



# OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

April 7, 1982

Inco Resources, Inc.  
8100 Marty, Suite 117  
Overland Park, Kansas 66204

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the Davis Lease, Well No. 12, located in Franklin County, Kansas and submitted to our laboratory on March 30, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

3 c to Overland Park, Kansas  
2 c to Larry Brown, Hutchinson, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Inco Resources, Inc. Lease Davis Well No. 12  
 Location 1800' SNL & 330' WEL, NW¼  
 Section 33 Twp 17S Rge 21E County Franklin State Kansas

Elevation, Feet - - - - -

| Name of Sand                 | Brown Limestone  | First Squirrel | Second Squirrel |
|------------------------------|------------------|----------------|-----------------|
| Top of Core                  | 569.0            | 583.0          | 646.0           |
| Bottom of Core               | 574.6            | 588.6          | 662.0           |
| Top of Sand                  | 569.0            | 583.3          | 646.0           |
| Bottom of Sand               | * (Tested) 574.2 | 587.5          | 652.2           |
| Total Feet of Permeable Sand | 5.2              | 4.2            | 2.9             |
| Total Feet of Floodable Sand | 0.0              | 0.0            | 0.9             |

Distribution of Permeable Sand:  
Permeability Range  
Millidarcys

Feet

Cum. Ft.

|                             | Feet | Cum. Ft. |
|-----------------------------|------|----------|
| <u>BROWN LIMESTONE</u>      |      |          |
| 0 - 4                       | 4.5  | 4.5      |
| 25 - 27                     | 0.7  | 5.2      |
| <u>FIRST SQUIRREL SAND</u>  |      |          |
| 0 - 2                       | 3.9  | 3.9      |
| 3 - 4                       | 0.3  | 4.2      |
| <u>SECOND SQUIRREL SAND</u> |      |          |
| 0 - 2                       | 1.8  | 1.8      |
| 14 - 16                     | 1.1  | 2.9      |

|                                                                 |        |        |                      |
|-----------------------------------------------------------------|--------|--------|----------------------|
| Average Permeability Millidarcys                                | 4.6    | 0.64   | 6.2                  |
| Average Percent Porosity                                        | 14.2   | 16.5   | 14.3                 |
| Average Percent Oil Saturation                                  | 29.8   | 28.6   | 35.0                 |
| Average Percent Water Saturation                                | 42.9   | 59.8   | 54.4                 |
| Average Oil Content, Bbls./A. Ft.                               | 315.   | 370.   | 378.                 |
| Total Oil Content, Bbls./Acre                                   | 1,638. | 1,555. | 1,890.               |
| Average Percent Oil Recovery by Laboratory Flooding Tests       | 0.     | 0.     | 15.2                 |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. | 0.     | 0.     | 166.                 |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre     | 0.     | 0.     | 149.                 |
| Total Calculated Oil Recovery, Bbls./Acre                       | 0.     | 0.     | See "Cal. Rec." Sec. |

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## GENERAL INFORMATION & SUMMARY

Company Inco Resources, Inc. Lease Davis Well No. 12  
 Location 1800' SNL & 330' WEL, NW¼  
 Section 33 Twp 17S Rge 21E County Franklin State Kansas

Elevation, Feet - - - - -

| Name of Sand                           | Cattleman | Bartlesville |
|----------------------------------------|-----------|--------------|
| Top of Core - - - - -                  | 693.0     | 767.0        |
| Bottom of Core - - - - -               | 703.6     | 787.0        |
| Top of Sand - - - - - * (Tested)       | * 693.7   | 767.0        |
| Bottom of Sand - - - - - * (Tested)    | 702.0     | * 786.0      |
| Total Feet of Permeable Sand - - - - - | 7.5       | 19.0         |
| Total Feet of Floodable Sand - - - - - | 7.5       | 3.0          |

**Distribution of Permeable Sand:**  
 Permeability Range  
 Millidarcys

Feet

Cum. Ft.

