Slag Houses in a Steel City*

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Résumé

La coopération communautaire joue depuis longtemps un rôle appréciable dans la promotion de la construction de logements pour familles à faibles revenus au Canada. La coopérative Insulite Housing Group a allié la culture ouvrière traditionnelle à de nouveaux matériaux pour ériger quinze logements collectifs à Sydney, en Nouvelle-Écosse, de 1950 à 1954. Elle a bâti ces habitations grâce à une technique de construction novatrice utilisant le laitier d'une aciérie de Sydney. Elle s'enracinait dans une culture ouvrière traditionnelle qui soulignait l'importance du bien commun et de la capacité d'adaptation. L'article met en relief l'expérience sur le terrain acquise lors de la construction des bâtiments dans le cadre de ce projet coopératif particulier : matériaux et technologie, modalités de financement et rapports entre les membres du groupe et avec leur dirigeant, l'aciérie et, dans une moindre mesure, l'État.

Abstract

Community-based co-operation has long been an important factor in promoting the construction of housing for low-income families in Canada. The Insulite Housing Group was a co-operative that used a combination traditional work culture and innovative materials and techniques to build 15 slag houses in Sydney, Nova Scotia, between 1950 and 1954. This group built houses using an innovative building technology utilizing slag from the Sydney steel plant. It operated within a traditional work culture that recognized mutual benefit and resiliency. This article will centre on the ground-level experience of home-building in this particular co-operative: materials and technology, financial arrangements, and the group members' relationships with each other, their leader, the steel company and to a lesser extent, the state.

In the early 1950s, fourteen new ranch-style bungalows of *slag-aggregate*[1] concrete with stucco cladding presented a different kind of housing on the landscape of Sydney, Nova Scotia. They were not the only houses made from slag-aggregate concrete at the time: in fact, by 1950, several companies in the region were using *slag-concrete* blocks or *pouring-in-place* for walls, floors and even roofs. But the houses discussed in this paper were unique for two reasons: they were planned and constructed by a self-help project, the Insulite Housing Group, involving fourteen working families in Sydney; and, the walls were made of slabs — an innovation developed by the leader of the group, which added ease and speed to the construction. The project provided the prototype for several hundred homes built by the Insul-Lite Houses Company in eastern Nova Scotia over the next decade. This ethnographic study of a particular co-operative building experience in Sydney contributes to an understanding of group dynamics based in the culture of work, attitudes toward housing quality, and the imperatives of innovation.

The Canadian context for the Insulite Housing Group's activities is found in the post-war housing movement in which the Canadian

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Mortgage and Housing Commission (CMHC) promoted home ownership and the introduction of new designs and materials.[2] Although home ownership had been the ideal and goal of the Sydney working class since early in the twentieth century, it became, after World War II, a "Canadian tradition" strongly promoted by government.[3] Indeed, such political promotion may have been a factor in the various types of assistance experienced by the Insulite Housing Group. The one-storey bungalow type constructed by the Insulite Housing Group fit with the national push for a "straight forward, small house" design for the employed working class, although, in Sydney, they did not appear in "clusters" or suburbs as recommended.[4] The concrete and stucco building materials used by the housing groups were not only an innovative alternative to wood, but also, quite possibly, were a response to the Cold War call for bomb shelters.[5] Joann Latremouille summed up the era when she noted that, in the 1950s, house design had become a centralized activity controlled jointly by corporations and state; it was the end of traditional housing in Nova Scotia, and the beginning of designs, building technologies and financial arrangements that were not connected with the history of the region.[6] Yet, the Insulite Housing Group did not fully subscribe to the totality of these changes, for the "slag houses" represented both innovative construction technology and traditional values; and while the project resulted in a commercial housing "development," it was initially lodged within a regional context of co-operative housing, an established "tradition" in the region by that time.[7]

It is appropriate that the "slag insulite project" took shape in Sydney, where, in 1899, political and financial manoeuvring resulted in the Dominion Iron and Steel Company (DISCO) building an integrated steel plant on Sydney Harbour. Abundant coal deposits in Cape Breton were the primary factor in bringing the steel industry to Cape Breton, but a good harbour alongside Sydney, limestone in rural Cape Breton, and iron ore deposits in nearby Newfoundland were also factors. In 1950, when the slag insulite project began, the plant was operated by the Dominion Steel and Coal Corporation (DOSCO).[8] From its inception, the steel industry has been the major employer in the City of Sydney.

The steel industry in Sydney, like other steel towns across North America, played a major role in the provision of housing for its workers in the early twentieth century. Hundreds of substantial single and double company houses were constructed for all levels of workers and management.[9] By 1910, DISCO had ceased building homes for its workers, and by the 1930s, most of the company houses had been sold to the steel workers. Except that some of them were semi-detached, the company houses were no different in their construction from other residential buildings in Sydney of the first quarter of the century: they were 1-1/2 to 2-1/2 storey, wood-frame, gable- or hip-roofed, with wood-shingle cladding. Compared to the earlier participation of the steel company in housing, the slag insulite project represented a relatively minor and isolated involvement.

The Insulite Housing Group was one of many housing co-ops in Cape Breton from the 1930s to the 1970s. All were directly or indirectly inspired by the Antigonish Movement, a self-help initiative started by St Francis Xavier University (St FX) in the 1920s, and facilitated by priests from the Roman Catholic Diocese of Antigonish. The 1936 revision of the Nova Scotia Housing Act was a factor in these early co-operative housing initiatives for it allowed for 75 percent financing through the Nova Scotia Housing Commission and local credit unions.[10] The model for the housing co-ops in Cape Breton was developed in 1937 by the neighbourhood of "Tompkinsville," the first co-op housing project in the Atlantic region.[11]

"Sweat equity," an idea that was fundamental to the concept of co-operatives was a basic requirement for the housing co-operatives. Father William Roach, St FX extension worker, defined the term: "Sweat equity was after-hours, every weekend, long, difficult hours that resulted in the pride of home ownership. There was also a sense of responsibility...a labour of love."[12] Roach emphasized that the co-operative experience was a continuation of a long sustained pattern of self-help and neighbourliness, the familiar pioneer tradition of communities coming together to "raise" barns and houses. The housing co-ops, like the "raisings," had,

> *no grand design, no permanent organization, no structure or institutionalization...There were no guidelines for these men to follow except a desire to own a home and a determination to see this goal achieved...The rules were very simple — buy at the best prices, cooperate with your neighbour and exchange skills."*[13]

The Insulite Housing Group, in adapting these general "principles," nonetheless maintained a distance from the co-operatives under

Fig. 1
Edmund and Vida Anthony moved into their "slag" home on Lingan Road, Sydney, in 1954.

the leadership of the Catholic church in the area. In fact, they had no connection with the St FX Extension Department or with any other public institution. They initially considered seeking guidance from St FX, but decided that this would compromise their independence. Also, they did not want to be restricted to one location, a requirement for the "official" housing co-operatives at the time. Nor did they borrow from the Nova Scotia Housing Commission for the cost of building and materials — they wanted individual mortgages from a financial institution of their own choosing.[14] This was not necessarily easier than financing through the Nova Scotia Housing Commission. One member recalled going to Eastern Trust for his mortgage. He was told that he could have money to put in the foundation; then, if that was satisfactory, he could ask for more. He accepted those conditions and financed the construction in that manner.[15]

The housing group was, nonetheless, a "co-operative" in practical terms. The members planned and made decisions about design and construction in a co-operative manner; they bought their materials in bulk to save money; they owned equipment and paid for skilled help co-operatively. However, they did not form a legal co-operative company, they did not hold a joint mortgage, and they were not supervised or governed by any outside institution, other than normal electrical and plumbing standards. The time for each phase of the project was carefully planned for each site so that all houses would be at the same stage of construction, more or less. But, in practice and against recognized co-operative principles, the progress of construction on each house was often inconsistent because some group members found ways of speeding up the process, usually through getting extra help through their kin networks.

