

Ceramics: Geologic Lens - Systemic Practice

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Note: Section II – *Case Study: Cretaceous Split Rock Formation: Anthropocene Transformation*, was not included in the International Ceramic Symposium - Ceramics & Ecology Catalog text, but was adapted from the audio portion of the Symposium Special Lecture presentation. Other projects discussed in the Symposium presentation not included in the published text include: *Soda Boat*, 1973 and *Encased Piece*, 1979.

Section I

Geologic Lens:

The origin, life cycle and existential nature of the planet earth may be thought of in terms common to both ceramics and geology. Primal elements of fire and earth, intrinsic to any definition of ceramics are also fundamental to the geologic interpretation of the physical earth. This analogy of the *geologic lens* includes a full range of organic and inorganic materials and processes such as igneous, metamorphic and sedimentary rocks, geo-biotic assemblages and the morphologies of their denudative and generative processes, including parallel human constructs. From this concept, an extended definition of the materiality and processes of ceramics may be extrapolated and new associative structures proposed and examined. In this light, from nature throughout geologic time, ceramic-like structures could include: deposits of calcareous and siliceous ooze on oceanic basins, stratigraphic structures of terrestrial silt, mud and sandstone as well as intrusive/extrusive bodies of igneous and metamorphic rock. By similar association into the Anthropocene¹ Epoch, or current human era, ceramics may include: civic highway/hydrologic systems, skyscrapers, agricultural fields, earthworks, ceramic objects, among many others. By the addition of a broader scale of geologic terminology, context and concepts such as: intrusion, erosion, deposition, diagenesis, metasomatism, facies, geochrono- and allo-stratigraphy, etc., to the already partially geology-engaged language of ceramics, a discourse opens to new landscapes, timescapes and ecologies with cross-generative potential. This extended language can stimulate the creation of useful analogs of human activity and the human-built environment within natural systems and consciousness to vitalize forms of systemic practice for art, architecture, industry that both enriches our understanding of materiality and process as well as potentially creating a coequal relationship with our environment. Cities, architecture, roads and other civic constructions made by mankind of earth materials during the Anthropocene Epoch, may also be described as forms of anthroturbation², which describes the disturbance, dislocation and restructuring of geologic formations and materials by human agencies into new forms. In addition to the anthroturbational analogies of: mining as erosion, transport as flow and construction as sedimentation, the built topography of a city can be understood in geomorphic terms: streets as canyons, buildings as plateaus, sewers as caves and plazas as playas.

Section II

Case Study: Cretaceous Split Rock Formation: Anthropocene Transformation

When comparing the erosion structures of mankind, such as a marble quarry in Italy, and nature, as in the Grand Canyon in America, one finds a difference in context and time scale, but the idea of denudation or removal as in erosion in the creation of the structure and transformation of materials is common to both. These are examples of seeking similarity rather than difference between human and natural processes. A case study that that will illustrate this concept in more depth involves the *Split Rock Formation*. The *Split Rock Formation* is a stratigraphic assemblage that was deposited in estuarine environments along the eastern edge of the Cretaceous Western Interior Seaway, bisecting the North American continent, about 100 million years ago, near what is now the South Dakota-

Minnesota border. The estuarine environment varied between marine and fluvial, depositing a range of clays, sandstones, silts and mudstones over many thousands of years. This deposit is now being quarried near Springfield, MN for the extraction of shale and clay for the manufacture of bricks. The strata in the quarry exposed by the machinery of extraction presents a visual snapshot of the materials geologic history from which a geologist can discern the environment and conditions of deposition and the Cretaceous paleogeography. In the quarry, the erosion by mechanical systems and transport to storage areas for processing have geologic analogs of denudation, transport and temporary deposition. After the processing and shaping of the materials into raw bricks of which there are additional geologic analogs of turbulence, compression, shearing and deposition onto kiln cars, the bricks are ready for metamorphosis by fire into a new state of lithification which we know as fired brick. Within this whole process other structures are developed including: assemblages of broken brick compiled by bull-dozer with the analogy of clastic moraines alluding to glacial processes and the formal stratigraphic structures of stacks waiting for transport to market. The final state, or final for the time being, of some of these bricks can be found on the façade of Rapson Hall, School of Design at the University of Minnesota in Minneapolis, MN. This state of vertical assemblage between cementaceous bonding structures (known as cement mortar) will likely end up in a land-fill or recycled when a new building is built and ultimately returned to the earth at some point in some form.

As one stands on the shore of the Mississippi River nearby where it has cut deeply into the underlying sediment, looking towards the campus one can see the buildings of the University sitting above the Pleistocene (or less than 1 million year old) glacial till and river outwash sediments resting directly on 350 million year old Paleozoic sediments. This missing approximately 349 million years is called an unconformity, of which that material has been eroded away before the Pleistocene and is probably now deposited to the south perhaps in the Gulf of Mexico or in sites in between. The University buildings become part of this stratigraphic assemblage as an Anthropocene layer, deposited by human agency.