CATTLEMAN SAND

|         |     |     |
|---------|-----|-----|
| 0 - 11  | 1.7 | 1.7 |
| 23 - 37 | 2.5 | 4.2 |
| 54 - 93 | 3.3 | 7.5 |

BARTLESVILLE SAND

|             |     |      |
|-------------|-----|------|
| 0 - 9       | 6.9 | 6.9  |
| 69 - 138    | 3.1 | 10.0 |
| 208 - 547   | 4.0 | 14.0 |
| 687 - 949   | 3.0 | 17.0 |
| 1226 - 1240 | 2.0 | 19.0 |

|                                                                           |                                                   |        |
|---------------------------------------------------------------------------|---------------------------------------------------|--------|
| Average Permeability Millidarcys - - - - -                                | 43.1                                              | 368.5  |
| Average Percent Porosity - - - - -                                        | 18.6                                              | 20.2   |
| Average Percent Oil Saturation - - - - -                                  | 62.1                                              | 17.4   |
| Average Percent Water Saturation - - - - -                                | 19.8                                              | 67.8   |
| Average Oil Content, Bbls./A. Ft. - - - - -                               | 887.                                              | 297.   |
| Total Oil Content, Bbls./Acre - - - - -                                   | 6,655.                                            | 5,640. |
| Average Percent Oil Recovery by Laboratory Flooding Tests - - - - -       | 23.6                                              | 2.3    |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - | 341.                                              | 45.    |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - -     | 2,560.                                            | 134.   |
| Total Calculated Oil Recovery, Bbls./Acre - - - - -                       | See "Calculated Recovery" Section for both sands. |        |

The core was sampled by a representative of Oilfield Research Laboratories. Air and KCI water were used as a drilling fluid. The core was reported to be from a non-virgin area.

Since only the Second Squirrel sand, the Cattleman sand, and the Bartlesville sand responded to flooding susceptibility tests, calculated recovery is given for these sands only.

#### FORMATION CORED

The detailed log of the formation cored is as follows:

| <u>Depth Interval,<br/>Feet</u> | <u>Description</u>                                                 |
|---------------------------------|--------------------------------------------------------------------|
| <u>BROWN LIMESTONE</u>          |                                                                    |
| 569.0 - 571.0                   | Grayish brown calcareous shaly sandstone.                          |
| 571.0 - 571.7                   | Grayish brown calcareous fossiliferous sandstone.                  |
| 571.7 - 574.2                   | Grayish brown calcareous shaly sandstone.                          |
| 574.2 - 574.6                   | Grayish brown very shaly calcareous sandstone.                     |
| 574.6 - 583.0                   | No core.                                                           |
| <u>FIRST SQUIRREL SAND</u>      |                                                                    |
| 583.0 - 583.3                   | Gray shale.                                                        |
| 583.3 - 583.6                   | Brown shaly sandstone.                                             |
| 583.6 - 587.5                   | Gray very shaly sandstone with scattered brown sandstone partings. |
| 587.5 - 588.6                   | Gray shale.                                                        |
| 588.6 - 646.0                   | No core.                                                           |
| <u>SECOND SQUIRREL SAND</u>     |                                                                    |
| 646.0 - 646.5                   | Alternate layers gray shale and brown sandstone.                   |
| 646.5 - 647.0                   | Gray limestone.                                                    |

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|               |                                                          |
|---------------|----------------------------------------------------------|
| 647.0 - 647.2 | Brown very shaly sandstone.                              |
| 647.2 - 647.6 | Dark brown shaly sandstone.                              |
| 647.6 - 648.7 | Gray and brown laminated shale and sandstone.            |
| 648.7 - 649.8 | Gray very shaly sandstone with brown sandstone partings. |
| 649.8 - 650.3 | Brown shaly sandstone.                                   |
| 650.3 - 652.2 | Grayish brown very shaly sandstone.                      |
| 652.2 - 662.0 | Gray shale.                                              |
| 662.0 - 693.0 | No core.                                                 |

CATTLEMAN SAND

|               |                                                                   |
|---------------|-------------------------------------------------------------------|
| 693.0 - 693.7 | Gray and brown laminated slightly calcareous shale and sandstone. |
| 693.7 - 700.0 | Brown sandstone.                                                  |
| 700.0 - 700.7 | Brown slightly shaly sandstone.                                   |
| 700.7 - 701.3 | Brown sandstone.                                                  |
| 701.3 - 701.5 | Gray shale.                                                       |
| 701.5 - 702.0 | Brown sandstone.                                                  |
| 702.0 - 703.6 | Gray shale.                                                       |
| 703.6 - 767.0 | No core.                                                          |

BARTLESVILLE SAND

|               |                                                          |
|---------------|----------------------------------------------------------|
| 767.0 - 775.0 | Brown sandstone.                                         |
| 775.0 - 777.4 | Gray and brown laminated shale and sandstone.            |
| 777.4 - 781.5 | Light brown sandstone with scattered gray shale partings |
| 781.5 - 787.0 | Gray and brown finely laminated shale and sandstone.     |

LABORATORY FLOODING TESTS

SECOND SQUIRREL SAND

The Second Squirrel sand in this core responded to laboratory flooding tests, as a total recovery of 149 barrels of oil per acre was obtained from 0.9 feet of sand. The weighted average percent oil saturation was reduced from 55.8 to 40.6, or represents an average recovery of 15.2 percent. The weighted average effective permeability of the samples is 0.59 millidarcys, while the average initial fluid production pressure is 27.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 6 samples tested, 2 produced water and oil. This indicates that approximately 33 percent of the sand represented by these samples is floodable pay sand.