The Insulite Housing Group started their "study groups" at the steel plant in 1950 and meetings were held as needed during the entire project.[16] For over a year it was "strictly business" as they planned and negotiated with L. E. Shaw Brick Company to use their facilities. At the meetings, they also worked out any disagreements. They had parties only once or twice to mark stages in the project. "We didn't have many social activities; we were a diversified group. It was a hard, hard two years [building the houses and]...we had babies."[17]

The group was made up of twelve Dominion Steel Company employees and two others. The steel workers were Harvey Hodder, Jake Curry, Jim MacCarron, Walter Kenney, Norman Powell, Wally MacKinnon, Bill Fedora, Dave Coady, Duke Gallant, Bill McCabe, Edmund Anthony, and Norman Weiner. They were either skilled steel or mechanical workers, foremen in some

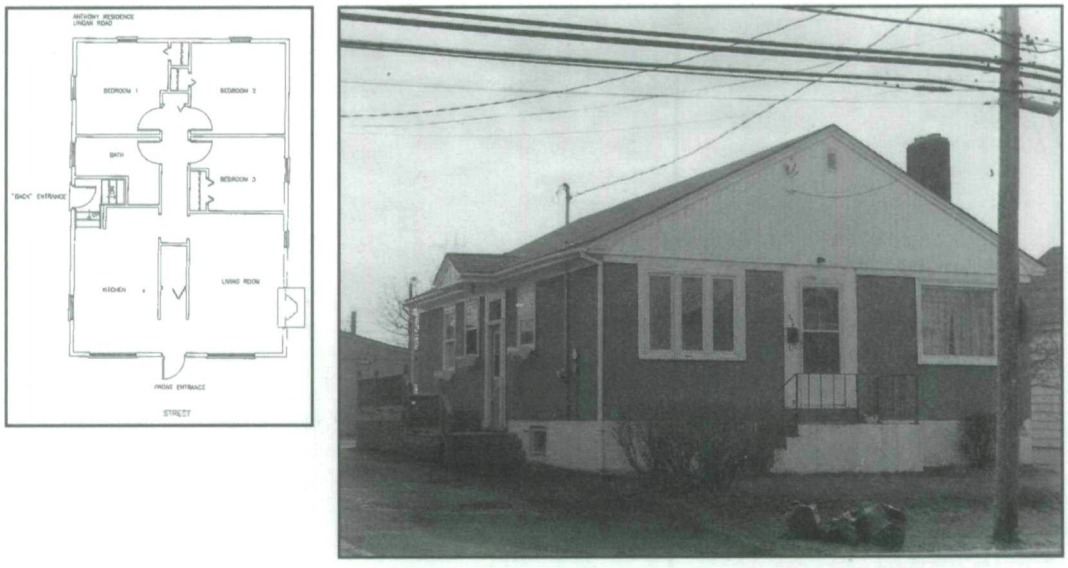


Fig. 2
Plan 1: front and side view of Anthony home. The facade is the gable end of the house because of the size of the lot. The kitchen is larger than usual (see floorplan). Plan by R. Winn, CAD Lab., University College of Cape Breton.

part of the plant or, in the case of Norman Weiner, a metallurgical engineer working in the Research Department of DOSCO. The others were Ted Tracey, a barber, and Ernie Johnson, who worked for J. R. MacDonald Wholesalers. Most were young men at the time of construction, recently married, and fully employed. The original study group involved a larger number of steelworkers and others, but only fourteen decided to be in what amounted to an experiment in house construction.

Norman Wiener, the leader and organizer of the Insulite Housing Group was an Orthodox Jew. He was highly respected by his contemporaries and is still remembered as a "good steel man," a decent man who was reluctant to speak ill of anyone. It is said of Norman Weiner that he wanted everyone to have a good and cheap home, namely the "slag-insulite" house. Weiner's diary, a comprehensive account of the group's activities, both in terms of construction and of his perception of the success of the human relationships involved, contributes substantially to this study.[18] Weiner left DOSCO in the 1960s to work in Israel.[19]

All of the houses built by the Insulite Housing Group are extant: except for two families, all of the members were still living in their houses in 1994. They began construction in 1952, and by 1954 they had completed fourteen houses located all over Sydney, including the areas of Sydney River, Ashby, Westmount, and Whitney Pier.

The slag houses, in introducing the suburban bungalow, required an adjustment to relatively new uses of "home space." The houses are all rectangular bungalows measuring 28×40′ (8.5 × 27 m), with 9-foot (2.7-metre) posts, and a gable roof pitched at four and twelve. The orientation of the facade depended on the size of the lot. There are examples of both the long and short facade facing the street or "front." Usually the front door faced the street, but there is an example of the basic floorplan with no door on the street. These were in keeping with the greater usage of the "back entry" common in working-class communities. The back entry led downstairs to a semi-finished basement used for the hobbies of the household members — comparable to the large outdoor "workshops" of the past. Additions to the houses in the form of wings, porches, verandas and lately, decks, have been added, all after the initial construction, in response either to fashion or to larger families.

Norman Weiner supplied the basic floorplan (common to "ranch-style bungalows" of the time), but because the type of construction allowed for flexibility, there were several variations on the plan, depending on the preferences of the members. One of the main variations was the size of the kitchen, which in Weiner's plan and in the fashion of the time was a "nook" where food was prepared, which resulted in the necessity of utilizing the previously neglected dining room. However, the working-class preference for a large kitchen prevailed for several members, and they sacrificed the dining room and some hall space in order to have a large kitchen.

In Edmund Anthony's house, the large kitchen was further facilitated by the orientation

Fig. 3 (left, and opposite) *Plan 2, Tubrett "Insul-Lite" home on Lingan Road. Note that the "front" door is on the side; the "back" door on the other side leads to the kitchen (see floorplan). Plan by R. Winn, CAD Lab, University College of Cape Breton.*

of the house, with the front door on the gable end, and the "back" (leading to kitchen) door at the side of the house, further necessitated by the sharing of the driveway with his brother-in-law. Abundant cupboard space and ample light are noticable in the Anthony kitchen. When the Anthony's children grew up, they changed one of the bedrooms to a dining room, as originally recommended. Walter Kenney also changed the size and orientation of his kitchen and bathroom. The changes were usually incorporated by the members who finished last, as they had the advantage of evaluating the floorplans of the other houses. Fireplaces, placed in the living room, were found in almost every one of the original fourteen homes, a definite concession to the new suburban house type.

