| | | | | | Property | South Hea | irt | | Hole No. | Sh02-01 |
|---------------|--------------|--------------|--------|----------|----------------|-------------|---------------------------------------|--|-----------|---------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | ermittee | | | | |
| | | | | | Address | | | · | | |
| | | | | | | John Mohl | | | | |
| | | | | | Commenced | | 3/5/02 | | Finished | 3/5/02 |
| | | | 1 | | Minates | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| Locate hole | e within se | ction; where | n hole | [| Method of d | rilling | Rotary | Logged by | B. Pruitt | |
| is not vertic | cal, give di | rection & a | ngle | | Drilling Fluid | i: | Air/Water In | jection | | |
| Surface Ov | vner | | | | | Signed | | | | |
| | • | | | | - | | | <u></u> | | |
| Page 1 of | 1 | | | | | Title | e t | - | | |
| Dep | | | | Lith | 1 | | | | | <u></u> |
| From | To | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | — . — | | |
| 0.0 | 15.0 | 15.0 | ····· | CL | Clay, yell | owish gray, | soft | | | |
| 15.0 | 20.0 | 5.0 | | CL | Clay, gray | , soft, san | dy | | | |
| 20.0 | 30.0 | 10.0 | | CL | Clay, yell | owish gray, | soft | | | |
| 30.0 | 34.0 | 4.0 | | CL | Clay, gray | /, soft | _ | н. Полого (1996) | <u>.</u> | |
| 34.0 | 51.5 | 17.5 | D | со | Lignite, br | rown | | , | | |
| 51.5 | 70.0 | 18.5 | | CL | Clay, gray | | D | | | |
| | | | | | | | | ······································ | <u></u> | |
| | | | | | | | · · · · · · · · · · · · · · · · · · · | | | |
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| | <u> </u> | | | | | | | | | |
| | | | | <u> </u> | † | | | · · · · · · · · · · · · · · · · · · · | | |
| L | | L | L | | J | | | | | |

| | | | | | Property | South He | art | | Hole No. | Sh02-01c |
|--------------|-------------|--------------|--------|--------------|---------------------------------------|--------------|-----------------|---------------|---------------|--|
| | | | | | • | | | | Туре | Core |
| | | | | | Lessee or p | permittee | · | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Mot | nl | | | |
| | | | | | Commence | ed drilling | 3/27/02 | | Finished | 3/27/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | e within se | ection; whe | n hole | | Method of | drilling | Rotary | _Logged by | B. Gjere | |
| is not verti | cal, give d | irection & a | angle | | Drilling Flui | id: | Air/Water Inj | ection | | ···· , |
| Surface O | wher | | | | | Signed | | | | |
| Juliace U | WIIC | | | | - | Signed | | | | |
| Page 1 of | 2 | | | | | Title | | | | · |
| | | | | | · · · · · · · · · · · · · · · · · · · | | | | | |
| De From | pth To | Thick. | Seam | Lith Type | | | | Description | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 0.0 | 33.0 | | | | Drill out to | core point | | | | |
| | | | | | | | | | | |
| 22.0 | 47.5 | | | | Corod 14 | El. Deceu | ored 12 Ch | | intent: oppo | are that |
| 33.0 | 47.5 | | | | Cored 14. | o, recov | ered 13.6': | coal core is | intact, appe | |
| | | | | | some of | shale roof | was lost | | | |
| 33.0 | 33.6 | 0.6 | | CL | Clay, gra | y, core is b | oroken & hig | hly fractured | l; probably l | ost core here |
| 33.6 | 34.5 | 0.9 | | | Lost | | | | | |
| | | | | <u> </u> | 1 | | | | | |
| 34.5 | 36.0 | 1.5 | | CL | Clay, gra | у | | <u> </u> | | <u></u> |
| 36.0 | 36.6 | 0.6 | D | co | Lignite, b | rown, shal | ey, fissile, hi | igh pyrite co | ncentrations | 5 |
| 36.6 | 43.0 | 6.4 | D | со | Lignite, b | rown, retai | ins moisture | somewhat | more | |
| | | | | 1 | | | | | | |
| | | | | | I than the | iower secti | on of the co | re, (somewi | hat oxidized) |) |
| 43.0 | 47.5 | 4.5 | D | co | Lignite, b | rown, ban | ded with ligh | t brown laye | ers; | ······································ |
| | | | | | thin pyrite | bands at 4 | 4.2' and 45 | 5.5' | | |
| | | | | | | | | | an the top of | art of the core |
| | | | | <u> </u> | Sundue III | | no away mu | | | |
| | | | | | | | | | ····. | |
| | | | L | | <u> </u> | | | <u> </u> | | |

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3/27/02 Date South Heart

Property

Page No. 2 of Hole No. Sh02-01c

| Dep | oth | | | Lith | |
|------|------|--------|------|----------|--|
| From | То | Thick. | Seam | Туре | Description |
| | | | | | |
| | | | | | |
| | | | | | |
| 47.5 | 54.5 | | | | Cored 7.0' Recovered 6.3' core is intact; driller thought he had |
| | | | | | about 0.5' of alou floor but nothing was there a probably last the floor |
| | | | | | about 0.5' of clay floor but nothing was there - probably lost the floor |
| | | | | | |
| | | | | | |
| 47.5 | 53.8 | 6.3 | D | co | Lignite, brown, banded; lower 0.6' is more fissile |
| | | | | | |
| 53.8 | 54.5 | 0.7 | | L | Lost TDD |
| | | | | | |
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KIEWIT MINING GROUP INC.

LITHOLOGY LOG

| | | | | | Property | South He | art | | Hole No. | Sh02-02a |
|---|---------------|---------------|-------|--------------|----------------|---------------------------------------|---------------------|-----------------|---------------------------------------|---|
| | | | | | | | | | Туре | Piezometer well |
| | | | | | Lessee or p | ermittee | | <u> </u> | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Moh | 1 | | | |
| | | | | | Commence | d drilling | 3/27/02 | | Finished | 3/27/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| [| L | | | | | | | | | |
| | | ection; whe | | | Method of d | | Rotary | Logged by | R. Schmid | |
| is not vert | lical, give o | lirection & a | angle | | Drilling Fluid | d: | Air - Water | Injection | | |
| Surface C | Wner | | | | - | Signed | | • | | and you and water and we want the state of the |
| Page 1 of | 1 | | | | | Title | Hydrogeolo | gist - Water Si | upply Inc | |
| | | 1 | | | | | | | | |
| De From | pth To | Thick. | Seam | Lith Type | | | | Description | | |
| | | | | | | | | | | |
| | | | | | <u> </u> | | | | · · · · · · · · · · · · · · · · · · · | |
| ļ | | | | | | | | | | |
| | | | | | Completed | l as a mon | itor well in s | and below th | ne D seam | |
| | | | | | See log by | Roger Scl | hmid - We | st well 2A | | |
| | | | | | | | | | | |
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BOARD OF WATER WELL CONTRACTORS 900 E. BOULEVARD AVE, DEPI. 770 * BISMARCK, NORTH DAKOTA 58505-8850

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| - | | | ell Contractors within 30 days after completion or abai | |
|--|---|---|--|---------------------------------------|
| 1. WELLI | OWNER | | 7. WATER LEVEL | |
| | Kienergy Inc | | Static water level 139.7 Feel | : below surfac |
| | 203: S Main, Suite | | If Clowing: closed-in pressure | |
| | Sheridan, WY 8280 | | GFM flow through | inch pip |
| | | | Controlled by: Valve Redu | |
| 2. WELL | LOCATION | West well 2A | If other, specify | |
| . 5 | | 139-98-17 CB B | | · · · · · · · · · · · · · · · · · · · |
| | | | 8. WELL TEST DATA | |
| | | | Pump Bailer | Other |
| • | 0 | | Pumping level below land surface | |
| | | | ft. after hrs.pum | |
| | | | ft. after hrs.pung | ping gp |
| ÷ | | | ft. after hrs.pum | |
| | Stark | | | |
| SW1/4 N | W1/4 NW1/4 Sec. 17 Twp. | 139 N.Rgg. 98 W | 9. WELL LOG | Depth (Ft. |
| 1 | | · · · | Formation | 1 |
| | OSED USEGeothermal | | Silt, yellowish brown, oxi | dized 1 |
| - Contraction | mestic | | Clay, yellowish brown, oxi | |
| st | bckwunicipal | Test Hole | Clay, brown, Shale | 2 |
| | | | Rock | 23. |
| - - | IDD DRILLED | | Shale, brownish gray | : 2 |
| Cable | · · · · · · · · · · · · · · · · · · · | | Shale, light gray | . 3 |
| | A RotaryJetted | Auger | Lignite | 3 |
| If othe | n. specify | ······································ | Shale, gray w/lignite lens | |
| C TAVIA PPE | ROUALITY | | Lignite | 72. |
| | sker sample collected for | F1 | Shale, gray | 95. |
| | hemical analyses? | Уег X №о | Lignite | 9 |
| - | Sactariological Analyses? | and the second second | Shale, gray, rock at 113 | |
| | to what laboratory was it | | Sand, silty, gray | 13 |
| | | | Lignite | 1.5 |
| • | | | Shale, gray | 19 |
| | CONSTRUCTION | • | Shale, silty, gray | 1.9 |
| | r of fioleinches | Depth 240_fcet | Sand, fine, silty | 22 |
| Casing: | Steel X_Plast | | Sandstone rock | : 22 |
| | X_ThreadedWelde | dOther | Sand, fine | 23 |
| II othe | r specity | | Shale, green | 24 |
| Fipe We | ight: Diameter: Fro | | • | • |
| 1 | /ft 2_inches +2.2_f | eer 217.5 feet | | i |
| | t 2_inches 227.5_f | • — | (use separate sheet if ner | ssary) |
| the second s | Ttinches | | 10 DATE COLOR FRED 37 Man / | 12 |
| | forated pipe used? | Yes X NO | 10. DATE COMPLETED 27 Mar (| |
| Períòra | ited pipe set from | ft to feet | 11. WAS THE HOLE PLUGGED OR A | BANDONED? |
| | | Yes X No | YES X NO | 2 |
| | reil screen installed? | X Yes No | it so, how? | , : |
| Materia | اليهوا فيناوي مناقبة المناقبة المتحالية المتحالي المحالة المحالة المحالة المحالة المحالة المحالة المحالة المحالة | meter <u>2</u> inches | AA JU, 1908 : | |
| | ze10_set from217.5_fee | | 12 REMARKS 400# OF Abrasiv | es Inc san |
| Slot Si | | eet to feet | pack to 207', 625# benton: | |
| | ther or seal used? | ¥65X NO | surface. | |
| | It is a second of | Depthft | 70-40 | |
| | what meterial | | | |
| lf so, Type of | well: Straight screen | | 13 DRILLER'S CEPTIFICATION | |
| If so, Type of | | Gravel packed X = To 207 | 13. DRILLER'S CERTIFICATION This well was drilled under my jurisdi | |
| If So, Type of Depth g Grougin | f well: Straight screen_ prouted: From O og material: Cement | To 207 Other X | | |
| If So, Type of Depth g Grougin | f well: Straight screen_ prouted: From 0 | To 207 Other X | This well was drilled under my juriadi report is true to the best of my know] | edge i |
| If so, Type of Depth g Groutin If othe | f well: Straight screen_ prouted: From O og material: Cement | To 207 Other X Chips | This well was drilled under my jurisdi report is true to the best of my knowl Driller's or Firm's Name | edge i |
| If So, Type of Depth 9 Groutin If othe Well he 12" abo | rell: Straight screen grouted: From 0 og material: Cement er explain: Bentonite ad completion: Pitless u ove grade | To 207 | This well was drilled under my jurisdi report is true to the best of my knowl Driller's or Firm's Name MoHL Drilling, ImC. Address | Certificate N |
| If So, Type of Depth 9 Groutin If othe Well he 12" abo | f well: Straight screen routed: From 0 g material: Cement r explain: Bentonite ac completion: Pitless u | To 207 | This well was drilled under my jurisdi report is true to the best of my knowl Driller's or Firm's Name MoHL Drilling, ImC. Address | Certificate N |
| If So, Type of Depth g Groutin If othe Well he 12" abo If othe | rell: Straight screen grouted: From 0 og material: Cement er explain: Bentonite ad completion: Pitless u ove grade | To 207 | This well was deilled under my jurisdi report is true to the best of my knowl Driller's or Firm's Name Modifies Beul.44 ND 58523 | certificate N |
| If So, Type of Depth g Groutin If othe Well he 12" abo If othe Was pum | f vell: Straight screen routed: From 0 g material: Cement er explain: Bentonite ad completion: Pitless u por grade er, specify '2.2' abov | To 207 Other X Chips Dir Other X Te grade yes_XNO | This well was drilled under my jurisdi report is true to the best of my knowl Driller's or Firm's Name MoHL Drilling, ImC. Address | Certificate N |

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| | | | | | Property | South H | eart | | Hole No. | SH02-02b |
|------------|-----------------------------|--------|-------|----------|---------------------------|--|--|-----------------|-----------|---|
| | | | | | | | | | Туре | Piezometer well |
| | | | | | Lessee or | permittee | مىلىدىنى <u>بىرىمى بىرىمى مىرىمى مى</u> | | | <u></u> |
| | | | | | Address | | | | | |
| | | | | | Driller | John Mo | hl | | ····· | |
| | | | | | Commence | ed drilling | 3/28/02 | | Finished | 3/28/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| | | | | } | | | | | | |
| | e within se cal, gìve di | | | | Method of Drilling Flu | | Rotary Air - Water I | Logged by | R. Schmid | |
| s not veru | cai, give c | | angre | | Drining i la | | | njeouon | | |
| urface O | wner | | | | _ | Signed | | | | |
| | 4 | | | | | T :41 - | 14.1.1.1.1. | | | |
| age 1 of | 1 | | | | | Title | Hydrogeolog | gist - Water Su | pply Inc | |
| De | | | | Lith | T | | | | | |
| From | То | Thick. | Seam | Туре | | | | Description | | |
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| | | | | | | | | | | |
| | | | | | Complete | | -: | | D | |
| | | | | | Complete | | | oal aboe the | D Seam | |
| | | | | | See log b | y Roger So | hmid - Eas | t Well 2C | | |
| | | | | | <u> </u> | | | | | <u> </u> |
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BOARD OF WATER WELL CONTRACTORS 900 E. BOULEVARD AVE, DEPT. 770 * BISMARCK, NORTH DAKOTA 58505-0850

