Media in the Dump

SALVAGE STORIES AND SPACES OF REMAINDER

He could tell at a glance that these ancient machines took up most of the storage space; they lined two entire walls, from ceiling to floor. Most of them had a layer of dust on them. The window space, too, was filled up by machines for sale, all second-hand, nothing new. Like a junk store, he thought morbidly. His experience went entirely against used merchandise; it made him feel queasy even to touch dusty, dirty-looking objects in second-hand shops. He liked things new, in sanitary cellophane packages. Imagine buying a used toothbrush, he thought to himself. Christ.

—PHILIP K. DICK, In Milton Lumky Territory

Salvage Stories

Having moved through the material and spatial registers of fossilized chips and screens, plastic packaging and electronic memory, this study arrives at the most obdurate, if disparate, aspect of electronic waste—that formless mass of peripherals and scrap, wires and printed circuit boards, that surfaces and settles in the dump and junkyard as the cast-off dregs of technological progress. This terminal tale then settles with rubbish, where electronics have ultimately reached the end of their operability and so collect and sediment in landfills. In these sites, there are two stories that emerge to reveal much different aspects of waste, electronic and otherwise. One story concerns a project crew of garbologists cutting core samples through landfills and sifting through rubbish to obtain a picture of contemporary consumption patterns. Bottles and burgers, ancient newspapers and mechanical relics, diapers and wrappers, all of the things we have used up are excavated deep from the steaming bowels of these recently sedimented landforms. The workers, in white jump-
Dismantling electronic waste and removing gold from circuit boards with aqua regia, Guiyu, China, 2002. (Photograph courtesy of Basel Action Network.)
suits and waders, enter this debris into a detailed inventory as evidence of our consumption activities. Here is a record of all that we coveted, possessed, and abandoned, sampled and tabulated from the formless sludge of decomposition.

The other story involves a picture of a worker suited in galoshes and rubber gloves standing under a lean-to, surrounded by muddy ground. In the worker’s hand is a printed circuit board that he dips into an acid bath in order to extract tiny remnants of gold. Similar to the garbologists, this worker also sifts through the fallout of contemporary consumption, but for a much different purpose. He salvages valuable materials from electronic waste for resale because this material has been diverted from the landfills of developed countries and sent to developing countries for recycling. This diverted waste resurfaces in the scrap yards and loading docks of China and Nigeria. Waste not fit for Western dumps, due to either the lack of available landfill space or the high level of toxic substances in electronics, is, then, partially excluded from the record of consumption that the garbologists so meticulously compile.

Each of these operations is a salvage practice, a retrieval of wasted material, whether salvaging gold from discarded circuit boards or salvaging consumption data from the formless record of contemporary rubbish. Each of these salvage operations deals with the waste of contemporary culture. But the similarity between these salvage practices ends when we take into account the very different circuits of disposal in which electronic waste moves and settles. In chapter 3, I began my discussion of how electronics tip into these circuits of disposal, where the initial displacement of waste gives rise to places. In this discussion so far, I have addressed those spaces prior to and in transition to the dump, from the shipping container to the archive. Here, my intention is to dwell on the dump and those practices in and around the landfill and junkyard, including salvage and recycling. As mentioned throughout this study, electronic waste is often sent to developing countries under the guise of recycling. As the Basel Action Network indicates, up to 80 percent of electronic waste from the United States and up to 70 percent of electronic waste from Europe is shipped to developing countries.1 Electronics may be diverted from Western landfills, but their “recycling” is often just a deferral until they reach another, if more distant, landfill.

This chapter registers the final stages of electronics in pieces and the processes of materialization that unfold as these fragmented machines scatter and travel across the globe, often far from their sites of initial con-
sumption and use. While the spaces prior to the dump often generate multiple practices for the recuperation of value, the dump also is a space conducive to continually picking over the dregs, for rubbish is inexhaustible. Waste sticks and congeals; spaces of delay extend into spaces of indefinite remainder. As electronics sediment and begin to break down, they even create an unwitting archive of material, temporal, and ecological effects. These uncanny archives, in contrast to the more deliberate archives of the previous chapter, are the sites where the distinct salvage practices discussed here are located. This chapter dwells on these final staging grounds, where waste disposal does not give rise to absolute dissolution but, rather, provokes questions about how salvage practices deal with and transform remainders (infinitely deferred, but remainders all the same), how they recuperate value, and how they engage with the inevitability and irreversibility of waste.