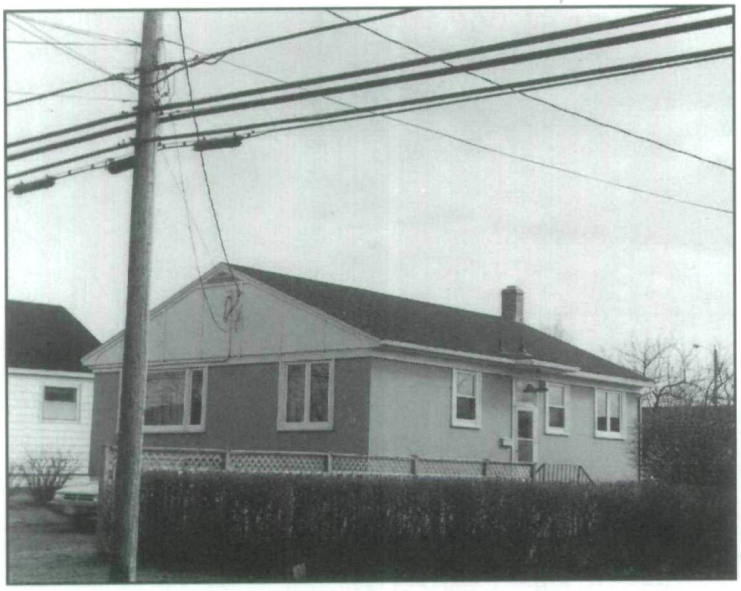
The primary ingredient in the Insulite houses was blast furnace slag, a waste by-product of the iron-making process at DOSCO.[20] Of virtually no use to DOSCO, except minimally for road construction, the slag had been dumped onto the shoreline and into the ocean by the hundreds of thousands of tonnes, increasing the area of the plant property by over 40 hectares in the nearly 100 years since the plant began production.[21]

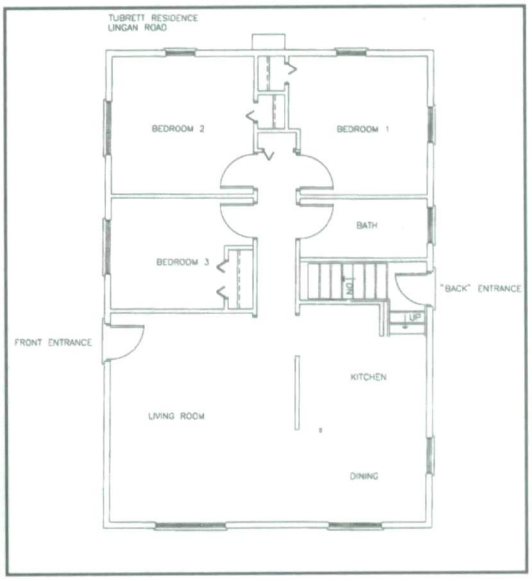
The modern construction potential of slag had been established in Europe since World War II when *foamed slag aggregate* or *popcorn slag* concrete was developed in Britain by the Gallai-Hatchard process.

> *Essentially the process consists of dumping molten blast furnace slag into a concrete pit or tank (called a bed). Water is injected into the slag through nozzles located in the floor of the bed and the rapid conversion of the water into steam by the molten slag foams or expands the slag. The foamed slag in crude form is then removed from the bed, crushed and sized for market use.*[22]

In 1942 the Nova Scotia Department of Industry, interested in the British experience of rebuilding Coventry with slag concrete, suggested to DOSCO that foamed slag might be a useful building material in Nova Scotia. But there was no real progress on the idea until after the war when Gallai-Hatchard visited the steel plant in Sydney, and return visits were made by DOSCO officials to foamed slag plants in Britain. Following extensive research, DOSCO offered to make foamed slag available to any contractor who wanted to develop techniques in this new type of construction. Soon, the steel company was working with L. E. Shaw Ltd, a manufacturer of building products with eight plants in the Maritimes, including one in Sydney. Successive "progress reports" on foamed slag by DOSCO's Research Department in 1949 indicated to L. E. Shaw the compressive strengths of various weights of slag blocks, which were lighter than ordinary concrete. They also stressed the importance of correct water content in the concrete mixes of cement, sand and slag, adding that even the humidity of the air could be a significant factor.[23] By 1950, L. E. Shaw Ltd was producing foamed slag blocks and slabs called *thermocrete* for use in residential and business construction.

> *Foamed slag wall blocks, partition blocks, floor and roof slabs are made in modern block making machines recently purchased by L. E. Shaw Limited. The blocks and slabs are made with a mixture of foamed slag, portland cement*





and water and are compacted in the block machine under vibration and pressure. After being steam cured the blocks are stock piled for several weeks before use.[24]

As the names "insulite" and "thermocrete" suggest, the foamed slag had characteristics that made it a good insulating material. Tests on the foamed slag carried out at the Nova Scotia Technical College showed that eight inches (20 centimetres) of foamed slag had the same insulation values as 32 to 40 inches (80 to 100 centimetres) of ordinary concrete.[25] It also provided good sound insulation, was 40 percent the weight of the equivalent volume of sand-gravel concrete, and was fire resistant. The most talked of characteristic of the foamed slag was its ability to be cut or nailed into, making this material as easy to manage as wood. It was advertised as being 15 percent cheaper and stronger than a comparable wood frame house.[26]

The slag-concrete slabs were mixed and cast at the L. E. Shaw factory in Sydney by the group, sometimes late at night in freezing weather. They used cement ordered by the carload to the lumber supplier's railroad siding and delivered it to the Shaw's plant. The gravel for making concrete was delivered from a variety of sources and by a number of different people in the Industrial Area, depending on availability and price of delivery. Slag from the steel plant, "for the hauling away," was used instead of coarse sand in mixing concrete.

The building materials used for the houses were mainly from Stephens' Building Supplies. Later, when Chappell's Building Supplies offered to give the group a "co-op" reduction of 10 percent, some of the materials were obtained there. These supplies were the traditional wood products needed — windows and doors, 2×4's, 2×5's and 2×6's for forms, posts, plates, studding and trusses, and interior finishing requirements. Besides the mixing and casting facilities, L. E. Shaw supplied sewer pipes, flue blocks, bricks and tiles, and other concrete materials. Big kitchen stoves, made by General Electric, came from Chappell's. Benny Lipkus, who had a hardware and appliance store in Sydney, supplied the oil furnaces for hot-air duct heating. Lipkus' warehouse was also used to store many of the materials. Nails and other incidentals were bought wherever good prices could be found. For instance, three to four tons of nails were immediately ordered when it was discovered that 60-lb. nails were selling at Landry's Scrap Yard for 4 cents per pound.[27] All of these were bought as bulk orders on the approval of the carpenter; some items were paid for individually, some jointly from a financial resource pool established by the members. Payment for separately charged materials was required within ten days.