CATTLEMAN SAND

The Cattleman sand in this core responded to laboratory flooding tests, as a total recovery of 2,560 barrels of oil per acre was obtained from 7.5 feet of sand. The weighted average percent oil saturation was reduced from 62.1 to 38.5, or represents an average recovery of 23.6 percent. The weighted average effective permeability of the samples is 4.05 millidarcys, while the average initial fluid production pressure is 16.9 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 8 samples tested, 8 produced water and oil. This indicates that 100 percent of the sand represented by these samples is floodable pay sand.

BARTLESVILLE SAND

The Bartlesville sand in this core responded to laboratory flooding tests, as a total recovery of 134 barrels of oil per acre was obtained from 3.0 feet of sand. The weighted average percent oil saturation was reduced from 32.3 to 30.0, or represents an average recovery of 2.3 percent. The weighted average effective permeability of the samples is 84.22 millidarcys, while the average initial fluid production pressure is 5.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 19 samples tested, 3 produced water and oil, and 13 produced water only. This indicates that approximately 16 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERYSECOND SQUIRREL SAND

A study of the core data would indicate that efficient primary and waterflood operations in the vicinity of this well should recover approximately 136 barrels of oil per acre. This is an average recovery of 151 barrels per acre foot from 0.9 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

|                                                |      |
|------------------------------------------------|------|
| Original formation volume factor, estimated    | 1.05 |
| Reservoir water saturation, percent, estimated | 30.0 |
| Average porosity, percent                      | 13.6 |
| Oil saturation after flooding, percent         | 40.6 |
| Performance factor, percent, estimated         | 55.0 |
| Net floodable sand, feet                       | 0.9  |

CATTLEMAN SAND

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 2,830 barrels of oil per acre. This is an average recovery of 377 barrels per acre foot from 7.5 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

|                                                |      |
|------------------------------------------------|------|
| Original formation volume factor, estimated    | 1.05 |
| Reservoir water saturation, percent, estimated | 10.0 |
| Average porosity, percent                      | 18.7 |
| Oil saturation after flooding, percent         | 38.5 |
| Performance factor, percent, estimated         | 55.0 |
| Net floodable sand, feet                       | 7.5  |

BARTLESVILLE SAND

From a study of the core data, it would appear that efficient primary and waterflood operations in the vicinity of this well should recover approximately 698 barrels of oil per acre. This is an average recovery of 233 barrels per acre foot from 3.0 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

|                                                |      |
|------------------------------------------------|------|
| Original formation volume factor, estimated    | 1.06 |
| Reservoir water saturation, percent, estimated | 45.0 |
| Average porosity, percent                      | 24.9 |
| Oil saturation after flooding, percent         | 30.0 |
| Performance factor, percent, estimated         | 55.0 |
| Net floodable sand, feet                       | 3.0  |



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## RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Inco Resources, Inc. Lease Davis Well No. 12