“Textures of Decay”

The landfill is a kind of archive, which assembles not through deliberate or comprehensive collection but, rather, through a default accumulation of wasted matter tightly packed in airless cells. Deep within the mounds of refuse, an anaerobic environment develops, where materials are preserved unwittingly, simply through the lack of oxygen, light, and water: Biodegradability in landfills undergoes a state of arrest, so that most dumps end up mummifying their contents. Landfills ensure the longevity of the already extended life span of most materials. Electronics are embalmed, plastics endure, chemicals linger and spread, simultaneously. Wasted matter is preserved in this other archive, not as a collection of items for posterity, but as objects whose ecological duration far exceeds their cultural relevance. In this other accidental archive, which is far more disorderly and formless than even the most decrepit collection of computing history, it is possible to observe the transience and breakdown that characterizes waste and electronics.

The decay of waste occurs through temporal orders that span from the instant (of disposability) to a more extended geological history or earthly time. The landfill preserves this collision of temporal orders; it operates not just as a store of discarded objects but also as a record of technonatural relations that bear the imprint of shifting temporal and material conditions. Through the decay of material culture, it is possible to observe the landfill as an ecological archive. An unwitting staging ground for the
breakdown and demattering of wasted materials, the landfill contains a record of contemporary consumption, the duration and toxicity of materials, and the transformation and remaindering of materials. It is a kind of “garbage museum” that at once preserves remainders but also generates new possibilities for material transformation.4

Debris is often one of the most telling registers through which to understand material cultures. In this sense, archaeologist Michael Shanks suggests we turn our attention to these relatively neglected “material textures of decay.”5 Beyond preservation and order, ruination is a formative and critical dynamic within material cultures, revealing how and where things fall apart and what material practices and geographies emerge to process this debris. The landfill is an ideal site in which to study such textures of decay, because when things break down, we encounter the effects and processes of materiality.6 These effects and processes of material decay extend beyond the sheer fact of physical material breakdown, however, and encompass distinct temporalities and landscapes, as well as the practices and politics of salvage. When electronics break down and become formless, they split apart from the scripted spaces of preservation, progress narratives, and technological fascination.

Electronics further migrate across geopolitical divides to generate other salvage practices that must deal with the decay not just of technological imaginaries but also of toxic materialities. The salvage practices discussed in this chapter describe the actual repurposing of these materials. They also refer to the recovering of relations that are embedded within the final stages of handling electronic waste. From the debris and decay of electronics, it is possible to develop expanded salvage practices that turn over the imaginings, politics, economics, and geographies of electronic waste, in addition to the scraps of gold and copper that can be extracted from these machines. The fossils of leftover electronics make these relations resonate, and the natural history method enables the narration of these sedimented effects. In fact, Benjamin’s salvage practices made use of archives and fossils as waste from the past that could be recycled to make available unexpected narratives—a form of ragpicking.7 On one level, this form of salvage is striking in its difference from the garbology or electronic waste recycling previously described; on another level, Benjamin’s analysis suggests expanded dimensions of salvage. Whether ragpicker, garbologist, or waste worker, each engages in transforming, picking through and digging up, sifting and reworking remainders—albeit for much different purposes and in much different ways.
To salvage is to repurpose objects, to recycle some elements and discard others, to reinforce materials and rescue parts that are momentarily resonant and that operate in some way that had yet to be imagined. Waste is the stratum of the past in the present that is often overlooked. Salvaging is an act of imagining, of eliciting stories that may have been buried in the everydayness of objects. Yet salvaging is at once a poetic and political activity; it rematerializes the sets of material relations that enabled the manufacture, consumption, and movement of goods in the first place.

Working with waste is not a matter of simple recuperation. From the physical breakdown of objects, to the multiple sites across which they migrate, to the extended timescales and pollution that can be left behind, waste generates inassimilable remainders. Such remainders are often elided from waste management and sustainable development discourses, which propose that all forms of waste may eventually be broken down and recuperated into a usable, remainder-free form. Electronics materialize, dematerialize, and rematerialize. In this process, they do not sustain a seamless return to (re)production. Instead, they give rise to irreversible effects and remainders: a constellation of electronic waste. Waste always returns. Even with extensive attempts to salvage, recuperate, and recycle waste, remainders surface and resurface, thereby challenging sustainable development models that hold out for the flawless reintegration of wasted materials for renewed production.