The group members' financing arrangements were the source of some consternation as each person was required to contribute individually to paying the collective expenses. Tensions were sometimes created when the pool ran low, and pressure was put on individual members to make their contributions. The bookkeeping of each member's sweat and financial equity was another complicated matter requiring the services of a professional auditor.

Fig. 4
Anthony house with others on the street from the same period of construction.

A great deal of the equipment and materials for the housing group came from the steel plant. This "borrowing" by steel workers was a long-standing tradition resulting in many materials and tools finding their way to workers' off-hours homelife. It was a practice winked at by both the company and on-the-job supervisors. Indeed, an expression at the plant was, "the men take away anything they can put under their jackets; the bosses take away whatever they can get into the back of a truck."

Norman Weiner, however, was able to "legalize" much of the group's "borrowing," or "rabbit jobs."[28] Being of relatively high status at the steel plant, he formalized an official arrangement for his group that was based in the DOSCO's interest in experimenting with foamed slag as a building material. Early in the project, President Anson of DOSCO granted the group access to slag and its delivery by a crusher truck, 4.5 tonnes of "re-bar" scrap from the bar mill, a concrete mixer, wheelbarrows, and forms. Shortly afterward, the group got the long-term loan of a mixer from the coke ovens, located near the steel plant.[29] The various pieces of equipment were serviced in the mechanical departments of the steel plant and coke ovens as they inevitably broke down.

The list of borrowings and special favours grew and grew over the more than two years of construction, including nails, small tools and even a vacuum cleaner. The old truck bought by the group from one of the gravel suppliers was constantly breaking down and being fixed at the plant during off-hours. Occasionally a foreman was peeved when some piece of equipment was not returned on time, but on the whole, the privilege was quietly acknowledged and openly used. Another time, the truck was involved in an accident which broke the windows of the weigh-house. Again, DOSCO "let it go" without making the group pay for the damage. As group member Wally MacKinnon put it, "DOSCO was a good company to work for. They were part of the family,"[30]

Archie MacKenzie, skilled carpenter, was hired by the group for the duration of the project. He was paid at a rate of two dollars per hour for a forty hour week. He did not work a regular day, but instead worked as he was needed, doing specialized jobs, giving direction, and making sure that the construction on several houses continued at a balanced rate: "At the last of it ... he more or less supervised."[31] The other skilled workers on the project were the plasterer, the bricklayer, the plumber, and the electrician. Most of the electrical work was done by the three qualified steel plant electricians in the group, but the work was then inspected by another authorized electrician. "We were...good with our hands. Some fellows were natural carpenters. We had Archie for the technical stuff."[32]

The actual construction of the houses started, as most houses do, with the excavation for the foundation. The excavation was done by the members' pick-andshovel work and an excavation specialist named Harris who used a bulldozer. The forms of 4×8′ (1.2 × 2.4 m) panels, and some 4×8×2′ (1.2 × 2.4 × 0.6 m) for irregular spaces, were prefabricated at Ted Tracey's

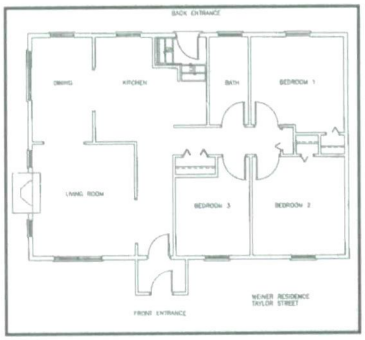


Fig. 5
Plan 3: Norman Weiner's home on Taylor Street. This floorplan is the typical "bungalow" style of the time. Plan by R. Winn, CAD Lab, University College of Cape Breton.

father's place in Ashby and moved to each building site as needed. Once in place the form panels were kept from sagging by "walers," a set of 2×4's placed at half height both inside and outside the forms and braced against the ground in each instance. Spacers for the 10″ (25 cm) thickness of the walls were wired in. Window boxes were made by the carpenter and situated for the pouring.

Each foundation (outside measurements 28×40′ (8.5 × 12 m)), including footers, required an average of 140 bags of cement, 28 yards of gravel and 12 yards of slag. The columns (8″×8″×8′ (20 cm × 20 cm × 2.4 m)) were of steel re-enforced concrete cast in forms on pads placed 9′ (2.7 m) from each side wall of the foundation: sometimes they were precast on site and grouted onto the pads. Sometimes there was a problem with the bad bonding between the concrete and the steel rod re-enforcing causing crumbling and breaking of the columns. The floors of the foundations were poured at a later date, a job reserved for poor weather when other more urgent tasks were completed.

After some experimentation the "mix" was set at 45 shovels of gravel, 25, 20 or 15 shovels of pre-wetted slag depending on the consistency of the gravel, and 23 to 25 litres of water, to one bag of cement. Re-enforced iron bar lengths from DOSCO, known as "re-bar" were used to strengthen the concrete. *Screeding*, a method of maintaining a level surface, was done using steel rods instead of the usual 2×4 board. On a good pour with a full contingent of member manpower, plus relatives and friends — sometimes up to eighteen people — there might be 4 men shovelling gravel, 2 shovelling slag, 1 shovelling cement, 1 mixer operator (from the steel plant or coke ovens for the first few pourings), 4 men tamping, and 6 on wheel barrows pouring the mixture into the forms. The first pouring ended with "a good clean party at Mira Ferry."[33] The last pour, also celebrated with a party, was on Thursday, 23 July 1953 over a year after the first. Throughout that time, there was a constant effort to find the correct mixture, slag being a virtually untested element replacing sand in the concrete. Weiner also endeavoured to shorten the 5 to 6 hour pouring time by different arrangements of the mixer and workers, sometimes by pouring two foundations at once, when the second set of forms could be obtained. In the end, it was the weather, manpower, and mood of the workers and their cranky equipment that decided the time and success of foundation pourings.

