

Deep Underground Science and Engineering Laboratory Request for Proposal for Geotechnical Engineering Services

May 12, 2008

Background

The former Homestake mine in Lead, SD has been selected as the site for the National Science Foundation's (NSF) Deep Underground Science and Engineering Laboratory (DUSEL). The site has many attributes that made it the site of choice for the NSF, which include well-characterized, varied, and interesting geology; expeditious access to great depths; significantly reduced technical risk; dedication to research without disruption from commercial uses; capacity to host a comprehensive, international, and multidisciplinary suite of experiments; and the ability to expand over time. To help acquire Homestake for scientific purposes, the State of South Dakota established the South Dakota Science and Technology Authority (SDSTA). SDSTA has established a well-understood plan for rehabilitating the mine facilities; a management organization addressing environmental, safety, and health functions, indemnification, insurance, and transition to DUSEL, as well as an operations plan for the first five years of infrastructure and transition.

The initial steps in defining DUSEL's scientific programs have begun. The Homestake Scientific Collaboration and SDSTA issued a call for Letters of Interest in 2007, and received eighty five responses. The Program Advisory Committee is currently reviewing, advising and advancing the program, thus providing greater strength in the planning efforts for DUSEL. Concurrent with this work SDSTA is implementing the Interim Laboratory; which includes research and development phases for DUSEL, and several experiments that will be ready for deployment prior to DUSEL construction. The programs for the Interim Laboratory and DUSEL include:

- Searches for dark matter, dark life and the limits of life on earth
- A vast array of earth-sciences topics, including geochemistry, hydrogeology, coupled processes, rock mechanics, underground engineering, environmental, geoneutrino, and biological investigations
- Experiments addressing high-profile societal issues including ground water, carbon sequestration, and geothermal energy

DUSEL is planning a phased approach to the development of the laboratory. Initial work will focus on the surface and the 4850' campus. SDSTA is focusing on the surface and the 300' campus. Later development will focus on the 7400' and 8000' levels. Initial development concepts for the 300' level and the 4850' level are shown in the scoping diagrams included in Exhibits "A" & "B".

At the 300' level, access already exists through the existing power tunnel portal (the Kirk Portal) which has direct access from Kirk Road. A new drift and portal are planned to

provide access to the 300' level. At the 4850' level, exploitation of the combined operation of the conveyances of both the Ross and Yates Shafts is planned, thus allowing phased construction activities with access by construction crews via the Ross Shaft and access for on-going lab operations via the Yates Shaft. Existing mine infrastructure (currently being refurbished by SDSTA) provides air and utilities through both shafts, and will allow temporary construction isolation barriers.

During the production mining operations at Homestake, a mature set of guidelines was established for drilling and blasting operations, and for ground control in new excavations and reconditioning with considerations for various rock conditions, including stress conditions and geometry of openings, duration of required accessibility, proximity of other openings, personnel exposure, and the potential for violent ground failure. These guidelines, and associated mining technologies which were derived from analytic studies and confirmed by many decades of experience, have provided an excellent basis for development of requirements and standards for excavation and ground control of new openings for DUSEL's underground laboratories.

Despite the strong base of knowledge from mining, excavation and underground construction standards for laboratory applications are significantly more stringent than those that were acceptable for mining operations. The site investigations and geotechnical analyses are critical to insure that both personnel safety and equipment protection is maintained with long term stability of all underground facilities. The traditional excavation and ground control methods for production mining operations will need to be reviewed and rethought for the increased care and coordination necessary to insure that acceptable quality assurance and construction management are present. Standards for proximity of new excavations adjacent to concurrent laboratory operations will generate the need for new and additional requirements and controls to prevent damage to research instrumentation and loss of research data or threat to safety. Geotechnical engineering, and excavation process specifications and controls, must address issues and concerns that are not typically present for production mining.

Scope of Work

This request for proposal is for geotechnical engineering services for DUSEL. The purpose of the geotechnical work is:

- 1) to provide a better understanding of the rock properties
- 2) to characterize the rock conditions in the areas of proposed future development
- 3) to establish parameters and recommendations for the rock excavation design work to follow in the next phase of work for DUSEL
- 4) to provide geotechnical data that can be used to evaluate potential impacts that phased construction will have on the adjacent rock.

The overall process for selection of the Geotechnical Engineer will be for the Selection Panel to review responses to this RFP; potentially interview a select number of firms based on the schedule below, and finalize the decision in June 2008.

The expertise outlined in this RFP must be met by qualified individuals of the firm. The experience must be demonstrated by direct or substantial involvement of the individuals, in a supervisory capacity at the project manager level or above, in these projects. The determination of the individual's qualifications and compliance with the submittal requirements shall be at the sole discretion of DUSEL.

At this stage, no design work has been undertaken. The parameters outlined below are intended to initiate planning for a geotechnical study. Refined and/or more accurate parameters may be available prior to the start of the onsite investigation. The geotechnical investigation and recommendations must be sufficiently comprehensive to cover moderate deviations from those parameters.

Proposers shall prepare a written proposal, making reference to the specifications noted in the paragraphs below. The proposal shall state the general approach to the work, the price for the work, and the schedule for the work in accordance with the requirements below.

DUSEL has some preliminary materials which are available to potential proposers responding to this RFP, and it is highly recommended that proposers review the information.

These documents are available at: <http://www.lbl.gov/nsd/homestake/dusel/>

The expected schedule, subject to change, is as follows.

Request for Proposal Issued	May 12, 2008
Site Tour	May 21, 2008
Responses Due to DUSEL	May 30, 2008
Interviews, if Required	June 4, 2008

The target date for the start of the work is August 1, 2008. Work on the 300' level can start on the 1st of August. However work at the 4850 level cannot start until September 15, 2008. Proposals should recognize and specify if the proposer will need one mobilization or two in order to complete the work, and the proposal should indicate a preferred starting date and a completion date.

The expected fee range for this scope of work is \$150,000 - \$300,000. Proposals must be for the scope of work requested in this RFP. However, if the proposed fee is outside of this range, proposers are encouraged to propose alternates to the base scope that would allow their proposal to fall within this range.

General Project Requirements

- 1) The selected Engineer will be required to abide by all applicable federal, state and local laws and ordinances, as amended from time to time. Included in, but not limited to, the applicable local laws and ordinances are:

- MSHA
 - 30 CFR Parts 1 through 199- Mineral Resources
 - Federal Mine Safety and Health Act of 1977, Public Law 91-173 with Updates
- OSHA
 - 1910 – Occupational Safety and Health (General Industry)
 - 1926 – Safety and Health Regulations for Construction, including 1926.800 Underground Construction
- NFPA
 - NFPA 520 – Subterranean Spaces
 - NFPA 101 – Life Safety Code
- Building Code
 - 2003 International Building Code
 - Section 405 – Special Requirements based on Occupancy – Underground Buildings.
 - 2003 International Fire Code
 - 1003 International Mechanical and Plumbing Codes
 - National Electric Code
 - South Dakota State Code
 - City and County Codes

2) Selected Geotechnical Engineer and its officers, agents, employees, and subconsultants shall:

- Abide by the SDSTA’s Safety Policy at all times and adopt compliance with the SDSTA’s Safety Policy as a top priority while performing work pursuant to this Contract. A copy of SDSTA’s Safety Policy is available upon request.
- Participate in all applicable training required by the U.S. Mine Safety and Health Administration (“MSHA”), including that required by 30 CFR Part 48, as amended from time to time. Consulting Engineer must provide proof of participation in all required training prior to the commencement of the work.
- Abide by all other safety policies, procedures and protocols adopted by SDSTA from time-to-time.
- Failure to comply with the terms any SDSTA or other applicable safety policy, procedure or protocol may result in termination of the Consulting Engineer’s contract. Failure to comply may also result in temporary work stoppage and removal from SDSTA property until such time as deficiencies have been corrected or an appropriate plan to correct such deficiencies is presented and accepted.

3) DUSEL may, at its sole and absolute discretion, reject any and all, or parts of any and all, proposals; re-advertise this solicitation; postpone or cancel, at any time, this solicitation process; or waive any irregularities in this solicitation or in the submittals received as a result of this solicitation.

- 4) All expenses involved with the preparation and submission of proposals to DUSEL, or any work performed in connection therewith, shall be borne by the Proposer(s). No payment will be made for any responses received, nor for any other effort required of or made by the Proposer(s) prior to commencement of work as defined by a contract approved by DUSEL.
- 5) The proposals will be evaluated by the Selection Panel appointed by the DUSEL. The Selection Panel will determine the top-ranked Proposer by consensus based on the Selection Criteria described in this RFP, and the interviews of the firms.
- 6) DUSEL reserves the right to enter contract negotiations with the highest ranked Proposer(s). If DUSEL and the Proposer(s) do not agree to terms of a Professional Services Agreement, DUSEL may elect to terminate negotiations and begin negotiating with the second-ranked Proposer and so forth. This process will continue until a contract has been executed, or, all submittals have been rejected. No Proposer shall have any claims and/or rights against DUSEL arising from such negotiation and/or the qualification process.
- 7) DUSEL reserves the right to contract for all or part of the work program described in the submittal requirements below.
- 8) Firm(s) submitting proposals should not submit any information in response to this solicitation which the Firm(s) considers to be a trade secret or confidential. The submission of any information in connection with this solicitation shall be deemed conclusively to be a waiver of any trade secret or other protection, which would otherwise be available to the Proposer. In the event that the Proposer submits information in violation of this restriction, either inadvertently or intentionally and clearly identifies that information in the submission as protected or confidential, DUSEL will endeavor to redact and return that information to the Proposer as quickly as possible, if appropriate. The Selection Committee will then evaluate the balance of the submission. The redaction or return of information pursuant to this clause may render a submission non-responsive.
- 9) Proposers are invited to carefully review the waivers and releases required as a condition of award that are included in this Request for Proposal:
 - The selected Geotechnical Engineer's staff and subconsultants must complete the SDSTA Acknowledgment of Risk form before entering the underground property, a copy of which is attached as Exhibit "C."
 - The selected Geotechnical Engineer's staff and subconsultants must complete the SDSTA Release, Agreement Not to Sue and Waiver before entering the underground property, a copy of which is attached hereto as Exhibit "D."
 - The selected Geotechnical Engineer and all of its Subconsultants must execute the Release and Indemnity Agreement in favor of the Homestake Indemnified Parties, the form of which is attached hereto as Exhibit "E".

Specific Project Requirements

The following field work is required, and the proposal must be based on this scope of work. Proposers may propose alternates to the work based on their experience and knowledge; however the proposal must be based on the scope outlined below. It is understood that different proposers may have different techniques and approaches and equipment, and alternates that benefit DUSEL and the knowledge of the rock are encouraged within the parameters defined herein and identified as such in the proposal.

Scope of Work to be undertaken at the 300' Level

Core Drilling

1. Four (4) oriented drill holes, producing oriented cores, core size to be NX to HQ (2 to 3 inches in diameter), 1800 feet total length, drilled in the Ellison/Northwestern Formation from the Kirk portal area toward the Ross shaft, as indicated on the attached drawings in Exhibit "A".
2. Core logging including core description and other required parameters as described below and to be approved by DUSEL prior to starting work. Core logging should be accompanied with digital photo recording of all cores and holes locations.
3. Rock structure orientation (discontinuities, foliation planes, etc.) should be determined from the oriented cores. Alternatively, a televueing technique may be used for some holes. A reasonable combination of the two techniques should be used.
4. Core boxing and preparation for shipment to laboratory.
5. The length of drilling noted above is approximate. The actual length of the drilled hole may vary by ten percent (10%) greater or lesser with no change in compensation.

Laboratory Tests

1. Uniaxial Compressive Strength Tests with axial and lateral deformations/strains– intact rock
2. Triaxial Compressive Strength Tests – intact rock
3. Indirect Tensile (Brazilian) Strength Tests – intact rock
4. Direct Shear Strength Tests – representative discontinuities
5. Rock density (at natural moisture content)
6. The number of specimens in each test must be adequate in the opinion of DUSEL to yield representative values of strength, failure criterion (friction angle and cohesion) as well as the deformational properties (Young's modulus and Poisson's Ratio).
7. Laboratory tests should be accompanied with digital photo recording of all test specimens before and after testing.

In-Situ Tests

1. Hydrological (packer) tests and determination of rock permeability at three locations
2. Introsopic imaging of the drill hole and structural study (determination of rock structure orientation – discontinuities, foliation planes, etc.)
3. Stress measurements, using a hollow inclusion cell (HI-cell) or a similar apparatus, at one location with multiple measurements in the hole.
4. Modulus of deformation using a Goodman Jack at three locations to be determined.

Site Mapping

1. Mapping of geology, hydrogeology (water seepage), weak/shear zones, rock alterations and rock structure along the floors, walls and roofs of drifts, 2000 feet total length, as indicated on the drawings in Exhibit “B”.
2. Mapping of the drift infrastructure (pipes, rock bolts, utilities, etc)
3. Mapping technique required: a reasonable and reliable combination of laser scanning technology and manual surveys.
4. The length of mapping noted above is approximate. The actual length of the drifts may vary by ten percent (10%) greater or lesser with no change in compensation.

Scope of Work to be undertaken at the 4850 Level

Core Drilling

1. Six (6) oriented drill holes producing oriented cores, core size to be NX to HQ (2 to 3 inches in diameter,) 2400 feet total length, to be drilled in the Homestake Formation and the Yates member at 4850 level in the vicinity of the new excavations, as indicated on the attached drawings in Exhibit “A”.
2. Core logging including core description and other required parameters as described below and to be approved by DUSEL prior to starting work. Core logging should be accompanied with digital photo recording of all cores and hole locations.
3. Rock structure orientation (discontinuities, foliation planes, etc.) should be determined from the oriented cores. Alternatively, a televIEWING technique may be used for some holes. A reasonable combination of the two techniques should be used.
4. Core boxing and preparation for shipment to laboratory.
5. The length of drilling noted above is approximate. The actual length of the drilled hole may vary by ten percent (10%) greater or lesser with no change in compensation.

Laboratory Tests

1. Uniaxial Compressive Strength Tests with axial and lateral deformations/strains– intact rock
2. Triaxial Compressive Strength Tests – intact rock
3. Indirect Tensile (Brazilian) Strength Tests – intact rock
4. Direct Shear Strength Tests – representative discontinuities
5. Rock density (at natural moisture content)
6. The number of specimens in each test must be adequate in the opinion of DUSEL to yield representative values of strength, failure criterion (friction angle and cohesion) as well as the deformational properties (Young's modulus and Poisson's Ratio).
7. Laboratory tests should be accompanied with digital photo recording of all test specimens before and after testing.

In-Situ Tests

1. Hydrological (packer) tests and determination of rock permeability at six locations.
2. Introsopic imaging of the drill holes and structural study (determination of rock structure orientation – discontinuities, foliation planes, etc.)
3. Stress measurements, using a hollow inclusion cell (HI-cell) or a similar apparatus, at three locations to be determined by DUSEL in the vicinity of the new excavations at 4850 level.
4. Modulus of deformation using a Goodman Jack at six locations.