| Sample No.                  | Depth, Feet | Effective Porosity Percent | Percent Saturation |       |       | Oil Content Bbls. / A Ft. | Perm., Mill. | Feet of Sand |          | Total Oil Content | Perm. Capacity Ft. X md. |
|-----------------------------|-------------|----------------------------|--------------------|-------|-------|---------------------------|--------------|--------------|----------|-------------------|--------------------------|
|                             |             |                            | Oil                | Water | Total |                           |              | Ft.          | Cum. Ft. |                   |                          |
| <u>BROWN LIMESTONE</u>      |             |                            |                    |       |       |                           |              |              |          |                   |                          |
| 1                           | 569.6       | 13.5                       | 16                 | 47    | 63    | 168                       | 0.21         | 1.0          | 1.0      | 168               | 0.21                     |
| 2                           | 570.5       | 16.2                       | 13                 | 61    | 74    | 163                       | 0.33         | 1.0          | 2.0      | 163               | 0.33                     |
| 3                           | 571.4       | 21.7                       | 32                 | 29    | 61    | 539                       | 26.          | 0.7          | 2.7      | 377               | 18.20                    |
| 4                           | 572.7       | 11.2                       | 33                 | 42    | 75    | 287                       | 3.3          | 1.5          | 4.2      | 431               | 4.95                     |
| 5                           | 573.6       | 11.9                       | 54                 | 32    | 86    | 499                       | 0.39         | 1.0          | 5.2      | 499               | 0.39                     |
| <u>FIRST SQUIRREL SAND</u>  |             |                            |                    |       |       |                           |              |              |          |                   |                          |
| 6                           | 583.5       | 17.6                       | 56                 | 23    | 79    | 765                       | 3.1          | 0.3          | 0.3      | 230               | 0.93                     |
| 7                           | 584.5       | 16.8                       | 43                 | 41    | 84    | 560                       | 0.27         | 1.4          | 1.7      | 784               | 0.38                     |
| 8                           | 585.5       | 17.2                       | 19                 | 67    | 86    | 254                       | 1.0          | 1.0          | 2.7      | 254               | 1.00                     |
| 9                           | 586.5       | 15.5                       | 16                 | 80    | 96    | 192                       | 0.25         | 1.0          | 3.7      | 192               | 0.25                     |
| 10                          | 587.4       | 15.2                       | 16                 | 80    | 96    | 189                       | 0.27         | 0.5          | 4.2      | 95                | 0.15                     |
| <u>SECOND SQUIRREL SAND</u> |             |                            |                    |       |       |                           |              |              |          |                   |                          |
| 11                          | 646.4       | 12.6                       | 54                 | 30    | 84    | 528                       | 1.1          | 0.5          | 0.5      | 264               | 0.55                     |
| 12                          | 647.5       | 14.5                       | 58                 | 35    | 93    | 652                       | 1.5          | 0.4          | 0.9      | 261               | 0.60                     |
| 13                          | 648.6       | 17.1                       | 24                 | 62    | 86    | 318                       | 14.          | 1.1          | 2.0      | 350               | 15.40                    |
| 14                          | 649.6       | 12.9                       | 30                 | 68    | 98    | 300                       | Imp.         | 1.1          | 3.1      | 330               | 0.00                     |
| 15                          | 650.6       | 15.3                       | 26                 | 71    | 97    | 309                       | 1.5          | 0.9          | 4.0      | 278               | 1.35                     |
| 16                          | 651.5       | 12.5                       | 42                 | 36    | 78    | 407                       | Imp.         | 1.0          | 5.0      | 407               | 0.00                     |
| <u>CATTLEMAN SAND</u>       |             |                            |                    |       |       |                           |              |              |          |                   |                          |
| 17                          | 694.5       | 22.0                       | 54                 | 15    | 69    | 922                       | 67.          | 1.3          | 1.3      | 1199              | 87.10                    |
| 18                          | 695.4       | 19.8                       | 67                 | 20    | 87    | 1029                      | 54.          | 1.0          | 2.3      | 1029              | 54.00                    |
| 19                          | 696.5       | 21.4                       | 59                 | 10    | 69    | 980                       | 92.          | 1.0          | 3.3      | 980               | 92.00                    |
| 20                          | 697.3       | 17.7                       | 73                 | 20    | 93    | 1002                      | 23.          | 1.0          | 4.3      | 1002              | 23.00                    |

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## RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

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Company Inco Resources, Inc. Lease Davis Well No. 12

