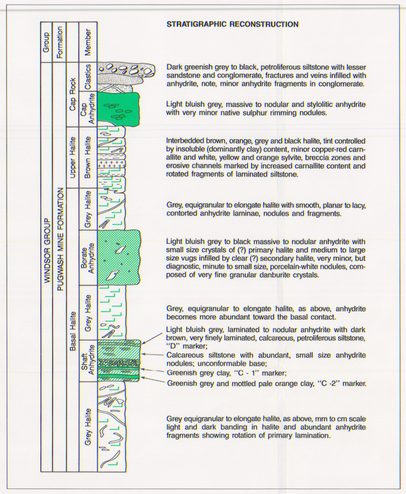
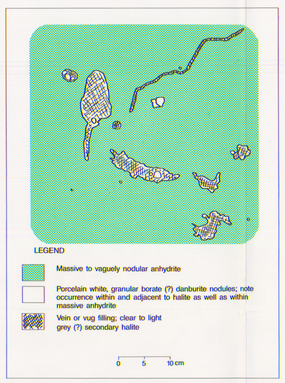
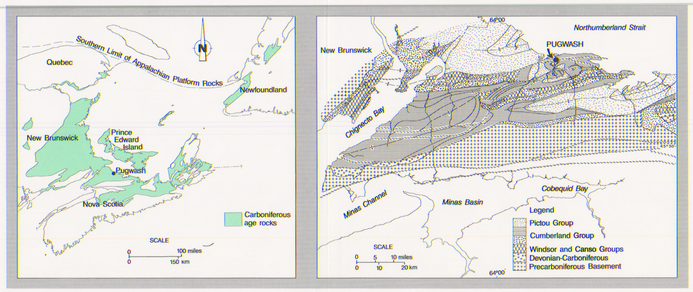
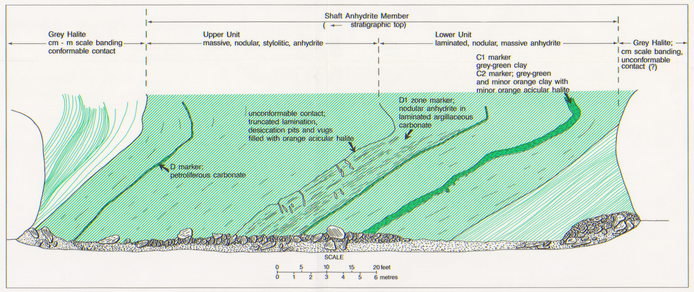


90-1/C - The Pugwash mine stratigraphic reconstruction is based on detailed observations and several assumptions; the Shaft Anhydrite Member exhibits stratigraphic top indicators; at the central area of the mine workings, the Shaft Anhydrite Member forms an antiform structure which allows its stratigraphic interpretation relative to the Grey Halite Member; the contact between the Grey Halite member and the potash-bearing Brown Halite Member is, where preserved, transitional; the Borate Anhydrite Member is virtually always in contact with the Grey Halite Member on all sides; the Cap Anhydrite Member is in contact with either the Brown or Grey Halite Member or with the marginal clastics.