Site Mapping

1. Mapping of geology, hydrogeology (water seepage), weak/shear zones, rock alterations and rock structure along the floors, walls and roofs of drifts, 6000 feet total length, as indicated on the drawings in Exhibit "B".
2. Mapping of the drift infrastructure (pipes, rock bolts, utilities, etc)
3. Mapping technique required: a reasonable and reliable combination of laser scanning technology and manual surveys.
4. The length of mapping noted above is approximate. The actual length of the drifts may vary by ten percent (10%) greater or lesser with no change in compensation.

Prior to starting work on the site, the Geotechnical Engineer shall submit to DUSEL for approval samples of the templates for drilling and testing data that the Engineer proposes to submit as work product. Upon completion of this scope of work, all cores shall be returned to DUSEL in Lead, SD. properly wrapped and placed in wooden boxes, protected from the elements and labeled appropriately.

All raw data, daily work logs, notes and observations by those doing the work, actual tests data should be acquired and filed electronically, with hard copy back up as appropriate.

Upon completion of field investigation, laboratory analysis and interpretation, the geotechnical engineer shall issue a draft report for review by DUSEL, and a final report for general use in design and construction. The final report shall be signed and sealed by a Professional Engineer licensed in the State of South Dakota, and shall include the following:

General Requirements for the Report

- A summary of the investigation methods used, including a plan showing boring locations relative to the planned structure and the associated boring logs.
- General description of the geology, including the presence of water.
- Determination of the geotechnical engineering characteristics of the subsurface materials encountered in the subsurface, and exploration cored samples, and groundwater conditions at the locations explored.
- Specification of any testing recommended by Geotechnical Engineer for the excavation design and construction phases of the project.
- Delineation of geologic features of engineering significance that may impact the underground construction and/or structures.
- Recommendation of appropriate criteria for perimeter enclosure structures and associated design capacities including skin friction values, bearing values, and required testing program necessary during excavation design and construction phases of the project.
- Recommendations for dewatering during construction, if required.
- Recommendations for enclosure structure drainage, if required.
- Analysis of rock to ascertain presence of corrosive materials, including pH levels, chloride and sulphates.
- Requirements and/or temporary support (if any) to stabilize perimeter enclosure structure during construction phases.
- Recommendations and criteria for possible excavation/cavity sizes and orientations for future lab development.
- Comments on Geotechnical Engineer's findings compared with previous studies on rock properties and structure.
- Mapping is to be submitted in paper and electronic form. Electronic form to be in .dxf format and other standard importable format as proposed by proposer and accepted by DUSEL. Laser /LIDAR scanner data should be submitted in as format importable to Vulcan 3D software (Maptek, Inc.).
- Report is to be submitted in paper and electronic form. Electronic form is to Adobe Acrobat (pdf) or Word

Specific Requirements for the Report to be produced for both the 300 and 4850 Levels

Core Drilling Hole Survey

- Collar Coordinates of the Locations
- Hole/Section Bearing
- Hole/Section Inclination
- Core Orientation (in 3D, and with reference to North)

Core Logging

- Surveyed linear intervals down hole from hole collar
- Rock description and lithology
- Rock Quality Designation index and core recovery percentage
- Level of documentation of description and lithology to be approved by DUSEL prior to starting work.

Structural Properties to be determined from the cores

- Discontinuity spacing in feet
- Discontinuity frequency in #/ft
- Discontinuity dip in degrees
- Dip direction in degrees

Mechanical Properties to be determined from the laboratory tests

- Rock density in lb/ft³
- Uniaxial compressive strength of rock, psi, + Young's Modulus, E and Poisson's Ratio, ν
- Tensile strength of rock in psi
- Triaxial strength of rock (friction angle, ϕ and cohesion, c)
- Direct shear strength of discontinuities (friction angle, ϕ and cohesion, c)
- Sample lengths are to be between two and two and one half times (2-2.5x) the diameter of the core
- Tests are need in three directions: two parallel (strike and dip directions) and one perpendicular to the schistosity plane

Rock Mass Quality

- RMR - Rock Mass Rating classification system

In-Situ Testing

- Permeability
- Stress Field Components in 3D
- Modulus of deformation

Mapping

- Manual/Photographic
 - Digital photographs of the entire core column
 - Introsopic view of the drill holes
 - Televiewer data and interpretation
 - Images of the water seepages
- Laser Scoping
 - 3D scan of the existing excavations
 - 3D scan of the geology rock structure and drift infrastructure.

Proposal Requirements

The proposal must contain the following:

1. Resume(s) for all member(s) of each firm contained within the proposal, with a description of their experience and their role for this project.
2. References for three projects on which these individuals have worked together of a similar size and scope within the last ten (10) years.
3. An expected manpower schedule for your firm's work based on the workplan defined in requirement 4 below, and the standard hourly rates that will apply to this project.
4. Proposed workplan for onsite and offsite work, including management plan and safety plan.
5. Description of work product, and any proposed alternates to the Scope of Work noted above.
6. Fee Schedule based on the workplan and work product described in items 4. and 5. above. As a minimum the fee schedule must be broken down into the following sections:
 - a. Onsite investigations.
 - b. Offsite analysis.
 - c. Preliminary and final reports.
 - d. Consultation during excavation design phase of the project.
7. Fee and workplan for mapping must be broken out as a separate scope of work.
8. A letter confirming licensures and certifications to perform the work encompassed in this RFP, including licensee names and corresponding license and registration and certification numbers.

Ranking Criteria

1. Demonstration of knowledge and understanding of the project requirements, including knowledge of design and construction practices for underground construction.
2. Approach to the project - including workplan, work product and quality control.
3. Qualifications of team members assigned to the project.
4. Strength of references.
5. Demonstration of ability to provide required services within schedule and budget.
6. Strength and demonstration of capabilities in interview (if held).
7. Fee proposal.

Interviews, if required, will be held on June 4, 2008 at the South Dakota School of Mines in Rapid City, SD. The target date for the start of the work is August 1, 2008. Selection will be based on ranking and successful negotiation of fee and scope.

Proposers should submit six paper copies and one electronic copy (pdf format) of the proposal to:

Mr. Scott Lewis
Deep Underground Science and Engineering Laboratory
One Cyclotron Road, MS:50B-5239
Building 50B, Room 5232
University of California
Berkeley, CA 94720
Homestake.DUSEL@eRoom2.LBL.gov

Proposals should be made in sealed envelopes or containers with the name of the project, the submitting firm's name, address and telephone number clearly indicated on outside of the envelopes or containers. All proposals should be delivered no later than 2:00 pm PST May 30, 2008. Materials received after that time may not be considered. Questions must be sent in writing, and should be addressed to Mr. Lewis at the above address, or at the following email address: Homestake.DUSEL@eRoom2.LBL.gov. Answers to questions will be provided through email in order to expedite the response process unless an objection is raised by a firm; in which case that firm may receive the information by fax or mail. Questions will be collected and responses will be issued on May 19th and May 25th to all firms receiving the RFP from the DUSEL. Questions will not be taken after 5:00 pm PST May 24th. For additional information about the project, please go to:

www.lbl.gov/nsd/homestake/

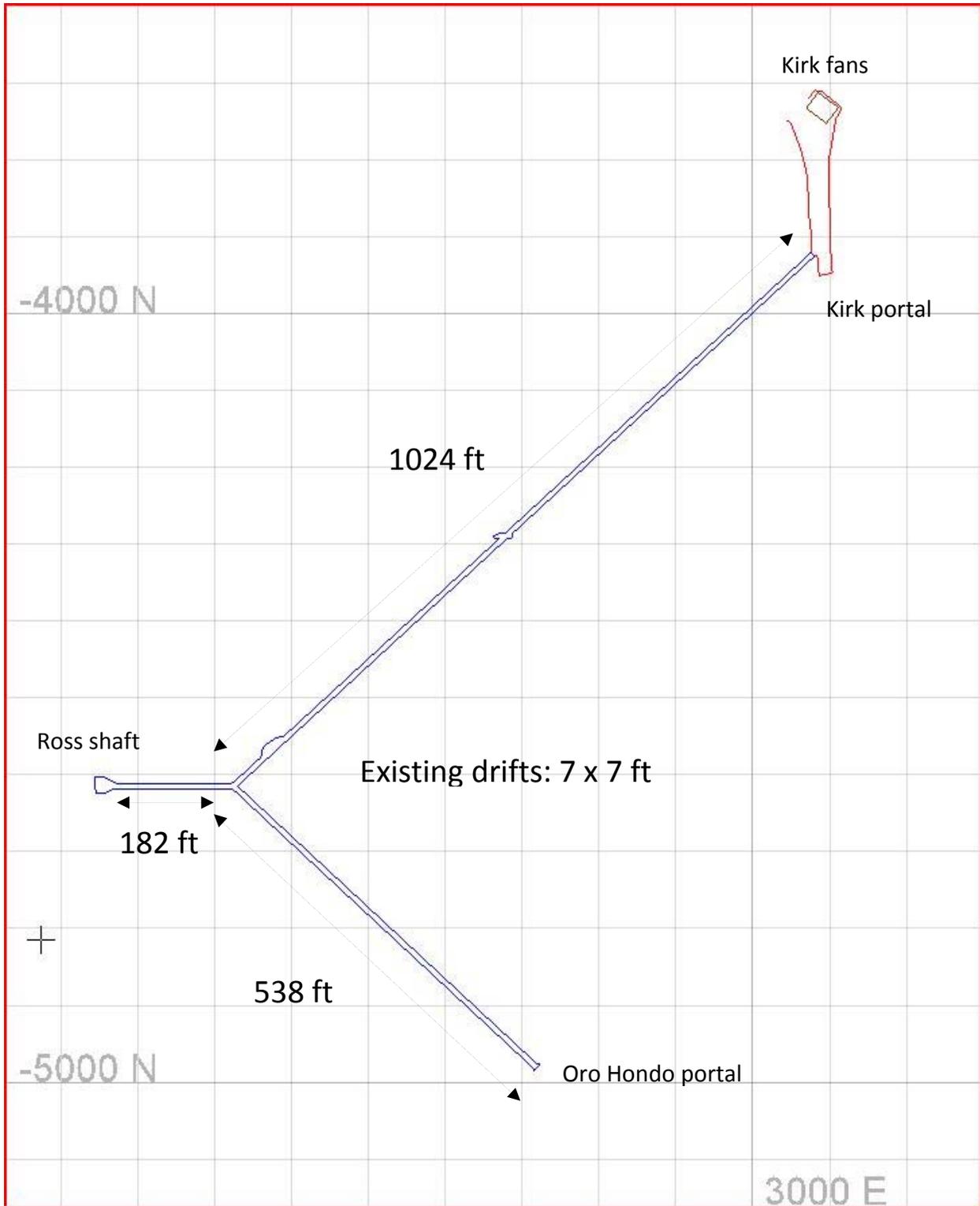


Fig.5 Plan view of the area designated for new development (corrected strings).

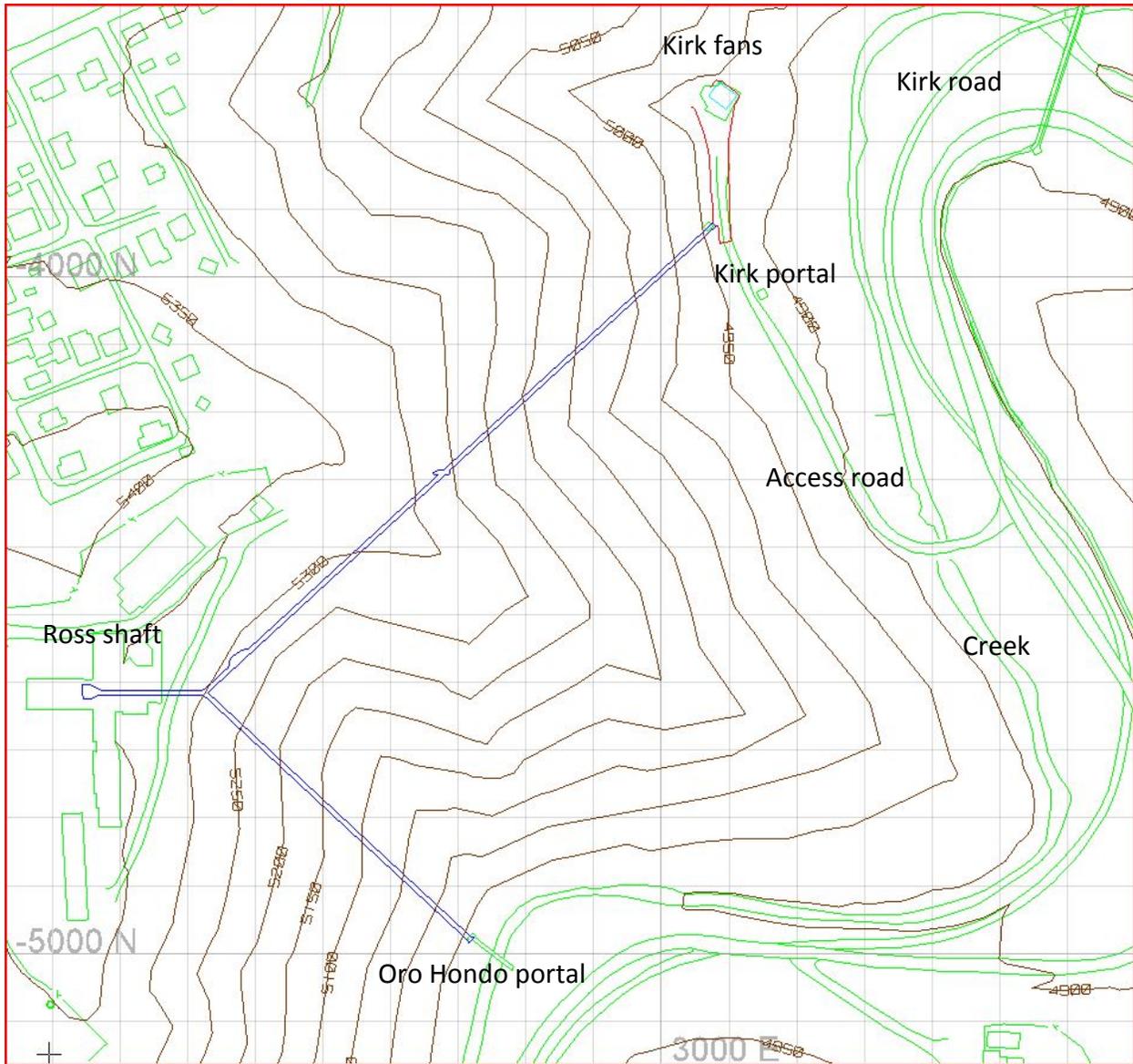


Fig.6 Plan view of the area designated for new development with topography contours, roads and surface infrastructure.