Salvage necessarily involves engaging with those temporalities of decay and processes of materialization that constitute the texture of waste. How do electronics die? Where do they go to die? How do they transform and decompose? What (and whom) do they leave behind? New salvage practices become necessary in order to address the irretrievable remainders that accompany waste. These practices can offer ways of engaging with waste that attempt not to project a future of management and integration but, rather, to address and recuperate waste in its complexity. There is a politics of salvage, a politics of remainder; but as Benjamin also reminds, there is a poetics of salvage, a poetics of remainder. The remainder of this chapter traces the material dissolution and decay of electronics, piece by piece, to the landfill.

Electronic Recovery, Electronic Remainder

As electronics break down at end of life, they enter several stages of devaluation, salvaging, recycling, reprocessing, and decay. Just as the manu-
facture of electronics gives rise to chemical fallout and wasted resources, so, too, the disposal of electronics creates debris. Thompson notes, in his study on “rubbish theory,” that economic and physical decay are often discontinuous. Items become valueless, but their physical shells linger as “rubbish.” While this rubbish may at some time circulate back to a position of durable value, its valueless status may persist indefinitely. Electronics depreciate in a similar way, where a PC may be devalued from an initial value of 2,000 U.S. dollars at the time of purchase to a maximum resale of 150 U.S. dollars three years later. Even accounting for the sparse market for vintage computers, this disappearing value will typically never be recovered. There is yet another option for items in the rubbish category, and that is the possibility of salvage and recycling. While most electronics will never relocate to a position of durable value, they can be repaired or can be stripped and cleared of any materials of marginal value.

Electronics undergo many transformations in the course of decay. Repair and salvage typically precede recycling in the electronic disassembly process. Few electronics are repaired, due to the high costs of repair relative to the price of new machines. Remanufacturing does occur in some instances but is particularly dependent on whether electronics will be reissued in markets in developed or developing countries (with the latter often seen as a more viable market for refurbished machines). The process of remanufacture can actually conserve a large proportion of the labor, materials, and energy put into machines, since it repurposes machines into a similar form. Recycling, in comparison, focuses on salvaging and reforming materials into relatively raw substrates for renewed manufacture. Although repair, remanufacture, and reuse are still possible strategies for working with inoperable electronics, they are typically less common salvage practices. With reuse, moreover, the age of the machine is an important factor in recovering any possible value. A new machine may fetch a price as high as 100 U.S. dollars if it can be repaired for reuse, while a machine more than 10 years old will have little to no value at all.

Raw materials are salvaged from obsolete electronics, often by hand, by waste pickers working in conditions similar to those mentioned at the beginning of the chapter. The majority of salvaged materials sell for less than 1 U.S. dollar per pound. As a report of the International Association of Electronics Recyclers indicates, the “commodity recovery values” from stripped electronics range between 1.50 to 2 U.S. dollars.
per machine. At the same time, these values are unstable, and because newer electronics contain fewer valuable metals and are now comprised of even more plastics, material prices are even lower than before. The markets for salvaged goods also frequently fluctuate due to the changing relations between sites of manufacture and consumption, as well as the relatively minor contribution that recycled materials make to the overall supply of materials to manufacturing. Many recyclers attempt to make up for these potentially erratic movements in value by trading in considerable volumes of scrap. Electronics returns to another economy of abundance—similar to the microchips discussed in the first chapter—where large volumes of electronic scrap are the most certain way to realize profits. At the scrap stage, disassembled electronics become important for their volumes of copper, gold, or steel. This is technology measured by the ton, a strange reversal of the apparent dematerialization that once characterized these electronics.

Waste, in this respect, becomes a kind of “ore,” something held in large inventories and sourced from distinct areas. The gathering of this ore is a project involving considerable labor. Materials are stripped and worked, altered and extracted, burned and soldered, fried and dipped. Much of this salvage work is carried out by waste workers in developing countries, who process materials in relatively informal and small-scale settings. The informal sector of waste work is, on the whole, not very well documented. But from Delhi, India, to Guangdong, China, many stages of transformation and “recovery” take place within the movement of electronic waste. Environmental scholars Ravi Agarwal and Kishore Wankhade, who work with Toxics Link, an organization that focuses on electronic waste, discuss how Delhi, India, has become a recycling center: “The presence of upstream markets, local entrepreneurship, and tiny-scale industries have made it a prime spot for trading recovering, reprocessing, and selling waste.”

While many of the salvage and recycling operations for electronic waste take place in backyards and alleys, this informal sector exists in a close relationship with the more formal and mainstream economic channels for material distribution. Electronic waste may be collected in formal and recognized routes for waste handling, but in the process of its disposal, shipping, salvage, and scrapping, it circulates into more informal economies and “gray” markets. Well-established channels for importing used electronics exist in India and beyond. Electronic waste circulates from developed countries (including the United States, Europe, and
parts of Asia) through transit points spanning from Dubai to Singapore, passing through as undefined scrap in order to ease the customs process in ports ranging from Delhi to Lagos.