| Sample No.               | Depth, Feet | Effective Porosity Percent | Percent Saturation |       | Oil Content Bbls. / A Ft. | Perm., Mill. | Feet of Sand |          | Total Oil Content | Perm. Capacity Ft. X md. |
|--------------------------|-------------|----------------------------|--------------------|-------|---------------------------|--------------|--------------|----------|-------------------|--------------------------|
|                          |             |                            | Oil                | Water |                           |              | Ft.          | Cum. Ft. |                   |                          |
| 21                       | 698.4       | 15.5                       | 74                 | 21    | 890                       | 10.          | 1.0          | 5.3      | 890               | 10.00                    |
| 22                       | 699.6       | 17.6                       | 48                 | 26    | 655                       | 36.          | 1.0          | 6.3      | 655               | 36.00                    |
| 23                       | 700.6       | 14.4                       | 63                 | 20    | 704                       | 5.6          | 0.7          | 7.0      | 493               | 3.92                     |
| 24                       | 701.6       | 17.2                       | 61                 | 22    | 814                       | 35.          | 0.5          | 7.5      | 407               | 17.50                    |
| <u>BARTLESVILLE SAND</u> |             |                            |                    |       |                           |              |              |          |                   |                          |
| 25                       | 767.6       | 23.7                       | 32                 | 51    | 588                       | 493.         | 1.0          | 1.0      | 588               | 493.00                   |
| 26                       | 768.4       | 24.9                       | 30                 | 54    | 580                       | 687.         | 1.0          | 2.0      | 580               | 687.00                   |
| 27                       | 769.6       | 25.5                       | 32                 | 48    | 633                       | 948.         | 1.0          | 3.0      | 633               | 948.00                   |
| 28                       | 770.5       | 23.7                       | 34                 | 63    | 625                       | 481.         | 1.0          | 4.0      | 625               | 481.00                   |
| 29                       | 771.5       | 26.3                       | 31                 | 53    | 633                       | 1226.        | 1.0          | 5.0      | 633               | 1226.00                  |
| 30                       | 772.6       | 24.7                       | 32                 | 54    | 613                       | 1239.        | 1.0          | 6.0      | 613               | 1239.00                  |
| 31                       | 773.4       | 20.9                       | 12                 | 56    | 195                       | 208.         | 1.0          | 7.0      | 195               | 208.00                   |
| 32                       | 774.4       | 25.0                       | 15                 | 69    | 291                       | 794.         | 1.0          | 8.0      | 291               | 794.00                   |
| 33                       | 775.3       | 13.2                       | 5                  | 89    | 51                        | 0.29         | 1.0          | 9.0      | 51                | 0.29                     |
| 34                       | 776.7       | 15.4                       | 19                 | 77    | 227                       | 1.7          | 1.4          | 10.4     | 318               | 2.38                     |
| 35                       | 777.6       | 18.5                       | 11                 | 58    | 158                       | 137.         | 0.6          | 11.0     | 95                | 82.20                    |
| 36                       | 778.5       | 23.5                       | 5                  | 64    | 91                        | 546.         | 1.0          | 12.0     | 91                | 546.00                   |
| 37                       | 779.6       | 20.3                       | 7                  | 71    | 110                       | 133.         | 1.0          | 13.0     | 110               | 133.00                   |
| 38                       | 780.6       | 21.1                       | 6                  | 79    | 98                        | 108.         | 1.0          | 14.0     | 98                | 108.00                   |
| 39                       | 781.3       | 19.9                       | 11                 | 50    | 170                       | 69.          | 0.5          | 14.5     | 85                | 34.50                    |
| 40                       | 782.5       | 16.7                       | 13                 | 84    | 168                       | 8.7          | 1.5          | 16.0     | 252               | 13.05                    |
| 41                       | 783.4       | 16.8                       | 21                 | 72    | 274                       | 2.2          | 1.0          | 17.0     | 274               | 2.20                     |
| 42                       | 784.5       | 12.3                       | 4                  | 81    | 38                        | 1.2          | 1.0          | 18.0     | 38                | 1.20                     |
| 43                       | 785.3       | 15.0                       | 6                  | 90    | 70                        | 3.5          | 1.0          | 19.0     | 70                | 3.50                     |

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

| Company | Inco Resources, Inc.    | Lease                    | Davis                                   | Well No.                               | 12                                 |
|---------|-------------------------|--------------------------|-----------------------------------------|----------------------------------------|------------------------------------|
|         | Depth Interval,<br>Feet | Feet of Core<br>Analyzed | Average<br>Permeability,<br>Millidarcys | Permeability<br>Capacity<br>Ft. x Md.  |                                    |
|         |                         |                          | <u>BROWN LIMESTONE</u>                  |                                        |                                    |
|         | 569.0 - 574.2           | 5.2                      | 4.6                                     | 24.08                                  |                                    |
|         |                         |                          | <u>FIRST SQUIRREL SAND</u>              |                                        |                                    |
|         | 583.3 - 587.5           | 4.2                      | 0.64                                    | 2.70                                   |                                    |
|         |                         |                          | <u>SECOND SQUIRREL SAND</u>             |                                        |                                    |
|         | 646.0 - 652.2           | 2.9                      | 6.2                                     | 17.90                                  |                                    |
|         |                         |                          | <u>CATTLEMAN SAND</u>                   |                                        |                                    |
|         | 693.7 - 702.0           | 7.5                      | 43.1                                    | 323.52                                 |                                    |
|         | Depth Interval,<br>Feet | Feet of Core<br>Analyzed | Average<br>Percent Oil<br>Saturation    | Average<br>Percent Water<br>Saturation | Total Oil<br>Content<br>Bbls./Acre |
|         |                         |                          | <u>BROWN LIMESTONE</u>                  |                                        |                                    |
|         | 569.0 - 574.2           | 5.2                      | 29.8                                    | 42.9                                   | 1,638                              |
|         |                         |                          | <u>FIRST SQUIRREL SAND</u>              |                                        |                                    |
|         | 583.3 - 587.5           | 4.2                      | 28.6                                    | 59.8                                   | 1,555                              |
|         |                         |                          | <u>SECOND SQUIRREL SAND</u>             |                                        |                                    |
|         | 646.0 - 652.2           | 5.0                      | 35.0                                    | 54.4                                   | 1,890                              |
|         |                         |                          | <u>CATTLEMAN SAND</u>                   |                                        |                                    |
|         | 693.7 - 702.0           | 7.5                      | 62.1                                    | 19.8                                   | 887                                |
|         |                         |                          |                                         |                                        | 6,655                              |