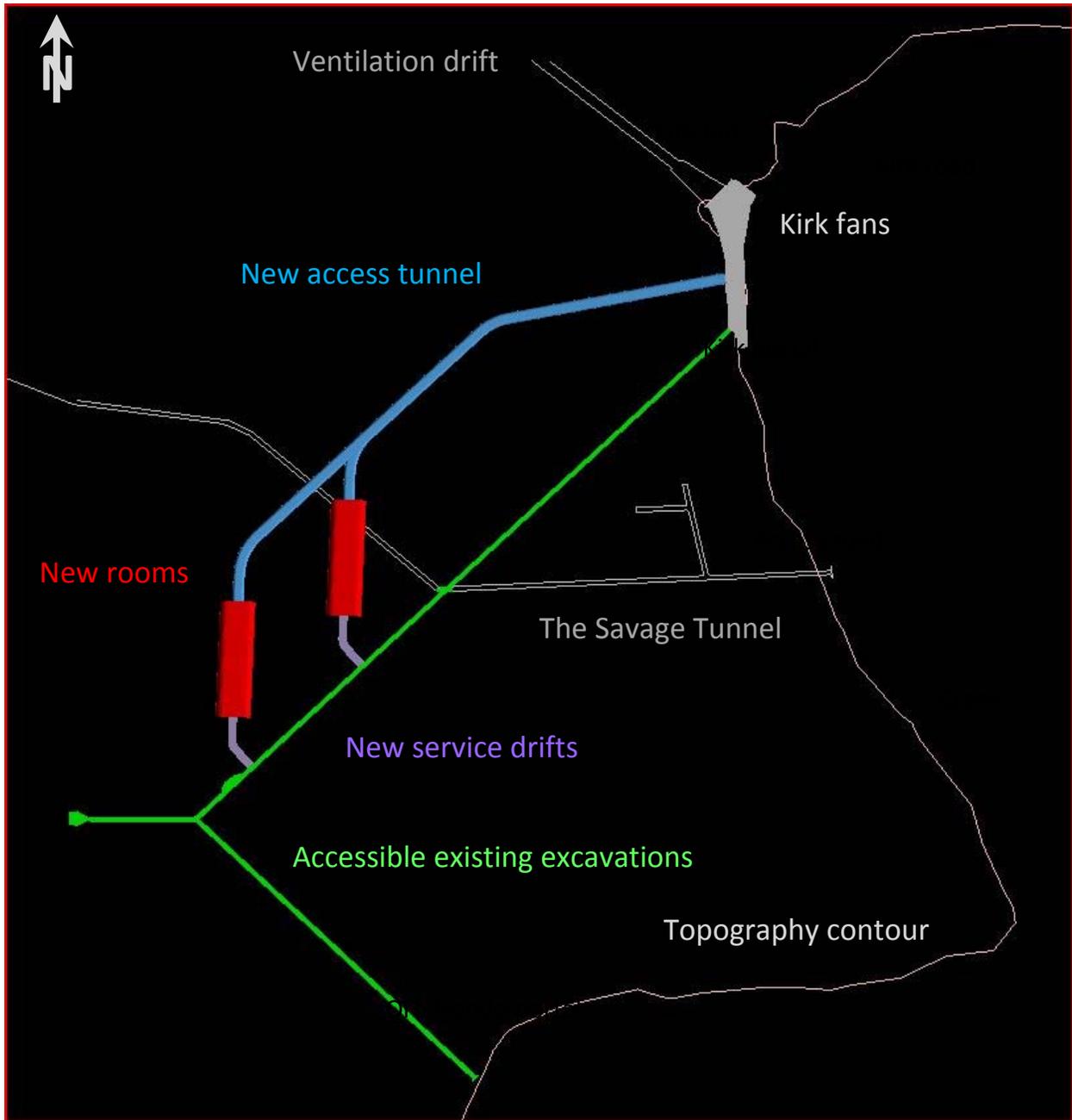


Fig.8 Proposed new excavation layout at 300 level

Note: The New excavation layout results in more overburden cover for better shielding. The Savage tunnel below the 300 level may require moving one of the new rooms to a better location.

New Access tunnel: (W = 16.5 ft; H = 16.5 ft)

New rooms: (W = 50 ft; L = 165 ft; H = TBD)

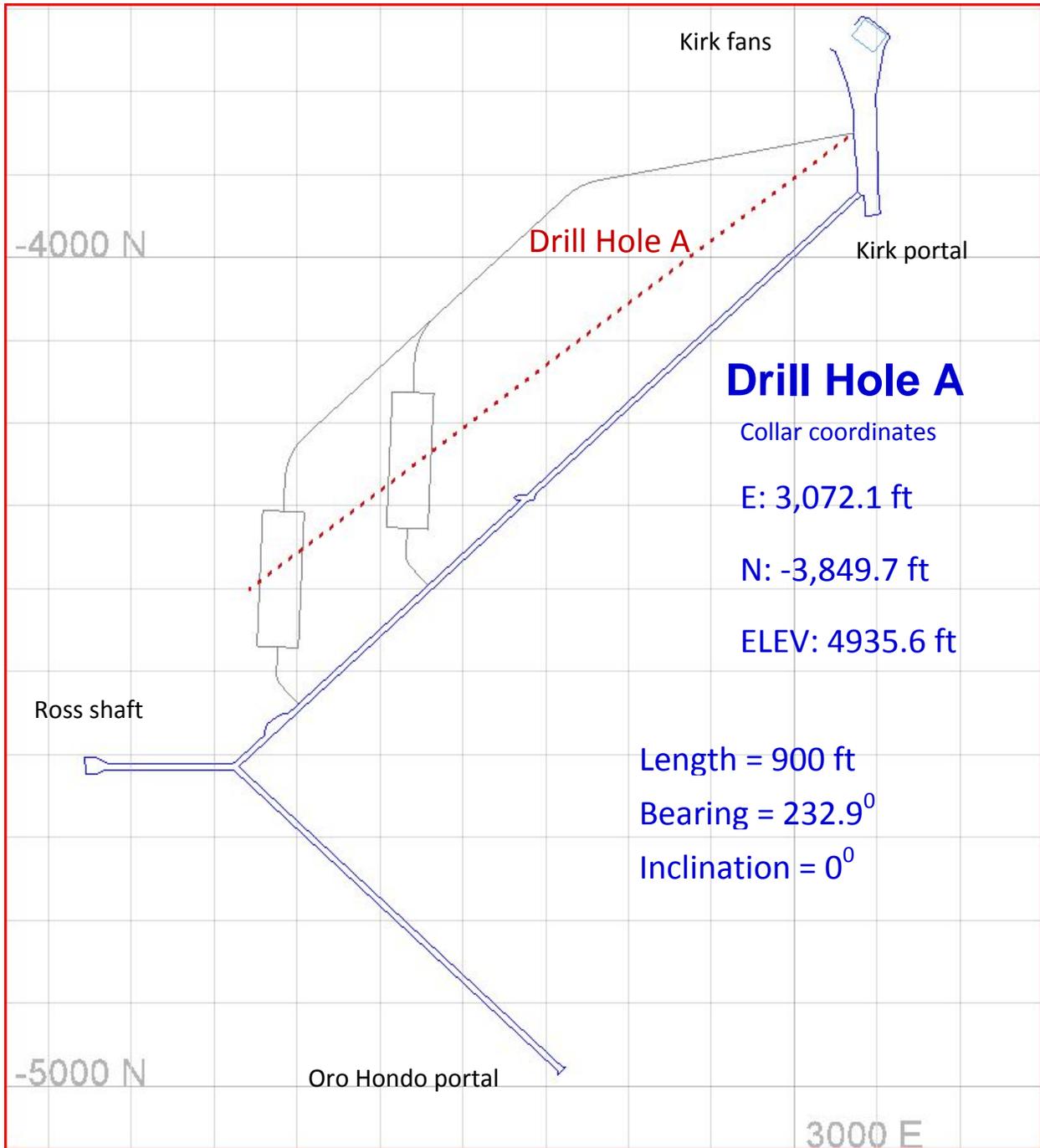


Fig.16 Location and orientation of the borehole (scenario A) to be drilled in the area designated for new development.

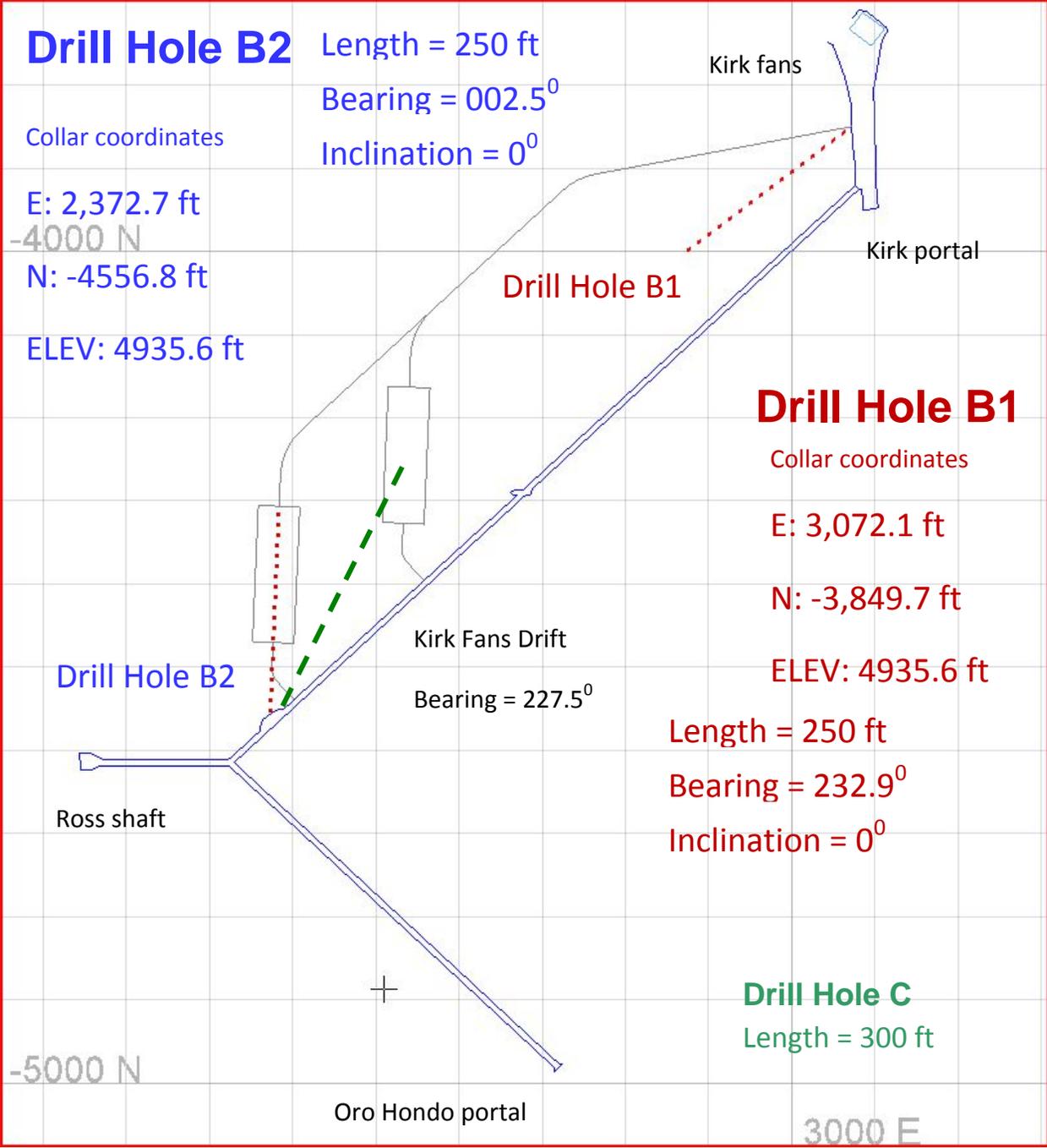


Fig.17 Location and orientation of the boreholes (scenario B) to be drilled in the area designated for new development.

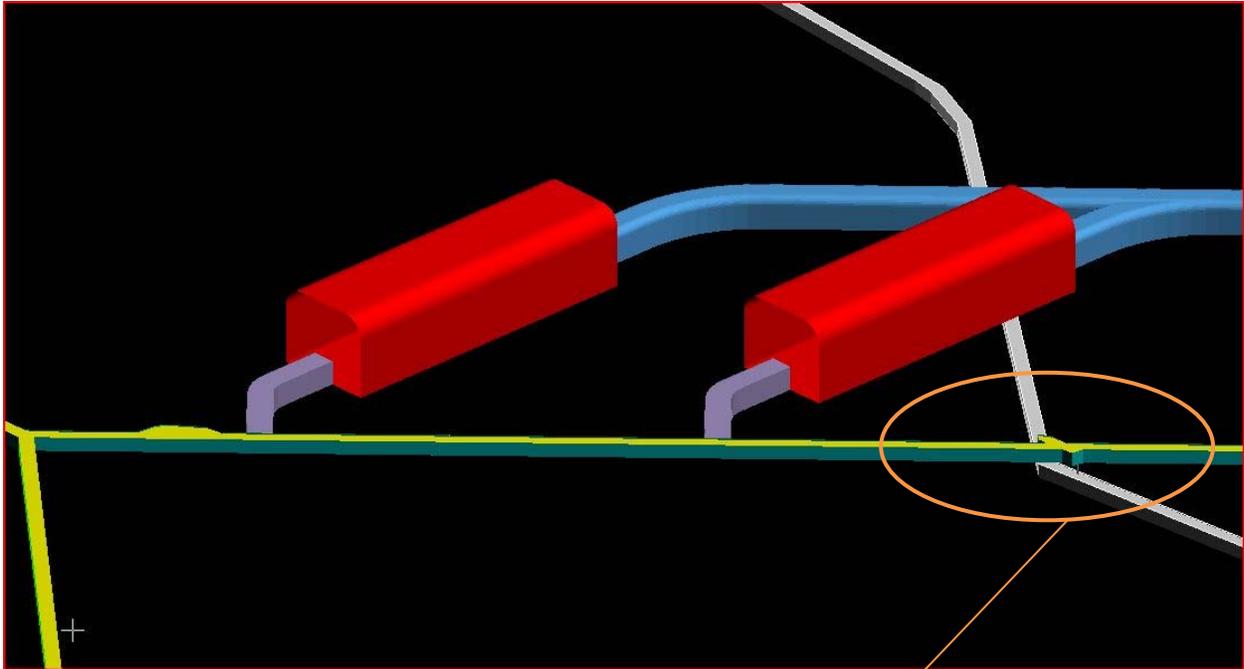


Fig.19 The 300 level - new development area (3D model).