Shipping containers stacked with obsolete electronics are routed and rerouted from transit point to port, labeled and relabeled as various forms of scrap or raw materials. The dismantling of electronics occurs as much through these infrastructures and routes as it does through the stripping of machines. Electronics are not labeled as waste but, instead, often travel through this more formless category of scrap. It is this same category of scrap that allows recyclers from developing countries to rescind responsibility for what happens to used electronics, for at this point, the electronics have transformed, magically, into little more than spare parts. Yet there are still many stages left in the dismantling, salvaging, and recycling of these machines. The salvage transformations that electronics undergo on their “route to the recycler” include the process of waste dealers first determining whether the machine is reusable and, if not, its potential price by weight. Machines then may be resold or scrapped, and if scrapped, they are separated into component parts, from monitors and memory to keyboards and motherboards, wires and casings, microchips and peripherals. Here is the machine in pieces, where hard drives, CPUs, monitors, and chips are stripped and redistributed in secondhand markets. When all working components are extracted, the machines are then stripped for scrap. Copper wires are stripped from their housing, where hours of work may yield mountains of material but only a few dollars in return. Chips are methodically removed from circuit boards and drenched in acid baths to remove specks of gold. Waste pickers strip away at these machines that are not designed for disassembly, uncovering their toxic insides through equally toxic means of removal. They receive for their labor often just enough money to maintain a subsistence-level existence.

Multiple material transformations and exchanges take place in the salvaging of these discarded electronics. At every stage in the movement of electronic waste, material is extracted and repurposed. Electronics fall apart and are stripped and salvaged; but the spaces through which electronics move play a significant role in the process of that dissolution. The circulation of waste through spaces of remainder is a critical part of the material textures of electronic decay. The movement of waste and the different methods for processing waste span from collection and transport to assorted stages of disposal, which entail everything from incineration
and recycling to dumping and exportation. Exportation of waste is often discussed as an unviable method of waste handling, yet it is a common way in which materials are displaced. Indeed, while discussions of waste handling are often restricted to the more obvious channels of dumping and recycling, there are numerous other circuits through which rubbish moves, from reuse to salvaging. Objects that are used or used up do not necessarily issue straight for the dump. Secondhand goods, from clothing to furniture, may be repurposed in a number of ways. At the same time, these more innocuous goods move in different ways than goods that have a high level of toxicity, such as electronic waste.

As this mapping of the disassembly of electronic waste suggests, secondhand objects do not always circulate as benign objects capable of reuse. Recirculation and recuperation are strategies essential to the movement of commodities such as electronics, but these processes are often opaque. They take place in informal economic sectors, in peripheral landscapes, performed by workers in developing countries. Recirculation also involves the transformation and conversion of materials. As John Frow suggests, “the conversion processes by which things pass from one state into another” is a critical area of material culture yet to be explored fully. The processes of disposing of and destroying things not only lead to the conversion and transformation of materials but also potentially contribute to the mobility and circulation of those materials. These processes may be more or less accelerated. But the conversion process and the spaces through which electronics move are replete with remainder.

Material disassembly and conversion does not just enable circulation, moreover. Circulation may also further contribute to the transformation of goods, particularly through a decline in value or fall in status. Once commodities such as electronics travel to developing countries, they migrate toward the rubbish category just by virtue of passing across this geopolitical and economic divide. As anthropologist Michael Taussig suggests, commodities that turn up in developing countries almost automatically acquire this sense of the outmoded. It is the circulation of these objects to developing countries that “releases” the “atmosphere” of objects, imbuing them with the quality of the “recently outmoded.” Outmoded objects, together with toxins and waste, are cast off in this terrain that operates as a global landfill as much as a record for the fallout from modernity. However, through this record, the “power
of ghosts embedded in the commodities created by yesteryear’s technology” come to light, revealing, at once, the promises initially offered by commodities as well as the remainder and resources that issue from maintaining the repetitive force of progress.