**Oilfield Research Laboratories**  
**SUMMARY OF PERMEABILITY & SATURATION TESTS**

**TABLE III**

| Company |  | Inco Resources, Inc.     |                          | Lease                                   | Davis                                  |                                       | Well No.                           | 12 |
|---------|--|--------------------------|--------------------------|-----------------------------------------|----------------------------------------|---------------------------------------|------------------------------------|----|
|         |  | Depth Interval,<br>Feet  | Feet of Core<br>Analyzed | Average<br>Permeability,<br>Millidarcys | Permeability<br>Capacity<br>Ft. x Md.  |                                       |                                    |    |
|         |  | <u>BARTLESVILLE SAND</u> |                          |                                         |                                        |                                       |                                    |    |
|         |  | 767.0 - 773.0            | 6.0                      | 845.7                                   | 5,074.00                               |                                       |                                    |    |
|         |  | 773.0 - 786.0            | 13.0                     | 148.3                                   | 1,928.32                               |                                       |                                    |    |
|         |  | 767.0 - 786.0            | 19.0                     | 368.5                                   | 7,002.32                               |                                       |                                    |    |
|         |  | Depth Interval,<br>Feet  | Feet of Core<br>Analyzed | Average<br>Percent Oil<br>Saturation    | Average<br>Percent Water<br>Saturation | Average<br>Oil Content<br>Bbl./A. Ft. | Total Oil<br>Content<br>Bbls./Acre |    |
|         |  | <u>BARTLESVILLE SAND</u> |                          |                                         |                                        |                                       |                                    |    |
|         |  | 767.0 - 773.0            | 6.0                      | 31.8                                    | 53.8                                   | 612                                   | 3,672                              |    |
|         |  | 773.0 - 786.0            | 13.0                     | 10.7                                    | 74.2                                   | 151                                   | 1,968                              |    |
|         |  | 767.0 - 786.0            | 19.0                     | 17.4                                    | 67.8                                   | 297                                   | 5,640                              |    |