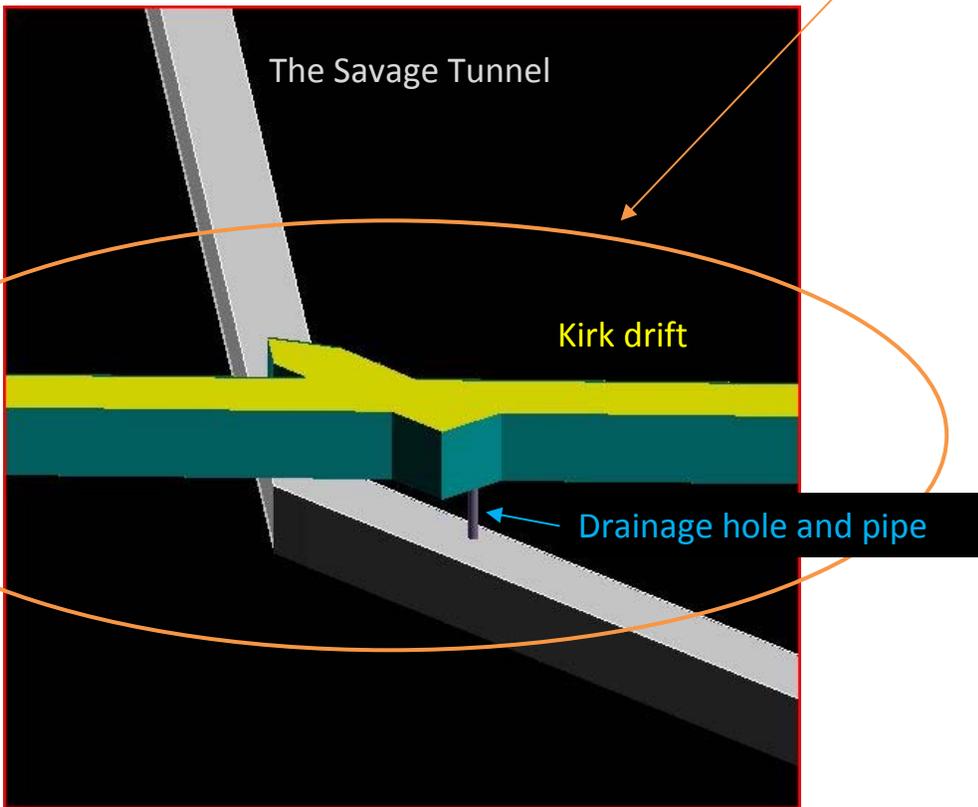


Fig.20 The 300 level and the Savage Tunnel (3D model).

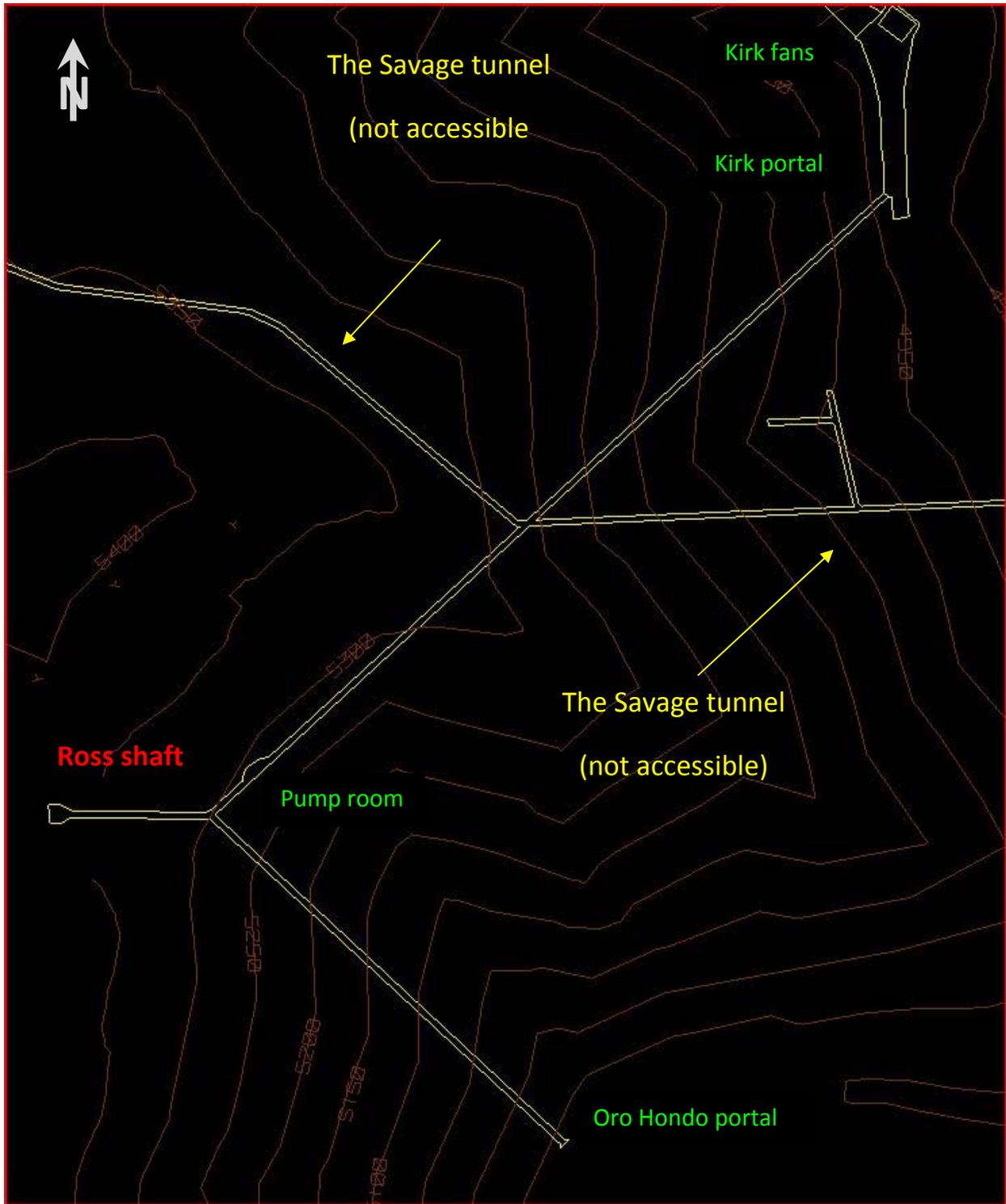


Fig.24 Mapping scope – existing drifts, excavations and areas to be mapped at 300 level.

Exhibit B

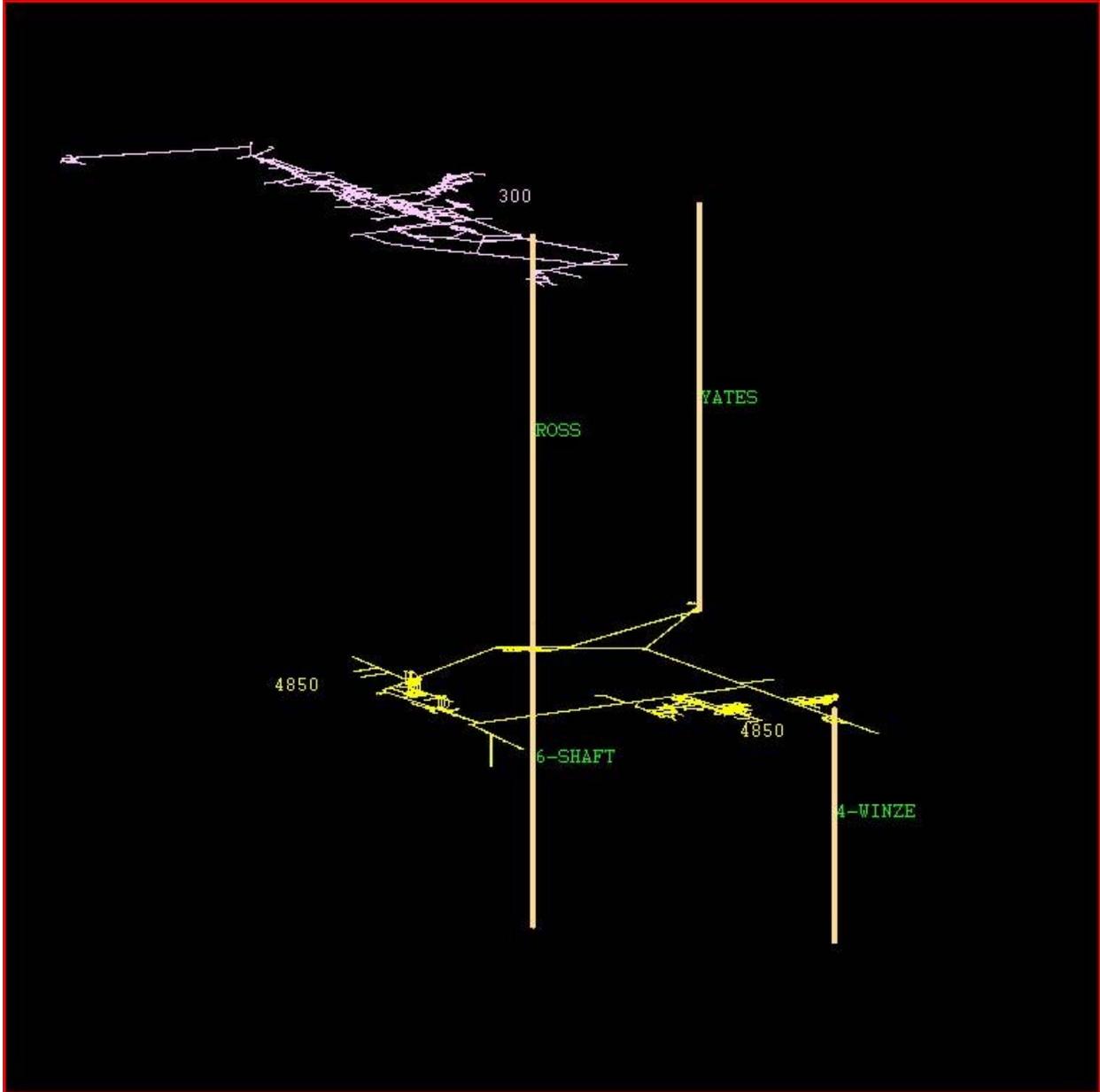


Fig. 2 Homestake Mine – 4850 level in relation to the 300 level (Homestake original data base).

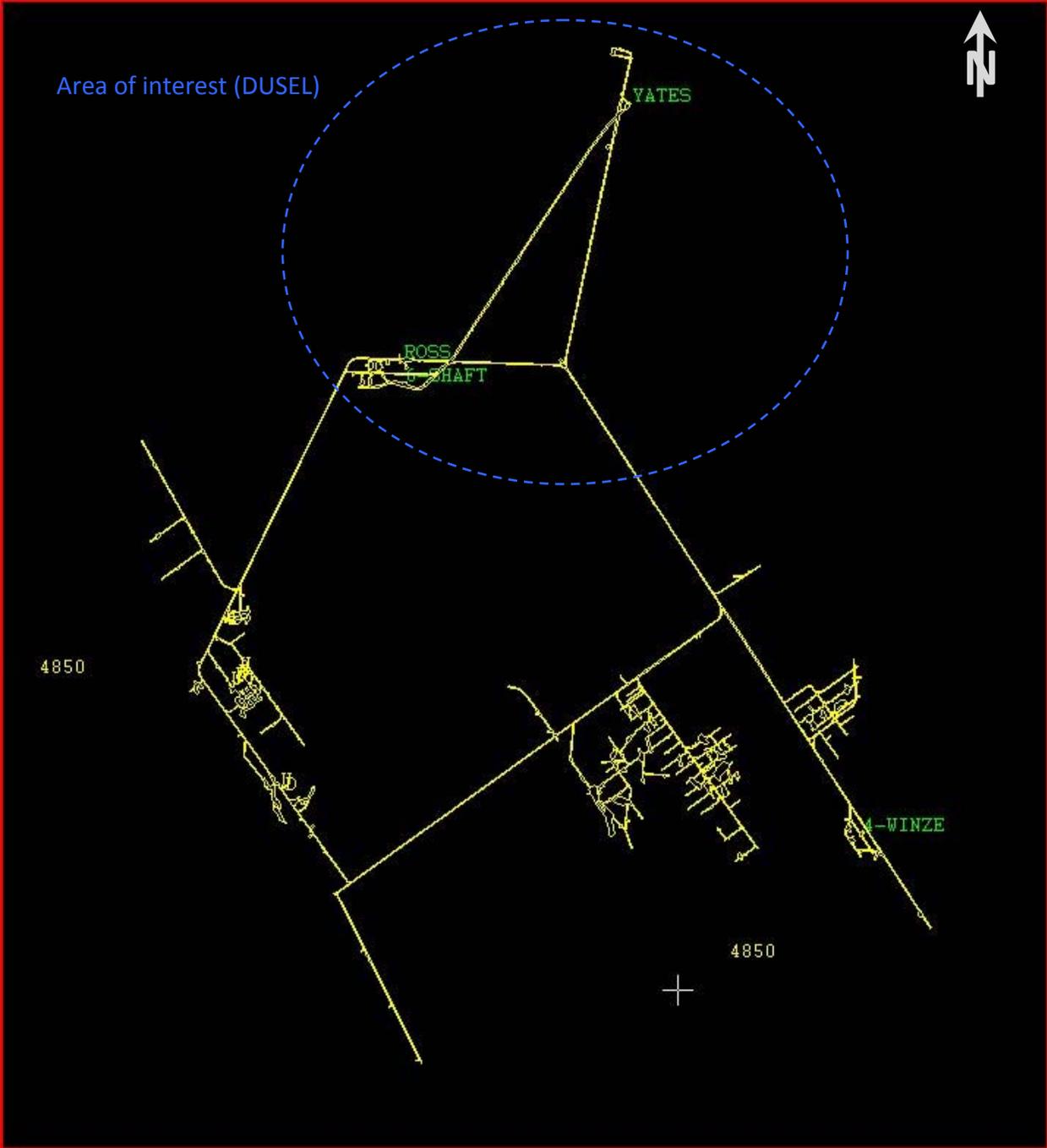


Fig. 3 Homestake Mine – 4850 level in plan view (Homestake original data base).