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| | | WELL DRILL | | | - |
|--|--|-----------------------------|---|--|------------|
| State law | regains that this report be filed with | the State Bound of Water We | Il Contractors within 30 days after completion or aband | ionstrent of the | e well. |
| 1. WELL | OWNER | | 7. WATER LEVEL | | |
| | Kienergy Inc | | Static water level Feet | below su | ríace |
| Addcess | 203 S Main, Suite | | If flowing: closed-in pressure | | |
| | Sheridan, WY 8280 |)1 | | inch | |
| O WISTI | LOCATION | East well 2C | Controlled by: Valve Redu | cers | other |
| | | 139-98-17CBB | If other, specify | | |
| | | | 8. WELL TEST DATA | | • |
| | | | - Pump Bailer | Other | |
| • | | : | Pumping level below land surface | | |
| | | | ft. after hrs.pump | - Contraction of the local division of the l | dem |
| | | | ft. after brs pung | | abw |
| County | Stark | | fr. after hrs.pum | ing | dbw |
| | NW1/4 NW1/4 Sec. 17 Twp. | 139 N. Box 98 W | 9. WELL LOG | Deser | |
| | which a principle rector is sufficient. | | S. WALL LLA. Formation | Depch | (FC-) |
| 3. PROP | OSED USEGeothermal | X Monitoring | Silt, yellowish brown, oxi | dized | 10 |
| D | opesticIrrigation | Incustrial | Clay, yellowish brown, oxi | dized | 15 |
| <u> </u> | tock Municipal | Test Hole | Clay, brown, Shale | i . | 23 |
| | | | Rock | | 23.5 |
| 4 | HOD DRALLED | | Shale, brownish gray | | . 28 |
| Capl. | -sections | | Shale, light gray | | 35 |
| | ord RotaryJetted | Auger | Lignite | 1 | 37 |
| II OLDE | i specify | ····· | Shale, gray w/lignite lens | | 66 72 5 |
| 5. WAT | ER QUALITY | | Lignite | 1 | 72.5 73 |
| | acer sample collected for | | Shale, gray | : | 1.3 |
| (| chemical analyses? | Yes X No | | 1 | |
| | Bacteriological Analyses? | | | | |
| IS so, | to what laboratory was it | t sent? | | | : |
| | · · · · · · · · · · · · · · · · · · · | | | 1 | |
| 6. WELI | LCONSTRUCTION | • | | i | |
| Diamete | r of Hole 5 inches | Depth 73 feet | | 1 | · · · |
| casing: | steel X Plast | 1c Concrete | | <u>}</u> | 1 |
| | X_ThreadedWelde | dOther | | 1 : | |
| | er specify | • | | | |
| | eight: Diameter: From | | - | <u> </u> | |
| | lb/ft _2_inches _+2_1 lb/ft inches | feet 68_feet | | <u> </u> | |
| | | feet feet | (use separate sheet if nece | 538LY) | |
| Statement of the local division of the local | rtorated pipe used? | Yes X No | 10. DATE COMPLETED 28 Mar 0 | 2 | • |
| | ated pipe set from | ft to ; feet | | | i |
| | | Yes X No | 11. WAS THE HOLE PLUGGED OR AT | BANDONE | D? |
| Was a v | well screen installed? | X yes No | Yes X No | : | |
| Materia | al PVC Die | meter 2 inches | if so, how? | | |
| | | et to 73 feet | 12 REMARKS 120# of Abrasiv | S The | : has |
| Slot Si | izeset_fromfe | eet tofeet | pack to ??', 450# bentonit | | |
| was par | cker or seal used? | Yes X No | 2', cuttings to surface. | | |
| | what material | Depthft | | | : |
| | | Gravel packed X | 13. DRILLER'S CERTIFICATION | | 1 |
| | grouted: From 0 | <u>To</u> ?? | This well was drilled under my jurisdi report is true to the best of my knowly | ction and t | hip |
| | ng material: Cement er explain: Bentonite | Other X | ambles the remaining the Dear or why KUCAT | i. | 1 |
| | ead completion: Pitless u | | Driller's or Mirm's Name | Certifics | |
| | 1 . | other X | MoHL Drilling Inc | 10 | 5 |
| | | e grade | Beulah ND 585: | ~~~ | • |
| | mp installed? | yes XNO | | | |
| · • | 11 disinfected upon compl | | Signed by | 10 -1 | ate |
| | WDRPT01 | · • | Joke K Mohl | 1 04 | -04-07 |
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| | | | | | Property South Heart | | Hole No. Sh02-02c | | | |
|-------------|--------------|-------------|----------------------|------|----------------------|---|--------------------------|---|----------------|--|
| | | | | | | | | | Туре | Core/Piez. Well |
| | | | | | Lessee or p | permittee | | | | · |
| | | | والمراجعين المراجعين | | Address | | | | | |
| | | | | | Driller | John Moh | | | | |
| | | | | | Commence | ed drilling | 3/28/02 | | Finished | 3/28/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| ocate hol | e within se | ction; wher | 1 hole | | | ethod of drilling Rotary Logged by B. Gjere & R. Sc | | | | |
| s not verti | cal, give di | rection & a | ingle | | Drilling Flui | id <u>:</u> | Air - Water | Injection | | ······································ |
| Surface Ov | vner | | | | | Signed | | | | |
| | | | | | - | | | | | |
| Page 1 of | | 1 | | | | Title | | | | |
| Der | oth | | | Lith | 1 | | | | | |
| From | To | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| 0.0 | 139.0 | | | | Drill out to | core point | | | | |
| | | | | | | .0' - recove | | | | |
| 139.0 | 153.0 | | | | Coled 14. | <u>0 - 16004</u> | eleu 13.7 | | | |
| | | | | | | ······· | | | | |
| 139.0 | 139.3 | 0.30 | | IC | Lost - a s | mall rock fe | ell in and ro | lled around | on top of core | e |
| 139.3 | 139.7 | 0.40 | | CL | Clay, gray | /, soft | | | | |
| 139.7 | 140.4 | 0.70 | D | со | Lignite, br | own, fissile | , high pyrite | e concentrat | ions | |
| 140.4 | 153.0 | 12.60 | D | со | Lignite, br | own, bande | ed, thin fiss | ile zones thr | oughout | |
| | | | | | | | vertical fra | | <u> </u> | |
| | | | | | | | | | | |
| 153.0 | 158.0 | | | | Cored 5.0 | ' - recover | ed 4.1' | | | |
| | | | | | ļ | ····· | | | | |
| 153.0 | 156.5 | 3.50 | D | со | Lignite, br | rown, large | pyrite band | at 153.3' | | |
| 156.5 | 157.1 | 0.60 | D | со | Lignite, br | own, fissile | and shale | , heavy ovri | te concentra | tion in |
| | | | | | vertical f | | | i and and a second a | | |
| 157.1 | 158.0 | 0.90 | | ю | Lost | | TDD | | ····· | |
| | | | | | | | | | 0-1 | |
| | | | | ł | completed | d as a moni | tor well - se | e log by R. | Schmid - Cei | nter well 2B |

BOARD OF WATER WELL CONTRACTORS 900 E. BOULEVARD AVE, DEFT. 770 * BISMARCK, NORTH DAKOTA 58505-0850

WELL DRILLER'S REPORT

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| | r requires that this report be filed with the State Board of Water We | | | |
|--|---|---|--|----------|
| | DWINER | 7. WATER LEVEL | | _ |
| Jame | Kienergy Inc | Static water level Feet | below surf | lace |
| Acdress | 203 S Main, Suite 2004 | If flowing: closed-in pressure | | psi |
| | Sheridan, WY 82801 | | inch p | - |
| | | Controlled by: Valve Reduce | ars <u>o</u> t | her |
| 2. WELL | LOCATION Center well 28 139-98-17CBB | If other, specify | | |
| : | | & WELL TEST DATA | | |
| | | Pump Bailer | Other | |
| | | Pumping level below land surface | | |
| | | ft. afzer hrs.pumpi | Contraction of the local division of the loc | dbw |
| : | | ft. after hrs.pumpa | | dbu |
| Consta | Stark | ft. efterhrs.pumpi | ng | dba |
| | NW1/4 NW1/4 Sec. 17 Twp. 139 N. Rge. 98 W | A WEEK LOG | k | - |
| . 20141.00 | merta marta sector tebress wurdetss a | 9. WELL LOG | Depth ⁱ () | TO TO |
| 3 2808 | OSED USE Geothermal X Monitoring | Silt, yellowish brown, orid | lized | 10 |
| | omestic Irrigation Industrial | Clay, yellowish brown, oxid | | 15 |
| م ىمۇنىدىن | tock Municipal Test Mole | Clay, brown, Shale | | 23 |
| | Addie Transa Addree 1236 blage | Rock | 2: | 3.5 |
| 4. MÉT | TOD DRILLED | Shale, brownish gray | | 28 |
| Cabl | | Shale, light gray | ÷ | 35 |
| | ord Rotary Jetted Auger | Lignite | • | 37 |
| If othe | er specify | Shale, gray w/lignite lense | -9 | 66 |
| | | Lignite | | 2.5 |
| 5. WAT | ERQUALITY | Shale, gray | | 5.5 |
| was a v | arer sample collected for: | Lignite | - | 97 |
| | Chemical analyzes? Yes X No | Shale, gray, rock at 113 | | 130 |
| | Bactoriological Analyses? Yes X No | Sand, silty, gray | | 139 |
| IÍ 50, | to what laboratory was it sent? | Lignite | | 156 |
| • | | Shale, gray | | 158 |
| < WEI | LCONSTRUCTION | Share, gray | • • | 4.49 |
| | er of Hole 5 1/3 inches Depth 158 feet | | | |
| Casing | | · · · · · · · · · · · · · · · · · · · | | |
| ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | X Threaded Welded Other | | | |
| TF orb | er specify | | | |
| | eight: Diameter: From: To; | | | |
| | lb/ft2_inches _+2_feet147_feet | | ······ | |
| | lh/ft inches feet feet | (Use separate sheet if neces | i i | |
| | lb/ft inches feet feet | Jan - putter and at Higher | | |
| Was De: | Efprated pipe used? Yes X No | 10. DATE COMPLETED 28 Mar 02 | | |
| | ated pipe set from ft to fast | | i i | |
| Was Ca | sing left open end? Yes X No | 11. WAS THE HOLE PLUGGED OR AB | NDONED | ? |
| | well screen installed? X Yes . No | Yes X No | | |
| Hateri. | al PVC Diameter 2: inches | 1f so, how? | · | |
| Slot S | ize_10_set from 147 feet to 157 feet | | | - |
| | ize feet to feet | 12 REMARKS 280# of Abrasive | | |
| | cher or seal used? Yes X No | pack to 142', 1,400# benton | | ps |
| | what material Depth ft | to 3', cuttings to surface | | |
| | f well: Straight screen Gravel packed X | 00-40 | | |
| | grouted: from 0 To 142 | IS DRILLERS CERTIMATION | leas in mi | |
| | ng material: Cement Other X | This well was dralled under my jurisdict report is true to the best of my knowled | | .3 |
| | er explain: Bentonite Chips | • | | |
| If oth | ead completion: Pitless unit | MoHL Drilling, Inc | Certificat | |
| | | Address | 10 | 2 |
| | ove drade Densi ar | | 1 | |
| Well h 12" ab | | Reijsh NO SSGOZ | • | |
| Well) h 12" ab If oth | er specify 2' above grade | Beilsh ND 58523 | | |
| Well h 12" ab If oth Was pu | er specify 2' above grade | Beilich NO 58523 | Dat | |
| Well h 12" ab If oth Was pu Was we | er specify 2' above grade | | Dat 04-2 | |

KIEWIT MINING GROUP INC.