The research for this case study and the transformation of materials from that Cretaceous estuarine environment into an Anthropocene structure, is part of a project I am working on at the University of Minnesota called *SITE INDEX*, that includes collaboration with UMN faculty and landscape architect, Rebecca Krinke. We are designing four gardens for the School of Design complex. The geologic history of the brick will be one of four etchings of text directly on the parent material, the other materials being copper, glass and concrete. Like the brick, the other materials are geologically analyzed in an attempt to fundamentally understand that material. This may be thought of metaphorically as the “geologist from Mars,” who comes to Earth and cannot tell the difference between a hillside and a building and asks the question of each structure, “what is this, of what is it made and where did it come from?”

Section III

Systemic Practice

There are numerous instances in my work that engage systemic practice and geologic references, thought and research. A series of seminal environmental performance/kiln works from 1979 to 1992 were inspired by my studies of geology and oceanography as a student at UC Davis, Davis, CA, in the late 1960's (this research is still very much ongoing). For me, the materials of sculpture and ceramics are perceived and worked with from the viewpoint of natural origin, process and scale; dolomite, kaolin, feldspar, etc., existing as powders in the glaze room made up rock formations I had studied in a geologic context. This adjustment of scale and context was further informed by a strong interest in the work of 19th century landscape artists such as Turner, Homer and Kennsett. An exemplary kiln work, *Land Monitor/Fired Volcanic Boulder*, 1980, examines volcanic geologic process and materiality. In this work, the steel and ceramic fiber blanket kiln was removed at the peak of the firing to expose a mafic (high iron/magnesium – low silica) basalt boulder in an attempt for the viewer to physically re-experience the boulder's birth/origin by returning it to a near-molten state. The firing took place near an extinct Pleistocene volcano field in the desert outside Albuquerque New Mexico.

A series of 3 kiln works, *Untitled (Earth Orchid)*, Hartford, CT, 1988, *Oculus: Dead Sea/Oil Field*, Arvada, CO, 1989, and *Humboldt Ship*, Arcata, CA, 1989 are grouped under the title of *51 Million BTU's* (BTU - British Thermal Unit, is a scientific term for the measurement of energy) which is the total calculated energy expended in the firing of these projects. This series in itself makes an initial exploration through form, image and process of the solar/botanical/geologic origin of fossil fuels and the transformative energy released by their ignition. As an

example, *Untitled (Earth Orchid)* examines botanical form by the ignition of natural gas into radiant energy within the central core of a kiln/furnace shaped to resemble the cross-section of an abstract orchid.

Further engaging the energy/metabolic issues of *51 Million BTU's* is a two-part project, *Phase I* and *Phase II: 51 Million BTU's/Metabolism Study/C₃H₈, e⁻, NaCl*, 1991-2008. Both are video installations engaged with the transformation of energy expended in *51 Million BTU's*. Using the projection of video on a rock-salt-surfaced screen, *51 Million BTU's/ Metabolism Study/C₃H₈, e⁻, NaCl*, visually and metaphorically expatiates upon scientific ideas initiated in the site projects about the ancient solar origin of fossil fuels. These concepts briefly state that Mesozoic-Cenozoic sunlight shining on ancient forests and mats of algae floating on ancient seas was transformed along with atmospheric CO₂ by photosynthesis into energy laden organic materials. These materials were later deposited and further transformed by geologic processes into what are now called fossil fuels. The ignition and transformation of fossil fuels in the site projects releases the stored ancient sunlight in the form of radiant energy. In a prototype version, *Phase I: 51 Million BTU's/Metabolism Study/C₃H₈, e⁻, NaCl*, 1991-1993, a single three-tube video projector was used to project an interwoven sequence of the furnace firings onto the rock salt screen. The salt crystal screen references the generally marine environment in which botanic materials were originally deposited. The crystals also act as prisms to diffract the projected video image breaking down its visual structure. The projected images in this prototype version underwent a partial transformation towards sunlight, still retaining much of their form. *Phase II: 51 Million BTU's/Metabolism Study/C₃H₈, e⁻, NaCl*, 1991-2008, employs three, 3 high-intensity LCD projectors also projecting onto a heavily rock salt encrusted screen and completely powered by contemporary sunlight through the use of solar voltaic panels. The use of three video projectors serves to completely transform the projected image into an intense, undifferentiated light reminiscent of sunlight. Simultaneous sound and image of non-diffracted video is seen on adjacent monitors so the viewer can see the degree of transformation taking place.