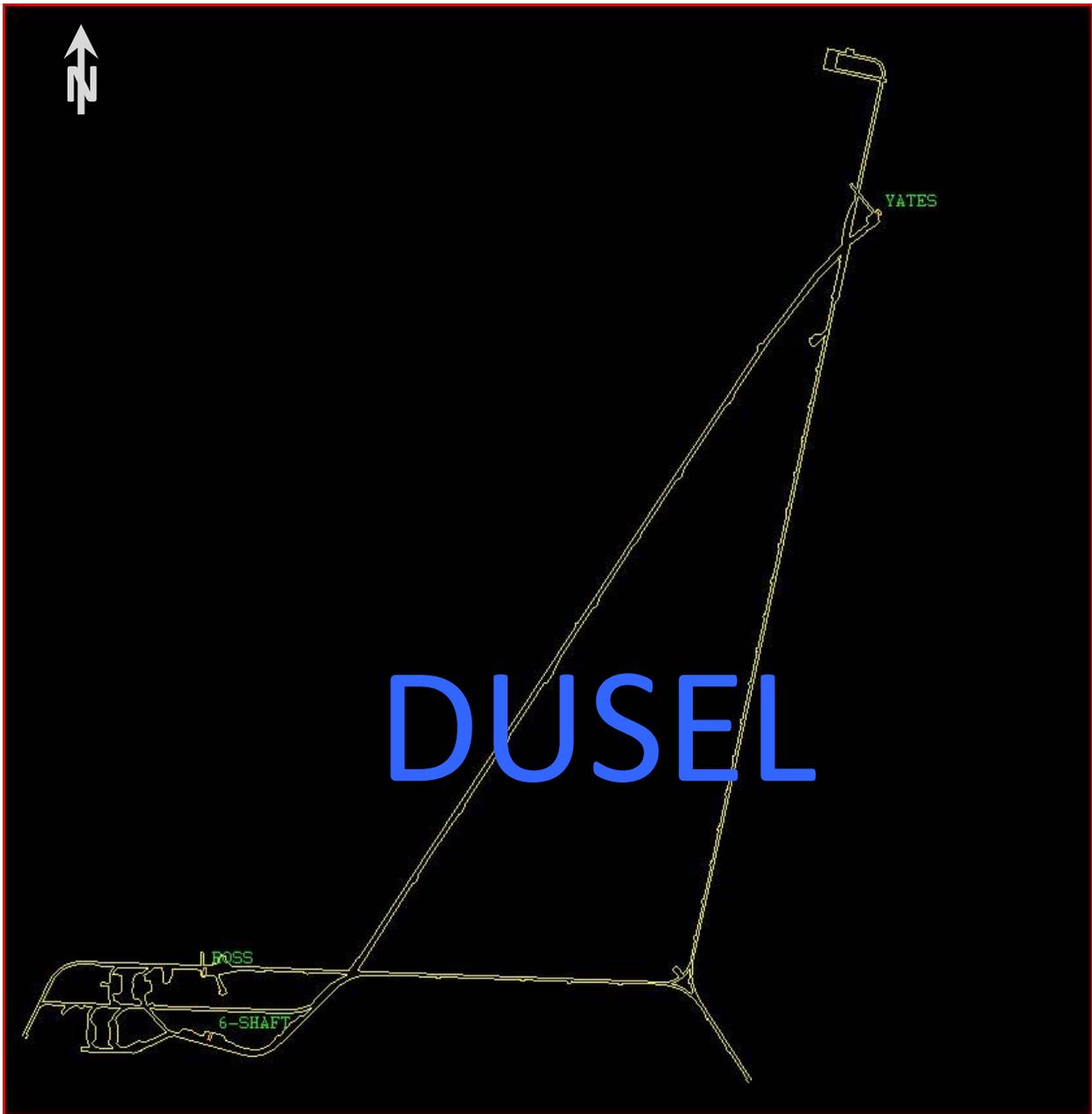


Fig.4 4850 level - area of interest (DUSEL mid level)

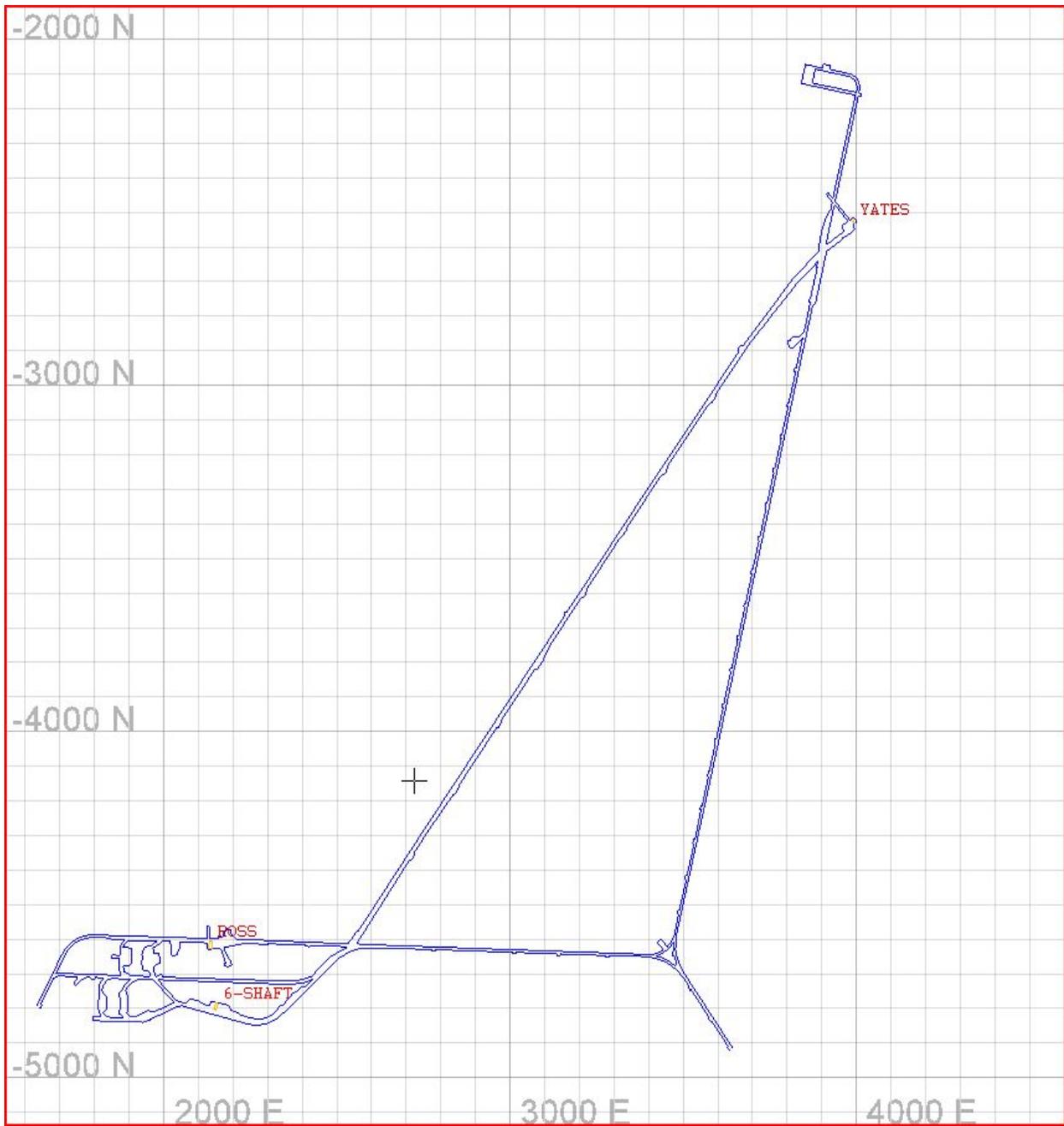


Fig.5 4850 level - area of interest (DUSEL mid level)

Note: Local coordinate system in feet with false origin.

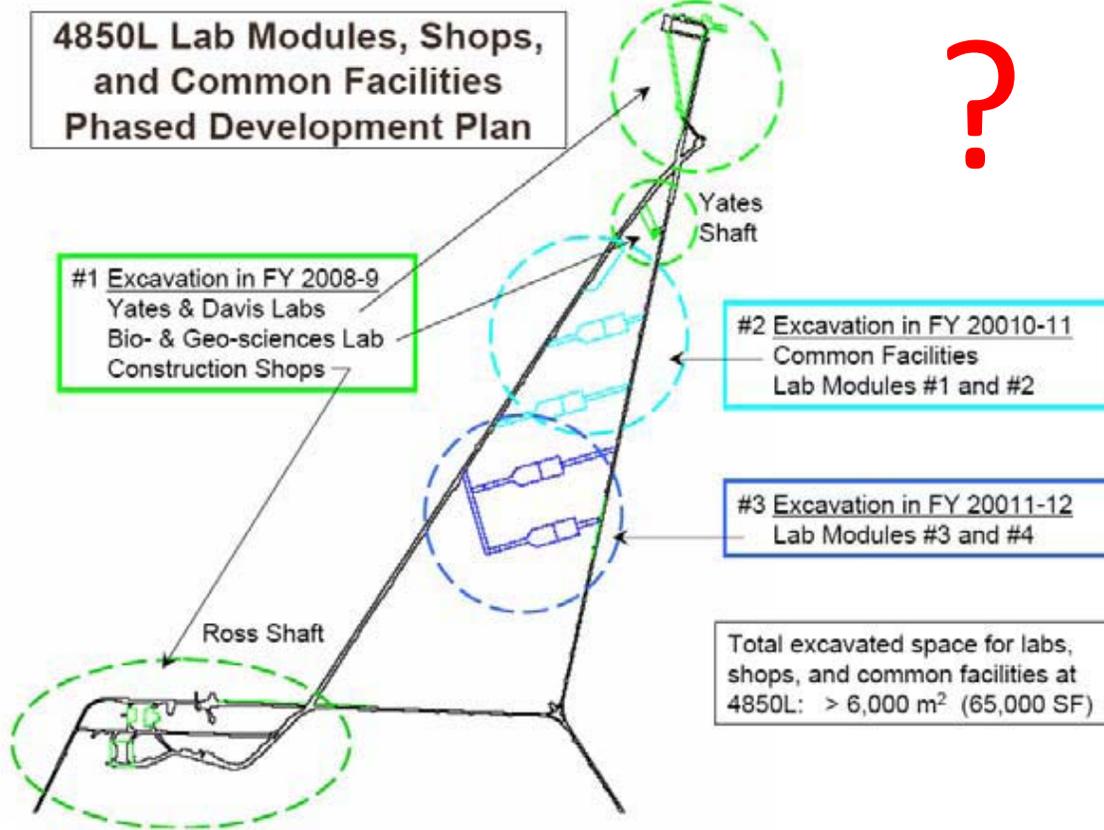


Fig.13 Proposed new excavations at 4850 level - as outlined in CDR – 2007

Note: Size, exact placement and orientation of laboratory modules and new excavation: subject to analysis and study.

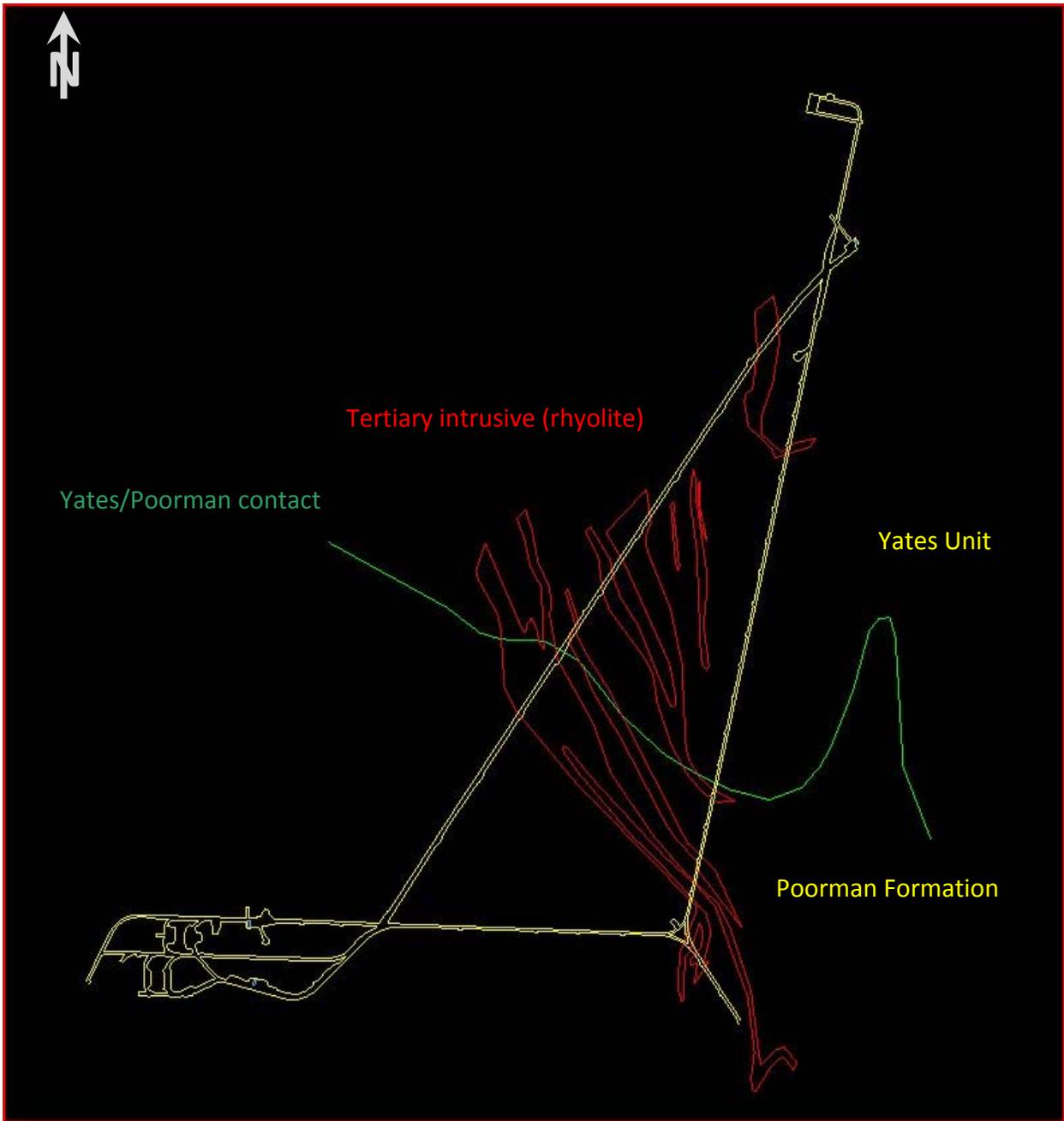


Fig.23 Geology (lithology and rock structure) at 4850 level in the area of interest.

Note: Rock structure (foliation planes and individual discontinuities) vary from place to place and from unit to unit. Some data at specific locations is available in Homestake/Vulcan database. Some information in Homestake/Vulcan database may not be complete.