LITHOLOGY LOG

| | | | | | Property South Heart | | | Hole No. Sh02-03 | | |
|---------------|-------------|-------------|------|------|----------------------|---------------|---------------|-------------------------|-----------|--------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | ermittee | | | | |
| | | | | | Address | | | · | | |
| | | | I | | Driller | John Moh | 1 | | ····· | |
| | | | | | Commence | d drilling | 3/4/02 | | Finished | 3/4/02 |
| | | | : | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| | |] | | | | | | | | |
| Locate hole | | | | | Method of d | - | | _Logged by | B. Pruitt | |
| is not vertic | al, give di | rection & a | ngie | | Drilling Fluid | . <u></u> | Air - Water I | njecuon | | |
| Surface Ov | vner | | | | _ | Signed | | | | |
| | | | | | | | | | | |
| Page 1 of | 1 | | | | | Title | ······ | | | |
| Dep | oth | | | Lith | <u> </u> | | | | | |
| From | То | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| 0.0 | 5.0 | 5.0 | | TS | Soil materi | ial, black t | o brown | | | |
| 5.0 | 13.5 | 8.5 | | CL | Clay, tan, | soft | | | | |
| 13.5 | 17.0 | 3.5 | F | со | | ft, oxidized | 1 | | | |
| 17.0 | 35.0 | 18.0 | | CL | Clay, gray | , soft | | | | |
| 35.0 | 38.5 | 3.5 | | CL | Clay, gray | , sandy | | | | |
| 38.5 | 39.5 | 1.0 | E | CO. | Lignite | | | | | |
| 39.5 | 80.0 | 40.5 | | SS | Sandstone | e, gray, fine | e grained, so | oft, not well | cemented | |
| 80.0 | 103.0 | 23.0 | | ss | Sandstone | e, gray, coa | arser graine | d, not well o | emented | |
| 103.0 | 105.0 | 2.0 | | SS | Sandstone | e, gray, hai | rd, well cem | ented | | ······ |
| 105.0 | 108.0 | 3.0 | | SH | Shale, gra | ıy | | | | |
| 108.0 | 116.5 | 8.5 | | ss | Sandstine | , gray, grad | ding to clay | | | |
| 116.5 | 134.0 | 17.5 | D | со | Lignite | | | | | |
| 134.0 | 143.0 | 9.0 | | ss | Sandstone | e, gray | | | <u></u> | |
| 143.0 | 150.0 | 7.0 | | CL | Clay, gray | , | TDD | | | |
| | | | | | | | | | | |

| | | | | | Property South Heart | | | | Hole No. | Sh02-03c |
|--------------|-------------|--------------|--------|----------|----------------------|--------------|--|----------------|-----------------|-------------------|
| | | | ·a | | | | | | Туре | Core |
| | | | | | Lessee or p | ermittee | • | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Moh | | • | | |
| | | | | | Commence | d drilling | 3/19/02 | ···= | Finished | 3/19/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | e within se | ection; whe | n hole | | Method of c | _ | | Logged by | B. Gjere | |
| is not verti | cal, give d | irection & a | angle | • | Drilling Flui | d <u>:</u> | Air - Water | Injection | | |
| Surface O | wner | | | | | Signed | | | | |
| | | | u | | - | - | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | |
| Page 1 of | | 2 | | | | Title | | | | |
| De | oth | <u> </u> | | Lith | <u>1</u> | | | | | |
| From | То | Thick. | Seam | Туре | | | | Description | | |
| | | | | | ; | | | | | |
| | 145.0 | | | | Drill such As | | | | | |
| 0.0 | 115.0 | | | | | core point | ····· | <u></u> | | |
| | | | | | | | ····· | | | |
| 115.0 | 129.0 | | | | Cored 14. | 0', recover | ed 12.6' - | driller said h | e cored slig | ntly more |
| | | | | | than 1' of i | roof | | | | |
| | | | | <u> </u> | | | | | | |
| 115.0 | 116.4 | 1.4 | | | Lost; soft, | , sandy roo | f? | | | |
| 116.4 | 124.0 | 7.6 | D | co | Lignite, br | own, a 0.0 | 5' pyrite on | top of seam | (not include | d in the |
| | | | | | interval ala | anyzed sind | ce it would i | oe cleaned o | off). This inte | erval is a little |
| | | | | | · | | | | | |
| | | | | | Soliel a e | XINDILS MOD | e venical in | actures man | the lower p | art of the seam. |
| | | | | ļ | Pyrite nod | ules at 19.8 | 8' and 122. | .0' - 122.3'. | | |
| 124.0 | 129.0 | 5.0 | D | co | Lignite, br | own, harde | r than abov | e described | zone. Exhi | bits dark and |
| | | | | | light brow | n bands - h | as a woody | v texture. Mo | oisture seem | ns to wick |
| | | | | | 1 | | | | | |
| | | | | | away from th | e surface | | · | | |
| | | | | ļ | | | | | | |
| | | | | ļ | ļ | | | | | |
| | | | | | | ATT - 10 | • • •••• <u></u> | | | |

3/19'02 Date

Property South Heart

Page No. 2 of Hole No. Sh02-03c

| Depth Lith | | | | | |
|------------|-------|--------|----------|---|--|
| From | To | Thick. | Seam | Туре | Description |
| | | | | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | |
| | | | | | |
| | | | | | |
| 129.0 | 135.0 | | | | Cored 6.0', Recovered 6.0' |
| | | | | | |
| | | | | | |
| 129.0 | 134.0 | 5.0 | D | co | Lignite, brown, banded, woody texture |
| | | | | | |
| ļļ | | | | | thin pyrite nodules at 129.3' and 131.1' |
| 134.0 | 134.4 | 0.4 | | SH | Shale, black, carbonaceous |
| | | 0.4 | | | |
| 134.4 | 135.0 | 0.6 | | SH | Shale, gray TDD |
| | | | | | |
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| | | | | | Property | South He | art | | Hole No. | Sh02-04 | | | |
|-------------|-------------|--------------|--------|---------|-------------|----------------|-----------|---|-------------|--|--|--|--|
| | | | | | | | | | Type Rotary | | | | |
| | | | | | Lessee or p | permittee | | | | | | | |
| | | | | | Address | | | | | | | | |
| | | | | | Driller | John Moh | | | | | | | |
| | | | | | Commence | ed drilling | 3/5/02 | | Finished | 3/5/02 | | | |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | _ State | ND | | | |
| l ocate hol | e within se | ection; whe | n hole | | Method of | drillina | Rotary | Logged by | B. Pruitt | | | | |
| | | irection & a | | | | id <u>:</u> | | | | | | | |
| | | | | | | | | | | | | | |
| Surface Ov | wner | | | | - | Signed | | | | , | | | |
| Page 1 of | | 1 | | | | Title | | | | | | | |
| Day | oth | | | Lith | T | | | a a successive and the successive a | | | | | |
| De From | То | Thick. | Seam | Туре | | | | Description | | | | | |
| | | | | | | • | | | | | | | |
| 0.0 | 28.0 | 28.0 | | CL | Clay, yelio | owish gray, | soft | · | | | | | |
| 28.0 | 30.0 | 2.0 | F | со | Lignite, br | rown | | | | | | | |
| 30.0 | 72.5 | 42.5 | | CL | Clay, gray | 1 | | | | | | | |
| 72.5 | 79.0 | 6.5 | E | со | Lignite, br | rown | | | | | | | |
| 79.0 | 102.0 | 23.0 | | CL | Clay, gray | 1 | | | | | | | |
| 102.0 | 104.0 | 2.0 | E1 | со | Lignite, br | rown | | | | | | | |
| 104.0 | 110.0 | 6.0 | | CL | Clay, gray | / | | | | | | | |
| 110.0 | 115.0 | 5.0 | | SS | Sandston | e, gray, sof | t | | | | | | |
| 115.0 | 125.0 | 10.0 | | CL | Clay, gray | <u>, sandy</u> | | | | <u>,,</u> | | | |
| 125.0 | 140.0 | 15.0 | | CL | Clay, gray | / | - | | | | | | |
| 140.0 | 157.0 | 17.0 | D | со | Lignite, br | rown | | | | | | | |
| 157.0 | 170.0 | 13.0 | | CL | Clay, gray | / | TDD | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | ······································ | | | |
| | | | | | 1 | | | | | | | | |
| | | | | <u></u> | <u> </u> | | | | | | | | |

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KIEWIT MINING GROUP INC.

LITHOLOGY LOG

| | | | | | Property | South He | art | | Hole No. | Sh02-04c |
|---|-------------|--------------|-------|------|---------------|--------------|--------------------------|--|---|--|
| | | | | | | | | | Туре | Core |
| | | | | | Lessee or p | permittee | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | |
| | | | | | Address | | | | | ······································ |
| | | | | | Driller | John Moh | 1 | | · · · · · · · · · · · · · · · · · · · | |
| | | | *= | | Commence | d drilling | 3/19/02 | | Finished | 3/19/02 |
| | | | | | | Sec. 17 | T. 139 N. | R. 98 W | State | ND |
| L | | | | | | | | | | |
| Locate hol | | | | | Method of a | | | Logged by | B. Gjere | ······ |
| is not verti | cal, give d | irection & a | angle | | Drilling Flui | d: | Air - Water | Injection | ·····,_···· | |
| Surface Ov | wner | | | | - | Signed | · | | - | |
| | | _ | | | | | | | | |
| Page 1 of | | 2 | | | | Title | | - K - M - M - H | | |
| Dep | oth | | | Lith | | | | | | |
| From | То | Thick. | Seam | Туре | | , | <i>Wardan a</i> r o maar | Description | | |
| | | | | | | | | | | |
| 0.0 | 71.0 | | | | Drill out to | core point | 1 | | | |
| | | | | | | | | | <u></u> | · · · · · · · · · · · · · · · · · · · |
| 71.0 | 81.0 | · · · · | | | | 0' - recovei | ea 10.0 | | | |
| | | | | | | | | | | |
| 71.0 | 72.8 | 1.8 | | CL | Clay, gray | , soft | | | | |
| 72.8 | 73.3 | 0.5 | Е | со | Lignite, br | own | | | | |
| 73.3 | 73.5 | 0.2 | E | CL | Clay, brow | nish gray | | | | |
| 73.5 | 79.6 | 6.1 | E | со | | | | | | |
| | | | | | | | pyrile 2011e | 79.1' to 79.6 | | <u></u> |
| 79.6 | 80.4 | 0.8 | | CL | Clay, gray | , | | | | - <u></u> |
| 80.4 | 80.7 | 0.3 | | co | Lignite, br | own, shale | y, soft | | | |
| 80.7 | 81.0 | 0.3 | | CL | Clay, soft | | - | | | |
| | | | | | | | | | | |
| | 404.0 | | | | | | • | | | |
| 81.0 | 101.0 | | | | | core point | 2 | | | |
| | | | | | | | | | = 11200 - E. S. | ····· |
| | | | | | | | | | | |
| | | | | | | | | | | |
| ۱ <u>ــــــــــــــــــــــــــــــــــــ</u> | | | | I | .1. | | | | | |

3/19/01 Date

Property: South Heart

Page No. 2 of Hole No. Sh02-04c

| Der | oth | | | Lith | |
|-------|-------|--------|------|------|--|
| From | То | Thick. | Seam | Туре | Description |
| 101.0 | 107.3 | | | | Cored 6.3' - recovered 6.3' |
| | | | | | |
| 101.0 | 102.9 | 1.9 | | CL | Clay, gray |
| 102.9 | 104.8 | 1.9 | E1 | со | Lignite, brown, soft, woody |
| 104.8 | 106.0 | 1.2 | | CL | Clay, gray, banded with thin stringers of carbonaceous material. |
| 106.0 | 106.9 | 0.9 | | со | Lignite, brown, soft, shaley - banded with thin, gray clay |
| 106.9 | 107.3 | 0.4 | | CL | Clay, gray |
| | | | | | |
| 107.3 | 140.0 | | | | Drill out to core point 3 |
| 140.0 | 154.5 | | | | Cored 14.5' - recovered 14.5' |
| | | | | | |
| 140.0 | 140.5 | 0.5 | | со | Lignite, brown, fissile, very high pyrite concetrations |
| 140.5 | 154.5 | 14.0 | D | co | Lignite, brown, banded, fissile in thin zones, |
| | | | | | pyrite nodules at 141.1', 143.2', 151.3' and 154.0' |
| | | | | | |
| 154.5 | 158.5 | | | | Cored 4.0' - recovered 4.0' |
| | | | | | |
| 154.5 | 157.5 | 3.0 | D | со | Lignite, brown, more fissile than above described zone, soft |
| 157.5 | 158.0 | 0.5 | | CL | Clay, brown, coaly |
| 158.0 | 158.5 | 0.5 | | CL | Clay, gray TDD |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| Type Rotary Lessee or permittee Address Driller John Mohl Commenced drilling 3/4/02 Sec. 9 T. 139 N. R. 98 W State ND | |
|---|---------|
| Address Driller John Mohl Commenced drilling 3/4/02 Finished 3/4/02 | |
| Driller John Mohl Commenced drilling 3/4/02 Finished 3/4/02 | |
| Commenced drilling <u>3/4/02</u> Finished <u>3/4/02</u> | |
| | |
| Sec. 9 T. 139 N. R. 98 W State ND | - - |
| | - |
| Locate hole within section; when hole Method of drilling Rotary Logged by B. Pruitt | |
| is not vertical, give direction & angle Drilling Fluid: Air - Water Injection | |
| Surface Owner Signed | |
| | |
| Page 1 of Title | |
| Depth Lith | |
| From To Thick. Seam Vype Description | |
| | <u></u> |
| 0.0 10.0 10.0 CL Clay, brownis-gray, soft | |
| 10.0 14.0 4.0 CL Clay, gray, soft | |
| 14.0 20.0 6.0 E CO Lignite, brown, soft, oxidized | |
| 20.0 37.0 17.0 CL Clay, gray | |
| 37.0 39.0 2.0 E1 CO Lignite, brown, shaley | n |
| 39.0 75.0 36.0 CL Clay, gray | |
| 75.0 87.5 12.5 IC Lost circulation - no returns | |
| 87.5 104.0 16.5 D CO No returns - coal picks taken from geophysiscal logs | |
| 104.0 120.0 16.0 CL Clay, gray TDD | |
| | |
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| | |
| | |

| | 97e 3/18/02 ID |
|--|---|
| Address Driller John Mohl Commenced drilling 3/18/02 Sec. 9 T. 139 N. R. 98 W State Nit Locate hole within section; when hole Method of drilling Rotary Logged by B. Gjere is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Page 1 of 2 Litth | |
| Driller John Mohl Commenced drilling 3/18/02 Finished 3/ Sec. 9 T. 139 N. R. 98 W State Ni Locate hole within section; when hole Method of drilling Rotary Logged by B. Gjere is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed | |
| Commenced drilling 3/18/02 Finished 3/ Sec. 9 T. 139 N. R. 98 W State Ni Locate hole within section; when hole Method of drilling Rotary Logged by B. Gjere is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed | |
| Sec. 9 T. 139 N. R. 98 W State Ni Locate hole within section; when hole Method of drilling Rotary Logged by B. Gjere is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed Page 1 of 2 Title Lith Lith | |
| Locate hole within section; when hole Method of drilling Rotary Logged by B. Gjere is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed Page 1 of 2 Title Depth Lith | ID |
| is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed Page 1 of 2 Depth Lith | |
| is not vertical, give direction & angle Drilling Fluid: Air - Water Injection Surface Owner Signed Page 1 of 2 Depth Lith | |
| Page 1 of 2 Title | |
| Page 1 of 2 Title | |
| Depth Lith | |
| | |
| | |
| | |
| 0.0 36.0 Drill out to core point 1 | |
| | |
| | |
| 36.0 41.0 Cored 5.0' - recovered 4.6' | |
| 36.0 37.4 1.4 CL Clay, gray soft | |
| 37.4 39.4 2.0 E1 CO Lignite, brown, soft, woody texture - pyrite band at 38.8' | |
| 39.4 39.8 0.4 CL Clay, gray, soft, grading to carbonaceous | |
| 39.8 40.6 0.8 CO Lignite, brown, soft, grading to carbonaceous shale at botton | m |
| 40.6 41.0 0.4 IC Lost | |
| | <u></u> |
| | • <u>•••</u> •••••••••••••••••••••••••••••••• |
| 41.0 86.5 Drill out to core point 2 | |
| | ••••••••••••••••••••••••••••••••••••••• |
| 86.5 100.5 Cored 14.0' - recovered 13.2' | . <u>.,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,</u> |
| probably lost roof since driller thought we had about 1' of cla | ay |
| before hitting the coal | |
| | |
| | |