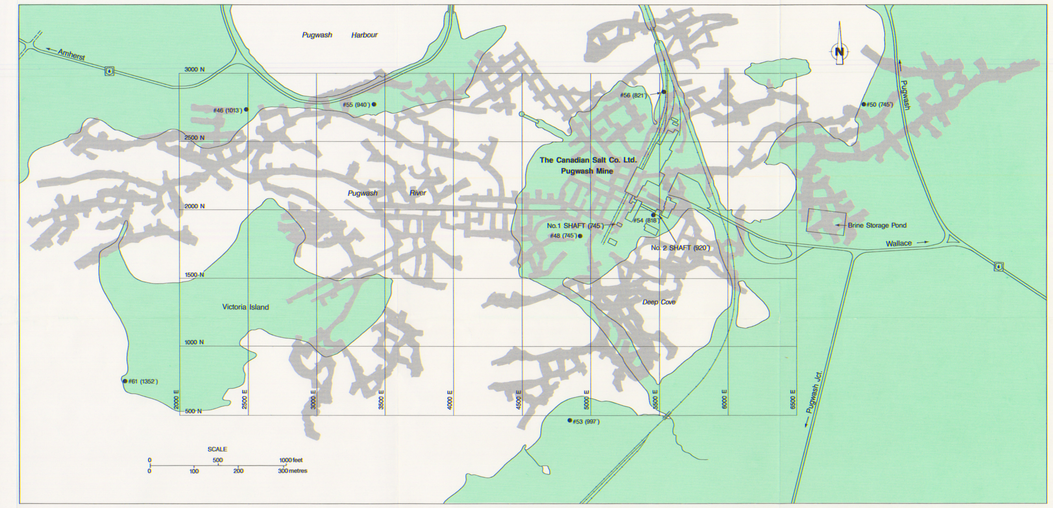


90-1/B - Detail of Borate Anhydrite Member showing the mode of occurrence of danburite ($Ca_2B_2(Si_2O_7)$, nodules; (1) within the massive anhydrite; (2) within vugs filled by fine to coarse grained, equigranular, clear (secondary) halite and completely enclosed in halite; and (3) at the contact between the halite filled vugs and the massive anhydrite; note that the nodules are composed of very fine, granular danburite and occur as individual nodules and as clustered nodules; diagram represents a composite of representative observations.

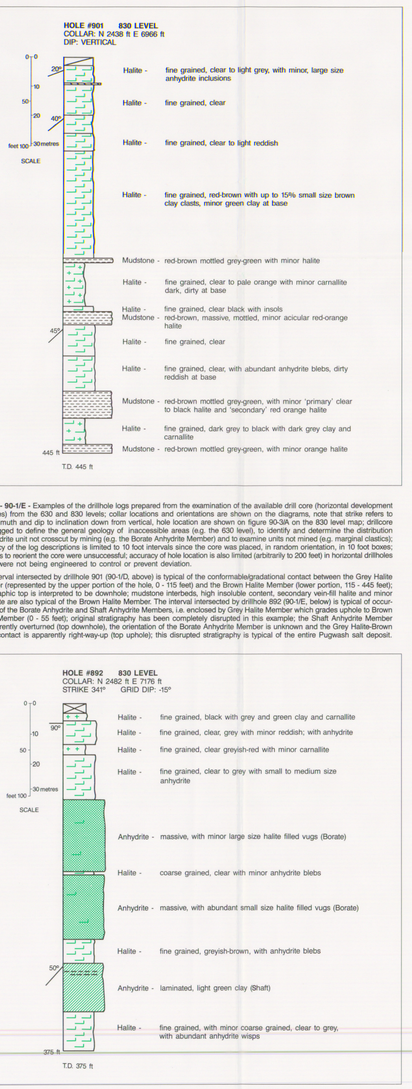




90-1/A - Cross section of the Shaft Anhydrite Member exposed in mine pillar section; location on 830 level, 1550N, 4550E, type section, Shaft Anhydrite Member; note internal markers: D; D-1; C-1; C-2 and stratigraphic orientation; contact between upper and lower unit is a depositional unconformity, unrelated to halokinetic deformation, basal contact with grey halite may also be unconformable.