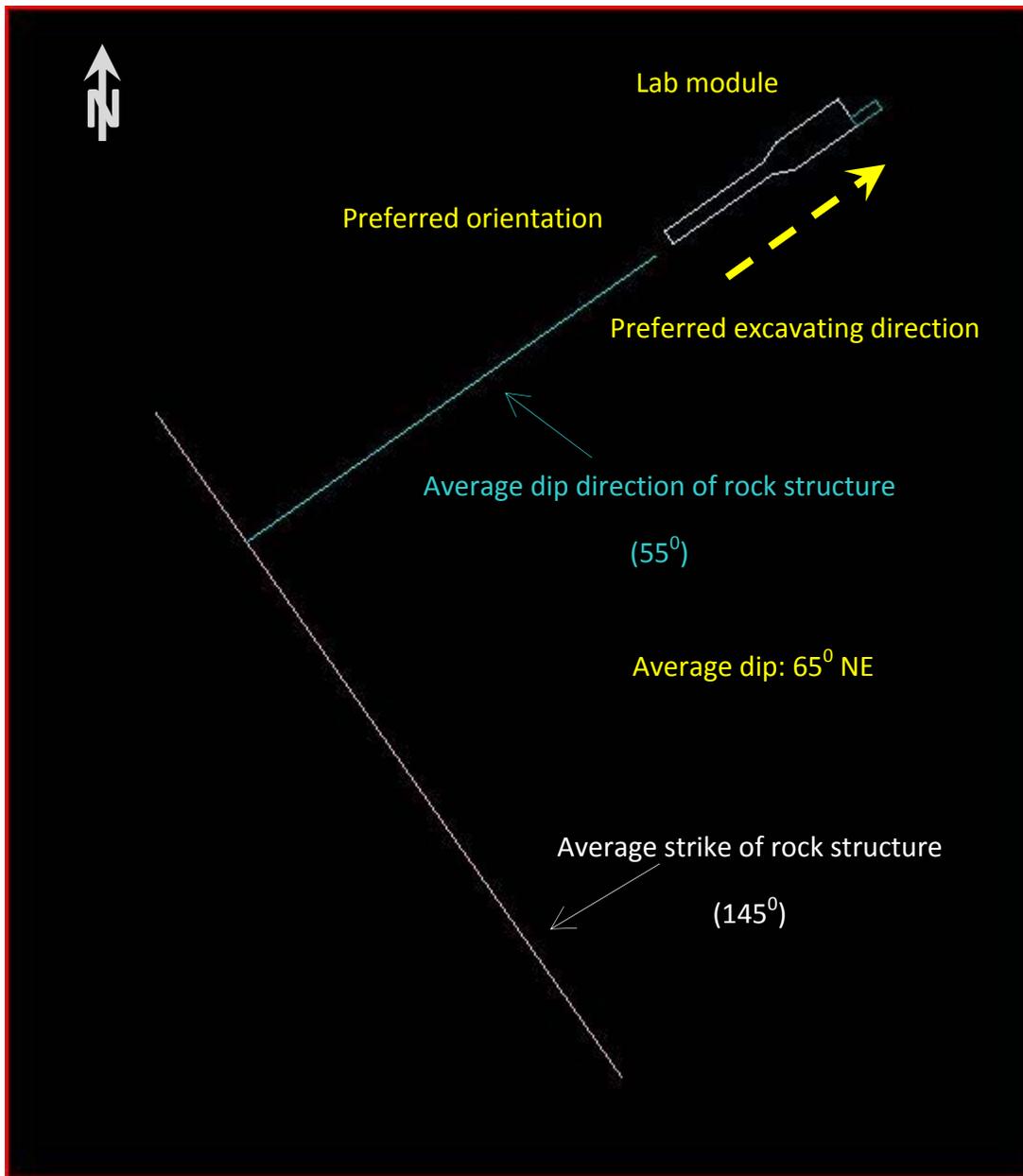


Fig.24 The most favorable orientation of the lab module with reference to rock structure.

Note: The most favorable orientation of an excavation (from the stability standpoint) is when its long axis is perpendicular to rock structure (foliation, discontinuities, etc), with direction of drive: with dip.

Drilling Program

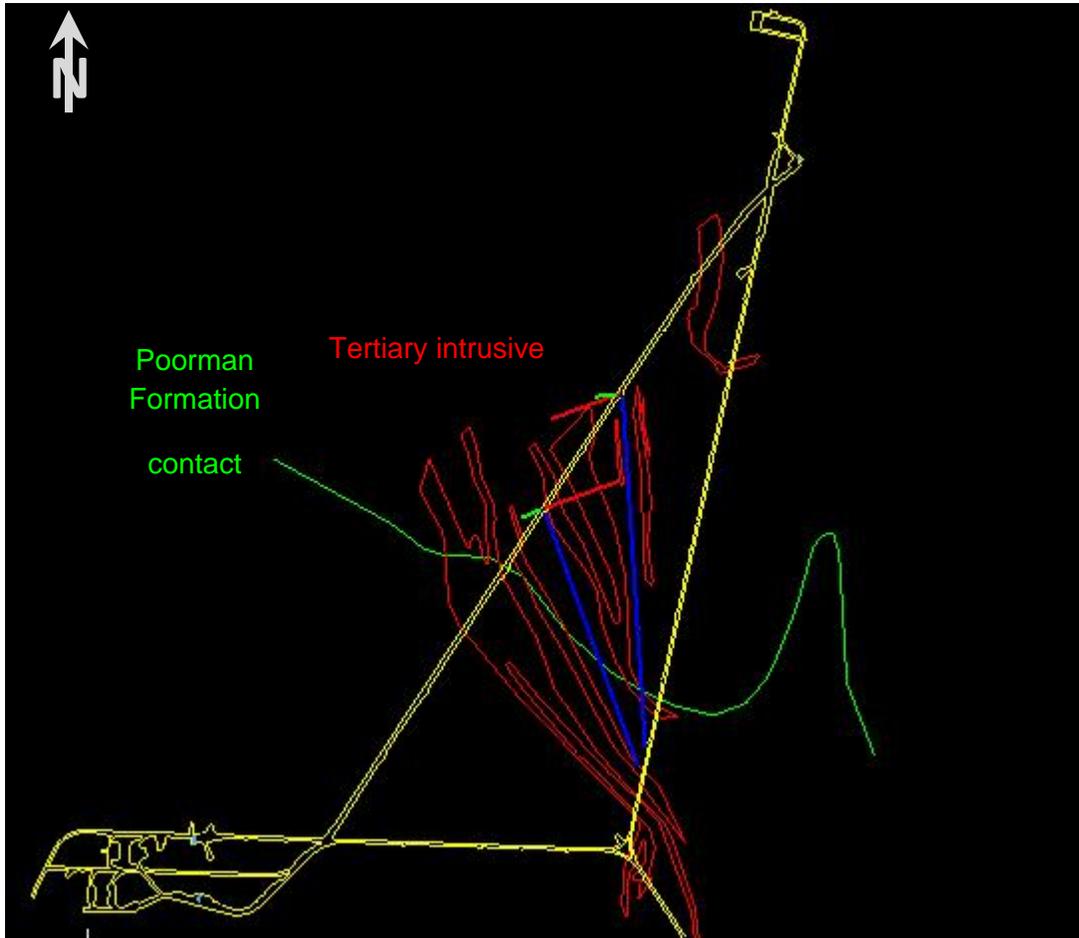


Fig.29 Location and orientation of directional drill holes in DUSEL area with reference to geology.

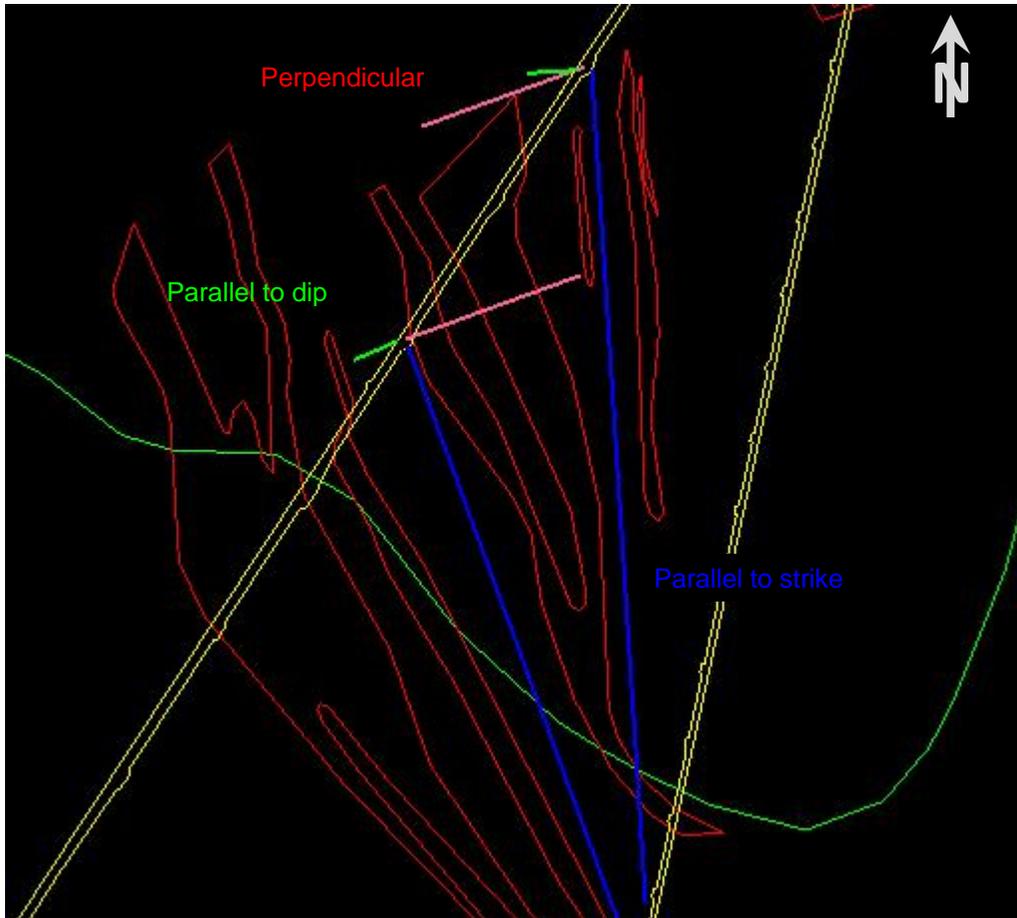


Fig.30 Location and orientation of directional drill holes with reference to rock structure and the existing excavations.

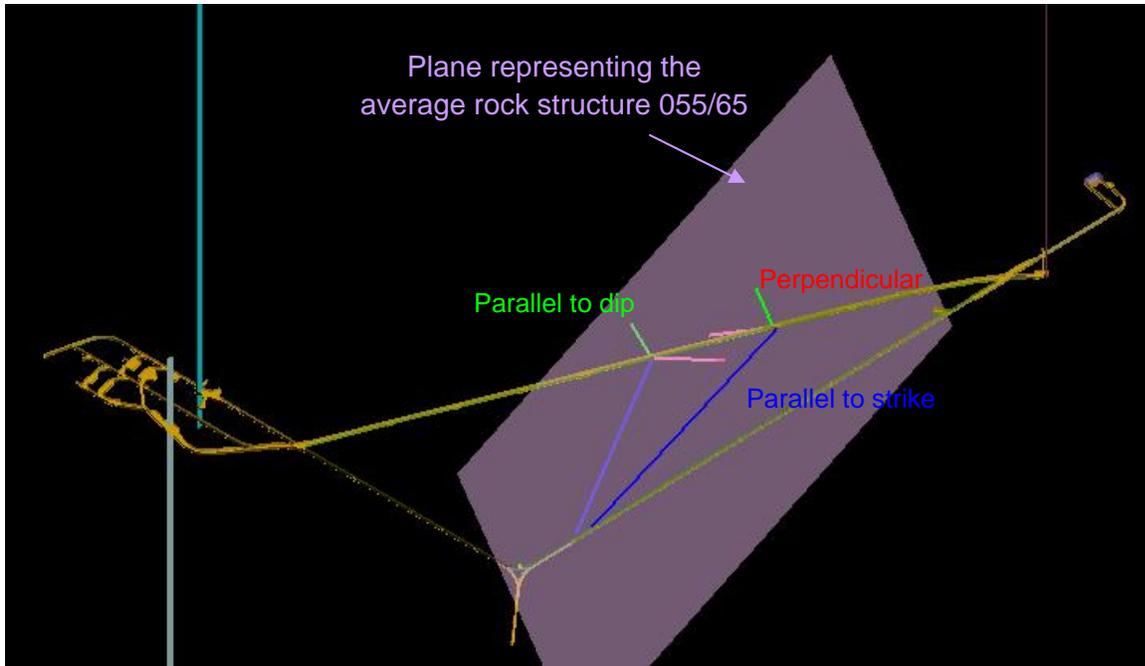


Fig.31 Orientation of drill holes with reference to the average attitudes of rock structure – 3D model.

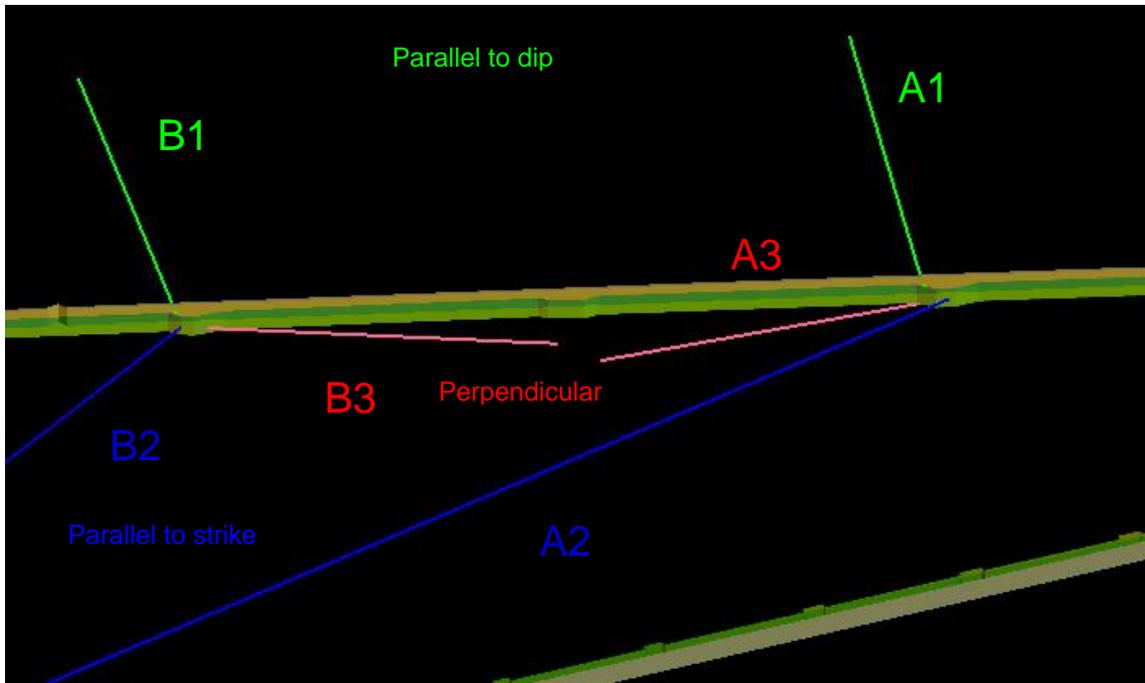


Fig.32 Location and orientation of drill holes – 3D model.

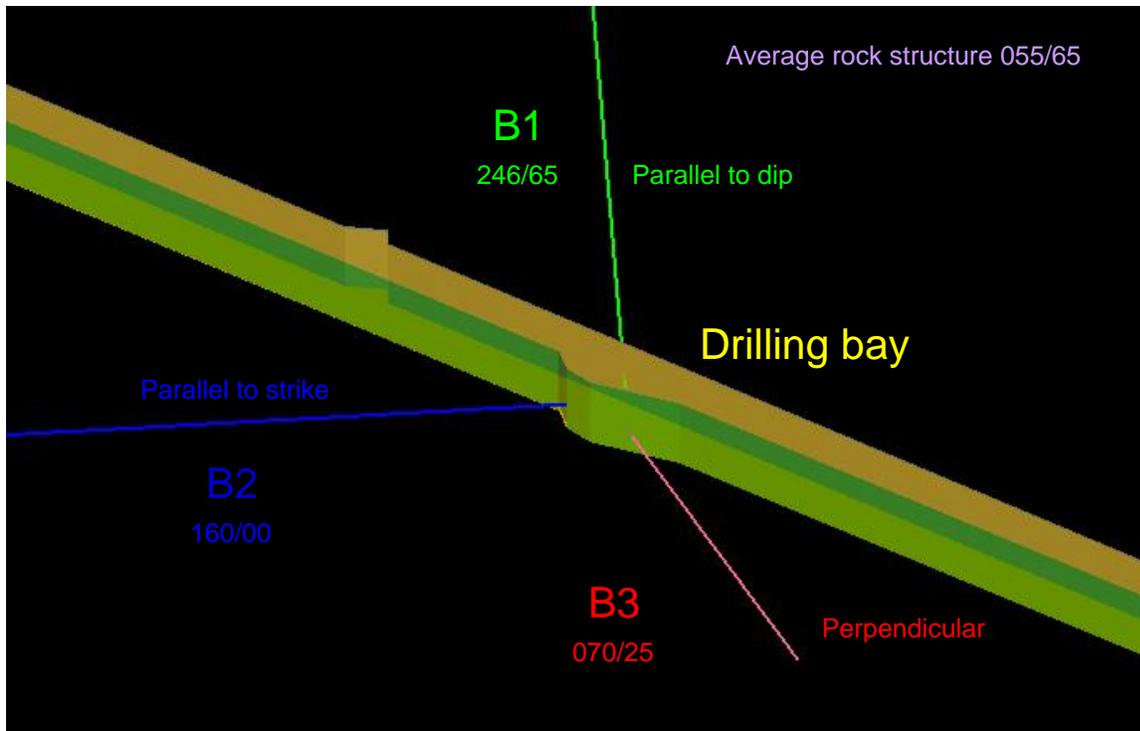


Fig.33 Location and orientation of drill holes in 4850 drift – triple-hole set.