3/18/02 Date

Property: South Heart

Page No. 2 of Hole No. Sh02-05c

Depth Lith То Thick. Seam Description From Туре 86.5 87.4 IC 0.9 Lost core 0.4 D CO Lignite, brown, fissile, very high pyrite concentration 87.4 87.8 CO Lignite, dull brown, fissile 88.4 0.5 D 87.8 D CO Lignite, brown, dull luster, top 6" has numerous clay partings 88.4 94.8 6.4 100.5 5.7 94.8 D CO Lignite, brown, thin bands of bright coal; pyrite nodules at 98.5' 100.5 105.5 Cored 5.0' - recovered 4.3' driller said about 0.5' of floor was cored. 100.5 102.9 2.3 D CO Lignite, dull brown, fissile 102.9 103.0 0.1 D CL Clay, gray, high pyrite content 103.0 104.9 1.9 D CO Lignite, brown, dull, soft 104.9 105.5 0.6 IC TDD Lost core

| | | | | | Property | South He | art | | Hole No. | Sh02-06 |
|--------------|-------------|--------------|-------|----------|---------------|------------|-------------|-------------|----------|--|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | ermittee | | | | |
| | | | | | Address | • | <u> </u> | | | |
| | | | | | Driller | John Moh | 1 | | | |
| | | | | | Commence | d drilling | 3/4/02 | | Finished | 3/4/02 |
| | | | | | | Sec. 16 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | | | | | Method of c | | | Logged by | | |
| is not verti | cal, give d | irection & a | angle | | Drilling Flui | d <u>:</u> | Air - Water | Injection | | |
| Surface Ov | wner | | | | - | Signed | | n | | |
| Page 1 of | | 1 | | | | Title | | | | |
| , age , or | | <u> </u> | | | | | | | | |
| Der | | | | Lith | | | | Deservation | | |
| From | То | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| 0.0 | 13.0 | | | CL | Clay, yello | wish gray, | soft | | | |
| 13.0 | 38.0 | | | CL | Clay, gray | | | | | |
| 38.0 | 42.0 | | E | со | Lignite, br | own, soft | | | | |
| 42.0 | 72.0 | | | CL | Clay, gray | , sandy | | | | |
| 72.0 | 76.0 | | E1 | со | Lignite, br | | is punky | | | |
| 76.0 | 80.0 | | | CL | Clay, gray | | | | | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| 80.0 | 85.0 | | | SS | | | | | | · · · · · · · · · · · · · · · · · · · |
| 85.0 | 115.0 | | | CL | Clay, gray | | | | | |
| | 135.0 | | | | | | | | | |
| 115.0 | | | D | co | Lignite, br | | | | | |
| 135.0 | 155.0 | | | CL | Clay, gray | 1 | TDD | ····· | | |
| | | | | | | | | | | |
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| | | | | | Property | South He | art | | Hole No. | Sh02-07 |
|--------------|-------------|--------------|-----------|------|---------------|--------------|-------------------------|--|-----------|---------------------------------------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | permittee | | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Mot | าไ | | | |
| | | | | | Commence | ed drilling | 3/4/02 | | Finished | 3/4/02 |
| | | | | | | Sec. 16 | T. 139 N. | R. 98 W | State | ND |
| | | | <u></u> , | | | | | | | |
| Locate hol | | | | | Method of o | | | Logged by | B. Pruitt | |
| is not verti | cal, give d | irection & a | angle | | Drilling Flui | id <u>:</u> | Air - Water | njection | | · · · · · · · · · · · · · · · · · · · |
| Surface O | wner | | | | | Signed | | | | |
| | | | | | - | | <u> </u> | | | |
| Page 1 of | | 1 | | | | Title | | <u></u> | | |
| De | pth | | | Lith | T | 9101 <u></u> | | | | |
| From | Το | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| 0.0 | 4.0 | 4.0 | | TS | Topsoil | | | | | |
| 4.0 | 21.0 | | | CL | Clay, tan, | soft | | | | |
| 21.0 | 45.0 | 24.0 | | SS | | | , weathered | | | |
| | | | | 1 | | | | | | |
| 45.0 | 60.0 | 15.0 | D | CO | Lignite, br | rown, top 1 | ' - 2' is <u>soft</u> , | weathered | | |
| 60.0 | 90.0 | 30.0 | | CL | clay, gray | , soft | TDD | ······································ | | |
| | | | | | | | | | | |
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KIEWIT MINING GROUP INC.

LITHOLOGY LOG

| } | | | | | Property | South He | art | | Hole No. | Sh02-07c | | |
|--------------|-------------|------------|---------|-----------|-----------------------------------|---------------------|----------------|---------------|---|------------------|--|--|
| | | | | | | | | | | Type Core | | |
| | | | | | Lessee or p | Lessee or permittee | | | | | | |
| | | | | | Address | <u></u> | | | | | | |
| | | | | | Driller | John Moh | | | | | | |
| | | | | | Commence | d drilling | 3/27/02 | | - Finished | 3/27/02 | | |
| | | | | | | Sec. 16 | T. 139 N. | R. 98 W | State | ND | | |
| | | | | l | Mathad of a | Lilling | Deter | Loggod by | D. Olara | | | |
| | | ction; whe | | | | Irilling d: | Air - Water | Logged by | B. Gjere | **** | | |
| not vera | bui, give a | | ingio - | | Dinning i fan | | | | | <u></u> | | |
| urface O | wner | | | | - | Signed | | | | | | |
| 200 1 of | | 1 | | | | Title | | | | | | |
| age i oi | | | | | | nue | <u></u> | <u></u> | | | | |
| Der | | | | Lith | | | | | | | | |
| From | То | Thick. | Seam | Туре | | <u></u> | | Description | 2 - 20 <u>-20-</u> 20-20-20-20-20-20-20-20-20-20-20-20-20-2 | | | |
| 0.0 | 44.0 | | | | Drill out to | core point | · | | | | | |
| | | | | | | | | | | | | |
| 44.0 | 58.0 | | | | Cored 14. | 0' - recovei | red 12.1' | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 44.0 | 45.2 | 1.2 | | SS | Sandstone | e, yellowist | 1-gray, very | soft, weathe | ered - interfa | ice with lignite | | |
| | | | | ļ | is broken, | crumbly, a | nd mashed | • | | . <u></u> | | |
| 45.2 | 47.1 | 1.9 | D | со | Lost, Wea | thered coa | I? - based (| on geophysi | cal log inter | oretations | | |
| 47.1 | 52.6 | 5.5 | D | со | Lignite, du | ill brown. c | rumbiv. veil | ow stains th | roughout, w | eathered | | |
| | 58.0 | | D | 1 | | | | | /rite band at | | | |
| 52.6 | 00.0 | 5.4 | | | | own, Danu | eu, verucal | nacures, py | me banu at | 57.5 | | |
| | ····· | | | <u> </u> | | | | | | | | |
| 58.0 | 61.0 | | | | Cored 3.0 | ' - recovere | ed 2.9' | | | <u> </u> | | |
| 1 | 59.0 | 1.0 | D | <u>co</u> | Lignite, br | own, fissile | e, thin clay p | partings thro | ughout | <u></u> | | |
| 58.0 | 00.0 | | | 1 | 1 | | | | | | | |
| 58.0 59.0 | 59.6 | 0.6 | D | co | Lignite, du | 1 | | | | | | |
| | | 0.6 1.3 | D | CO CL | | | <u></u> | | | | | |
| 59.0 | 59.6 | | D | | Lignite, du Clay, gray Lost | | TDD | | | | | |

| | | | | | Property | South He | eart | | Hole No. | Sh02-08 |
|--------------|-------------|------------|--------|--------------|-------------|----------------|--|-------------|----------|---|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | permittee | | | ······ | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Mol | <u>1 </u> | | | |
| | | | | | Commence | ed drilling | 3/4/02 | | Finished | 3/4/02 |
| | | | | | | Sec. 15 | T. 139 N. | R. 98 W | State | ND |
| Locate hole | a within co | ction: whe | n hole | | Method of | trilling | Rotary | l ogged by | | |
| is not verti | | | | | | d: | | | | |
| | | | | | | | | | | |
| Surface Ov | wner | | | | - | Signed | | | | |
| Page 1 of | | 1 | | | | Title | | | | |
| | | | | | | | | | | |
| Der From | oth To | Inick. | Seam | Lith Type | | | | Description | | |
| | | | | | | | | | | ĨĊŎĊŦĔġ <u>ġĊġĊĸŎ</u> ŢĊĸĊŢŢŊĊŶŦŢĿĬĊĬĊĬĊĬĊĬŎĬŎĬŎŎ |
| 0.0 | 11.5 | 11.5 | | CL | Clay, tan | to gray, sol | ft | | | |
| 11.5 | 17.0 | 5.5 | E | со | Lignite, to | p 3' - 4' is v | very soft, we | | | |
| 17.0 | 37.0 | 20.0 | | CL | Clay, gray | | | | | ······································ |
| | | 2.0 | E1 | co | 1 | , ouriey | | , | | <u></u> |
| 37.0 | 39.0 | | | | Lignite | | | | <u></u> | ******** |
| 39.0 | 88.0 | 49.0 | | CL | Clay, gray | , sandy | | | | |
| 88.0 | 104.5 | 16.5 | D | co | | | | | | ····· |
| 104.5 | 120.0 | 15.5 | | СІ | Clay, gray | / | TDD | | | |
| | | | | | | | | | | |
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| | | | | | | | | ····· | | |
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| | | | | <u> </u> | | | · *** **** *** *********************** | | | |
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| | | | | <u> </u> |] | | | | | |

| | | | | | Property | South He | art | | Hole No. | Sh02-11c |
|--------------|-------------|--------------|--|----------|---------------|---------------|----------------|---|--------------|-----------------|
| | | | | | | | | | Туре | Core/Piez. Well |
| | | | | | Lessee or p | permittee | | | | |
| | | | يېر ولندو ور وانو ^{ور} د ور و | | Address | | | | | |
| | | | | | Driller | John Mot | <u>1</u> | | | |
| | | | | | Commence | ed drilling | 3/28/02 | ., <u>, ,,,,, -,-,,,,,,,,,,,,,,,,,,,</u> ,-,- | Finished | 3/28/02 |
| | | | | | | Sec. 23 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | | | | | Method of (| - | | Logged by | R. Schmid & | B. Gjere |
| is not verti | cal, give d | irection & i | angle | | Drilling Flui | iu <u>.</u> | Air - Water | Injection | · | |
| Surface O | wner | | | | | Signed | | | | |
| Deve dief | | 2 | | | | Title | | | | |
| Page 1 of | | 4 | | | | nue | | | | |
| De | | | | Lith | | | | | | |
| From | То | Thick. | Seam | Туре | <u> </u> | | | Description | | |
| | | | | | | | ····· | | | |
| 0.0 | 47.0 | | | | Drill out to | core point | | | | |
| 47.0 | 61.0 | | | | Cored 14. | 0' - recov | ered 13.6' | | | |
| | | | | | | <u></u> | <u>,</u> | | | |
| 47.0 | 47.4 | 0.4 | | IC | Lost. sho | uld have h | ad about 0. | 5' of roof - sr | nall rock on | top of core |
| 47.4 | 48.0 | 0.6 | D | со | 1 | ack to brow | | | | |
| 48.0 | 55.5 | 7.5 | | со | 1 | | | fraaturaa | | |
| 40.0 | 55.5 | 1.5 | | | 1 | | ed, vertical | | | |
| | | | | | bands of | high pyrite | e concentrat | tion at 53' an | d 54' | |
| 55.5 | 57.0 | 1.5 | D | cs | Carbonac | eous clay, | black, soft, | (blackjack) | | |
| 57.0 | 57.1 | 0.1 | D | CL | Clay, tan, | bentonitic | | | - | |
| 57.1 | 58.8 | 1.7 | D | со | Lignite, du | ull black, sh | aley, fissile | | | |
| 58.8 | 59.4 | 0.6 | D | со | Lignite, br | own, soft, | fissile | | | |
| 59.4 | 61.0 | 1.6 | D | со | Lignite, du | ull black, sh | naley, fissile | | | |
| | | | | | | | | | | |
| | | | | | | | | | | <u></u> |
| | | | | | | | | | | |