In addition to salvaging the material residues and peripheral geographies connected to electronic waste, it is also possible to salvage these more mythic remainders from obsolete commodities. Contained in outmoded objects are these obscured dimensions (of politics, economics, resources) that inevitably resurface with the death of the commodity. Waste pickers who salvage through the remains of dead electronics do not necessarily have the luxury of entertaining the wish fulfillment these devices promised; instead, in salvaging and recycling these machines, they reveal how these promised wishes fall apart. By stripping, salvaging, and recycling electronics to a condition of formlessness (only to be reformed), it is possible to see both the expanded materialities of these devices and the layers of politics, economies, and ecologies that sediment through them.

Recycling and Dumping

As already discussed, the process of salvage precedes recycling, as a way to strip machines of any operable parts and ready materials for transformation and return to the status of (relatively) raw materials. Distinct materials and components are extracted from electronics, from chips to copper and gold. Waste workers in developing countries employ hammers to smash cathode-ray tubes to extract copper; they heat circuit boards to remove chips; they soak these same boards in acid baths to remove gold; they extract motors from printers; they refill printing cartridges; they smash and chip plastic for melting and recovery; they strip and burn PVC wires to extract copper or aluminum; they separate hard disks to retrieve copper, aluminum, and magnets. Recycling marks the transfer of these salvaged items back to production, where the metals, the plastics, and the working components are reintegrated into circuits of use. As discussed in chapter 3 however, even more than a return to production, recycling marks a return to wasting. While recycling appears to be a way to rid ourselves of remainder, to incorporate neatly all that is leftover, it in fact performs a deferral and inevitable return to the death of objects.

The transformation of waste to raw material through recycling is a
way in which commodities become formless in order to be reformed. Recycling does not remove remainder or wastage; instead, it displaces and transforms waste.\textsuperscript{28} The myth that waste may be recycled without remainder, instantly, into newly productive systems, presents a political and environmental dilemma. Not only does recycling rely on “economically viable markets” that, as Van Loon and Sabelis note, can actually take up recycled material for use in production; it also depends on the speculative “future profits” that will derive from “present waste.”\textsuperscript{29} The time between waste and recycling is supposed to be minimal, as though the fallout from linear growth may be recuperated in a cyclical time to feed back into that linear time. This collision of temporalities can present a key problem for recycling.\textsuperscript{30} Within this equation, there is the problem presented by the assumed remainder-free and instant recuperation of waste, as well as the problem of the assumed remainder-free status of renewed production. In this model, the management of waste, its return to recycling, is a “displacement.”\textsuperscript{31} However, this displacement is not directed toward a space “outside” the “system” but, rather, occurs within systems, across temporalities, and even in fictional futures. As discussed earlier, remainder “directs us,” even as we displace and attempt to reintegrate it. Remainder acquires a duration and delay, circulates through spaces, and undergoes material deformation and transformation, but it persists, nonetheless, in one form or another, as an ineradicable dust. Recycling, in this sense, is never complete and always generates even more waste.

While the majority of recycling takes place in the developing countries, some recycling, particularly initial salvage, takes place in developed countries. Electronics recycling facilities range in size and sophistication of operation. Some operations consist of a few workers who strip machines of particular components for reuse and then ship machines onward. Other operations shred entire machines. The latter process, considered by some to be one of the more advanced methods for dealing with electronic waste, consists of shredding everything into dust and separating these minute fragments into scrap categories based on their material composition.\textsuperscript{32} In this process, materials are purposefully driven to a state of dust, as the ideal unit of recuperation. Dust that most closely approximates raw materials may then be shipped to manufacturing markets for reuse. But once again, the reuse of these materials depends on ongoing manufacturing and consumer demand. Without this demand, even the most advanced of recycling methods does little more than convert materials into idle raw materials. Whether recycling methods are
“high-tech” ways of generating dust or consist of more dangerous methods of burning leftover electronics to render these materials to dust, the spaces and material sediments bundled into electronics do not transform into waste-free futures.

The contradiction, of course, is that electronics are rendered functionless if they are contaminated with even a speck of dust during manufacture. As discussed earlier, dust threatens the functioning of these machines, yet dust returns as a definitive mark of the materiality and temporality of electronics. Indeed, as cultural historian Carolyn Steedman suggests, dust is a mark of the past and of the “imperishability of matter, through all the stages of growth and decay.” Dust is a reminder that “Nothing goes away.” Steedman goes so far to suggest that dust “is not about Waste” but, instead, “is about circularity, the impossibility of things disappearing, or going away, or being gone.” Through this study on electronic waste, however, I suggest that dust and waste are not mutually exclusive categories—that dust, far from constituting the “opposite thing to waste,” actually increases our understanding of waste as a process involving transformation and remainder, not erasure through expenditure. Even within electronics, which are guided by a sense of the apparent ease of dematerialization and erasure, it is possible to observe just how persistent remainder is.