Note: The orientation of the triple set may be repeated, as needed, in other locations; the bearing may be reversed by 180⁰ to cover more rock volume.

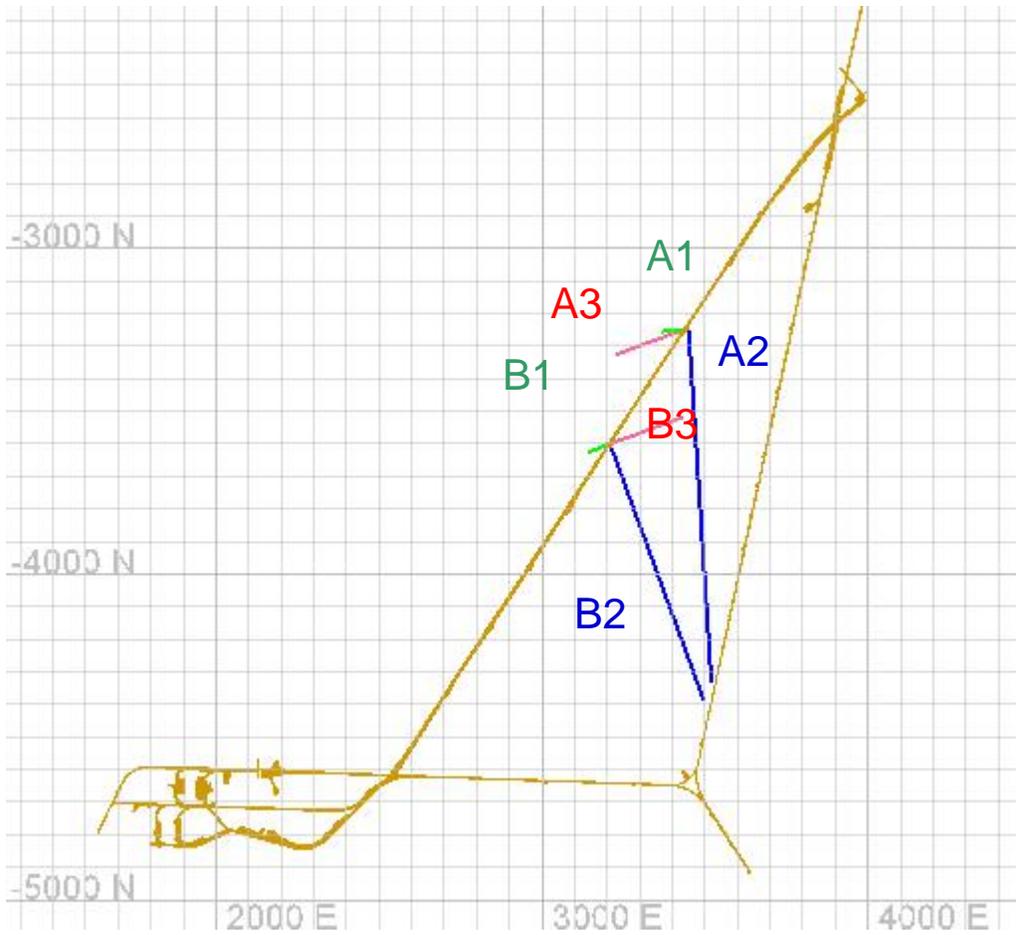


Fig.34 Drill hole location and orientation – plan view; grid in feet.

Hole ID	Bearing, °	Dip, °	Length, ft
A1	266	65	150
A2	176	0	1,000
A3	150	25	150
B1	246	65	150
B2	160	0	800
B3	070	25	150
Total length:			2,400

Mapping Scope

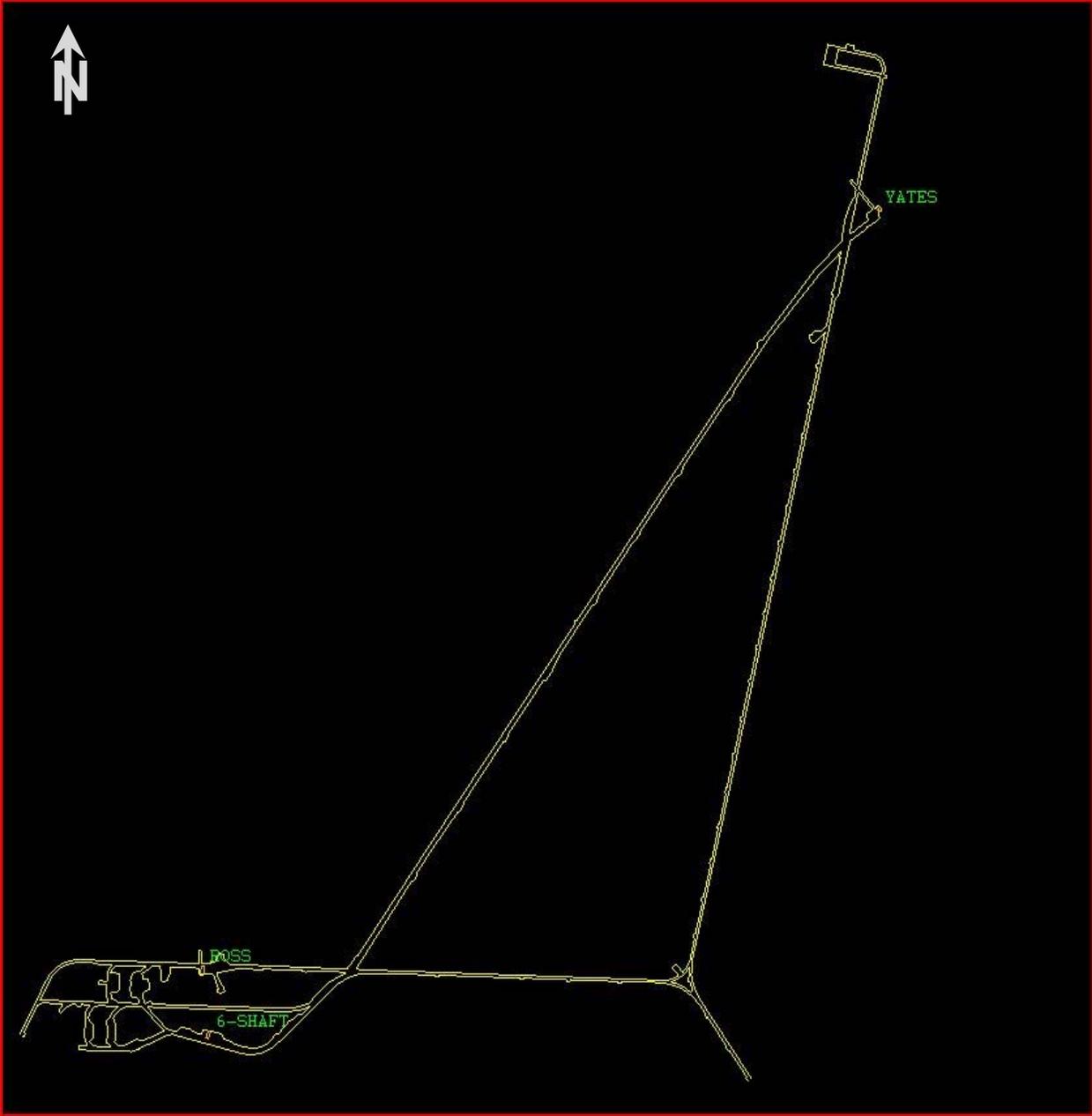


Fig.35 Mapping scope – existing drifts, excavations and areas to be mapped at 4850 level.

Exhibit C

SOUTH DAKOTA SCIENCE AND TECHNOLOGY AUTHORITY SANFORD UNDERGROUND SCIENCE AND ENGINEERING LABORATORY

ACKNOWLEDGMENT OF RISK

PAGE 1 of 3

In consideration for being permitted to enter upon the property of the South Dakota Science and Technology Authority (referred to in this document as the Authority”) located in and near Lead, South Dakota, including both the surface property and the underground workings and facilities owned by the Authority (referred to in this document as the “Authority’s Surface Property” or the “Authority’s Underground Property” and collectively, the “Authority’s Property”), which permission was granted at my request, I do hereby freely and knowingly state, declare and agree as follows:

(initial) _____ 1. I have independently investigated the risks to my health, life and safety and the risks of damage to my property resulting from my entry, presence and activities upon and in the Authority’s Property, including both the surface property and the underground property. Based upon that investigation, I have developed an informed understanding of the risks to me and my property resulting from my entry, presence and activities upon either or both of the Authority’s Surface Property and the Authority’s Underground Property.

(initial) _____ 2. Without limiting the generality of paragraph 1 above, I am aware that the Authority’s Surface Property is a former commercial mine which includes and contains heavy machinery, high-voltage electrical connections and conduits, open catwalks and other elevated walkways, apparent and hidden hazards of tripping or falling, industrial and mining chemicals and other agents, naturally-occurring minerals, naturally-occurring land and environmental conditions that are potentially hazardous, fully or partially reclaimed mine facilities (including, but not limited to, open pits, underground mine workings, process plants and waste rock areas), possible air-borne contaminants, high-pressure lines and vessels, falling or low-hanging items that present a risk of head injury and numerous other serious apparent and unapparent risks to my health, life and safety and risks of damage to my property.

(initial) _____ 3. Without limiting the generality of paragraph number 1 above, I am further aware that in addition to the risks associated with the Authority’s Surface Property described in paragraph 2 above, the Authority’s Underground Property is also a former commercial mine and it also includes and contains heavy machinery, high-voltage electrical connections and conduits, open catwalks and other elevated walkways, underground mine workings, apparent and hidden hazards of tripping or falling, industrial and mining chemicals and agents, naturally-occurring minerals, naturally-occurring geologic and environmental conditions that are potentially hazardous, possible air-borne contaminants, high-pressure lines and vessels and falling or low-hanging rock or other items that present a

ACKNOWLEDGMENT OF RISK

PAGE 2 of 3

risk of head injury. I am further aware that going underground involves a substantial risk of underground fires, underground floods, roof falls and collapses, failure of lifts, hoists and ventilation equipment, suffocation, being trapped, being crushed to death and numerous other serious apparent and unapparent risks to my health, life and safety and risks of damage to my property.

(initial) _____ 4. I acknowledge I have the time, knowledge and experience to make an intelligent choice concerning whether to assume the risks associated with my entry, and activities upon or in the Authority's Surface Property, the Authority's Underground Property or both.

(initial) _____ 5. I do hereby voluntarily, freely and unconditionally **assume any and all risk** of damage to my health, personal injury, death and damage to my property in any way associated with my entry, presence or activities upon, in or around Authority's Surface Property and the Authority's Underground Property.

(initial) _____ 6. I acknowledge that I have been given a **safety briefing or safety training**, and I agree to abide by guidelines explained during that briefing or training.

(initial) _____ 7. In the interest of safety and security, I agree that my person or property may be subject to **inspection** by Authority personnel at any time I am on Authority property.

(initial) _____ 8. I acknowledge that my failure to comply with any applicable law, regulation, rule or policy (including the guidelines explained during my safety briefing or safety training) is grounds for the Authority to immediately revoke my permission to enter the Authority's Property, to order me to immediately leave the Authority's property and to deny me future access to the Authority's Property. I agree to immediately comply with all directions given by the Authority to me pursuant to this paragraph.

(initial) _____ 9. I have been provided and have read and signed (or will sign), a document entitled "RELEASE, AGREEMENT NOT TO SUE AND WAIVER."

[DOCUMENT CONTINUED ON NEXT PAGE]

ACKNOWLEDGMENT OF RISK

PAGE 3 of 3

I HAVE READ THIS ACKNOWLEDGMENT OF RISK, CONSISTING OF **THREE PAGES AND NINE NUMBERED PARAGRAPHS**. I FULLY UNDERSTAND ITS TERMS AND THE RISKS DESCRIBED IN IT. I HAVE SIGNED IT FREELY AND VOLUNTARILY WITHOUT ANY INDUCEMENT, ASSURANCE OR GUARANTEE BEING MADE TO ME.

DATED this _____ day of _____, 20_____

[PRINT NAME]

THUMB
PRINT
HERE

I HAVE READ THIS ACKNOWLEDGMENT

[SIGNATURE]

I am requesting permission to enter the Authority's Property as an officer, agent, employee, consultant, scientific investigator, student, visitor, or I am otherwise affiliated with _____.

FOR OFFICE USE ONLY:

Witnessed by: _____ Logged by: _____
[print name]

_____ Date logged: _____
[signature]

Exhibit D

SOUTH DAKOTA SCIENCE AND TECHNOLOGY AUTHORITY SANFORD UNDERGROUND SCIENCE AND ENGINEERING LABORATORY

RELEASE, AGREEMENT NOT TO SUE AND WAIVER

PAGE 1 of 3

In consideration for being permitted to enter upon the property of the South Dakota Science and Technology Authority (referred to in this document as the "Authority") located in and near Lead, South Dakota, including both the surface property and the underground workings and facilities owned by the Authority (referred to in this document as the "Authority's Surface Property" or the "Authority's Underground Property" and collectively, the "Authority's Property"), which permission was granted at my request, I do hereby freely and knowingly state, declare and agree as follows:

(initial) _____ 1. I have today been provided and have read and signed a form entitled "ACKNOWLEDGMENT OF RISK," which describes in general terms the numerous apparent and unapparent **risks of serious personal injury, death or damage to my property** which exist on and in both the Authority's Surface Property and the Authority's Underground Property.