Date 3/28/02

Property: South Heart

Page No. 2 of Hole No. Sh

le No. Sh02-11c

| Dep | oth | | | Lith | |
|------|------|--------|---------------------------------------|------|--|
| From | То | Thick. | Seam | Туре | Description |
| | | | | | |
| 61.0 | 70.0 | | | | Cored 9.0' - recovered 8.6' |
| 61.0 | 68.8 | 7.8 | D | со | Lignite, brown, banded, thin fissile zones throughout |
| | | | | | thin clay stringers at 64.4' and 66.0' |
| 68.8 | 69.6 | 0.8 | D | со | Lignite, brown, woody texture, pyrite scale in vertical fracture |
| 69.6 | 70.0 | 0.4 | | IC | Lost TDD |
| | | ·· | | | |
| | | | | | |
| | | | | | completed as a monitor well |
| | | | | | see Sh02-11b by Roger Schmid |
| | | | | | |
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BUAKD OF WATER WELL CONTRACTORS 900 5. BOULEVARD AVE, DEPT. 770 * BISMARCK, NORTH DAKOTA 58505-0850

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| 2. WELL LOCATION South well 11A 1 39-98-23AAA 3. WELL TEST DATA 4. 1 1 1 5. 1 1 1 5. 2000 2. WELL LOCATION South well 11A 1. 1 1 5. 2000 2. WELL LOCATION South well 11A 1. 1 1 5. 2000 2. WELL TEST DATA 5. 2000 5. 2 | |
|--|--------------|
| Name Kienergy Tac Fact Carlos Fact Carlos Address 203 S Bain, NY 62803 Gontrolled by: Linovagh indi 2. WELL LOCATION South well, 113 If flowing: closed is pressure indi 2. WELL LOCATION South well, 113 If flowing: closed is pressure indi 2. WELL LOCATION South well, 113 To there: specify indi 1 1 Image: specify Bailer other 2. WELL LOCATION South well, 113 Function: specify Image: specify indi 2. WELL LOCATION South well, 114 Function: specify Image: specify | : wcll. |
| Hans Kienergy Inc Face below and inf investing: closed-in pressure Face below and inf investing: closed-in pressure Address 203 S Emain, WY 62801 Controlled by: Linvoyah inch 2. WELL LOCATION South well, lla If investing: closed-in pressure inch 2. WELL LOCATION South well, lla If investing: closed-in pressure inch 1 1 Image: specify incoments inch inch 1 1 Image: specify incoments inch inch 1 1 Image: specify incoments inch inch 2. WELL LOCATION South well, lla inch inch inch 2. MOPTGED USE Geothermin X Monitoring Indestrial inch inch inch 3. WATER QUALTY Reverse Rotary Bored Silt, sandy, gray Silt, sandy, gray 3. WATER QUALTY Reverse Rotary Yes X Mo Shale, silty, gray Shale, silty, gray 4. WELL CONSTRUCTION Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray 5. WELL CONSTRUCTION South and subjease? | |
| Address 203 S Bain, Suite 2004 If Flowing: Closed in pressure Sheridan, WX 82801 GM flow through 2. WELL COCATION South well 1.11A GM flow through 1 1 1 GM flow through 2. WELL COCATION South well 1.11A Tf tother.specify Tf tother.specify 1 1 1 Tf tother.specify Tf tother.specify 1 1 1 Tf tother.specify Tf tother.specify 1 1 1 Tt tother.specify Tt tother.specify 2. WELL CONSTRUCTION Transadad Sonto Tt tother.specify Tt tother.specify 1 1 1 1 Tt tother.specify Tt tother.specify 1 1 1 1 1 Stale, silty, gray Shale, silty, gray </td <td></td> | |
| Sheridan, WY 82801 Get flow through ich 2. WELL COCATION South well 111A 1 139-99-232AA to total suffice 1 1 1 <td></td> | |
| 2. WELL COATION 2. WELL COATION 2. WELL COATION 2. WELL COATION 2. WELL COATION 3. PROPOSED USE Geothermal X Monitoring Despective Triggation Industrial Stock Municipal Test Noie 3. PROPOSED USE Geothermal X Monitoring Dospective Triggation Industrial Stock Municipal Test Noie 3. PROPOSED USE Geothermal X Monitoring Dospective Triggation Industrial Stock Municipal Test Noie 3. WATH QUALITY 4. METHOD DRILED Coher semile Collected for: Charles analyses? Ves X Bo Despective Collected for: Charles analyses? Ves X Bo Despective Collected for: Charles Laboratory was it Seni? 5. WATH QUALITY Was a wask supple Collected for: Charles Laboratory was it Seni? 5. WATH QUALITY Was a wask supple Collected for: Charles Laboratory was it Seni? 5. WATH QUALITY Was a wask taboratory was it Seni? 5. WATH QUALITY Was a wask tool 105 freet 16 other, Specify | i |
| 2. WELL LOCATION 139-96-23AAA 4. WELL TEST DATA 1 1 1 2. WELL TEST DATA 2. WELL TEST | - • |
| 139-96-23àAa 1 1 2 Attract 1 1 2 Attract 1 1 2 Attract 2 Attract 2 Attract 3 Attract 2 Attract 2 Attract 2 Attract 2 Attract 2 Attract 2 Attract <tr< td=""><td>Other</td></tr<> | Other |
| 4. WELLIEST DATA Pump Bailer Other Pumping level below lind surface ft. atter_ hrs.pumping tt. atter_ hrs.pumping tt. atter_ hrs.pumping ft. atter_ hrs.pumping tt. atter_ hrs.pumping ft. att | |
| 1 | |
| Junitorial Junitorial Junitorial Junitorial Josephile Stark NEL/4 NEL/4 NEL/4 NEL/4 Sec.23 Twp.139 N.Rgs.98 W 3. PROPOSED USE Geothermal X Monitorial Josephile Triggiton Josephile Triggiton Josephile Triggiton Josephile Triggiton County Atter Josephile Triggiton Josephile Triggiton Josephile Triggiton County Stark A METHOD DRHILED Triggiton Cable Persess Rotary Chile Persess Rotary Josephile Persess Rotary Josephile Persess Rotary Josephile Stale Swatter Sampelic Josephile Stale Swatter Sampelic Swatter Sampelic Swatter Sampelic Swatter Sampelic Swatter Sampelic Swatter Sampelic Swatter Samapelic Swatt | |
| County Stark | |
| 1 1 1 County Stark 1 NES1/4 NE1/4 NE1/4 Sec.23 Twp.139 H.Rgs.96 W 5 3. PROPOSED USE Geothermail X Honitoring Defection Defection Irrigation Industrial Stark Numicipal Test after hrs.pumping 2. PROPOSED USE Geothermail X Honitoring Defection Clay, silty to sandy, yellowish | - |
| County Stark ft. after hrs.pupping NB1/4 NE1/4 NE1/4 NE1/4 Sec.23 Typ.139 N.Rge.96 W 9. WELLLOG Depth SPROPOSED USE Geothermal X Monitoring Stark Depth Stock Hunicipal Test Role 9. WELLLOG Depth Cable Fermical analyses Test Role Stale, silty to sandy, yray Cable Peverse hotary Betted Auger If other specify Jetted Auger Stale, silty gray S. WATER QUALITY Stark Stale, silty, gray Stale, silty, gray S. WATER QUALITY Stark Stale, silty, gray Shale, silty, gray S. WATER QUALITY Stark Stale, silty, gray Shale, silty, gray S. WATER QUALITY Stale Stale, silty, gray Shale, silty, gray S. WATER QUALITY Stale Stale, silty, gray Shale, silty, gray S. WATER QUALITY Stale Stale, silty, gray Shale, silty, gray Shale, silty, gray S. WATER QUALITY Stale Stale, silty, gray Shale, silty, gray Shale, silty, gray S. WATER QUALITY Stark Stark S | _db= |
| County Stark NE1/4 NE1/4 NE1/4 Sec.23 Typ.139 N.Rgs.96 w NE1/4 NE1/4 NE1/4 Sec.23 Typ.139 N.Rgs.96 w 9. WELLLOG Pormatics 1. Proven, voridized Stock Hunicipal Test Role Stock Hunicipal Test Role 4. METHOD DRHLED Stock Hunicipal Test Role 4. METHOD DRHLED Cable Peverse Rotary Bored 1. Stock Hunicipal Test Role Stock Hunicipal Test Role 4. METHOD DRHLED Stock Hunicipal Test Role Stock Hunicipal Test Role 1. Stock Hunicipal Test Role Stock Hunicipal Test Role Stock Hunicipal Test Role 5. WATER QUALITY Kas a vafer semple collected for: Chemical analyses? Yes X Ro Bettoriological Analyses? Yes X Ro If so, to what laboratory was it sent? 6. WELL CONSTRUCTION Diameter of Role Sinches Depth 195 fort Ib/ft 2 inches 105 feet 100 reet 10 DATE COMFLETED 28 Mar 02 Was a well screen installed? K ros No Natarial Streight Screen Or 175 feet to 185 feet Stot Size at from feet to feet Stot Size at from feet to feet Sto Size at from feet to feet Stot Size at from feet to feet Sto Size at from feet to feet Stot Size at from feet to feet Sto Size at from feet to feet Sto Size at from feet to feet Stot Size at from feet to feet Sto Size at from feet to feet Sto Size at from feet to feet Sto Size at from feet to feet Mas casing laft open end? To 2 173 Sto Size at from feet to feet Mas casing laft open end? To 2 173 Store sile was attiled to stread feet of feet feet feet feet of feet feet | gpm |
| NE1/4 N | _dbw |
| 3. PROPOSED USE | • |
| 3. PROPOSED USEGoothermal X_MonitoringDomesticItrigationIndustrialbrown, oridizedDomesticItrigationIndustrialbrown, oridizedDomesticItrigationIndustrialbrown, oridizedDomesticShale, gallowish brown, oridizedShale, silty brown, w/ organicsShale, silty gray | 1. |
| Decestic Irrigation Industrial brown, oridized Stock Hunicipal Test Role Shale, yallowish brown, oridized 4 METHOD DRHLED Shale, silty, brown, w/ organics Cable Deverse Rotary Bored Shale, silty, brown, w/ organics Cable Deverse Rotary Bored Shale, silty gray Cable Deverse Rotary Bored Shale, silty gray Sware semple collected for: Shale, silty, gray Shale, silty, gray Sware semple collected for: Shale, silty, gray Shale, silty, gray Sware semple collected for: Shale, silty, gray Shale, silty, gray Sware semple collected for: Shale, silty, gray Shale, silty, gray Sware semple collected for: Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray Shale, silty, gray <td>То</td> | То |
| | 10 |
| 4. METHOD DRILLED Shale, silty, brown, w/ organits 2. METHOD DRILLED Shale, silty, gray 2. Cable Peverse Rotarysored 3. METHOD DRILLED Suger 3. MATKE QUALTY Stale, silty gray 5. WATKE QUALTY Shale, silty gray 5. WATKE QUALTY Shale, silty, gray 5. WATKE QUALTY Shale, silty, gray 5. WATKE QUALTY Shale, silty, gray 6. WELL CONSTRUCTION Shale, silty, gray Diameter of Bole | |
| 4 METHOD DERILLED Cable | 21 |
| Cable Peverse Rotary Sored Sand, silty gray K_Forwood Rotary Jetted Auger Shale, light gray If other specify Shale, light gray S.WATER QUALITY Shale, silty, gray, line rock at S.WATER QUALITY Shale, silty, gray, line rock at S.WATER QUALITY Shale, silty, gray, line rock at Swarer semple collected for: Shale, silty, gray Chemical analyses? Yes X No Basteriological Analyses? Yes X No Shale, silty, gray Shale, silty, gray | 42 |
| X_Forword Rotary | 48 |
| If other specify Shale, light gray S. WATER QUALITY Shale, light gray Was a water sample collected for: Chemical analyses? Yes X No Shale, silty, gray Shale, silty, gray Shale, silty, gray Mastoriological analyses? Yes X No 100° 5 lignite at 108' If so, to what laboratory was it sent? Shale, silty, gray Shale, greenish gray 6. WELL CONSTRUCTION Shale, silty, gray Shale, silty, gray 9. Weight: Diameter: From: To: 1bft 2 inches Pastic 1bft 2 inches feet Nas perforated pips set from ft to Nas perforated pips set from feet to Nas packet or seal used? Yes No No Nas packet or seal used? Yes <t< td=""><td>69.5</td></t<> | 69.5 |
| 5. WATER QUALITY Was a water sample collected for: Chemical analyses? Yes X No Bettoriological Analyses? Tos X No Bettoriological Analyses? Tos X No If so, to what laboratory was it sent? 6. WELL CONSTRUCTION Diameter of Boleinches Depth 195_freet Casing: Steel X Plastic Concrete X Threaded Welded Other If other, specify Size Weight: Diameter: From: To: Ib/ftinches from ft to feet Was casing left open end? Yes X No Perforated pipe used? Yes X No Perforated pipe used? Yes X No Nas perforated pipe used? Yes X No Perforated pipe used? Yes X No Perforated pipe used? Yes X No Nas casing left open end? X res No Material PVC Slot Sizest from ft to feet Nas packer or seal ised? Yes X No Pir weil screen installed? X res No Material PVC Nas packer or seal ised? Yes X No Pir of wil: Straight screen_Gravel packed X No material: Cament To: 173 Grouting aterial: Cament To: 173 Well head completion: Pitlers unit No Has actiled under wy juridictions and to feet Was defined in reliance for the from ft to feet Nas packer or seal ised? Yes X No Material PVC Perforated pipe used? Yes X No Material PVC Nas packer or seal ised? Yes X No Material PVC Piler's or rither's Rame Well head completion: Pitlers unit Well head completion: Pitlers unit | 1 |
| 5. WATER QUALITY Was a water sample collected for: Chanical analyses? Yes X No Bettoriological Analyses? Tes X No Bettoriological Analyses? Tes X No Bettoriological Analyses? Tes X No If so, to what laboratory was it sent? 6. WELL CONSTRUCTION Diameter of Bole 5 inches Depth 195 feet Casing: Steel X Plastic Concrete X Threaded Welded Other If other specify From: To: Ibft 2 inches 185 feet 190 feet Nas perforated pipe used? Yes X No Perforated pipe set from ft to feet Was set scing laft open end? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas perforated pipe set from feet to feet Nas casing laft open end? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Naterial FVC Diameter 2 inches Slot Size set from feet to feet Nas packer or seal used? Yes X No Nas well head completion? Pitless unit | 72 |
| Was a water sample collected for: Shale, silty, gray, lime rock at 100' & lignite at 108' Chemical analyses? Yes X No Betteriological Analyses? Tes X No If so, to what laboratory was it sent? Shale, silty, gray 6. WELL CONSTRUCTION Shale, silty, gray Diameter of Hole | 74 |
| Chmical analyses? Yes X No Bectariological Analyses? Tes X No If so, to what laboratory was it sent? 6. WELL CONSTRUCTION Diameter of Bole | 76 |
| Batteriological Analyses? Tes X_No 100° & lignite at 108° If so, to what laboratory was it sent? Shale, greenish gray 6. WELL CONSTRUCTION Shale, silty, gray 0. and the second of th | <u> </u> |
| if so, to what laboratory was it sent? Shale, greenish gray 6. WELL CONSTRUCTION Shale, silty, gray Diameter of Holeinches Depth 195_fcet Shale, silty, gray Casing: Steel X Plastic Concrete Shale, silty, gray Material Welded Other Shale, silty, gray w/lignite seam If other, specify | 108 |
| 6. WEHL CONSTRUCTION Sandstone Diameter of Holeinches Depth 195_feet Shale, silty, gray Casing: X PlasticConcrete Shale, silty, gray w/lignite seam X Threaded | 112 |
| 6. WELL CONSTRUCTION Diameter of Holeinches Depth_195_fcet Casing: Steel X Plastic Concrete X Threaded Welded Other If other, specify Pipe Weight: Diameter: Prom: To: | 129 |
| Diameter of Boleinches Depth 195_fcet Casing: Steel X Plastic Concrete X Threaded Welded Other If other, specify Pipe Weight: Diameter: Prom: To: | 131 |
| Casing: Steel X Plastic Concrete Shale, silty, gray w/lignite seam X Threaded Welded Other Lignite If other, specify From: To: | 166 |
| X ThreadedWeldedOther Jignite If other, specify | 1170 |
| If other, specify Pipe Weight: Diameter: From: To: Ib/ft 2 inches +2 feet 175 feet Ib/ft 2 inches 185 feet 190 feet (use soparate sheet if nerestary) Ib/ft inches feet feet Was perforated pipe set from ft to feet Was casing left open end? Yes X No Perforated pipe set from ft to feet Was casing left open end? Yes X No Material PVC Diameter 2 inches Slot Size set from feet to feet Slot Size set from feet to feet Was packer or seal used? Yes X No Material PVC Diameter 2 inches If so, now? If so, what material Depth ft Type of will: Straight screen Gravel Packed X Depth grouted: From 0 70 173 Grouting material: Coment Other X If other replain: Bentonite Chips Weil head completion: Pitless unit Mo HL Dr: L:WS, ZWC /C | i 172 |
| Pipe Weight: Diameter: From: To: | 185 |
| Pipe Weight: Diameter: From: To: 1b/ft 2 inches +2 feet 175 feet 1b/ft 2 inches +2 feet 190 feet 1b/ft 2 inches feet 190 feet 1b/ft 2 inches feet (use suparate sheet if necessary) 1b/ft inches feet (use suparate sheet if necessary) 1b/ft inches feet (use suparate sheet if necessary) 1b/ft inches feet 10 DATE COMPLETED 28 Mar 02 Perforated pipe set from ft to feet 11 WAS THE HOLE PLUGGED OR ABANDONE Was a weill screen installed? X res No If so, how? Slot Size 10 set from feet to feet Was packer or seal used? Yes X No If so, what material Depth ft Type of will: Straight screen Gravel packed X Bo Grouting paterial: Cement Other X This wall was catiled under my juridiction and to the port is true to the best of my knowledge If other applain: Bentonite Chips MO HL Der: 1: WS, ZWC MO | 195 |
| Ib ft 2 inches 185 teet 190 teet (use soparate sheet if necessary) Ib ft inches feet (use soparate sheet if necessary) Ib ft inches feet (use soparate sheet if necessary) Was perforated pipe set from ft to feet Was casing left open end? Yes X No Naterial PVC Diameter 2 inches Slot size set from feet to Slot size set from feet to Vas packer or seal used? Yes X No If so, what material Depth ft Type of wall: Straight screen Gravel packed X Grouting material: Cement Other X If other poplain: Bentonite Chips Scrifters name Weil head completion: Pitless unit Mo HL Dr: 11:NS, ZWC | 1 |
| Ib/ft inches feet feet Was perforated pipe used? Yes X No Perforated pipe set from ft to feet Was casing left open end? Yes X No Was casing left open end? Yes X No Was a well screen installed? X Yes No Material PVC Diameter 2 inches Slot Size 10 set from 175 feet to 185 feet Slot Size set from feet to feet Vas packer or seal used? Yes X No If so, what material Depth ft Type of well: Straight screen Gravel packed X Depth grouted: From 0 To If other axplain: Bentonite Chips Well head completion: Pitless unit | |
| Was perforated pipe used? Yes X No 10 DATE COMPLETED _28 Mar 02 Perforated pipe set from It to feet Was casing left open end? Yes X No Was casing left open end? Yes X No Was a well screen installed? X res No Was a well screen installed? X res No Naterial PVC Diameter 2 dinches if so, how? Slot Size set from 175 feet to 185 feet i2 REMARKS 1,240 f Abrasives Inc Slot Size set from feet to feet Slot Size set from feet to feet Vas packer or seal used? Yes X No If so, what material Depth ft Type of whil: Straight screen Gravel packed X So -40 Bepth grouted: From 0 To 173 This wall was acilled under my jurisdiction and to report is true to the best of my knowledge If other applain: Bentonite Chips Scriftist Name Certifics Well head completion: Filless unit M0 HL Dr: 11:NS, ZWC IC | |
| Perforated pipe set from | • |
| Was casing left open end? Yes X No Was a weil screen installed? X Yes No Naterial PVC Diameter 2 inches No Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? Slot size set from 175 feet to 185 feet if so, how? If so, what material Depth ft Order Type of well: Straight screen Gravel packed X Depth ft Depth ft Straight screen Gravel packed X This wall was drilled under sy jurisdiction and the report is true to the best of my knowledge If other explain: Bentonite Chips Stiller's or firm's Name Certifics Well head completion: Fitless unit Mo HL Dr: 1:WS, ENC IC | |
| Was a well screen installed? X res No Material PVC Diameter 2 inches if so, how? Slot size 10 set from 175 feet to 185 feet if so, how? Slot size set from feet to feet feet to feet Slot size set from feet to feet feet to feet Slot size set from feet to feet feet to feet Slot size set from feet to feet feet to feet Vas packer oc seal used? Yes X No If so, what material Depth ft Type of well: Straight screen Gravel packed X Both ft Depth grouted: From 0 To 173 Grouting material: Cement Other X If other paplain: Bentonite Chips Briller's or firm's Name Well head completion: Fitless unit MO HL Dr: 11:NS, ZWC | ne |
| Waterial PVC Diameter 2 dinches Naterial PVC Diameter 2 dinches Slot Size 10 set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to 185 feet Slot Size set from 175 feet to feet Was packer or seal used? Yes X No If so, what material Depth ft Type of weil: Straight screen Gravel packed X Depth grouted: From 0 70 173 Grouting material: Cement Other X If other applain: Bentonite Chips Briller's or Firm's Name Well head completion: Fitless unit MO HL Dr: L:NS, ZWC | L F |
| Slot Size 10 set from 175 Leet to 185 feet Slot Size set from feet to feet Was packer or seal used? Yes X No If so, what material Depth ft Type of well: Straight screen Gravel packed X Depth grouted: From 0 70 173 Grouting material: Cement Other X If other applain: Bentonite Chips Well head completion: Fitless unit MO HL Dr: 1:NS, ZWC / C | |
| Slot Size set from feet to feet Was packed or seal used? Yes X No If so, what material Depth ft Type of well: Straight screen Gravel packed X Depth grouted: From 0 70 173 Grouting material: Cement Other X If other explain: Bentonite Chips Well head completion: Fitless unit 12. REMARKS 1,240# of Abrasives Inc sand pack to 173', 550# bentonite Ships to 3', cuttings to surface. Do-40 IS DRHLERS CERTIFICATION This well was drilled under my juriodiction and the report is true to the best of my knowledge Driller's or Firm's Name Mo HL Drill: NS, ZWC 10 | |
| Slot Size set from freet to reat Was packer or seal used? Yes X Ho If so, what material Depth Type of wall: Straight screen Gravel packed X Depth grouted: From 0 Yo 173 Grouting material: Cement Other X If other applain: Bentonite Chips State Chips Well head completion: Fitless unit Mo HL Dr: Lins, Zwc | _ ! |
| was packed of seal used? res A iso Ghips to 3', cuttings to surface. If so, what material Depth ft Type of will: Straight screen Gravel packed X Depth grouted: From 0 To 173 Grouting material: Cement Other X If other applain: Bentonite Chips Driller's or Firm's Name Well head completion: Fitless unit MO HL Dr: Livs, Two | |
| If so, what material Depth It Type of well: Straight screen Gravel packed X Depth grouted: From: 0 70 Grouting material: Cement Other X If other paplain: Bentonite Chips Scriller's or Firs's Name Well head completion: Fitless unit MO HL Dr: Lives, Zwc | |
| Depth grouted: From 0 70 173 F3 DRILLER'S CERTIFICATION Grouting material: Cement Other X report is true to the best of my knowledge If other paplain: Bentonite Chips Driller's or Firm's Name Certifics Well head completions Pitless unit MOHL Drilling, Two 10 | |
| Depth grouted: From 0 70 173 Grouting material: Cement Other X First values at ited under my jurisdiction and the from the part of the best of my knowledge if other explain: Bentonite Chips Filler's or First's Name Certifican Well head completion: Pitless unit MOHL Drilling, Inc. 10 | |
| Grouting material: Cement Other X report is true to the best of my knowledge If other explain: Bentonite Chips Driller's or Firm's Name Certifica Well head completions Pitless unit MOHL Drilling, Inc. 10 | his |
| If other explain: Bentonite Chips Briller's or Firm's Name Certifica Well head completion: Pitless unit Mo HL Dr: 11:NG, INC /C | Ĩ |
| Well head completion: Pitless unit Mo HL Dr: 11:NS, ZNC /C | |
| | |
| ALLEDS ALLEDS | () |
| If other, specify 2' above grade : Paul f dio Forman | i |
| If other, specify 2' above grade BearLah NO 58523 | ł |
| Signey Dy | ate |
| WS1QZ/WDRPT01 | -04. |
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DUARD OF WATER WELL CONTRACTORS 900 R BOULEVARD AVE, DEPT. 778 * BISMARCK, NORTH DAKOTA 58505-0850

