Review of Geotechnical and Archaeological Investigations at the Money Pit, Oak Island, Nova Scotia

Presentation by
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SNC-Lavalin Inc., Montreal
to
The Canadian Geotechnical Society
Western Quebec Section
Montreal Group
January 23, 2008
Outline of Presentation

1. Introduction
2. Historical Summary from 1795 to 1966
3. Geological, Geotechnical and Hydrogeological Conditions
4. Archaeological Findings at Money Pit from 1967
5. Search by Ron Aston 1999 to 2001 (North Carolina)
6. Search by Petter Amundsen 2003 (Norway)
7. Main Theories
8. Options for Future Exploration at the Money Pit
9. Conclusions
Location of Oak Island, Nova Scotia
In the 1500s, during the Portuguese voyages of discovery, islands in the New World were seeded with livestock and crops to have fresh supplies for future voyages. (Vigneras 1973)
Oak Island Lot Distribution

Present Ownership (2007)
Lot 5 – Robert Young
Lots 9 to 12 and 14 – Fred Nolan
Lot 13 – John Johnston
Lot 23 – Dan and David Blankenship
Lot 25 – Alan Kastrzewa (Michigan Group)
Remaining 23 Lots – Dan Blankenship and Michigan Group

The Treasure Trove License is in the possession of Oak Island Tours which is a Company formed by the Michigan Group.
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The Beginning in 1795

1. Depression in Ground
2. Cut Limb with Rope Marks
3. Visions of Pirates and Treasure
Main Findings in 1795 by Three Boys and from 1804 to 1805 by the Onslow Syndicate

1. In 1795 a depression in the ground was found beside a large oak tree.
2. Excavation to 25 feet in 1795 found flag stones and oak log platforms.
3. In 1804 the Onslow Syndicate excavated to 93 feet and found charcoal, putty, beach stones and coconut fibre.
4. At 93 feet depth the pit flooded to sea level and could not be bailed out.
5. In 1805 a second shaft adjacent to the Money Pit was excavated to 110 feet and was flooded.
Flooding of Second Shaft in 1805

- Water level in Money Pit at 33 ft during excavation of Shaft No.2 and lateral tunnel
- Wall of Money Pit in hard clay till (13 ft diameters)
- Bottom of excavation at 93 ft
- Upward flow of water helps water bail out of Money Pit
- Water and soil pressure against soil plug
- Lateral tunnel driven toward Money Pit
- Soil plug at end of lateral tunnel
- Bottom of Shaft No.2 at 110 ft

- Water level in Money Pit probably dropped when soil plug failed and then returned to 33 ft depth
- Wall of Money Pit in hard clay till (13 ft diameters)
- Bottom of excavation at 93 ft
- Upward flow of water flooded Shaft No.2 and returned water level in Money Pit to 33 ft depth
- Water and soil pressure caused failure of soil plug
- Shaft No.2 filled with water to 33 ft less than 2 hours after collapse of soil plug at end of lateral tunnel

Scale - Feet
Early Oak Island Digs 1850 - 1909

Sketch from Photo
Comparative Photos of Smith’s Cove
1860s and about 1897

Smith’s Cove
Looking toward
Isaac’s Point
1860s

Smith’s Cove
Looking toward
Isaac’s Point
about 1897
(R V Harris
1958 and 1967)
Photos of South Shore 1860s and Old Shaft

Money Pit Area from South Shore Cove 1860s

Old Exploration Shaft South of Money Pit Area

Cellar to Smith’s House

Barn

Old Shaft

Smith’s House?
Main Findings of the Truro Company in 1849

1. In 1849 the Truro Company excavated the Money Pit to 86 feet and then the pit flooded to sea level.

2. Drilling with a pod auger found timber platforms and evidence of assumed coins in chests.

3. No materials were recovered from the zone of assumed coins.
Results of Exploration in a Cofferdam at Smith’s Cove by the Truro Company in 1850

Reasons for Cofferdam
1. Realized Money Pit contained salt water
2. Water draining out of tidal zone at low tide
3. Boulders removed over 145 feet along shoreline of Smith’s Cove

Ref: Booklet – The Story of Oak Island 1895 (Based on work by the Truro Company in 1850)
The Oak Island Association 1861 to 1864
The Halifax Company 1866 to 1867

1. The Oak Island Association tried to approach the assumed chests at 100 to 105 feet by offset shaft and lateral tunnel. The resulting undermining caused a major collapse of the platforms and assumed chests in 1861.

2. The Halifax Company carried out extensive tunnelling and constructed a cofferdam at Smith’s Cove to block the flood tunnel.
Frederick Leander Blair, Ahmerst, N S
Involved from 1897 to 1951
Results of Drilling by the Oak Island Treasure Company in 1897 and Parchment Location

- **1897 Shaft**
- **Money Pit**
- **Parchment Recovered During Drilling Within Assumed Cement Vault**
- **Parchment Recovered by Pod Auger at 155 Feet**

**13 Feet**

**Note:** The drilling was carried out within an 85 ft trellis-tied shaft located within the limits of the Money Pit. The details of this shaft are not shown.
Photo of Parchment Recovered by the Oak Island Treasure Company in 1897

Parchment is $\frac{5}{16}$ inches long

Photo from Triton Alliance
Flood Tunnel and Filter Bed Based on Work by the Oak Island Treasure Company in 1897

No reference to Shafts 4 and 5 by Truro Co in 1850

5 holes at 30 ft spacing and 5” diameter drilled and blasted by OITC in 1897

Hole 3 water at 80 ft 160# dynamite

Tunnel length shown as 460 feet and rise is about 10 to 15 feet

Holes 1, 2, 4 and 5 No water 90-95 ft 50-75# dynamite

Ref: Booklet - History of Oak Island, Nova Scotia, and of the Work Done There at Different Times to Recover Buried Treasure 1926
Flood Tunnel and Filter Bed Profile
Revised Interpretation of Evidence

No Water 90-95 ft
Holes 1, 2, 4 and 5
(1926 Booklet)

Water 80 ft
Hole 3 ?
(1926 Booklet)

Tunnel length about 520 feet
and rise about 60 feet

Water 35 ft
Shaft 5
(Blair 1893)

No Water 75 ft
Shaft 4
(Blair 1893)

-100
-50
0
50
Money Pit
Ground Surface
Mean Sea Level
Bottom of Money Pit at 111 feet depth (1897)
Flood Tunnel filled with smooth beach stones
Glacial Till Overburden
Filter Bed and Feeder Drains at Smith's Cove
Boring
Shaft No. 5 4
Cave-In Shaft (No. 11)
Approximate Bedrock Surface (Projected from Money Pit)
Horizontal Distance - Feet
Elevation - Feet

No Water 80 ft
Hole 3 ?
(1926 Booklet)

Water 80 ft
Hole 3 ?
(1926 Booklet)
Henry Bowdoin, Franklin Roosevelt and Others 1909
The Chappell Shaft in Progress 1931

Chappell Shaft
12 X 14 Feet
Melbourne R. Chappell, Sydney, N S
Involved from 1897 to 1980 (Age 10 to 93)
Gilbert Hedden, Chatham, New Jersey
Involved from 1936 to 1937

Hedden Shaft
Hoist Section

Chappell Shaft
12 X 14 Feet

Hedden Shaft
12 X 24 Feet

1955
Professor
Erwin Hamilton
New York
Involved from
1938 to 1942
Exploration at Money Pit from 1931 to 1941

- Hamilton explored Chappell and Hedden Shafts from 1938 to 1942
- Chappell Shaft: Extended to 165 feet Pick, Axe and Anchor Fluke 1931
- Hedden Shaft: Extended to 124 feet and drilled to 167 feet 1937
Findings in Chappell Shaft in 1931 and Hedden Shaft in 1937

- 127 Feet
- 123 Feet
- 116 Feet

Pick, Axe and Anchor Fluke Found in Chappell Shaft (Photo from Triton Alliance)

Deepest excavation in Money Pit prior to 1931 was to 108 feet in 1867 and to 114 feet in 1897

Assumed Fallen Chests (1861) and Cement Vault (1897) not found
Poll Pick Chappell Shaft 1931

Photos from Triton Alliance
Anglo American Felling Axe Chappell Shaft 1931

Photos from Triton Alliance
Anglo American Axes (1725 - 1800)

Ref: Ancient Carpenters’ Tools (Mercer 1975)
Robert Restall, Hamilton, Ont
Involved from 1959 to 1965

Robert Restall and family at Money Pit
Robert Dunfield, California
Involved from 1965 to 1966

Robert Dunfield (right)
in South Shore
Trench Nov 1965
Fred Nolan, Waverley, NS
Involved from 1959 to Present

Fred Nolan at his Joudrey’s Cove cottage

Nolan’s Brass Casting 1\(\frac{1}{4}\) Inches Long
David Tobias, Montreal, Que
Involved from 1966 to 2006

At Becker Drill 1967

Scuba diving
Smith’s Cove 1976

In the Montreal Office 1996
Dan Blankenship, Miami, Florida  
Involved 1967 to Present

- Working on churn drill at Money Pit 1977
- Gardening on Oak Island 2005
David and Dan at the Bottom (180 feet) of Shaft 10X  1990

David Tobias

Dan Blankenship
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Bedrock Geology Western Mahone Bay

Boundary of Windsor Group and Maguma Group

LEGEND

EARLY CARBONIFEROUS
WINDSOR GROUP
- Limestone, gypsum, shale; possible submarine extent indicated
DEVONIAN
- Undivided granitic rocks
CAMBRO-ORDOVICIAN
MEGUMA GROUP
- Undivided slate, metasiltstone and meta-greywacke of the Goldenville and Halifax Formations

Geological boundary, dotted in submarine areas
- Bedrock locality cited in text
- Quarry in bedrock
- Diamond-drill hole(s)
- Fault, (known, and/or inferred)


Ref: Giles 1981
Geological Section of Oak Island
Surface Geology and Drumlins
Western Mahone Bay

Ref: Stae and Fowler 1981
Chart of Glacial Deposition in Nova Scotia

Ref: Stae 2004

Wood at 125 feet in Golder BH 202 Carbon Dated to 25,000 yrs BP

Phase 4
12-13 ka

Phase 3
15-18 ka

Phase 2
21 ka

Phase 1
40-75 ka
Land Submergence with Rise in Sea Level

8000 yrs BP
WL -30m

6000 yrs BP
WL -18m

0 yrs BP
WL 0m

Mahone Bay a Lagoon
Continental Shelf
Laurierian Channel
PEI not an island

Prince Edward Island
Mahone Bay Connected to Ocean

Ref: Daigle 2005
Connection of Mahone Bay to Ocean
6000 Years BP

Ref: Barnes and Piper 1978
Relative Sea Level Curve for Atlantic Canada

Lowstand about 70 m (230 feet) below present sea level 12,000 years ago

Lagoon in Mahone Bay connected to Ocean 6,000 years before present (sea level -18m)

Ref: Stae et al 2001
Effect of Glacier Flow on Drumlin Formation

Phase 1
40-75 ka

Phase 2
21 ka

Phase 3
15-18 ka

Phase 4
12-13 ka

Ref: Stae and Brown 1989

Ref: Eyles 1983
Mutlibeam Bathymetry at Oak Island July 1996

Boundary between muddy sand and gravel with boulders

Smith’s Cove

SE Phase 4
12-13 ka BP

SSE Phase 3
15-18 ka BP

Water Depth about 30 feet

Ref: Fader and Courtney 1998
Side Scan Survey by Dave Delaney Aug 05

20 Feet
Geological Profile at Money Pit and 10X

Wood at 125 feet in Golder BH 202 Carbon Dated to 25 ka BP

Flood Tunnel at Money Pit

Stoney Till and Lawrencetown Till 12-30 ka BP

Hartlen Till 40-75 ka BP

Broken Anhydrite

Competent Anhydrite

Interglacial Deposits
Geotechnical Programs

1. In 1969 Warnock Hersey put down 3 geotechnical holes in the Money Pit area and a number of archaeological holes.

2. In 1970 Golder Associates put down 4 geotechnical holes in the Money Pit area and 4 archaeological holes northeast of the Money Pit.

3. Archaeological holes were intended to investigate original workings and also provided geotechnical data.

4. Borehole depths at the Money Pit are with reference to existing ground surface which is about 10 feet lower than original ground surface.
Plan of Exploration Boreholes
Geotechnical Section A-A at Money Pit and 10X

**Note:** Historical shafts, tunnels and drill holes are not shown

**Intrerglacial Clays and Silts**

**Broken Anhydrite**

**Competent Anhydrite**

**Money Pit**

**10X**

**LEGEND FOR GEOTECHNICAL STRATIGRAPHY**

1. Reworked Soil
2. Hard Brown to Grey Clayey Till with Boulders
3. Hard Grey, Grey Brown and Brown Stratified Clayey Silt and Sandy Silt (Till)
4. Dense Brown and Grey Sandy Till with Boulders
5. Broken Anhydrite with Gypsum and Limestone Layers and with Open or Soil-filled Cavities
6. Open Cavity or Very Loose Soil in Broken Anhydrite
7. Soil Layer in Broken Anhydrite
8. Competent Anhydrite Bedrock

**Broken Anhydrite Scenarios**
1. Fractured bedrock with cavities and soil infillings
2. Huge anhydrite boulders in soil matrix
Geotechnical Section B-B at Money Pit and Dunfield Excavation

Photo

Dunfield Excavation

Clayey Till

Silty Till

Interglacial Clays and Silts

Competent Anhydrite

Broken Anhydrite

Money Pit

Hedden Shaft Intact

Chappell Shaft Collapsed

Photo Dunfield Excavation 1965/66

LEGEND FOR GEOTECHNICAL STRATIGRAPHY

1  REWORKED SOIL
2  HARD BROWN TO GREY CLAYEY TILL WITH BOULDERS
3  HARD GREY, GREY BROWN AND BROWN STRATIFIED CLAYEY SILT AND SANDY SILT (TILL)
4  DENSE BROWN AND GREY SANDY TILL WITH BOULDERS
5  BROKEN ANHYDRITE WITH GYPSUM AND LIMESTONE LAYERS AND WITH OPEN OR SOIL FILLED CAVITIES
6  SOIL LAYER ON BROKEN ANHYDRITE
7  COMPETENT ANHYDRITE BEDROCK

Notice:
Historical shafts, tunnels and drill holes are not shown

SECTION B-B (SEE FIGURE 3 FOR LOCATION)
# Depth of Cavity/Soil Zones in Broken Anhydrite

<table>
<thead>
<tr>
<th>Hole No</th>
<th>Distance and Direction from Money Pit (Feet)</th>
<th>Anhydrite Thickness Above Zone (Feet)</th>
<th>Depth of Cavity/Soil Zone Within Anhydrite (Feet)</th>
<th>Thickness of Zone (Feet)</th>
<th>Anhydrite Thickness Below Zone (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cavity</td>
<td>Cavity or Loose Soil</td>
<td>Loose Soil</td>
<td>Dense Soil</td>
</tr>
<tr>
<td>W1</td>
<td>50 NE</td>
<td>20</td>
<td>-</td>
<td>181 - 186</td>
<td>186 - 195?</td>
</tr>
<tr>
<td>W3</td>
<td>61 NW</td>
<td>5</td>
<td>166 - 170</td>
<td>-</td>
<td>170 - 178</td>
</tr>
<tr>
<td>W5</td>
<td>19 S</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>186 - 197</td>
</tr>
<tr>
<td>W6</td>
<td>120 SSW</td>
<td>No cavities or soil zones encountered in broken anhydrite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W7</td>
<td>17 S</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>180 - 209</td>
</tr>
<tr>
<td>10X</td>
<td>176 NE</td>
<td>50</td>
<td>230 - 235</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>G101</td>
<td>73 S</td>
<td>53</td>
<td>-</td>
<td>-</td>
<td>217 - 227</td>
</tr>
<tr>
<td>G102</td>
<td>50 S</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>G103</td>
<td>10 E</td>
<td>28</td>
<td>-</td>
<td>185 - 200</td>
<td>200 - 205</td>
</tr>
<tr>
<td>G104</td>
<td>72 SSW</td>
<td>47</td>
<td>-</td>
<td>-</td>
<td>209 - 216</td>
</tr>
<tr>
<td>G202</td>
<td>174 NE</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>217 - 238 Ft</td>
</tr>
<tr>
<td>G204</td>
<td>267 NE</td>
<td>13</td>
<td>211 - 213</td>
<td>-</td>
<td>213 - 217</td>
</tr>
</tbody>
</table>

Note: Twelve geotechnical and archaeological holes extended into the broken anhydrite. Eleven of the 12 holes encountered cavity/soil zones in the broken anhydrite.
Gradation of Overburden and Soil Infill in Anhydrite

Ref: Golder 1971
Key Results of Golder Hole G202
Located 3 Feet West of Hole 10 June 1970

Log for Borehole G202

Notes:
1. Wood sample was carbon dated to 25,000 years BP (Terasmae 1970) and was identified as Eastern Spruce (University of Toronto 1970).
2. Metal was identified as iron which consisted of much siliceous replacement material, the sample was of considerable age (Stelco 1970b – Nov 19).

Ref: Golder 1971
Gradation of Soils in Hole G202 - 228 to 238 Feet

Ref: Golder 1971
Plan of Cross Hole Tomography Panel D

- OAK ISLAND TREASURE COMPANY SHAFT (1897)
- MONEY PIT (HISTORICAL LOCATION)
- HEDDEN SHAFT (ORIGINAL LOCATION)
- CHAPPELL SHAFT (ORIGINAL LOCATION)
- TOP OF HEDDEN SHAFT LATERAL MOVEMENT
- EXISTING FENCE

Panel D (70 Feet)
Profile of Tomography Results for Panel D

Velocity (kft/s)

Tomography Data Ref: Platt 1995
Plan of Woods Hole Tidal Hydrogeology Testing in July 1995

Tidal Level Recorded in Mahone Bay

Water Level Recorded in 10X
Good Tidal Response

Water Level Recorded in Hole 93-03
Limited Tidal Response

Water Level Recorded in Triton Shaft
No Tidal Response

The salinity of the groundwater in the anhydrite is about 50 to 75% that of sea water

Ref: Woods Hole Oceanographic Institution 1996
Water Level Variation in 10X from Tidal Variation in Mahone Bay

Time Lag 1 Hour (Between Peaks)
Ratio of Amplitudes = 0.43 (0.65/1.5)

Ref: Woods Hole Oceanographic Institution 1996
(Measurements made in July 1995)
Flow reversals occur in the rock dump in phase with the tide.

Ref: BHP Billiton 2004
Water Level Variation in Coarse Rockfill Dump from Tidal Variation in Rupert Inlet

Time Lag 1 Hour (Between Peaks)
Ratio of Amplitudes = 0.68 (2.3/3.4)

Ref: BHP Billiton 2004
Particle Track El. - 10 m at 100 m from Shoreline

$k$ (Coarse Rockfill) = 25 cm/ s

Particle track for two tide cycles
Particle track for two additional cycles

Well #6
Well #5
Well #4

A
B
C
D

Particle Movement
20 m Horiz and 1 m Vert in 7 hours

Point A - Elevation - 10 m
Natural Scale 1 : 250

Exaggerated Vertical Scale
Horiz.: 1:250  Vert.: 1:50

Ref:
BHP Billiton 2004
Lab Scale Testing of Anhydrite Solubility

Ref: James and Lupton 1978

Distilled water flow at 56 ml/day (2 fluid oz/day) for 44 days

Sketch to Scale

36 mm Diameter (1.4 in)

2.5 mm Diameter Hole Before Test

6 mm Diameter Hole After Test

36 mm Diameter (1.4 in)

360 mm (14 in)
Example Flow System through Anhydrite from Mahone Bay to Money Pit and 10X

The flow system through anhydrite is activated by pumping at the Money Pit or 10X.

When there is no pumping the groundwater in the anhydrite is subject to flow reversals in phase with tidal variations.

Both of these water movement systems result in dissolution of anhydrite and increasing permeability with time.
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Becker Drill Setup 1967

Drive Pipe
5.5” o. d.

Inside Pipe
3” i. d.
1. The objective of the Becker drilling program was to drill through overburden to bedrock surface in search of the presumed treasure chests at 100 and 150 feet.

2. The first 10 holes extended to bedrock surface at depths of 145 to 165 feet.

3. The 11th hole (B11) extended to a depth of 200 feet before bedrock was encountered. Puddled clay was found from 184 to 200 feet and two oak buds were found embedded in the puddled clay at 196 feet.

4. This singular finding initiated the extension of all holes to 200 feet with the use of tricone drilling in bedrock.

5. 40 holes were drilled at the Money Pit from January to June 1967.

6. The drilling resulted in the major milestone of finding man made cavities in the bedrock at 200 feet and this was completely unexpected.

7. Lateral drift measurements were not made in the Becker holes but were made in 5 deep detection holes done in 1993.
Lateral Drift in Deep Detection Holes 1993

1. Five deep holes to about 250 feet were put down in 1993 for a geophysical detection program.

2. Lateral drift was measured in the 5 detection holes and in Hole B24/ W8.

3. This provided an understanding of the importance of lateral drift which was not measured in the previous Becker Holes.

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Depth (Feet)</th>
<th>Lateral Drift (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-01</td>
<td>240</td>
<td>2.6</td>
</tr>
<tr>
<td>93-02</td>
<td>240</td>
<td>1</td>
</tr>
<tr>
<td>93-03</td>
<td>263</td>
<td>17</td>
</tr>
<tr>
<td>93-04</td>
<td>240</td>
<td>6</td>
</tr>
<tr>
<td>93-05</td>
<td>225</td>
<td>14.5</td>
</tr>
<tr>
<td>B24/ W8</td>
<td>190</td>
<td>15</td>
</tr>
</tbody>
</table>
Plan of Deep Rock Area at Money Pit

Holes W2 and W9 probably drifted laterally to the North

NOTES
1. SEE LEGEND ON FIGURE 7 FOR IDENTIFICATION OF HOLE NUMBERING SYSTEM.
2. LATERAL DRIFT WAS MEASURED ONLY IN HOLE W8 AND DETECTION HOLES 93-01 TO 93-05. IN THE REMAINING HOLES, THE PLOTTED LOCATIONS AT BEDROCK SURFACE MAY VARY SIGNIFICANTLY DUE TO LATERAL DRIFT DURING DRILLING.
3. THE DEPTH TO ROCK FOR HOLES 93-03 AND 93-05 IS SHOWN ALONG THE MEASURED PATH OF LATERAL DRIFT AT THE ACTUAL PLAN LOCATION WHERE ROCK WAS ENCOUNTRED. IN HOLE W8, ROCK WAS NOT ENCOUNTERED TO THE DEPTH OF 200 FEET AT WHICH THE HOLE WAS TERMINATED.
4. THE DEPTH TO ROCK IS WITH RESPECT TO EXISTING GROUND SURFACE WHICH IS ABOUT 10 FEET LOWER THAN ORIGINAL GROUND SURFACE IN THE AREA OF THE MONEY PIT.
5. HOLES W2 AND W9 MAY BE INCLINED TO THE NORTH TOWARD THE DEEP ROCK AREA SINCE THEY ARE SURROUNDED BY HOLES WITH SHALLOW DEPTH TO ROCK.

FIGURE 10A
PLAN OF HOLES SHOWING DEPTH TO ROCK AT MONEY PIT
Pollen Count Results for Soil Samples from Broken Anhydrite 1970

Ref: Ritchie 1970

In Hole 103 “the occurrence of aggregations of typical post-glacial and recent pollen types in addition to the ‘normal’ rare isolated pollen types (Carpinus, Ulmus) suggests strongly that recent or post-glacial material has been mixed secondarily with the primary matrix.”

In Hole 102 “The macroscopic appearance of the matrix and the occurrence of isolated grains of Ulmus, Carpinus and Fagus is characteristic of glacial till.”

Hole G102
Sa 36 and 37
Glacial Soil
214 to 219 Ft

Hole G103
Sa 27 and 30
Recent Soil Inclusions
193 to 200 Ft

Hole G103
Sa 27 and 30
Recent Soil Inclusions
193 to 200 Ft

SECTION A-A
(SEE FIGURE 3 FOR LOCATION)
Pollen Count Samples from G102 and G103

G102 Samples
36 and 37
Undisturbed Glacial Soil
214 to 219 Ft
Sa 36 N=61
Sa 37 N=80

G103 Samples
27 and 30
Recent Soil Inclusions
193 to 200 Ft
Sa 27 N=24
Sa 30 N=26

Ref: Golder 1971
Metal Fragments in Golder Borehole 201

Metal fragments are friable wrought iron dating prior to 1800 (Stelco 1970b)

One Inch

Money Pit

Borehole 10X

Borehole 201

260 Feet

Money Pit

Borehole 201

12’ Sand Inclusion

2’ Sand Inclusion with Metal Fragments

Metal fragments found embedded in sand sample during sieve analysis (Golder 1971)

Borehole 201 Sample 10 84.5 to 86.5 Ft N = 121

Ref: Golder 1971

Ref: Golder 1971
Plan of Archaeological Sections at Money Pit

- **Money Pit (Historical Location)**
- **Oak Island Treasure Company Shaft (1897)**
- **Chappell Shaft (Original Location)**
- **Hedden Shaft (Original Location)**
- **Top of Hedden Shaft Lateral Movement**
- **Existing Fence**
Archaeological Section C-C at Money Pit

The brass foil was likely made by the early process of adding charcoal and calamine to copper dating from the alchemist period to about 1850 (Stelco 1970a).
Archaeological Section D-D at Money Pit

**LEGEND FOR SIMPLIFIED STRATIGRAPHY**

- GLACIAL TILL OVERBURDEN AND DISTURBED GROUND
- ROCK (MAINLY ANHYDRITE)
- SOIL FILLED CAVITY IN ROCK
- OPEN CAVITY OR VERY LOOSE SOIL IN ROCK
- CLAY (PUDDLED CLAY)

**NOTES**

1. THE SUBSURFACE STRATIGRAPHY IS SIMPLIFIED AND ONLY THE MAJOR UNITS ARE SHOWN.
2. THE HOLES (EXCEPT FOR HOLE WB) ARE SHOWN ALONG THEIR INTENDED ALIGNMENT AND DO NOT REFLECT SIGNIFICANT LATERAL DRIFT WHICH MAY HAVE OCCURRED.
3. THE LOCATION AT THE BOTTOM OF HOLE WB WAS ESTABLISHED BY LATERAL DRIFT MEASUREMENT. THE STRATIGRAPHY IN HOLE WB WAS MAINLY GLACIAL TILL, OVERBURDEN AND DISTURBED GROUND.
4. THE ACTUAL LOCATION OF HOLE WB IS LIKELY WITHIN THE INFERRED OUTLINE OF ORIGINAL WORKINGS DUE TO A STRATIGRAPHY SIMILAR TO THAT OF HOLE B21.

**FIGURE 9A**

ARCHAEOLOGICAL SECTION D-D AT MONEY PIT
Summary of Archaeological Features at Money Pit

<table>
<thead>
<tr>
<th>HOLE</th>
<th>FEATURES</th>
<th>DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>B11</td>
<td>PUDDLED CLAY, OAK BUDS</td>
<td>184-200</td>
</tr>
<tr>
<td>B13'</td>
<td>PUDDLED CLAY</td>
<td>184-200</td>
</tr>
<tr>
<td>B17</td>
<td>PUDDLED CLAY</td>
<td>176-198</td>
</tr>
<tr>
<td>B21</td>
<td>BRASS FOIL, PUDDLED CLAY, STAGNANT WATER</td>
<td>176-205</td>
</tr>
<tr>
<td>B24</td>
<td>INFERRED CHAMBER, CHINA FRAGMENT, WOOD</td>
<td>192-199</td>
</tr>
<tr>
<td>B25</td>
<td>INFERRED CHAMBER, IRON PLATE</td>
<td>191-198</td>
</tr>
<tr>
<td>B33</td>
<td>INFERRED CHAMBER, WOOD, LIME MORTAR</td>
<td>190-198</td>
</tr>
<tr>
<td>B35</td>
<td>WOOD, CHARCOAL, CLINKER</td>
<td>178-190</td>
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<tr>
<td>B40</td>
<td>PUDDLED CLAY</td>
<td>175-195</td>
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<tr>
<td>W9</td>
<td>WOOD, STAGNANT WATER</td>
<td>192-206</td>
</tr>
<tr>
<td>G103</td>
<td>REWORKED RECENT SOIL (INFERRED CHAMBER)</td>
<td>191-198</td>
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9. Conclusions
Ron Aston and Others 2001

Murray MacPhie
Jim Harvey
David Tobias
Ron Aston

David Tobias
Ron Aston Drilling Program August 2001
Boulder in Glacial Till Exposed by Aston 2001
Large Boulder at Shore
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Happy Norwegians May 2003

Eric Hauan
Petter Amundsen
Tony Ronning
Sigbjorn Larsen
Plan of Petter Amundsen Search Area 2003

Boulder cross found by Fred Nolan in 1981 and made public in 1992

Petter Amundsen Search Area

Boulder cross found by Fred Nolan in 1981 and made public in 1992

Boulder cross found by Fred Nolan in 1981 and made public in 1992

Boulder cross found by Fred Nolan in 1981 and made public in 1992
Kabalistic Tree of Life and Rosicrucian Cross

Click below for next image

Paul Foster Case

Rosicrucian Tree of Life
Boulder 282 Feet South of Cross
Boulders at Shore
Boulder 141 Feet South of Cross

Presumed primitive sun with radial lines
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Knights Templar
Sir Francis Drake and Queen Elizabeth I
Does the Queen have Drake's Missing Logs?

Sir Francis Drake  1540 - 1596

Queen Elizabeth I  1533 - 1603
Sir Francis Bacon and William Shakespeare
The Missing Original Manuscripts and
The Bacon-Shakespeare Authorship Controversy

Sir Francis Bacon
1561 - 1626

William Shakespeare
1564 - 1616

Shakespeare's First Folio
1623
Spanish Galleon Lost at Sea
In the 1500s, during the Portuguese voyages of discovery, islands in the New World were seeded with livestock and crops to have fresh supplies for future voyages. (Vigneras 1973)
Portuguese Flag Symbol from 1500s Compared to Engraved Hedden Stone

Portuguese Flag 1495 to 1577

Escutcheon (or Quina) containing five Bezants (white dots)

Four Portuguese Bezants and central cross??

Engraved granite stone found by Hedden in 1936
Sinking of the Conceptión 1641

Hazards and human error spell disaster

The Conceptión seemed jinxed from the start. After springing a leak and returning to Havana for repairs, she set out a week later, only to be battered by a hurricane. She limped along for a month before grinding against a shallow coral reef. As the ship sank over the course of 11 days, passengers and crew ripped timber loose to make rafts. The last 30 men to leave the wreck—only one of whom reached safety—threw cargo and treasure onto the reef to provide a higher place to stand and to mark the site, inspiring the name Silver Bank.

Though running aground made a fearful noise, initial damage was light. With heroic efforts, the crew used anchor lines to free the ship, only to have the wind push it back, grinding holes in the hull. Ultimately the ship, hitting an iceberg, broke apart at the stern, which drifted away. Of the some 500 passengers and crew, fewer than 200 survived.

The ship's two pieces sealed her doom. Thinking they were north of Puerto Rico, they sailed south, legally overrunning Admiral Juan de Villegas. He correctly figured the ship to be north of treacherous shoals. The admiral ordered a silver bowl brought forth. In front of the passengers, he liter- ally washed his hands of the decision.

500 People on board
200 People Survived
Ref: Bowden 1996
(National Geographic)
Sir William Phips and Recovery of the Treasure from the Concepción 1688/89

Ref: Bowden 1996 (National Geographic)

Treasure found, lost, then discovered anew

The sea did not easily yield the secret of where Concepción's riches lay. Recovery expeditions were mounted by private consortiums in the 1650s and '60s to no avail. But success came to William Phips, a brash young seaman from New England who wheedled financing from several English noblemen. He located the wreck in 1687, recovered an enormous amount of treasure, then split the site because of local piratical, threatening weather, and French pirates. As a reward, Phips was knighted by James II and received a share of the goods.

Once the site was found, Phips relied on the astonishing abilities of native pearl divers. Clambering rocks to aid their descent, they could hold their breath for up to five minutes.

William Phips
Treasure from the Concepción (Leftovers)  
(Nuestra Señora de la pura y limpia Concepción)

Articles recovered in 1978 by Burt Webber  
Ref: Bowden 1996 (National Geographic)
Pirates

TREASURE ISLAND
BY ROBERT LOUIS STEVENSON

1883

PIRATES OF THE CARIBBEAN: DEAD MAN'S CHEST

2006
### Theories - Who Buried What and When?

<table>
<thead>
<tr>
<th>Who</th>
<th>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Knights Templar</td>
<td>The treasure of the Knights Templar (The Holy Grail)</td>
<td>1300s to 1400s</td>
</tr>
<tr>
<td>2. Spanish</td>
<td>Treasure from damaged Spanish Galleon which sunk on way home</td>
<td>1500s</td>
</tr>
<tr>
<td>3. Spanish</td>
<td>Treasure stored on several occasions in underground vaults</td>
<td>1500s</td>
</tr>
<tr>
<td>4. Portuguese</td>
<td>Treasure from the Azores</td>
<td>Mid 1500s</td>
</tr>
<tr>
<td>5. Sir Francis Drake</td>
<td>Plundered Spanish treasure</td>
<td>Late 1500s</td>
</tr>
<tr>
<td>6. Sir Francis Bacon</td>
<td>The original Shakespearean Manuscripts</td>
<td>1600s</td>
</tr>
<tr>
<td>7. French</td>
<td>Treasure from French pay ship destined for Fortress Louisbourg</td>
<td>Mid 1700s</td>
</tr>
<tr>
<td>8. Sir William Phips</td>
<td>Treasure from the Spanish Galleon Concepción sunk in 1641</td>
<td>Money Pit 1688-89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flood Tunnel 1752-54</td>
</tr>
<tr>
<td>9. Conspirators from the British Military</td>
<td>Spoils from the sack of Havana in 1762</td>
<td>Shortly after 1762</td>
</tr>
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Note: Other less credible theories include Early Civilizations, Egyptians, Incas, Mayans, Aztecs, Mi’kmaq, Vikings, Acadians, Pirates and Aliens.
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Options for Future Exploration at the Money Pit

1. **Option 1**
   Exploration boreholes with lateral drift measurements and downhole camera inspection to define the nature of man made workings and possibly to verify the presence of treasure and artifacts. If successful, this could lead to specific targets which could be accessed by a small diameter shaft.

2. **Option 2**
   Excavation of a deep shaft of sufficient diameter to enclose the zone of man made workings at 200 feet depth.

3. Other options for initial exploration could be considered but it is noted that geophysics, including ground penetrating radar, have not been successful.
Archaeological Criteria for Excavation by Large Diameter Shaft

1. Excavation procedures should allow archaeological investigation as the shaft excavation proceeds. Nova Scotia regulations require that an archaeologist be present during the excavation.

2. The shaft diameter at bedrock surface should be of sufficient size to include the possible range of locations where the original Money Pit excavation extended below bedrock surface.

3. The shaft diameter at 200 feet depth should enclose a reasonable estimate of the lateral extent of the man-made chambers in bedrock.

4. Construction procedures should be available to allow excavation beyond the limits of the shaft so that possible tunnels to offset chambers can be explored.

Plan of Archaeological Features and Assumed Shaft
Summary of Geological, Geotechnical, Hydrogeological and Other Issues to Consider for Deep Shaft Excavation at Money Pit

1. Boulders in glacial till
2. Open and soil filled cavities in broken anhydrite
3. Saline groundwater in anhydrite
4. Cyclic groundwater movement in anhydrite due to tides
5. Very high permeability zones in broken anhydrite
6. Reworked soil zones resulting from events such as collapse of the Money Pit in 1861 and the Dunfield excavation of 1965/66
7. The presence of timbers and debris from numerous previous shafts and tunnels in the area of the Money Pit
8. Steel casings and pipes remaining in the ground from previous drilling operations
Expected Outcome of a Shaft Excavation at the Money Pit

1. A shaft excavation to bedrock surface is expected to resolve the nature of the presumed chests with coins drilled at 100 feet in 1849 and 155 feet in 1897, and the parchment may be recovered.

2. A shaft excavation to 200 feet is expected to recover significant evidence (and possibly artifacts and treasure) which will result in:
   - An obvious solution to the mystery (possibly by recovery of the parchment)
   - A solution determined in conjunction with related historical and archaeological studies or verification
   - The Oak Island mystery is not resolved (very unlikely outcome)
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Do We Have Proof of Original Work and the Location of the Treasure at Oak Island According to the Criteria of Othello?

Othello: So prove it

That the probation leave no hinge nor loop

To hang a doubt on

“OTHELLO, The Moor of Venice” (Shakespeare)
Conclusions

1. There are chambers at 200 feet depth at the Money Pit. Possibilities:
   • The chambers were made and nothing was put in them
   • The chambers were made, something of great value was put in them and then taken away
   • The chambers were made, something of great value was put in them and is still there

2. We don't know who did it or what is there, the mystery remains unsolved.
When Treasure is Recovered

“It’s gold—we’re rich! With all this loot, what’s the first thing you’re going to do?”

Ref: David Tobias
References 1 of 3


Review of Geotechnical and Archaeological Investigations at the Money Pit, Oak Island, Nova Scotia

Presentation by Les MacPhie to The Canadian Geotechnical Society Western Quebec Section Montreal Group January 23, 2008

Oak Island 1986

Oak Island 1992