(initial) _____ 2. Being fully aware of the risks as described in the accompanying "ACKNOWLEDGEMENT OF RISK," I do hereby voluntarily, freely and unconditionally **release** and **agree not to sue** the following persons and entities for any damage to my health, personal injury, death and/or damage to my property in way associated with my entry, presence or activities upon, in or around the Authority's Surface Property and/or the Authority's Underground Property, and I further hereby **waive** any such claims I may have against the following persons and entities. This **release, agreement not to sue and waiver** is given in favor of the following persons and entities:

(initial) _____ (a). The **State of South Dakota** and its elected representatives and officers, unelected officers, employees, agents, consultants and representatives; and

(initial) _____ (b). The **South Dakota Science and Technology Authority** and its officers, directors, employees, agents, consultants and representatives, and any visitor, contractor, consultant or any other person (natural or otherwise) that the South Dakota Science and Technology Authority directs to, invites or permits upon or authorizes to use the Authority's Property and its or their agents, representatives, consultants, lessees, licensees and invitees; and

(initial) _____ (c). **Barrick Gold Corporation**; any person, partnership, joint venture, corporation or any other form of enterprise which directly or indirectly controls, is controlled by or is under common control with Barrick Gold Corporation; any officer, director, employee, agent or consultant of Barrick Gold Corporation; and any visitor, contractor, consultant or any other person (natural or otherwise) that Barrick Gold

**RELEASE, AGREEMENT NOT
TO SUE AND WAIVER**

PAGE 2 of 3

Corporation directs to, invites or permits upon or authorizes to use the Authority's Property and its or their agents, representatives, consultants, lessees, licensees and invitees; and

(initial) _____ (d). **Homestake Mining Company of California**; any person, partnership, joint venture, corporation or any other form of enterprise which directly or indirectly controls, is controlled by or is under common control with Homestake Mining Company of California; any officer, director, employee, agent or consultant of Homestake Mining Company of California; and any visitor, contractor, consultant or any other person (natural or otherwise) that Homestake Mining Company of California directs to, invites or permits upon or authorizes to use the Authority's Property and its or their agents, representatives, consultants, lessees, licensees and invitees; and

(initial) _____ (e). **Mr. T. Denny Sanford or any other person** or entity providing funding or other support for the construction, operation and maintenance of the Authority, the Authority's Property and/or the Sanford Underground Science and Engineering Laboratory.

(initial) _____ 3. I understand that this document does not act to release, discharge or waive any rights I may have to compensation or the payment of medical expenses under applicable workers compensation law.

(initial) _____ 4. The release, agreement not to sue and waiver contained in this document includes any and all claims I or my heirs, representatives, successors or assigns (including, but not limited to, my family) may have as a result of any damage to my health, injury to me, my death or damage to my property, including incidental and consequential damages and loss of income, support and companionship.

(initial) _____ 5. I agree that if a court or other tribunal with jurisdiction rules that some portion of this document is for any reason unenforceable, the remaining portions of this document shall remain valid and enforceable.

(initial) _____ 6. The release and waiver contained in this document and my agreement not to sue the parties named above is and will be binding on me and my heirs, representatives, successors and assigns (including, but not limited to, my spouse and other family).

[DOCUMENT CONTINUED ON NEXT PAGE]

**RELEASE, AGREEMENT NOT
TO SUE AND WAIVER**

PAGE 3 of 3

I HAVE READ THIS RELEASE, AGREEMENT NOT TO SUE AND WAIVER, CONSISTING OF **THREE PAGES AND SIX NUMBERED PARAGRAPHS**. I FULLY UNDERSTAND ITS TERMS, UNDERSTAND THAT I HAVE GIVEN UP SUBSTANTIAL RIGHTS BY SIGNING IT, AND HAVE SIGNED IT FREELY AND VOLUNTARILY WITHOUT ANY INDUCEMENT, ASSURANCE OR GUARANTEE BEING MADE TO ME. I INTEND MY SIGNATURE TO BE A COMPLETE AND UNCONDITIONAL RELEASE OF ALL LIABILITY, AGREEMENT NOT TO SUE AND WAIVER OF LIABILITY TO THE GREATEST EXTENT ALLOWED BY LAW.

DATED this _____ day of _____, 20____

[PRINT NAME]

THUMB
PRINT
HERE

I HAVE READ THIS RELEASE

[SIGNATURE]

I am requesting permission to enter the Authority's Property as an officer, agent, employee, consultant, scientific investigator, student, visitor, or I am otherwise affiliated with _____.

FOR OFFICE USE ONLY:

Witnessed by: _____ Logged by: _____
[print name]

[signature] Logged by: _____

Exhibit E

RELEASE, AGREEMENT NOT TO SUE, WAIVER AND AGREEMENT TO INDEMNIFY

THIS RELEASE, AGREEMENT NOT TO SUE, WAIVER and AGREEMENT to INDEMNIFY is made and entered into this ___ day of _____, by _____ (“Contractor”) in favor of the Homestake Indemnified Parties (as defined below).

RECITALS

1. Contractor has entered into an Agreement with the South Dakota Science and Technology Authority (the “Authority”) of even date herewith, (the “Agreement”) for certain work to be performed by the Contractor in the Underground Property (as defined below).
2. Pursuant to the terms of Section 6.10(b) of the Property Donation Agreement (as defined below) a copy of which is attached hereto as Attachment “A,” the Agreement requires the Contractor to execute this Release, Agreement Not To Sue, Waiver and Agreement to Indemnify as a condition of the award of the Agreement to the Contractor.
3. The Contractor acknowledges that the award of the Agreement to it by the Authority and the payment by the Authority of the sums to be paid to the Contractor pursuant to the Agreement constitute good and valuable consideration for the Contractor’s execution of this Release, Agreement Not to Sue, Waiver and Agreement to Indemnify.
4. The Contractor is an experienced underground mining contractor or has made itself familiar with the risks associated with working underground, and thus has knowledge of the risk of injury, death or damage to property (including, but not limited to, the risk of injury, death or damage to third persons) resulting from working or being present in the Underground Property. Without limiting the generality of the foregoing, the Contractor has read the Acknowledgment of Risk which is attached hereto, marked as Exhibit “B,” and acknowledges knowledge of the risks described therein.
5. The Contractor has thoroughly and fully familiarized itself with the nature, general layout and operational history of the Mine (as defined below), and is thus familiar with the risk of injury, death or damage to property (including, but not limited to, the risk of injury, death or damage to third persons) presented by a mine of the size and nature, and with the extensive and lengthy operational history, of the Mine.

AGREEMENT

Based upon the foregoing Recitals, and for good and valuable consideration (including, but not limited to, the award of the Agreement), the receipt and sufficiency of which are hereby conclusively and irrevocably acknowledged by Contractor, Contractor agrees as follows:

A. Definitions.

1. “Homestake Indemnified Parties” means Barrick Gold Corporation; Homestake Mining Company of California; any person, partnership, joint venture, corporation or other form of enterprise which directly or indirectly controls, is controlled by or is under common control with Barrick Gold Corporation and/or Homestake Mining Company of California; any person visiting the surface or underground property at the request or with the authorization of any of the foregoing; and any contractor, subcontractor, director, officer, employee, agent, consultant or subconsultant or any other person or entity that Barrick Gold Corporation, Homestake Mining Company of California or any of their representatives invites on, allows or authorizes to use the surface property or the underground property and each of their agents, representatives, consultants, lessees, licensees and invitees.

2. "Homestake Indemnified Party" means one of the Homestake Indemnified Parties.
3. "Mine" means the former Homestake Gold Mine in and near Lead, Lawrence County, South Dakota.
4. "Property Donation Agreement" or "PDA" means the Property Donation Agreement Between and Among Homestake Mining Company of California, the State of South Dakota and the South Dakota Science and Technology Authority, dated as of April 14, 2006.
5. "Underground Property" means any property at the Mine owned by the Authority which is beneath the surface.

B. Release

1. Contractor hereby voluntarily, freely, irrevocably and unconditionally **releases, and agrees not to sue** the Homestake Indemnified Parties, or any of them, for any damage to health, personal injury, death and/or damage to property of the Contractor or any of its officers, directors, employees, agents, representatives, consultants, licensees and invitees in any way associated with Contractor's entry, presence or activities upon, in or around any surface property owned by the Authority and/or the Underground Property, and Contractor hereby **waives** any such claims.

2. This release, agreement not to sue and waiver includes any and all claims Contractor, its officers, directors, employees, agents and consultants, or any of its or their heirs, representatives, successors or assigns may have as a result of any damage to health, personal injury or death and/or damage to property, including incidental and consequential damages and loss of income, support and companionship.

3. This release, agreement not to sue and waiver is intended to be construed as broadly as possible so as to give the Homestake Indemnified Parties the maximum protection allowed by applicable law and as required by Section 6.10(b) of the PDA.

C. Agreement to Indemnify

1. To the fullest extent allowed by applicable law, Contractor hereby voluntarily, freely, irrevocably and unconditionally agrees to and shall indemnify, defend and hold harmless each of the Homestake Indemnified Parties from and against any and all claims, causes, actions or causes of action of any kind or nature whatsoever, whenever or by whomever asserted, arising out of or in any way related to the presence of the Contractor or any of Contractor's officers, directors, employees, agents, representatives, consultants, licensees, invitees, subcontractors, suppliers, designers, or any other person or entity acting for or on behalf of Contractor, and each of its or their officers, directors, employees, agents, subcontractors, suppliers, designers or any other person or entity acting for or on behalf of any of them on the surface property owned by the Authority or in or on the Underground Property.

2. Contractor's obligation to indemnify includes the obligation to pay all of the Homestake Indemnified Parties' reasonable attorney fees, costs and disbursements (including fees and costs of expert witnesses) incurred in connection with any claim, cause, action or cause of action for which Contractor is obligated to indemnify or in connection with any claim, action, suit or proceeding asserted or brought by the Homestake Indemnified Parties against Contractor in connection with this Release, Agreement Not to Sue, Waiver and Agreement to Indemnify.

3. If a Homestake Indemnified Party believes that it is entitled to indemnification under this Agreement, it shall give notice of such belief to the Contractor specifying that indemnification is sought pursuant to this Release, Agreement Not to Sue, Waiver and Agreement to Indemnify, the amount (to the extent known) in question, the nature of the event giving rise to the claim, the parties involved and any other information related to the claim.

4. The failure of the Homestake Indemnified Party to deliver prompt written notice of a claim shall not affect the indemnity obligations of the Contractor except to the extent the Contractor is prejudiced by such failure.

5. The Contractor shall have 30 days after receipt of such notice to elect to undertake, conduct and control (through counsel of its own choosing and at its own expense) the defense of the claim with respect to which indemnification is sought. If the Contractor fails to respond to the notice or declines to undertake the settlement or defense of the claim within the 30 day period, the Homestake Indemnified Party shall have the right to seek a determination in a court of competent jurisdiction compelling settlement or defense of the claim by the Contractor. In the alternative, the Homestake Indemnified Party shall have the right to contest, settle, or compromise such claim and the Homestake Indemnified Party shall not thereby waive any right to indemnity for such claim hereunder. The giving of notice by the Homestake Indemnified Party shall toll any statute of limitations for bringing a claim against the Contractor.

6. Once it is agreed or ordered that responsibility for defense of a claim lies with the Contractor, the Contractor shall take control, at its expense, of the defense of any such matter or its settlement. The Contractor shall permit the Homestake Indemnified Party to participate in such settlement or defense through counsel chosen by such Homestake Indemnified Party (but the reasonable fees and expenses of such counsel shall be borne by such Homestake Indemnified Party).

7. If the Contractor, at its cost and expense, (a) undertakes the defense of, and assumes full responsibility for, the claim; (b) is reasonably contesting such claim in good faith, by appropriate proceedings; and (c) undertakes such action (including the posting of a bond, deposit, or other security) as may be necessary to prevent any action to foreclose a lien against or attachment of the property of the Homestake Indemnified Party for payment of such claim, the Contractor shall maintain control of the defense against the claim; provided, however, that the Contractor shall not settle any such claim without the consent of the Homestake Indemnified Party, which consent may not be unreasonably withheld. Notwithstanding compliance by the Contractor with the preceding requirements, the Contractor shall have the right to pay or settle any such claim, but in such event it shall waive any right to indemnity by the Contractor for such claim.

8. This Release, Agreement Not to Sue, Waiver and Agreement to Indemnify shall not be amended or modified except in writing, signed by the Contractor and an authorized representative of the Homestake Indemnified Parties.

9. This Release, Agreement Not to Sue, Wavier and Agreement to Indemnify shall be binding upon the Contractor and inure to the benefit of the Homestake Indemnified Parties and their respective successors and permitted assigns, provided that Contractor shall not assign this Agreement or any rights herein without the prior written consent of the Homestake Indemnified Parties. Any purported assignment in the absence of such written consent shall be void.

10. The invalidity or unenforceability of any provision of this Release, Agreement Not to Sue, Waiver and Agreement to Indemnify shall not affect the validity or enforceability of any other provision hereof, each of which shall remain in full force and effect.

11. The failure of Contractor or any of the Homestake Indemnified Parties to insist, in any one or more instances, upon the strict performance of any of the terms, conditions or covenants hereof shall not be construed as a waiver or relinquishment for the future of such term, condition or covenant. No waiver, change, modification or discharge by the Contractor or any of the Homestake Indemnified Parties of any provision hereof shall be deemed to have been made or shall be effective unless expressed in writing and signed by the Contractor and an authorized representative of the Homestake Indemnified Parties.

12. All notices, consents, requests and approvals, any notice of change in address for the purpose of this paragraph, and other communications provided for or required herein, shall be given (a) by personal delivery; (b) by electronic communication, with a confirmation sent by registered or certified mail, return receipt requested; (c) by registered or certified mail, return receipt requested; or (d) by reputable express courier. All notices, consents, requests and approvals, any notice of change in address for the purpose of this Section, and other communications provided for or required herein, shall be effective and shall be deemed delivered on the date of delivery if delivered during normal business hours, and, if not delivered during normal business hours, on the next business day following delivery:

(a) If to the Contractor:

(b) If to Homestake:

Homestake Mining Co.
ATTN: Closure Manager
11457 Bobtail Gulch St.
Central City, SD 57754

A true and correct copy of any notice, consent, request and approval, and of any notice of change in address for the purpose of this paragraph shall also be provided to the Authority at the following addresses:

South Dakota Science and Technology Authority
630 East Summit
Lead, South Dakota 57754-1700
Attention: Executive Director

with a copy to:

Timothy M. Engel
May, Adam, Gerdes & Thompson LLP
503 South Pierre Street
P.O. Box 160
Pierre, South Dakota 57501

12. This Release, Agreement Not to Sue, Waiver and Agreement to Indemnify shall be governed by and construed according to the internal laws of the State of South Dakota, without regard to conflicts of law principles. Any action, suit or proceeding arising out of or related to this Agreement shall be brought in the state courts of the State of South Dakota.

13. Time is of the essence in the performance of the covenants, terms and conditions of this Release, Agreement Not to Sue, Wavier and Agreement to Indemnify.

14. All Exhibits referred to herein are hereby incorporated herein by reference.

15. All of the terms and provisions of this Release, Agreement Not to Sue, Waiver and Agreement to Indemnify shall survive termination or completion of the terms of the Agreement.

IN WITNESS WHEREOF, the Contractor has caused this Agreement to be executed this ____ day of _____, 2008.

Contractor

(SEAL)

By: _____

Name: _____

Title: _____

ATTEST:

By: _____

Its: _____