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| DUARD UP WAIEK W 900 r Boulevard ave., dept. 778 * Bi | | |
|--|---|------------------------|
| WELL DRILL State law sequires that this report be filed with the State Board of Water We | | oment of the well |
| 1. WELL OWNER Name Kienergy Inc | 7. WATER LEVEL Static water levelFeet | |
| Address 203 S Main, Suite 2004 Sheridan, WY 82801 | If flowing: closed-in pressure GPM flow through | psi inch pipe |
| 2. WELL LOCATION North well 118 | Controlled by: Velve Redu If other, specify | cersOther |
| | 8. WELL TEST DATA Pump Bailer | Other |
| | Pumping level below land surface ft. afterbrs.pump ft. afterhrs.pump | |
| County Stark NB1/4 NE1/4 NE1/4 Sec.23 Tup.139 N.Rge.98 W | Et. after hrs.pump | |
| 3. PROPOSED USEGeothermal X_Monitoring | 9. WELLLOG Formation Clay, silty to sandy, yell | To To |
| Domestic Irrigation Industrial Stock Kunicipal Test Bole | brown, oxidized Shale, yellowish brown, ox Shale, silty, brown, w/ or | |
| 4. METHOD DRULLED CableReverse RotaryBored X forword RotaryJettedAuger | Silt, sandy, gray Sand, silty gray | 42 48 (69,5 |
| If other, specify | Lignite Shale, light gray | 72 |
| 5. WATER QUALITY Was a water sample collected for: Chemical analyses?Yes X_No Nacceriological Analyses?Yes X_No If so, to what laboratory was it sent? | | |
| 6. WELL CONSTRUCTION Diameter of Bole 5 Binches Depth 72 Feet Casing: Steel X Plastic Concrete | | |
| Zashid. | | |
| | (uso separate shatt if nece | saty) |
| Lib/ft inches feet feet Was perforated pipe used? Yes X NO Perforated pipe set from ft to feet | 10. DATE COMPLETED28 Max 0 | |
| Was casing left open end? Yes X No Was a well soreen installed? X Yes No Material PVC Diameter 2 inches | 11. WAS THE HOLE PLUGGED OR AF | ANDONED? |
| Slot Size 10 set from 60 feet to 70 feet Slot Size set from feet to feet Was packer or seal used? Yes X Ho | 12 REMARKS 240# of Abrasive pack to 46', 300# bentonit 3', cuttings to surface. | i : ' |
| If so, what material Depth ft Type of well: Straight screen Gravel packed X of Depth grouted: From 0 To 46 Gronting material: Cemont Other X | 13. DRILLER'S CERTIFICATION This well was deilled under my jutisdik report is true to the best of my knowle | |
| If other explain: Bentonite Chips Well head completion: Pitless unit 12" above grade Other X | Driller's or Firm's Name MoHL Drill: NG, INC Address | Cercificate No. |
| If other specify 2' above grade Was pusp installed? yes XNo Was well disinfected upon completion? yes XNo | Bey LAH NO 585 | 23 Date 04-04-00 |
| WSIQZ\WDRPT01 | Joka Klindel | 07.09-00 |

