposure D  
**DEPTH:** 0-25  
**LOCATION:** NW 12-40-23W4
SAMPLE NO.: Exposure E
DEPTH: 5-10
LOCATION: S1/2 19-38-27W4

SAMPLE NO.: Exposure F
DEPTH: 0-8
LOCATION: NW 9-36-28W4
HISTOGRAMS OF PEBBLE COUNTS

SAMPLE NO.: Exposure A
DEPTH: 2 - 5
LOCATION: SE 5-42-26W4

SAMPLE NO.: Exposure B
DEPTH: 0 - 4
LOCATION: NE 7-41-26W4

SAMPLE NO.: Exposure C
DEPTH: 30 - 40
LOCATION: SE 26-39-27W4

SAMPLE NO.: Exposure D
DEPTH: 0 - 25
LOCATION: NW 12-40-23W4

Pebble Angularity: Subrounded
Surface Incrustation: Nil

Pebble Angularity: Subrounded
Surface Incrustation: Moderate

Pebble Angularity: Subrounded
Surface Incrustation: Nil

Pebble Angularity: Subrounded
Surface Incrustation: Nil

Less than 1%
SAMPLE NO.: Exposure E
DEPTH: 5 - 10
LOCATION: 51/2 19-36-27/W4

SAMPLE NO.: Exposure F
DEPTH: 0 - 8
LOCATION: NW 9-36-28/W4
APPENDIX D

HISTOGRAMS OF SIEVE ANALYSES FOR TESTHOLE SAMPLES
**Cumulative Wt. %**

**SAMPLE NO.:** Hole 1  
**DEPTH:** 12, 27  
**LOCATION:** W 1/2 18-36-1WS

**Cumulative Wt. %**

**SAMPLE NO.:** Hole 2  
**DEPTH:** 13, 27  
**LOCATION:** SE 13-36-2WS

**Cumulative Wt. %**

**SAMPLE NO.:** Hole 3  
**DEPTH:** 18  
**LOCATION:** S 1/2 18-36-1WS

**Cumulative Wt. %**

**SAMPLE NO.:** Hole 4  
**DEPTH:** 9, 33, 37, 33  
**LOCATION:** SW 30-35-2WS
Cumulative Wt. %

Sample No.: Hole 5
Depth: 12, 23
Location: NW 21-35-2W5

Sample No.: Hole 6
Depth: 9
Location: SW 4-33-2W5

Sample No.: Hole 7
Depth: 12
Location: 51/2 29-36-2W4

Sample No.: Hole 8
Depth: 18
Location: SW 20-36-2W4
SAMPLE NO.: Hole 9
DEPTH: 12
LOCATION: SE 31-36-2W4

SAMPLE NO.: Hole 10
DEPTH: 8
LOCATION: NW 3-40-27W4

SAMPLE NO.: Hole 11
DEPTH: 8
LOCATION: SW 17-39-27W4

SAMPLE NO.: Hole 12
DEPTH: 18
LOCATION: NE 3-40-29W4
**Cumulative Wt. X**

**SAMPLE NO.:** Hole 13  
**DEPTH:** 7, 18  
**LOCATION:** N1/2 10-42-24W4

**Cumulative Wt. X**

**SAMPLE NO.:** Hole 14  
**DEPTH:** 6  
**LOCATION:** SE 1B-41-24W4

**Cumulative Wt. X**

**SAMPLE NO.:** Hole 15  
**DEPTH:** 12  
**LOCATION:** NW 5-41-24W4

**Cumulative Wt. X**

**SAMPLE NO.:** Hole 16  
**DEPTH:** 6  
**LOCATION:** SE 32-40-24W4
SAMPLE NO.: Hole 21
DEPTH: 3
LOCATION: SE 28-39-23W4

SAMPLE NO.: Hole 22
DEPTH: 10
LOCATION: NW 34-37-25W4

SAMPLE NO.: Hole 23
DEPTH: 12
LOCATION: SW 4-38-25W4

SAMPLE NO.: Hole 24
DEPTH: 5
LOCATION: NW 1-38-25W4
**Cumulative Wt. %**

**WEIGHT (g)**

**MESH SIZE (U.S.)**

**SAMPLE NO.:** Hole 25  
**DEPTH:** 6  
**LOCATION:** SE 3-37-25W4

**Cumulative Wt. %**

**WEIGHT (g)**

**MESH SIZE (U.S.)**

**SAMPLE NO.:** Hole 26  
**DEPTH:** 12  
**LOCATION:** 51/2 36-36-25W4

**Cumulative Wt. %**

**WEIGHT (g)**

**MESH SIZE (U.S.)**

**SAMPLE NO.:** Hole 27  
**DEPTH:** 20  
**LOCATION:** NW 1-35-25W4

**Cumulative Wt. %**

**WEIGHT (g)**

**MESH SIZE (U.S.)**

**SAMPLE NO.:** Hole 28  
**DEPTH:** 8  
**LOCATION:** NW 31-40-25W4
FIGURE 3. GRAVEL RESOURCES OF THE RED DEER AREA NORTHWEST SEGMENT

LEGEND

Surficial Geology
- Present alluvial deposits (calligraphic)
- MS above (tertiary)
- U.S. Cretaceous deposits (calligraphic)
- M.P. Cretaceous deposits (calligraphic)
- Pre-Cretaceous deposits

Test Holes
- Test hole on the northwest segment (dot)
- Test hole on the eastern segment (dot)

Gravel Pits
- Gravel pit on the western segment (dot)
- Gravel pit on the eastern segment (dot)

Exposures
- Exposures on the western segment (dot)
- Exposures on the eastern segment (dot)

Highways
- Major highway, two lane
- Minor highway, two lane
- Secondary highway

To accompany Alberta Research Council Report 152
By R. D. Miller

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FIGURE 4. GRAVEL RESOURCES OF THE RED DEER AREA (NORTHEAST SEGMENT)
FIGURE 5. GRAVEL RESOURCES OF THE RED DEER AREA (SOUTHWEST SEGMENT)