# Oilfield Research Laboratories

## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

| Company    |             | Inco Resources, Inc.       |                         | Lease        |              | Davis        |                     | Well No. |                               | 12                                   |                                                |
|------------|-------------|----------------------------|-------------------------|--------------|--------------|--------------|---------------------|----------|-------------------------------|--------------------------------------|------------------------------------------------|
| Sample No. | Depth, Feet | Effective Porosity Percent | Original Oil Saturation |              | Oil Recovery |              | Residual Saturation |          | Volume of Water Recovered cc* | Effective Permeability Millidarcys** | Initial Fluid Production Pressure Lbs./Sq./In. |
|            |             |                            | %                       | Bbbs./A. Ft. | %            | Bbbs./A. Ft. | % Oil               | % Water  |                               |                                      |                                                |
| 1          | 569.6       | 14.0                       | 15                      | 163          | 0            | 0            | 15                  | 48       | 0                             | Imp.                                 | -                                              |
| 2          | 570.5       | 16.1                       | 13                      | 162          | 0            | 0            | 13                  | 62       | 0                             | Imp.                                 | -                                              |
| 3          | 571.4       | 21.2                       | 33                      | 543          | 0            | 0            | 33                  | 28       | 0                             | Imp.                                 | -                                              |
| 4          | 572.7       | 11.7                       | 32                      | 290          | 0            | 0            | 32                  | 43       | 0                             | Imp.                                 | -                                              |
| 5          | 573.6       | 12.0                       | 54                      | 503          | 0            | 0            | 54                  | 32       | 0                             | Imp.                                 | -                                              |
| 6          | 583.5       | 17.5                       | 56                      | 760          | 0            | 0            | 56                  | 24       | 0                             | Imp.                                 | -                                              |
| 7          | 584.5       | 16.9                       | 43                      | 564          | 0            | 0            | 43                  | 42       | 0                             | Imp.                                 | -                                              |
| 8          | 585.5       | 16.7                       | 20                      | 259          | 0            | 0            | 20                  | 67       | 0                             | Imp.                                 | -                                              |
| 9          | 586.5       | 15.6                       | 16                      | 194          | 0            | 0            | 16                  | 80       | 0                             | Imp.                                 | -                                              |
| 10         | 587.4       | 15.4                       | 16                      | 191          | 0            | 0            | 16                  | 79       | 0                             | Imp.                                 | -                                              |
| 11         | 646.4       | 12.7                       | 54                      | 532          | 9            | 89           | 45                  | 40       | 10                            | 0.30                                 | 45                                             |
| 12         | 647.5       | 14.6                       | 58                      | 657          | 23           | 261          | 35                  | 60       | 118                           | 0.95                                 | 10                                             |
| 13         | 648.6       | 16.6                       | 25                      | 322          | 0            | 0            | 25                  | 61       | 0                             | Imp.                                 | -                                              |
| 14         | 649.6       | 13.1                       | 30                      | 305          | 0            | 0            | 30                  | 67       | 0                             | Imp.                                 | -                                              |
| 15         | 650.6       | 15.2                       | 26                      | 307          | 0            | 0            | 26                  | 71       | 0                             | Imp.                                 | -                                              |
| 16         | 651.5       | 12.6                       | 42                      | 411          | 0            | 0            | 42                  | 37       | 0                             | Imp.                                 | -                                              |
| 17         | 694.5       | 22.1                       | 54                      | 926          | 20           | 343          | 34                  | 58       | 332                           | 9.74                                 | 10                                             |
| 18         | 695.4       | 19.9                       | 67                      | 1034         | 29           | 448          | 38                  | 56       | 378                           | 5.83                                 | 15                                             |
| 19         | 696.5       | 21.3                       | 59                      | 975          | 24           | 397          | 35                  | 40       | 92                            | 2.50                                 | 15                                             |
| 20         | 697.3       | 17.8                       | 73                      | 1008         | 34           | 470          | 39                  | 55       | 240                           | 3.00                                 | 10                                             |

Notes: cc—cubic centimeter.

\*—Volume of water recovered at the time of maximum oil recovery.

\*\*—Determined by passing water through sample which still contains residual oil.