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| | | | | | Property | South He | eart | | Hole No. | Sh02-13 |
|--------------|-------------|--------------|-------|------|---------------|--------------|---------------|-----------------|--------------|---------------------------------------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | permittee | • <u></u> | | | |
| | | | | | Address | <u></u> | | | | ···· |
| | | | | | Driller | John Mol | <u>nl</u> | | | |
| | | | | | Commence | d drilling | 3/4/02 | | Finished | 3/4/02 |
| | | | | | <u></u> | Sec. 21 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | | | | | Method of c | | Rotary | | B. Pruitt | |
| is not verti | cal, give d | irection & a | angie | | Drilling Flui | d <u>:</u> | Air - Water I | njection | | |
| Surface Ov | wner | | | | | Signed | | | | |
| | | | | | - | C | | | | ······· |
| Page 1 of | | 1 | | | | Title | | | | ······ |
| Der | | | | Lith | | | | | | |
| From | То | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| | | | | | | | | | | ····· |
| 0.0 | 5.0 | ·5.0 | | TS | Topsoil | | | | | |
| 5.0 | 25.0 | 20.0 | | CL | Clay, tan, | soft | ····· | | <u></u> | |
| 25.0 | 26.5 | 1.5 | | CL | Clay, gray | | | | | |
| 26.5 | 31.1 | 4.6 | F | со | Lignite | | | | | |
| 31.1 | 133.5 | | | SS | | | a amined a | oft, clayey fr | om 75' - 85' | |
| | | | | | | 5, yiay, iin | s granieu, se | JIL, Clayey III | 01173-03 | · · · · · · · · · · · · · · · · · · · |
| 133.5 | 151.0 | 17.5 | D | co | Lignite | | | | ······ | |
| 151.0 | 165.0 | 14.0 | | CL | Clay, gray | | TDD | | | |
| | | | | | | | | | | |
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| | | | | | Property | South He | eart | | Hole No. Sh02-13c | | |
|-----------|----------------------------|--------|------|------|------------------------------|--------------|----------------|--------------|-------------------|---------|--|
| | | | | | | | | | Туре | Core | |
| | | | | | Lessee or p | oermittee | | | | · | |
| | | | | | Address | | | | | | |
| | | | | | Driller | John Mot | nl | | | | |
| | | | | | Commence | d drilling | 3/19/02 | | Finished | 3/19/02 | |
| | | | | | | Sec. 21 | T. 139 N. | R. 98 W | State | ND | |
| |] | | | | | | | | | | |
| | e within se cal, give d | | | | Method of c Drilling Flui | | | Logged by | B. Gjere | | |
| Surface O | wner | | | | - | Signed | | | | | |
| Page 1 of | | 2 | | | | Title | - <u></u> | | | | |
| De | oth | | | Lith | <u></u> | | | | <u></u> | | |
| From | То | Thick. | Seam | Туре | | | · | Description | | | |
| 0.0 | 26.0 | | | | Drill out to | first core p | point | | | | |
| 26.0 | 32.0 | | | | Cored 7.0 | - recovere | ed 7.0' | | | | |
| | | | | | | | | <u></u> | | | |
| 26.0 | 26.6 | 0.6 | | CL | Clay, gray, | , soft | | | | | |
| 26.6 | 31.7 | 5.1 | | со | Lignite, bro | own, | | | · | | |
| | | | ··· | | top 3' is w | eathered; t | oottom 2' is s | solid and ba | nded | | |
| | | | | | high pyrite | content at | 27.3' and 2 | 8.9' | -, | | |
| 31.7 | 32.6 | 0.9 | | CL | Clay, gray | , soft | | | - <u></u> | | |
| 32.6 | 33.0 | 0.4 | | SH | Shale, car | bonaceous | s, fissile | | | | |
| | | | | | ļ | | | | | <u></u> | |
| | | | | | | | | | | | |
| 33.0 | 133.0 | | | | Drill out to | second co | ore point | | | | |
| | | | | | ļ | | | | | | |
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| L | | | | | <u> </u> | | <u> </u> | | | | |
| | | | L | | | <u></u> | | | | | |

3/19/02 Date

Property: South Heart

Page No. 2 of Hole No. Sh02-13c

| De | oth | | | Lith | |
|-------|-------|--------|------|----------|---|
| From | То | Thick. | Seam | Туре | Description |
| | | | | | |
| 133.0 | 147.0 | | | | Cored 14' - recovered 14' |
| | | | | | |
| | | | | | |
| | 400 5 | 0.5 | _ | | |
| 133.0 | 133.5 | 0.5 | D | co | Lignite, brown, fissile, high pyrite content |
| 133.5 | 143.0 | 9.5 | D | co | Lignite, brown, pyrite scale in verticla fracture |
| 100.0 | 140.0 | 0.0 | | | |
| 143.0 | 147.0 | 4.0 | D | co | Lignite, brown, banded light brown, the surface of this segment |
| | | | | | |
| | | | | | drys much more quickly than the top segment |
| | | | | | |
| | | | | | |
| 147.0 | 152.0 | | | | Cored 5' - recovered 5' |
| 147.0 | 152.0 | | | | |
| | | | | | |
| | | | | | |
| 147.0 | 150.8 | 3.8 | D | co | Lignite, brown, woody texture, fissile zone at 149'-149.4' |
| | | | | | |
| 150.8 | 152.0 | 1.2 | | CL | Clay, gray TDD |
| | | | | | |
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| | | | | | Property S | outh Hea | irt | | Hole No. | Sh02-14 |
|---------------|-----------|--------|------|--------------|-----------------|------------|---------------|-------------|----------|---------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or pen | mittee | | | | ···· |
| | | | | | Address | | | | | |
| | | | | | Driller J | ohn Mohl | | | | |
| ļ] | | | | | Commenced of | frilling | 3/26/02 | | Finished | 3/26/02 |
| | | | | | S | ec. 21 | T. 139 N. | R. 98 W | State | ND |
| Locate hole | | | | | Method of drill | ine | Deter | Logged by | R. Ciara | |
| is not vertic | | | | | Drilling Fluid: | - | Air - Water I | | b. Gjere | |
| | | | | | - | | - | | | |
| Surface Ov | wner . | | | | S | igned | <u> </u> | | | |
| Page 1 of | | 1 | | | т | ïtle | | | | |
| | | | | | | | | ····· | | |
| Der From | oth To | Thick. | Seam | Lith Type | | | | Description | | |
| | | | | | | | | | | |
| | | | | | | | | · | <u> </u> | <u></u> |
| 0.0 | 4.0 | 4.0 | | TS | Topsoil, Ioan | ny | | | | |
| 4.0 | 5.0 | 1.0 | | CL. | Clay, gray, s | oft | | | | ······ |
| 5.0 | 7.0 | 2.0 | | со | Lignite, soft, | weathere | d | | | |
| 7.0 | 39.5 | 32.5 | | CL | Clay, gray, s | oft, silty | | | | |
| 39.5 | 41.0 | 1.5 | E | со | Lignite, soft, | shaley | - | | | |
| 41.0 | 65.0 | 24.0 | | CL | Clay, tan, sil | | | | | |
| | | | | 1 | | | | | | |
| 65.0 | 67.0 | 2.0 | E1 | <u>co</u> | Lignite, soft, | snaley | <u> </u> | <u></u> | <u></u> | |
| 67.0 | 69.0 | 2.0 | | CL | Clay, gray | | | | | |
| 69.0 | 98.5 | 29.5 | | ST | Siltstone, gra | ay, sandy | | | | |
| 98.5 | 117.0 | 18.5 | D | co | Lignite, brow | <u>vn</u> | | | | |
| 117.0 | 130.0 | 13.0 | | CL | Clay, gray | | TDD | | | |
| | | | | | | | | | | |
| | | | | | | | | | | ····· |
| | | | | | <u> </u> | <u> </u> | | | | |
| | | | | <u> </u> | <u> </u> | | | | | |
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| | | | | | Property | South He | eart | | Hole No. | Sh02-14c |
|--------------|--------------|--------------|-------|------|----------------|---------------------------------------|--|----------------|--------------|--|
| | | | | | | | | | Туре | Core |
| | | | | | Lessee or p | ermittee | | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Mol | 1 | | | <u></u> |
| | | | | | Commence | d drilling | 3/26/02 | | Finished | 3/26/02 |
| | | | | | | Sec. 21 | T. 139 N. | R. 98 W | State | ND |
| | | | | | | | | | | |
| Locate hol | | - | | | Method of d | - | | Logged by | B. Gjere | |
| is not verti | cal, give di | irection & a | ingle | | Drilling Fluid | 1: | Air - Water | njection | | |
| Surface O | wner . | | | | _ | Signed | | | | |
| Dana di af | | 4 | | | | T [4] - | | | | |
| Page 1 of | | <u> </u> | | | | Title | | | | |
| De | oth | | | Lith | T | | | | | |
| From | То | Thick. | Seam | Туре | | · · · · · · · · · · · · · · · · · · · | | Description | | |
| | | | | | | | | | | |
| 0.0 | 99.5 | | | | Drill out to | core point | - just toppe | ed coal (abo | ut 0.2') | |
| | | | | | (went up a | bout 1' vei | rtical, but co | al was abou | it the same | deoth) |
| | | | | | <u></u> | | | | | |
| | | | | | | | ······································ | | | · ·· . |
| 99.5 | 113.5 | | | | Cored 14' | - recover | ed 13.7' | | . <u></u> | |
| | | | | | | | | | | |
| 99.5 | 106.7 | 7.2 | D | со | Lignite, bro | own, soft, i | fractured, th | in (0.1') parl | ing at 100.5 | ' and 101.4' |
| 106.7 | 107.3 | 0.6 | D | со | Lignite, bro | own, band | ed | | | |
| 107.3 | 113.5 | 6.2 | D | со | Lignite, bro | own, band | ed, surface | dries quickly | /, | |
| | | | | | pyrite sca | ale in verti | cal fractures | ; from 109' to | o 113' | |
| | | | | | | | | | | |
| 113.5 | 118.5 | | | | Cored 5' - | | d 4 0' | | | |
| 113.3 | 110.0 | | | | | IECOVEIE | u 1 .3 | | | <u>`````````````````````````````````````</u> |
| | | | | | | | | | | |
| 113.5 | 118.4 | 4.9 | D | со | Lignite, bro | own, soft f | riable zones | s at 114.5' ai | nd 116.5' | |
| | | | | ļ | 0.1' pyrite | e band at 1 | 117.1' | ···· | | |
| 118.4 | 118.5 | | | IC | Lost | | TDD | | | |