There were no beams or joists in the main floor. Instead, small 90-lb. rails were used as beams or trimmers.[34] They were laid into notches at the top edge of the foundation and went the length of the foundation, cemented into supporting concrete columns. The grouting was done with cement and sand mixed 1 to 3 and 1 percent chloride.[35] The rails were delivered in 19′6″ (6 m) lengths; any required slicing was done using a "fish plate."[36] The use of rails was introduced by Norman Weiner. Through DOSCO, the group was able to obtain scrap rails from Newfoundland, the result of demolition of its narrow gauge railway. The arrangement with DOSCO called for payment in equivalent scrap from local junk dealers.[37] Initially, the group had attempted to use prestressed concrete slabs as floor joists, taking two days to make a batch for Walter Kenny's house. However, they were too heavy to lift: "all we had was our own backs."[38] It was agreed "that even the DOSCO crane wouldn't have been able to lift them. So we left them there in

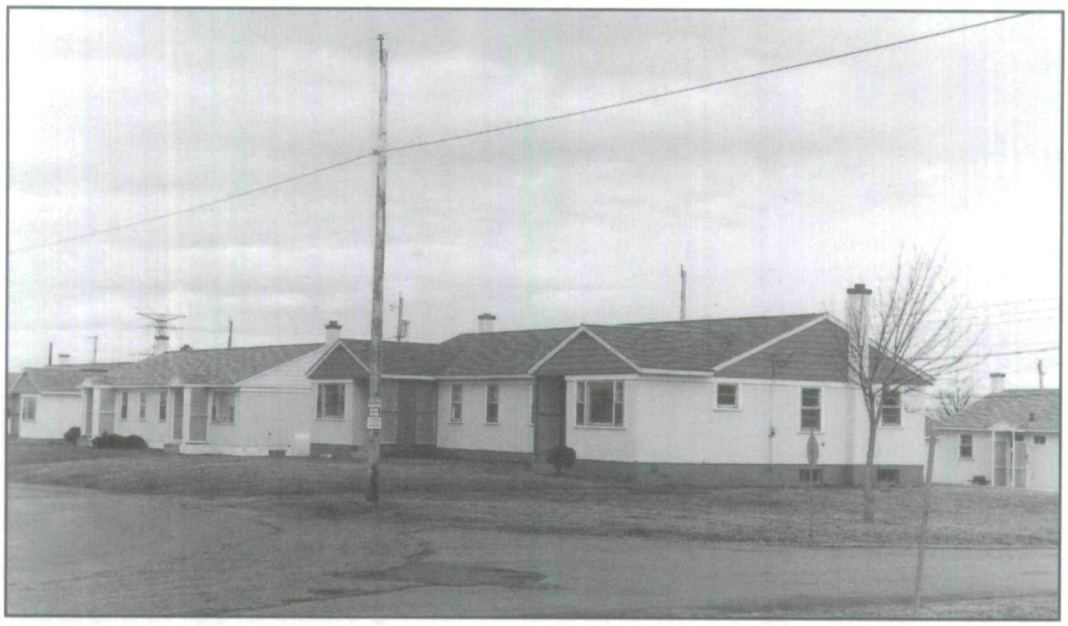


Fig. 6
Group of "Isul-lite" houses at the former Radar Base in Sydney.

Walter Kenny's yard, four or five feet under the ground. We buried our mistakes!"[39]

The main floor was made of 9′ (2.7 m) concrete slabs poured at L. E. Shaw originally designed for roofing. The slabs were shaped exactly like the wall slabs mentioned above except for the length. They were laid three lengthwise across the width of the foundation, starting at the notched edge of the foundation wall, across on top of the rail trimmers: the three lengths of 9′ (2.7 m) making up the 27′ (8 m) inside width of the house. At the beginning, there was concern about the strength of the floor slabs when cracking was noticed in the "web" or thinner centre part.

> *Got two loads of slabs from Shaw. Note some cracks in web. Coady tried stomping on them and of course crashed thru [sic]. Group became alarmed and took some back to Shaw for explanation. Mr. Strang [manager at Shaw's] came out and calmly told group about limitations of roof slabs as floor slab. Slabs o.k. for normal construction loads and walking, but it's intended to put 1-1/2–2" [4 to 5 cm] concrete top coat on anyway. Group took rest of slabs back and put a few more on MacCarron's.*[40]

The floor could take 2 to 3 hours to lay with four men laying slabs and two men grouting the joints between the slabs.

To facilitate electrical wiring, a groove was cut at the end of the slab to allow wire to pass from the basement. Then, the conduit pipe was laid on the top of the slabs and a coat of cement poured over it and the entire slab flooring. This allowed for access for repairing or changing the electrical system in future years.[41] Screeding was done to ensure levelling. Tile, linoleum or other flooring was put on top.

Originally, the walls of the houses were to be poured in place, much like the foundation.[42] But Norman Weiner, influenced partly by articles in *Science and Mechanics Magazine*, but mostly by his curiosity and ingenuity as a researcher, developed a technique by which slabs were used for the walls.[43] He proposed a slab 18″×8′ (46 cm × 2.4 m), the same thickness as a floor slab (8″ (20 cm)) with a curve or groove down the 12″ (30 cm) wide centre part of the slab, giving the thinner part (the "web") about 5 cm in thickness and eight centimetres of 20-cm thickness on each side or "rib" of the slab. Wire mesh was set into the web, and steel rods set into the ribs, for re-enforcing. Finally, the wall slabs were "finished" by brushing on a coat of stucco with a long-handled fibre brush.

The idea of slab walls was first brought to the attention of the group's carpenter, Archie MacKenzie, by Weiner on 10 October 1951. MacKenzie was enthusiastic, and Weiner then went to the local building inspector, Malcolm MacIvor who made several suggestions for attaching the slabs to the walls. In Halifax, Weiner met with L. E. Shaw to arrange for production.[44] Immediately upon his return, he called his group together. "Meeting later with all but MacKinnon, plus Archie. Discussed slab-versus-solid walls. Group agreed, reluctantly it seemed. Waiting results of tests…"[45] The tests carried out at DOSCO's lab showed

that a foamed slag wall slab, without wire mesh re-enforcing, could withstand the weight of 1383 kg in cement bags, uniformly distributed.[46] The group, satisfied with the idea, ordered the cement and delivered it to the Shaw plant. They also arranged for and delivered slag from the steel plant.[47] They prepared steel rods and wire mesh for re-enforcing, poured the casts, cut them to size, finished them and delivered them to the building sites.[48]

Except for the length and the use of slag in the concrete, the wall slabs were exactly the same as the floor slabs in dimensions; they were lighter because of the slag composition. There were some problems with the slag walls. They were quite fragile, and would crumble and break if the delicate placement of the re-enforcing steel rods was not correct.

Raising the wall slabs was a much more demanding job than laying floor slabs. First, the carpenter built a sort of "staging" which consisted of 9-foot (2.7 metre) corner posts (doubled 2×4's) which held up the top plate (2×6's). Into this space, the slabs were raised, and set on top of the foundation, protruding out about 1 centimetre. The plate was nailed with four-inch nails to the tops of the wall slabs.

> *The best management seems to be to have 4 men carry slabs from the stock pile to the wall. One man is on the ground pushing the base while tilting, and one man is on the ladder above to ensure proper positioning and to nail. The first slab is plumbed both ways, and the rest are simply butted to it, the wall and the plate....6 men can put up about 8 full slabs per hour.*[49]

The slabs were grouted on to the foundation and the joints were also grouted. Short slabs were used under and over the windows, and over the doors (lintel slabs). They were notched to allow for a proper fit for the doors and windows. When the walls were in place, the corner posts were removed and thermocrete blocks used to make either squared corners or "bull nose" corners.

On 29 October 1951, a sample "W-type" roof truss was built and pattern pieces cut by Archie MacKenzie.[50] After that, the group met frequently to build trusses at Ted Tracey's place. The roof was built in the following way: first, the front end truss was set into place, braced and boarded to be covered later with plywood.

> *Trusses are carried from pile by 4 men. Rope on near end is used to pull up one end. Three men above manhandle it into position. Trusses held by 3 spikes toe nailed into plate [which has been doubled] Time = 10–12 minutes per truss...Archie built two strongbacks down length of house, using 2×5 beams and 2×4 posts with scabs. After boarding, these were taken down.*[51]

Then the end truss was put into place and boarded. Twenty-two trusses were used on each house. The roof was boarded in with plywood and then tar-papered and shingled with asphalt shingles. The roof did not require weight-bearing partitioning walls, making changes possible to the basic floorplan.

The work on the interior began as soon as the house was closed in. The interior work was much more traditional than the exterior. Any foundation floors not poured already were completed and footings and flues provided for fireplaces. Heating ducts were cut into the floors and furnaces installed; 3/4" tongue and groove spruce boards were used for the ceiling. The wall partitions were studded and boarded or gyprocked. The interior walls had five centimetres of insulation added to the web groove. Strapping, rocklathe insulating board and plaster were then put on.

All members found that the cost of vermiculite in the plaster raised the plastering costs. In response, Norman Weiner tried out yet another innovation in plastering his house: "I used granulated slag as plaster aggregate in the closets only. Plasterer likes it; says it is not slippery under trowel like vermiculite, easy to finish, light, etc."[52]

The interior work was done mainly by individuals rather than by groups. However, the work continued to be started or guided by the carpenter. It was at this juncture that the wives of the members began to play a significant role in the planning and actual construction. They put up strapping and rock lathe, painted, and helped to build cupboards. Some of the design modifications suggested by the women — making a kitchen more convenient or enlarging a window — were not always appreciated by Norman Weiner, but they were implemented just the same.

DOSCO had an ongoing interest in the progress of the housing project. The photographer from the company's public relations magazine, *Teamwork*, came to take pictures in the earlier stages of construction. The plant's technical photographer, Ray Martheleur, also took photographs for the plant's record later in the construction.[53]

Weiner had the buildings inspected toward the end of the project by various officials representing the Nova Scotia Housing Commission and the Canadian Mortgage and Housing

Fig. 7
Slag heap at Sydney Steel has covered over 40 hectares of land on the shore of Sydney Harbour since 1899. This section of the slag is being processed for road construction.

Corporation. He reported that, on the whole, they seemed quite satisfied with the houses, except for the rails that were used as beams or trimmers. They felt these were too light, and would not withstand the weight of the house over a long period of time. Edmund Anthony and other members rejected this criticism in 1993, declaring that there have been no stress problems in forty years.[54]

These inspections were probably done for approval of the building technique in view of Weiner's proposal to start a formal company to build a large number of the houses. Archie MacKenzie, the carpenter, was part of the company, along with a man named Zelokovitch in Port Hawkesbury. The members of the housing group were also asked to take part, but all declined mainly because after four years of planning and building, they simply did not have the energy for more.

The company, "Insul-Lite Houses" lasted only for about two years, in which time hundreds of houses were built, many in the Sydney area, including the Radar Base, and Port Hawkesbury. The houses did not deviate greatly in either dimension or floorplan from the original fourteen of the Insulite Housing Group headed by Weiner. There is a certain amount of confusion as to why the company ceased operation, especially since the houses were of proven quality and were relatively cheap. Some say that the successful Insul-Lite business was supporting the less profitable enterprises of Zelokovitch and finally all went bankrupt. Others said that DOSCO, having given generously to the steelworkers in their efforts to build, were not so willing to give free or nearly free materials to a profit-oriented institution. Still others suggested that the company "got greedy" and was over-charging for the houses.

Nor did L. E. Shaw continue to use slag in its concrete products. It was suggested by current personnel at the Shaw Group plant in Dartmouth that the limited market accounted for the end of manufacture of slag aggregate blocks and slabs.[55] Also, that residual iron in the slag caused rust problems, and removing the iron would have made the venture uneconomic.[56] There is no evidence that rust was a problem in the houses built by the Insulite Housing Group. There is a further suggestion that the threatened closure of the steel plant in 1967 also was a factor in the supply of sufficient amounts of slag to the Shaw plant.[57] A review of the experience of the housing group combined with the available research reports seems to suggest that control of water content in the aggregate mix might have been a factor in the failure to continue using slag. When the small group of men did the mixing, they had probably learned to accurately judge, through trial and error, the correct amount of water, adding ingredients until the consistency "felt right," much the same as a "folk" recipe in the preparation of food. While this flexibility might have been possible in the production of a small number of slabs, it would have been virtually impossible to mass produce the aggregate without strict temperature and humidity controls. Such control might not have been economically feasible at the time. Another problem might have been the transportation of the slag especially after L. E. Shaw moved its manufacturing operation to Halifax in the early 1960s.

Despite the apparent commercial failure of the slag aggregate concrete, the evaluation of the slag houses remains very positive almost forty years later. Maintenance is minimal, with painting needed about every five years. The heating costs are low, and there is no "sweating" from excess moisture. Soon after the completion of construction, almost every member switched over to hot water radiators from the original hot air ducts. When the coke ovens closed in the 1980s, those using coke switched to coal. The only complaints seem to centre around the hardness of the floor, which makes house work tiring when women are "on their feet all day".[58]

Some group members are still at a loss to understand why the slag houses didn't become commonplace in Cape Breton. Wally Mackinnon felt that "tradition" was against them: wood was very popular and continues to be, while concrete and brick have historically been treated with suspicion. Concrete was simply too "out of the ordinary." Indeed, Norman Weiner's ideas were considered "crazy" by some. His deviance from accepted forms of house building was the object of several incidents of vandalism and theft of materials. On 20 April 1953, "some 'children' picked a large hole in Curry's floor, and dropped a slab in the basement also. At Kenney's they tore up some roofing and knocked holes in the floor too."[59]

Despite these unpleasant incidents, the evaluation of the experience of building the insulite houses was, in retrospect, a happy one. The members still get together occasionally to reminisce and to laugh over the mistakes and other more enjoyable shared experiences. The problems of the old truck, the borrowed mixers, and the burial of the unused concrete floor joists were usually the centre of the pleasant memories.[60]

Weiner's contemporary view of the construction treats the problems with the equipment with combined humour and consternation,[61] but in his private log of the group's experience, he was somewhat less assured of the camaraderie of the group and its success as a co-operative. There were complaints of men "hogging" manpower to do low priority jobs, of failure to reach a consensus when ordering the furnaces, of personality problems when one member insisted on getting his work done "next." One of the worst problems was that an individual would do a job working with relatives and friends outside the group; the same individual might then be reluctant to join in group ventures and to help the others with the same job. Weiner was not alone in his concern. There was, at one point, a "constitutional crises" when group members who strongly believed in co-operative principles became angry and frustrated.

The role of the carpenter was often confused, and there were disagreements about the quality of workmanship.[62] Money was often a problem as each member had to finance his own materials as well as contribute to the general fund which paid the carpenter and paid for some bulk-ordered supplies. The carpenter took a large percentage of the fund and there were often changes in the work organization to "get more out of Archie."[63] Other prices for skilled work, taken at an hourly rate, exceeded initial estimates.[64]

Nevertheless, the spirit of the group was important to Weiner and he frequently made notations on the morale of the group, their attendance and degree of exhaustion. Sometimes the end of a phase of work was marked with some sort of social gathering. Once he remarked, "crew spirit lagging badly, no progress;" another time, "this competitive spirit is good for morale."[65] There is ample evidence that Weiner had respect for the members' family life and religious traditions, as well as his own. Both Jewish and Christian holy days were observed, and the members' illnesses and the birth of their children were noted.

The juxtaposition of innovation and tradition in this housing experience is based in both the steel industry and in building techniques. The use of slag as a concrete aggregate was a thoroughly unconventional building material. At the same time, slag was a very familiar substance to steelworkers and indeed to the entire community of Sydney.[66] While co-operative housing was an engaging and apparently new concept, it was, in fact, well-founded in a tradition of mutual support emanating both from the rural roots of most Sydney residents, and from their industrial working class experience.[67] On a "shop floor" level, the mutual understanding and benefit found in the "rabbit jobs" at the steel plant spoke for a work force and administration that appreciated the wider value of these on-the-job traditions. Another working-class principle might have been at work in the use of slag: the reluctance to waste. Weiner and his research colleagues noted that "there is usually a fascination in converting an otherwise 'waste material' into a useful product."[68] The floorplan of the slag houses, while deviating from the familiar two-storey pattern, nevertheless adhered to the importance of the kitchen and the "back" door as the primary entry for the

working-class family. The elements of construction not utilizing slag and steel, such as the roof, the foundation, and the interior finishing were part of the everyday knowledge of a people who had been building their own homes for generations and who had confidence in that tradition of self-reliance. But, as Wally Mackinnon conjectured, it seemed to be the conservation of the long-standing tradition of building in wood that kept the slag houses from becoming a commonplace and acceptable part of the Sydney landscape.

The slag houses built by the Insulite Housing Group in the 1950s stand as particularly solid monuments to the leadership of Norman Weiner, to the culture of work in the steel industry, and to the spirit of a group of men who were inspired to try a radically untraditional means of providing shelter for their families. The story of the Insulite Housing Group was one of co-operation that may have been based in the principles of the famous Co-operative Movement of Antigonish, but which developed its own independent and distinct system of organizing themselves, of developing innovative building materials and methods, and of completing the construction of their own homes. That the homes have stood the test of time suggests that there may be some profit in revisiting both the building techniques and the organizational style of this unique experience in Canadian housing history.

NOTES

1. Slag is an "industrial mineral" made up of iron ore, limestone and coal, the ingredients of pig-iron production.
2. John C. Bacher, *Keeping to the Marketplace: The Evolution of Canadian Housing Policy* (Montreal: McGill-Queen's University Press, 1993), 188, noted that home ownership, at that time, was also the basis of rental policies within the National Housing Act. It was the "only visible social housing goal of the federal government. It assumed...the character of the Holy Grail." John Miron, *Housing in Postwar Canada: Demographic Change, Household Formation, and Housing Demand* (Montreal: McGill-Queen's University Press, 1988), specifically, "The Postwar Housing Stock," 148–191, noted that during the period 1951–1961, more single houses were built in Canada than in any other ten-year period in its history. See also, Michael Doucet and John Weaver, *Housing the North American City* (Montreal: McGill-Queen's University Press, 1991); CMHC, *Canadian Building Innovations*, 1943–1993 (Ottawa: 1993); CMHC, *Summary Report: The Changing Housing Industry in Canada 1946–2001* (Ottawa: 1988).
3. John Sewell, *Houses and Homes: Housing for Canadians* (Toronto: Lorimer, 1994), specifically chapters "Home Ownership Programs," 82–96; "The Land Question," 97–116.
4. Marc Denhez, *The Canadian Home: From Cave to Electronic Cocoon* (Toronto: Dundern, 1994), 100. The National Housing Act design no. 371 was "a modern bungalow in the low cost field" with plans available for $10, cited in Denhez, *Canadian Home*, 94.
5. Denhez, *Canadian Home*, 102–103. See also, "Low Cost Houses from Sydney Foamed Slag," in *Teamwork*, March 1951, which advertised poured slag-aggregate concrete houses as "bullet proof, invulnerable to bomb splinters and considerably more safe under radio active bomb attack," 14–15. Donald G. Wetherell and Irene R. A. Kmet, *Homes in Alberta: Building, Trends, and Design, 1870–1967* (Edmonton: University of Alberta, 1991), 260–277, discuss the inception of the "stucco-ed" in western Canada.
6. Joann Latremouille, *Pride of Home: The Working Class Housing Tradition in Nova Scotia 1749–1949* (Hantsport, N.S.: Lancelot, 1986), 87–90.
7. Jim Duke and Sue MacLeod, "Self-Help Housing: The Canadian Experience," in *Canadian Housing/ Habitation Canadienne* 12, no. 1 (Spring, 1995): 8–10.
8. The Sydney plant became British Empire Steel Corporation (BESCO) in 1920; it was Dominion Steel and Coal (DOSCO) in 1929; A. V. Roe Ltd. took over DOSCO in 1957; the plant became Sydney Steel (SYSCO), a Nova Scotia crown corporation in 1967; in 1992 SYSCO was "privatized," operated jointly by Min Metals of China and the Nova Scotia government. See SYSCO Papers, MG14, 26, and the Steel Project Papers, MG14, 206, Beaton Institute Archives, University College of Cape Breton.
9. They can still be seen in Sydney, particularly in the Ashby area. In other parts of Sydney settled by immigrants, such as Whitney Pier, company housing was more likely to consist of shacks initially intended for single labourers. See Elizabeth Beaton, "Housing, People and Place: A Case Study of Whitney Pier," Ph.D. diss., University of Manitoba, forthcoming, 1996. For an understanding of the role of the steel industry in company housing, see Margaret F. Byington, *Homestead: The Households of a Mill Town*; (Russell Sage, 1910; reprint, Pittsburgh: University of Pittsburgh, 1974) and C. L. Woolridge, R. H. Stevens, P. C. Kuegle, and W. J. Riley, "Industrial Housing," in *Year Book of the American Iron and Steel Institute* (New York: 1922), 87–120.
10. The Revision allowed for the recognition of co-operatives as limited companies. Loans for 75 percent of construction costs were made at 3.5 percent interest for 25 years at a rate of $12.15 per member per month. Local credit unions loaned the groups any remaining financial requirement at 1 percent interest. See, *Co-operative Housing*

Handbook, prepared by J. Duncan MacIntrye (Sydney, N.S.: St Francis Xavier University, [1969]), 1, 2, and Moses Coady, *Masters of Their Own Destiny: The Story of the Antigonish Movement of Adult Education through Economic Co-operation* (New York: Harper, 1939), 78.

11. See Richard MacKinnon, "Tompkinsville, Cape Breton Island: Co-operativism and Vernacular Architecture," in this issue of *Material History Review*.
12. [William Roach], "Brief History Cooperative Housing in Nova Scotia," 5.
13. [Roach], "Brief History Co-operative Housing," 3, 4.
14. Edmund and Vida Anthony, interviews, 11 August 1993; 12 November 1993; also Bill McCabe, 8 November 1993.
15. Wally MacKinnon, interview, 10 April 1996.
16. Promoted by co-operative activists, Frs Moses Coady and Jimmy Tompkins, the "study groups" became a recognized element of the Antigonish Movement's co-operative housing projects. See Coady, *Master of Their Own Destiny*.
17. MacKinnon, interview, 10 April 1996.
18. Norman Weiner's diary dates from Saturday, 30 May 1952 when the first foundations were being poured, to Saturday, 10 July 1954, the last day with "the group." Weiner Collection, MG12, 261, Beaton Institute, University College of Cape Breton.
19. Norman Weiner was interviewed for this study in 1990.
20. In a year, a blast furnace can produce 400 000 tonnes of pig iron per year; coincidentally it would produce some 270 000 tonnes of slag. There are several different types of slag, depending on how it is cooled down from its 2300°C state at removal from the blast furnace. See J. R. Wallace, P. Fedora, and N. D. Weiner, "Properties and Applications of Iron Blast Furnace Slag," Shaw Group Collection, MG14, 224, Beaton Institute Archives, University College of Cape Breton.
21. Slag is, nevertheless, far from useless: it was used to make cast-slag cannon balls as early as 1589, but its use as a construction material did not occur until 1729 in England; from that time it has been used in Europe and America as an ingredient in mortar, bricks, cement, composition roofing, and concrete. See J. R. Wallace et al., "Properties and Applications of Iron Blast Furnace Slag."
22. "New Sydney Steel Plant By-product Now on Market," *Teamwork* (August 1950): 6.
23. "Foamed Slag: Second Progress Report — Laboratory Experiments," to: N. A. Parlee, written by J. R. Wallace, 12 April 1949; "Foamed Slag, Production of Building Blocks: Third Progress Report," to: N. A. Parlee, from: J. R. Wallace, P. Fedora, 19 July 1949. Shaw Group Collection, MG14, 224, Beaton Institute Archives.
24. *Teamwork* (August 1950): 6. In 1951, the "Thermocrete" product was tested for thermal conductivity by the Nova Scotia Technical College Science Service in Halifax. See, report on "tests on Thermocrete Building Units," Shaw Group Collection, MG14, 224, Beaton Institute Archives.
25. *Teamwork* (August 1950): 7.
26. *Teamwork* (August 1950): 6–8.
27. Weiner diary, 26 August 1952.
28. "Rabbit jobs" were favours carried out "on the quiet," using plant materials or labour to fix or make something for oneself or for a friend.
29. At that time the coke ovens were operated by the Koppers Company.
30. Wally MacKinnon, interview, 10 April 1996.
31. Edmund Anthony, interview, 11 August 1993.
32. Wally MacKinnon, interview, 10 April 1996.
33. Weiner diary, 28 June 1952; also 1 July 1952.
34. The "poundage" of rails is the weight given per yard of rail. This rail was considered to be small and relatively light, about the same as the weight of a steel mine prop.
35. Weiner diary, 4 October 1952.
36. Weiner diary, 12, 13 August 1952; 11–26 September 1952. A "fish plate" is a short piece of steel rolled to fit the bottom edge of a rail. It is used to splice rail pieces and can be nailed to railway ties.
37. Weiner diary, 11 September 1952; Monday, 22 September 1952; Tuesday, 23 September 1952.
38. Bill McCabe, interview, 15 April 1996.
39. Wally MacKinnon, interview, 10 April 1996.
40. Weiner diary, 3 October 1952.
41. Edmund Anthony, interview, 12 November 1993.
42. Casting-in-place was already being used in 1951 by the Foamed Slag Construction and General Engineering Company of Dartmouth: see, "Low Cost Houses from Sydney Foamed Slag: Object to Pour Whole House in Forms like a Basement," *Teamwork* (March 1951): 14–15.
43. Weiner diary, 2, 11–14 October 1952.
44. Weiner diary, 11–14 October 1951.
45. Weiner diary, 15 October 1951.
46. Reported in Norman Weiner diary, 21 May 1954.
47. According to Weiner's diary, on Tuesday, 22 July 1952, eight men unloaded 1000 bags of cement at Stephen's siding. They delivered 700 bags to L. E. Shaw, the rest distributed to participants.
48. According to his diary, Weiner started the process of obtaining a patent in April 1954.
49. Weiner diary, 6 January 1953.
50. Weiner diary.
51. Weiner diary, Monday, 19 January 1953. A "scab" is a short piece of lumber used to strengthen a joint. It may be nailed, screwed or bolted.
52. Weiner diary, 15 May 1954.
53. Weiner diary, 23 October 1952; 5 May 1954.
54. Weiner diary, Monday, 22 March; Tuesday, 23 March; Friday, 9 April 1954; Edmund and Vida Anthony, interview, 12 November 1993.
55. In the late 1980s, L. E. Shaw was changed to Shaw Group at the retirement of L. E. Shaw, when he turned management over to the workers at the plant.
56. Wayne Maclean, interview 6 April 1996. Also, C. J. Widgery, L. E. Shaw Ltd. to A. G. Spracklin, DOSCO, "re: slag" in which he suggests that the slag from DOSCO has been of questionable quality due to large amounts of residual iron. Shaw Group Collection, MG14, 224, Beaton Institute Archives.
57. "[F]eaturing...Sydney", in *Shaw* 3, no. 3 (November 1967): 1, 3, Shaw Group Collection, MG14, 224, Beaton Institute Archives.
58. Vida Anthony, interview, 11 August 1993.
59. Weiner diary, 20 April 1953.

60. Edmund Anthony, interviews, 11 August, 12 November 1993.
61. Weiner, interview.
62. Weiner diary, 20 April, 23 April, 30 April, 21 July 1953.
63. Weiner diary, 3 July 1952, for example.
64. Weiner diary, 24 July 1953.
65. Weiner diary, 12 and 13 July 1952; 7 April, 1953.
66. "Dumping the slag" was almost a romantic notion in Sydney for the way it lit up the sky at night; a humorous song about the dumping has long been part of the culture of steelmaking in Sydney.
67. Much has been written on this topic on a broader level, but the eastern Nova Scotia experience of the basis of co-operatives is summed up by Dan W. MacInnis, "Clerics, Fisherman, Farmers and Workers: The Antigonish Movement and Identity in Eastern Nova Scotia, 1928–1939," (Ph.D. thesis, McMaster University, 1978).
68. Wallace et al., "Properties and Applications...," 28, Shaw Group Collection, MG14, 224, Beaton Institute Archives.