Rotting Flame, 1994-2009, shown as part of the exhibition: World Contemporary Ceramics: *Adventures of the Fire*, is an instrument of chemical transformation and time. The processes of fire and decay are essentially two forms of oxidation, fire is relatively fast and decay is much slower. In this sense *Rotting Flame* is the image of fire animated within the time frame of the decay of oranges. The orange color of the citrus also parallels the incandescence and final oxidation of carbon particles in the brightest part of a flame. Important antecedents to *Rotting Flame* were the performance/kiln projects in which fire was the essential agent of physical and durational change. *Land Monitor/Fired Volcanic Boulder*, 1980, *Wave Kiln (of Fire)*, 1984, *Untitled (Earth Orchid)*, 1988 and *Metabolism and Mortality/O₂*, 1992 are exemplary of this series. In these environmental projects the fire was an agent of change in the geologic sense, used to alter earth materials within a site-developed kiln structure; here geologic time was compressed into human time by speeding up the normally glacial rate of geologic transformations.

A site-related work, *Devonian Shale (Aquifer I)*, 2000, examines anthropurbation in relationship to contemporary and ancient geologic landscapes. The structural dynamics of a drainage/irrigation system interacting with physical and historical properties of a geologic formation constitute the conceptual basis for *Devonian Shale: Aquifer I*. This project was developed by working with a site in western New York state near Alfred University that embodied two related but distant time dimensions: recently, as an abandoned surface mine for shale/clay used to produce roofing tile and bricks by local ceramic factories in the late 1800's and geologically as a exposure of shale and sandstone strata deposited in a shallow sea during the Devonian era, now the shale acts as an active aquifer system. The core structure of the artwork is made of the site's Devonian shale, processed, extruded and fired in a manner similar to the technology of the early ceramic factories. A further process of coating and firing the armature with a slurry of indigenous sediment each time it is exhibited creates a new site-evolved stratigraphic structure in contemporary time. The modular and extensible configuration of this work refers to the original sea floors of Devonian time where the shale was deposited as mud and fine silt. This process of deposition underwent a continual, fractal reiteration through geologic time creating strata after broad horizontal strata. The immense surface area of this compiled shale formation approaches in concept the integral process of mathematics, where a function is "allowed to approach infinity" to calculate a theoretically impossible surface area, itself an analogy to the incomprehensibility of geologic time. In our contemporary era this fractal/infinitesimal dimension is continued through this stratigraphic assemblage's activity as an aquifer and living filter where hydrostatic pressure is driving water molecules through protracted and unimaginable passages along surfaces laid down over 350 million years ago. A dynamic correlation may be said to exist between the continuous multiplicity of events occurring during deposition (the turbidinal effects of particle descent and settling) and the inflection of that process during lithification of the silt into slate and the subsequent dendritic flow of water in the aquifer. This process is diagrammatically referenced by *Devonian Shale (Aquifer I)*'s vector-like drainage/irrigation layout, re-stratification process and theoretically unlimited size.

In a recent project, *Yerba Buena Complex*, 2008, A park area in San Francisco, CA, Yerba Buena Gardens, where the project was displayed, considers the Gardens an Anthropocene Epoch structural geologic deposit of various origins resting unconformably on Cenozoic sediments above the Alcatraz Terrane of the Franciscan Complex, the bedrock formation of most of the San Francisco area. This relationship was initially examined symbolically and materially by the public sculpture, *Deep Gradient/Suspect Terrain...*, in the form of a descending ship made of steel and green glass, containing ocean floor sediments extracted 4 miles off the California coast, installed on the Yerba Buena site in 1993. In the exhibition, "Bay Area Now 5," at the Yerba Buena Center for the Arts, in Yerba Buena Gardens, *Yerba Buena Complex* structurally and conceptually extends this inquiry further into the Yerba Buena site by tectonic installation of green filters into the architecture of the Center for the Arts and video imagery of the construction of Yerba Buena Gardens and gathering of sediment for *Deep Gradient/Suspect Terrain...* An initial expression of research into the allochthonous origin of the aluminum cladding of the Center for the Arts is also intended as an element of *Yerba Buena Complex*. The symbolism of transparent green, referring to the deep-sea depositional environment of the Franciscan Complex sediments, analogs of transport and displacement of sediment, both in time and distance, from previous landscapes and accretionary processes, are extended and reconfigured in, *Yerba Buena Complex*. In conjunction with the green depositional symbolism, the video documentation of raw materiality and process examine an analog of humanity as an anthroturbational agent of denudation and formation, at some level indistinct from that of nature.

1. Crutzen, Paul, International Geosphere-Biosphere Programme (IGBP), newsletter no. 41, 2000. Anthropocene: a term used to describe the current geological period, starting from the 18th century when human activities began to impact global climate and ecosystems.

Roloff, John, expanded definition of Anthropocene: a term used to describe the current geological period as a subset of the Holocene geologic epoch, beginning with the Neolithic period, the onset of agriculture and city states, approximately 9000 BC, marking a shift from paleolithic attitudes of humans towards nature that began a period continuing to the present of significant impact of human activities on global ecosystems (including climate) in the form of *anthroturbation* (see No. 2 below).

2. Paul Spudich, USGS Geophysicist, Anthroturbation: a term developed in conversation with John Roloff, 1999.