| | | | | | Property South Heart | | | | Hole No. Sh02-15 | | |
|------------------------------|------------|--------|-------|------|----------------------|--|-------------------------|--------------|------------------|---------------------------------------|--|
| | | | | | | | | | Туре | Rotary | |
| | | | | | Lessee or p | permittee | | | ···· | ······ | |
| | | | | | Address | . <u> </u> | | | | | |
| | | | | | Driller | John Moh | 1 | | | | |
| | | | | | Commence | ed drilling | 3/5/02 | | Finished | 3/5/02 | |
| | | | | | | Sec. 23 | T. 139 N. | R. 98 W | State | ND | |
| | | | | ļ | | | | , | | | |
| Locate hole is not vertic | | | | | Method of o | • | Rotary Air - Water i | Logged by | Pruitt - Mohi | | |
| is not verac | ai, give u | | angie | | Drining Fich | u <u>. </u> | All - Water | njecaon | | | |
| Surface Ov | vner | | | | - | Signed | | | | | |
| | | 4 | | | | Title | | | | | |
| Page 1 of | | .1 | | | | Title | | | | | |
| Dep | | | | Lith | | | | | | | |
| From | То | Thick. | Seam | Туре | | | | Description | | | |
| | | | | | | | | | · | | |
| 0.0 | 7.5 | 7.5 | | TS | Topsoil, lo | amy | | | | | |
| 7.5 | 20.0 | 12.5 | | CL | Clay, tan, | soft | | | | | |
| 20.0 | 30.0 | 10.0 | | ss | Sand, tan | , soft | | | | | |
| 30.0 | 37.0 | 7.0 | | GR | Gravel, 1/ | 8" - to 1/4", | , subrounde | d | | | |
| 37.0 | 50.0 | 13.0 | D | со | Lignite, a | lso blowing | up a lot of | gravel | | | |
| 50.0 | 60.0 | 10.0 | | IC | Lost circu | lation | TDD | | | | |
| | | | | | | | | <u></u> | | | |
| | | | | | | No geoph | nysical log | - too much (| caving | | |
| | | | | | | | | | | | |
| | | | | | | | | | <u></u> | | |
| | | | | | | | | | <u></u> | · · · · · · · · · · · · · · · · · · · | |
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| | | | | | Property South Heart | | | | Hole No. SH02-16 | | |
|--------------|-------------|--------------|-------|------|----------------------|---------------------------------------|--------------|---------------|------------------|-------------|--|
| | | | | | | | | | Туре | Rotary | |
| | | | | | Lessee or p | ermittee | <u></u> | | | | |
| | | | | | Address | | | | | | |
| | | | | | Driller | John Mor | <u>.</u> | | | | |
| | | | | | Commence | d drilling | 3/5/02 | | Finished | 3/5/02 | |
| | | | | | | Sec. 22 | T. 139 N. | R. 98 W | State | ND | |
| | | | | | | | | | | | |
| Locate hol | | | | | Method of d | | | _Logged by | Mohl | | |
| is not verti | cai, give d | irection & a | angle | | Drilling Fluid |]. | Air - Water | njection | | | |
| Surface Ov | wner | | | | _ | Signed | <u> </u> | | | | |
| | | | | | | | | | | | |
| Page 1 of | | 1 | | | | Title | | | | | |
| Der | oth | | | Lith | Ī | | | | | <u></u> | |
| From | То | Thick. | Seam | Туре | | | - | Description | | | |
| | | | | | | | | | | | |
| 0.0 | 1.0 | 1.0 | | TS | Topsoil | | | | | | |
| | 40.0 | | | SS | | · coft o k | | | | | |
| 1.0 | | 39.0 | | | | | | tritus in the | | | |
| 40.0 | 50.0 | 10.0 | | GR | Gravels, s | ubrounded | , coal fragm | nents in grav | els | | |
| | | | | | | TDD | | | | | |
| | | | | | | | | | | | |
| | | | | | Hole is un: | stable and | caving - ca | nnot make a | connection | | |
| | | | | | Abandon h | nole | | | | | |
| | | | | | No geophy | | | | | | |
| | | | | | ine geoping | Journog | | | | | |
| | | | | | | | <u> </u> | <u> </u> | | | |
| | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | |
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| | | | | | Property | South He | art | | _ Hole No. | Sh02-16b |
|--------------|--------------|------------|--------|--------------|---------------|---------------|---------------|---------------|---------------|--|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or | permittee | | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Moh | 1 | | | <u></u> |
| | | | | | Commence | ed drilling | 3/26/02 | | Finished | 3/26/02 |
| | | - | | | | Sec. 22 | T. 139 N. | R. 98 W | _ State | ND |
| Locate hol | e within se | ction; whe | n hole | | Method of | drilling | Rotary | Logged by | B. Gjere | |
| is not verti | ical, give d | irection & | angle | | Drilling Flui | - | Air - Water I | - | | ······································ |
| Surface O | wner | | | | _ | Signed | | | | |
| Page 1 of | | 1 | | | | Title | | | | · |
| | | | | | | | | | | |
| Der From | pth To | Thick. | Seam | Lith Type | | | | Description | | |
| | | THOR. | Coann | Турс | | | | Description | | |
| | | | | | | ~~~~ | ····· | | | |
| | | | | | Off set ab | out 20' fron | n 16a and tr | y again | | |
| 0.0 | 1.0 | | | TS | Topsoil, Id | oamy | | | | |
| 1.0 | 18.0 | | | AL | Alluvial m | aterial, soft | , gray, silty | | | |
| 18.0 | 30.0 | | | GR | Gravels, s | ubrounded | , sand, - pa | rticles inclu | de coal frag | ments, |
| | | | | | scoria, s | s, etc. Ret | um water is | dark gray | | |
| | | | | | | | | | | |
| | | | | | tried to ge | et a geophy | sical log - I | nole was ca | ving at 27' - | |
| | | | | | very unsta | able - abai | ndon | | | |
| | | | | | | | | <u></u> | | |
| | | | | | | | | | | |
| | | | | | | | <u> </u> | | | |
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| | | | | | Property | South He | eart | | _ Hole No. | Sh02-17 |
|-------------|--------------|--------------|-------|------|---------------|--------------|---------------------------------------|-------------|------------|---------------------------------------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | permittee | | | | |
| | | | | | Address | | · · · · · · · · · · · · · · · · · · · | | | |
| | | | | | Driller | John Mol | nl` | | | |
| | | | | | Commence | ed drilling | 3/5/02 | | Finished | 3/5/02 |
| | | | | | | Sec. 23 | T. 139 N. | R. 98 W | State | ND |
| | | | |] | | | | | | |
| | | ection; whe | | | Method of a | | | Logged by | B. Pruitt | |
| is not vert | ical, give d | irection & a | angle | | Drilling Flui | ia <u>:</u> | Air - Water I | njection | | , |
| Surface C | wner | | | | - | Signed | | | | |
| Page 1 of | | 1 | | | | Title | | | | |
| Fage 101 | | * | | | | The | | | | |
| | pth | | | Lith | | | | D | | |
| From | То | Thick. | Seam | Туре | | <u></u> | | Description | | |
| | | | | | | | | | | · · · · · · · · · · · · · · · · · · · |
| 0.0 | 10.0 | 10.0 | | TS | Topsoil, Ic | oamy , | | | | |
| 10.0 | 32.0 | 22.0 | | CL | Clay, tan, | soft | | | | |
| 32.0 | 40.0 | 8.0 | | CL | Clay, gray | /, | | | | |
| 40.0 | 50.0 | 10.0 | | ss | Sand, gra | y, fine grai | ned, silty | | | |
| 50.0 | 68.0 | 18.0 | D | со | Lignite | | | | | |
| 68.0 | 80.0 | 12.0 | | CL | Clay, gray | /, | TDD | | | |
| | | | | | | | | <u></u> | | |
| | | | | | | | | | | |
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| h | | | | | * | | | | | |
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| | | | | | Property | South He | eart | | Hole No. SH02-17c | | |
|-----------|------------------------------|---|------|------|--|--|------------------|-----------------------|-------------------|---|--|
| | | | | | | | | | Туре | Core | |
| | | | | | Lessee or p | ermittee | | | | | |
| | | | | | Address | | | | | | |
| | | | | | Driller | John Mol | nl | | | | |
| | | | | | Commence | ed drilling | 3/25/02 | | Finished | 3/25/02 | |
| | | | | | •••••••••••••••••••••••••••••••••••••• | Sec. 23 | T. 139 N. | R. 98 W | State | ND | |
| | | | | | | | | | | | |
| | le within se ical, give d | | | | Method of o | drilling d: | | Logged by njection | B. Gjere | | |
| | | | • | | · | | | | | 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - | |
| Surface O | wner | <u></u> | | | - | Signed | | ··· | | · | |
| Page 1 of | | 2 | | | | Title | | | | | |
| | | | | | | | | | | | |
| | pth To | Thick. | Soom | Lith | | | | Description | | | |
| From | 10 | THICK. | Seam | Туре | 1 | | | Description | | | |
| | | | | | | | | | | | |
| 0.0 | 48.0 | | | | Drill out to | core point | | | | · · · · · · · · · · · · · · · · · · · | |
| | 1 | | | | | | | | | | |
| 48.0 | 62.0 | | | | Cored 14' | - recover | ed 12.1' pr | obably lost t | he top soft s | and; | |
| | | | | | | | out 1.5' - 2 | | | | |
| 48.0 | 49.9 | 1.9 | | IC | Lost | | | | | | |
| | | | | [| · · | | | | | | |
| 49.9 | | 0.3 | D | co | 1 | | ite concentr | auon | | | |
| 50.2 | 50.6 | 0.4 | D | co | Lignite, br | own, | | | <u></u> | | |
| 50.6 | 50.8 | 0.2 | D | co | Lignite, ve | ry high pyr | ite concentr | ation | | | |
| 50.8 | 56.7 | 5.9 | D | со | Lignite, br | own, band | ed, | | | | |
| 56.7 | 56.8 | 0.1 | D | CL | Clay, gray | | | | | | |
| 56.8 | 57.2 | 0.4 | D | со | Lignite, br | | | | | | |
| 57.2 | | | | ян | Shale, car | | | | | | |
| 58.0 | | | D | со | Lignite, br | مان المراجع من المراجع بين المراجع من المراجع المراجع من المراجع المراجع المراجع المراجع المراجع الم | ed, | | | | |
| | | | | | | | , = ² | | | | |
| | | | | | 1 | <u></u> | | <u>,</u> | | | |
| La | • | ••••••••••••••••••••••••••••••••••••••• | | A | - | | | | | | |

.

Date 3/25/02

Property: South Heart

Page No. 2 of Hole No. Sh02-17c

Depth Lith From То Thick. Seam Туре Description 62.0 69.0 Cored 7' - recovered 7' 62.0 68.0 6.0 D CO Lignite, brown, banded, pyrite nodule at 62.9' CL Clay, gray, soft TDD 68.0 69.0 1.0

| | | | | | Property | South He | art | | Hole No. | Sh02-18a |
|--------------|--------------|--------------|--------|------|----------------|---------------|---------------------------------------|---------------------------------------|-------------------------|---------------------------------------|
| | | | | | | | | | Туре | Rotary |
| | | | | | Lessee or p | ermittee | | | | |
| | | | | | Address | | | | | |
| | | | | | Driller | John Moh | 1 | | | |
| | | | | | Commence | d drilling | 3/26/02 | | Finished | 3/26/02 |
| | | | | | | Sec. 28 | T. 139 N. | R. 98 W | State | ND |
| Locate ho | le within se | ction; whe | n hole | | Method of d | irilling | Rotary | _Logged by | B. Gjere | |
| is not verti | ical, give d | irection & a | angle | | Drilling Fluid | d <u>:</u> | Air - Water I | Injection | <u></u> | |
| Surface O | wner | | | | - | Signed | | | | |
| Page 1 of | | 1 | | | | Title | | | | |
| rayeror | | | | | | 1100 | ····· | | | |
| De From | pth To | Thick. | Seam | Lith | | | | Description | | |
| FIOI | 10 | THICK. | Seam | Туре | | | | Description | **** * * | |
| | | | | | | | | | | |
| 0.0 | 4.0 | 4.0 | | TS | Topsoil, lo | amy | | | | |
| 4.0 | 10.0 | 6.0 | | CL | Clay, gray | | | | | |
| 10.0 | 22.0 | 12.0 | | CL | Clay, tan, | soft, alluvia | al | | | |
| 22.0 | 30.0 | 8.0 | | SL | Silt, gray, | sandy, soft | t | | | |
| 30.0 | 42.0 | 12.0 | | SS | Sand, darl | k gray, med | dium graine | d | 21.44.47 5 4 4 4 | |
| 42.0 | 52.0 | 10.0 | | GR | Gravels, s | and, fragm | ents of sco | ria, chips of | coal | |
| 52.0 | 53.0 | 1.0 | | SS | Sandstone | e, hard | | | | <u></u> |
| 53.0 | 60.0 | 7.0 | | SS | Sand, gray | y, fine grair | ned, soft | | TDD | <u></u> |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | <u> </u> | | | · · · · · · · · · · · · · · · · · · · |
| | | | | | | | <u> </u> | · · · · · · · · · · · · · · · · · · · | | |
| | | | | | | | · · · · · · · · · · · · · · · · · · · | | | |
| | | | | | | , <i>, ,</i> | <u></u> | | <u></u> | |
| | | | | | | | | | | <u> </u> |
| L | | L | | l | 1 | | | | | |

KIEWIT MINING GROUP INC.

| | | | | Property South Heart | | | | Hole No. Sh02-22 | | |
|---|-------|----------|------|----------------------|---------------------------------------|-------------|-----------|--|-----------|--|
| | | <u> </u> | | | | | | | Туре | Rotary |
| | | | | Lessee or permittee | | | | | <u></u> | |
| | | | | | Address | | | | | |
| | | | | | Driller John Mohl | | | | | |
| | | | | | Commence | d drilling | 3/5/02 | | Finished | 3/5/02 |
| | | | | | · | Sec. 27 | T. 139 N. | R. 98 W | State | _ND |
| | | | | | | | | | | |
| Locate hole within section; when hole | | | | | Method of o | | Rotary | | B. Pruitt | <u></u> |
| is not vertical, give direction & angle | | | | | Drilling Fluid: Air - Water Injection | | | | | |
| Surface O | wner | | | | | Signed | | | | |
| | | | | | - | - | <u> </u> | | - / | |
| Page 1 of | | 1 | | | | Title | | | | |
| De | oth | | | Lith | r | | | | <u> </u> | <u></u> |
| From | To | Thick. | Seam | Туре | | | | Description | | |
| | | | | | | | | | | |
| 0.0 | 16.0 | 16.0 | | CL | Brown to | nrav soft | | <u>. </u> | | |
| | | | | | | | | | | |
| 16.0 | 18.0 | 2.0 | E | co | Lignite, so | nt, snaley | | | | <u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u> |
| 18.0 | 35.0 | 17.0 | | SS | Sand, gra | у | | | | |
| 35.0 | 39.0 | 4.0 | | CL | Clay, gray | 1 | | | | |
| 39.0 | 42.0 | 3.0 | E1 | со | Lignite, so | oft, shaley | | | | |
| 42.0 | 45.0 | 3.0 | | CL | Clay, gray | | | <u></u> | | |
| | | | | | | | | | | |
| 45.0 | 50.0 | 5.0 | | SS | Sand, gra | | | | | |
| 50.0 | 75.0 | 25.0 | | CL | Clay, gray | / | | | | |
| 75.0 | 90.5 | 15.5 | | SS | Sand, gra | у | ····· | <u></u> | | · |
| 90.5 | 104.5 | 14.0 | D | со | Lignite | | | | | |
| 104.5 | 120.0 | 15.5 | | CL | Clay, gray | | TDD | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | <u> </u> | | | | | |
| | | | | | + | | <u> </u> | | | |
| | | I | 1 | 1 | 1 | | | | | |