# Oilfield Research Laboratories

## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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| Inco Resources, Inc. |             |                            | Lease                   |               | Davis        |               | Well No.            |         | 12                            |                                      |                                                |
|----------------------|-------------|----------------------------|-------------------------|---------------|--------------|---------------|---------------------|---------|-------------------------------|--------------------------------------|------------------------------------------------|
| Sample No.           | Depth, Feet | Effective Porosity Percent | Original Oil Saturation |               | Oil Recovery |               | Residual Saturation |         | Volume of Water Recovered cc* | Effective Permeability Millidarcys** | Initial Fluid Production Pressure Lbs./Sq./In. |
|                      |             |                            | %                       | Bbbls./A. Ft. | %            | Bbbls./A. Ft. | % Oil               | % Water |                               |                                      |                                                |
| 21                   | 698.4       | 15.6                       | 74                      | 896           | 28           | 339           | 46                  | 50      | 557                           | 1.50                                 | 25                                             |
| 22                   | 699.6       | 17.7                       | 48                      | 659           | 14           | 192           | 34                  | 61      | 467                           | 1.72                                 | 20                                             |
| 23                   | 700.6       | 14.5                       | 63                      | 709           | 17           | 191           | 46                  | 48      | 518                           | 2.92                                 | 20                                             |
| 24                   | 701.6       | 17.3                       | 61                      | 819           | 20           | 268           | 41                  | 55      | 551                           | 2.25                                 | 20                                             |
| 25                   | 767.6       | 24.2                       | 31                      | 582           | 0            | 0             | 31                  | 53      | 582                           | 39.36                                | 5                                              |
| 26                   | 768.4       | 24.8                       | 30                      | 577           | 0            | 0             | 30                  | 62      | 577                           | 51.98                                | 5                                              |
| 27                   | 769.6       | 25.4                       | 32                      | 631           | 0            | 0             | 32                  | 52      | 631                           | 38.61                                | 5                                              |
| 28                   | 770.5       | 23.8                       | 34                      | 628           | 3            | 55            | 31                  | 67      | 573                           | 86.97                                | 5                                              |
| 29                   | 771.5       | 26.2                       | 31                      | 630           | 2            | 41            | 29                  | 58      | 589                           | 79.47                                | 5                                              |
| 30                   | 772.6       | 24.6                       | 32                      | 611           | 2            | 38            | 30                  | 61      | 573                           | 86.22                                | 5                                              |
| 31                   | 773.4       | 20.7                       | 12                      | 193           | 0            | 0             | 12                  | 73      | 193                           | 8.70                                 | 10                                             |
| 32                   | 774.4       | 24.9                       | 15                      | 290           | 0            | 0             | 15                  | 71      | 290                           | 85.92                                | 5                                              |
| 33                   | 775.3       | 13.5                       | 5                       | 52            | 0            | 0             | 5                   | 90      | 52                            | 0.12                                 | 30                                             |
| 34                   | 776.7       | 15.9                       | 18                      | 222           | 0            | 0             | 18                  | 78      | 222                           | Imp.                                 | -                                              |
| 35                   | 777.6       | 18.3                       | 11                      | 156           | 0            | 0             | 11                  | 62      | 156                           | 49.94                                | 5                                              |
| 36                   | 778.5       | 23.2                       | 5                       | 90            | 0            | 0             | 5                   | 79      | 90                            | 48.73                                | 5                                              |
| 37                   | 779.6       | 20.8                       | 7                       | 113           | 0            | 0             | 7                   | 81      | 113                           | 40.98                                | 5                                              |
| 38                   | 780.6       | 21.4                       | 6                       | 100           | 0            | 0             | 6                   | 84      | 100                           | 12.99                                | 5                                              |
| 39                   | 781.3       | 20.2                       | 11                      | 172           | 0            | 0             | 11                  | 71      | 172                           | 46.11                                | 5                                              |
| 40                   | 782.5       | 17.1                       | 13                      | 172           | 0            | 0             | 13                  | 84      | 172                           | Imp.                                 | -                                              |
| 41                   | 783.4       | 16.9                       | 21                      | 275           | 0            | 0             | 21                  | 74      | 275                           | 1.27                                 | 30                                             |
| 42                   | 784.5       | 12.5                       | 4                       | 39            | 0            | 0             | 4                   | 82      | 39                            | Imp.                                 | -                                              |
| 43                   | 785.3       | 15.5                       | 6                       | 72            | 0            | 0             | 6                   | 90      | 72                            | 1.24                                 | 25                                             |

Notes: cc—cubic centimeter.

\*—Volume of water recovered at the time of maximum oil recovery.

\*\*—Determined by passing water through sample which still contains residual oil.

# Oilfield Research Laboratories

## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

| Company                                           | Davis                |                | Well No.          |
|---------------------------------------------------|----------------------|----------------|-------------------|
| Inco Resources, Inc.                              | Lease                | CATTLEMAN SAND | BARTLESVILLE SAND |
|                                                   | SECOND SQUIRREL SAND | 693.7 - 702.0  | 767.0 - 773.0     |
| Depth Interval, Feet                              | 646.0 - 652.2        |                |                   |
| Feet of Core Analyzed                             | 0.9                  | 7.5            | 3.0               |
| Average Percent Porosity                          | 13.6                 | 18.7           | 24.9              |
| Average Percent Original Oil Saturation           | 55.8                 | 62.1           | 32.3              |
| Average Percent Oil Recovery                      | 15.2                 | 23.6           | 2.3               |
| Average Percent Residual Oil Saturation           | 40.6                 | 38.5           | 30.0              |
| Average Percent Residual Water Saturation         | 48.9                 | 53.1           | 62.0              |
| Average Percent Total Residual Fluid Saturation   | 89.5                 | 91.6           | 92.0              |
| Average Original Oil Content, Bbls./A. Ft.        | 588.                 | 891.           | 623.              |
| Average Oil Recovery, Bbls./A. Ft.                | 166.                 | 341.           | 45.               |
| Average Residual Oil Content, Bbls./A. Ft.        | 422.                 | 550.           | 578.              |
| Total Original Oil Content, Bbls./Acre            | 529.                 | 6,683.         | 1,869.            |
| Total Oil Recovery, Bbls./Acre                    | 149.                 | 2,560.         | 134.              |
| Total Residual Oil Content, Bbls./Acre            | 380.                 | 4,123.         | 1,735.            |
| Average Effective Permeability, Millidarcys       | 0.59                 | 4.05           | 84.22             |
| Average Initial Fluid Production Pressure, p.s.i. | 27.5                 | 16.9           | 5.0               |

NOTE: Only those samples which recovered oil were used in calculating the above averages.



WATER SAT., PERCENT → ← OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCYs  
--- EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYs