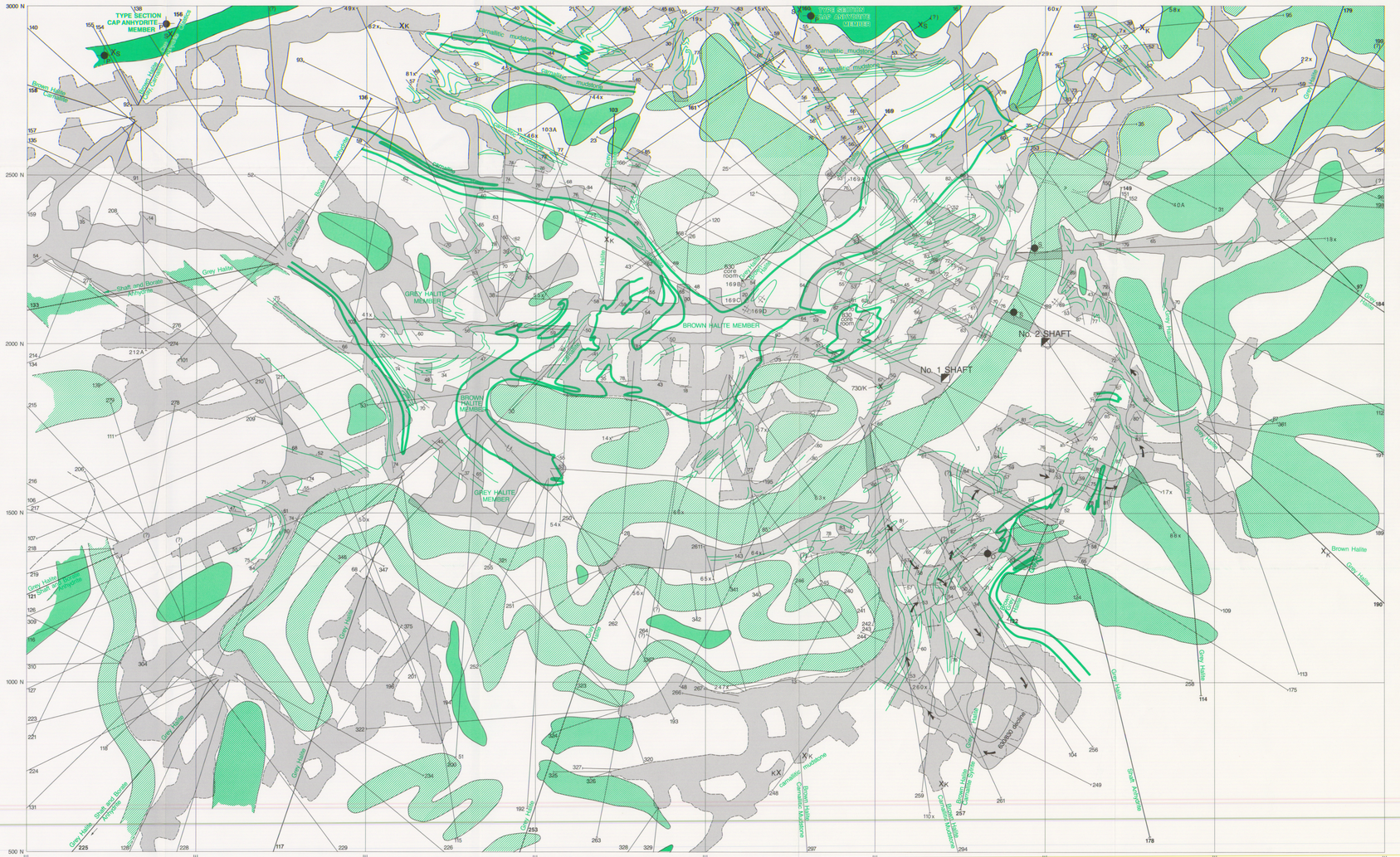


Location map of the Canadian Salt Company Ltd., Pugwash Mine; grid index refers to the area shown on the main 630 foot level map and the shading shows the complete area of 630 foot level underground workings. Note the relationship between the size, shape and orientation of the Pugwash River and the size, shape and orientation of the underground workings.



90-1/D - 90-1/E - Examples of the drillhole logs prepared from the examination of the available drill core (horizontal development drillholes) from the 630 and 830 levels; collar locations and orientations are shown on the diagrams, note that #890 refers to grid azimuth and dip to inclination down from vertical, hole location are shown on figure 90-3/A on the 830 level map; drillcore was logged to define the general geology of inaccessible areas (e.g. the 630 level), to identify and determine the distribution of anhydrite unit not crossecut by mining (e.g. the Borate Anhydrite Member) and to examine units not mined (e.g. marginal clastics); accuracy of the log descriptions is limited to 10 foot intervals since the core was placed, in random orientation, in 10 foot boxes; attempts to reorient the core were unsuccessful; accuracy of hole location is also limited (arbitrarily to 200 feet) in horizontal drillholes which were not being engineered to control or prevent deviation.

The interval intersected by drillhole 901 (90-1/D, above) is typical of the conformable/gradational contact between the Grey Halite Member (represented by the upper portion of the hole, 0 - 115 feet) and the Brown Halite Member (lower portion, 115 - 445 feet); stratigraphic top is interpreted to be downhole; mudstone interbeds, high insoluble content, secondary vein-fill halite and minor carnallite are also typical of the Brown Halite Member. The interval intersected by drillhole 892 (90-1/E, below) is typical of occurrences of the Borate Anhydrite and Shaft Anhydrite Members, i.e. enclosed by Grey Halite Member which grades upholw to Brown Halite Member (0 - 55 feet); original stratigraphy has been completely disrupted in this example; the Shaft Anhydrite Member is apparently overturned (top downhole), the orientation of the Borate Anhydrite Member is unknown and the Grey Halite-Brown Halite contact is apparently right-way-up (top uphole); this disrupted stratigraphy is typical of the entire Pugwash salt deposit.



LEGEND

- SHAFT ANHYDRITE MEMBER; laminated with lesser nodular and stylolitic; defined by the occurrence of internal clay and siltstone markers.
- BORATE ANHYDRITE MEMBER; nodular and stylolitic to massive with minor laminated; clear to white halite infilling vugs; defined by the occurrence of porcelain-white danburite ($Ca_2B_2(SiO_4)$) nodules.
- CAP ANHYDRITE MEMBER; nodular to stylolitic and massive with very minor brownish yellow nodule rims composed of biogenic calcite and native sulphur.
- UNDIFFERENTIATED ANHYDRITE; due to incomplete exposure or drillhole intersection.
- GREY HALITE/BROWN HALITE MEMBERS; undifferentiated (except where noted); contacts are commonly obscured by internal diversity of the Brown Halite Member and halokinetic deformation; pattern shows bedding, flow lineation.
- Anhydrite - Halite boundary; known, inferred
- Bedding/flow lineation; vertical, horizontal; tops unknown except in SHAFT ANHYDRITE MEMBER
- Antiform; defined, inferred, plunging
- Synform; defined, inferred, plunging
- Underground development drillhole; horizontal; angled; showing end of hole and label
- Drillhole; vertical underground development, vertical surface exploration
- K, B, Ch, S — Mineral occurrence; carnallite ($KMgCl_3 \cdot 6H_2O$)/sylvite (KCl), blue halite (Na_2Cl), chambersite ($Mn_3B_7O_{13}Cl$), native sulphur (S)
- O, S, P — Hydrocarbon occurrence; oil show, oil stain, petroliferous odor, gas show
- SHAFT - NO. 1 - 710 feet deep, rectangular - 6.5 feet x 15.25 feet; used for exhaust ventilation and escapeway;
- SHAFT - NO. 2 - 930 feet deep, circular - 16 feet in diameter; used for intake ventilation, production and transport.
- MINE WORKINGS: 630 level - first cut - 18 feet x 30 feet to 30 feet x 50 feet - second cut - 60 feet x 50 feet; - third cut - 90 feet x 50 feet; 730 level - only cut - 30 feet x 50 feet; 830 level - first cut - 30 feet x 55 feet - second cut - 60 feet x 55 feet.

NOTE: Base maps derived from underground survey maps prepared by the Canadian Salt Co. Ltd. Updated to July, 1988. Grid north is 19 minutes west of astronomic (true) north. Grid reference point is the center of the number 2 shaft placed at 5500 feet E, 2000 feet N to position the zero reference away from the mine area and to establish positive values for grid locations and drift labels. Previous 630 level grid has been shifted (from 0,0 at number 2 shaft) to coincide with the other working levels. All measurements are reported in English units to be consistent with the Canadian Salt Co. Ltd. policy.

Most of the 630 level area was inaccessible to the author due to the age of the workings and safety considerations; therefore, geological interpretation of the level is a compilation based on (a) detailed mapping by Dr. R. Evans (1972), (b) surveys of the mine workings by mine personnel and (c) detailed logs of available drill core and drillers logs of unavailable core. Drillholes used for stratigraphic correlation and structural interpretation are shown in bold and were selected based on location and the availability of core. Drillers logs were reinterpreted based on detailed logging by the author.

ACKNOWLEDGMENTS: Access to the underground workings and permission to undertake this project were provided by the Canadian Salt Co. Ltd. and facilitated by Mr. William McCormick (mine manager), Mr. Mike Waterfield (mine engineer) and Mr. Doug Wallace (mine captain). Underground mapping assistants were P. Lake (1985), G. Howells (1986) and P. Rose (1987). The ongoing contribution of Mr. Peter Lake (Canadian Salt Co. Ltd.), in providing accurate base maps discussion, critical review and comments has been invaluable to the preparation of these maps and is gratefully acknowledged. Additional critical review and discussions regarding the geology and history of the Pugwash deposit were provided by Dr. Robert Evans (Mobil Research and Development Corp., Dallas Texas).

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

MAP 90-1

GEOLOGY
OF THE
CANADIAN SALT COMPANY LIMITED

PUGWASH MINE

630 LEVEL

PUGWASH, NOVA SCOTIA

D.C. CARTER

SCALE 1 : 1600

Feet 100 0 100 200 300 Feet

Metres 100 0 100 200 300 400 Metres

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

JACK MacISAAC, MINISTER — JOHN J. LAFFIN, D.ENG, FEC, FENG., DEPUTY MINISTER

HALIFAX, NOVA SCOTIA

1990

Cartography by:
Land Registration and Information Service
Amherst, Nova Scotia

Nova Scotia
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Canada-Nova Scotia
Mineral Development Agreement