Processes of salvage, recuperation, and recycling are attempts to address this intractable remainder and where it goes. Yet electronics recycling not only creates renewed remainder and waste; it is also, as the Basel Action Network suggests, “a misleading characterization of many disparate practices—including de-manufacturing, dismantling, shredding, burning, exporting, etc.—that is mostly unregulated and often creates additional hazards itself.” Recycling potentially unleashes even more hazards to workers and environment, as toxic materials are used throughout the salvaging and breakdown of machines. Even with these dubious recycling methods, only a fraction of electronics actually enters the reuse, salvage, and recycling stream, with as little as 11 percent of all electronics being processed for recycling in the United States. Many of these machines are divested from large institutions and corporations, which are required to recycle their equipment. But many current recycling practices are difficult to trace fully, and depending upon the methods used may generate effects that are as toxic as, if not worse than, landfilling. As the Basel Action Network indicates, the remaining electronic waste stream is sent to landfills or incinerators.
The dump is a site where we encounter this fossil record in high relief. Garbologists picking through the recent remains of consumer culture or waste pickers in developing countries both work with the accelerated fossils of electronics. Sifting through these dead electronics—the sediment from compulsive upgrades—waste pickers may discover that the electronic mode of decay does not extend to rot but, rather, to leakage and contamination. These devices enjoy a plastic persistence and know nothing of biodegradability. Electronic material does not admit for total decay, even though the Long Now Foundation has established, through its “Digital Dark Ages” project, that digital media, including CDs, tapes, and files, all functionally decay typically within a matter of five years. Rates of decay may even accelerate in tropical climates, where VHS tapes have become almost completely obsolete, as the humidity creeps through magnetic plastic tape to render it inoperable. Yet, from the initial rendering of inoperability to a state of complete dust, there is a protracted process of wasting, decay, and sedimentation. This sediment develops not just through the making of goods but also through their unmaking.

In the dump, electronics cohabitate with indiscriminate landfill refuse. Whether at the end of the recycling process in developing countries or at the end of life in developed countries, electronics that do not undergo salvage and recuperation instead migrate to the dump. Electronic waste may travel the ocean as it passes into networks of recycling, but even such distribution is not enough to ensure that material will be reused. A large quantity of electronics sent for recycling in developing countries is in fact dumped instead of recycled, as the process of recycling proves to be too cumbersome or unprofitable. “In open fields, along riverbanks, ponds, wetlands, in rivers, and in irrigation ditches,” the Basel Action Network documents, you will find “lead CRT glass, burned or acid-reduced circuit boards, mixed, dirty plastics including mylar and videotape, toner cartridges, and considerable material apparently too difficult to separate.” These materials, together with the residues of ash and acids from electronics recycling, are scattered across landscapes in developing countries that are, in many cases, the global landfills for developed countries.

The version of dumping found in these cases is an open dump, in contrast to the sanitary landfills and incinerators of developed countries. But even in the space of the relatively impermeable landfill, now the most common method for waste disposal, heterogeneous materials mix in an equally indiscriminate way. The architecture of the landfill accretes
through the sedimentation of trash, layers covered with earth and compacted into airless cells. The landfill settles, shifts, and subsides, generating methane gases and carbon dioxide. Material of any sort, whether paper or diapers, electronics or food scraps, is buried together in a space of “seemingly final disposal.” But this shifting architecture decomposes into the soil to expel greenhouse gases and heavy metal runoff, as well as intractable and scattered objects that refuse to decay.

Disposal may be “seemingly final,” yet there are still multiple ways in which waste may be recuperated and in which remainder may resurface. Indeed, the seeming finality of the dump has been the source of inspiration for various proposals to redesign the dump as a space of storage, reuse, and flow. “Sorted dumps” have been one way to imagine organizing dumps according to materials and location, so that they may be more efficiently mined in the future. A dump is, on one level, a repository of ore for possible future use. To this extent, the dump, as proposed by some, may even be obsolete, an ancient and inefficient way of dealing with abandoned materials. Mira Engler describes proposals by Dutch landscape architects to use dumps as “transit points,” or as a “temporary storage space,” where materials are stored for eventual recycling. Even more, these landfills may become the next mines, where instead of dismantling entire mountains for minerals, we can turn to these hills of consumption to extract materials. Presented in these future visions for more ideal dumps is the persistent presence of waste as an “unwanted surplus” that may at sometime become valuable again. Yet this vision relies on the persistent belief in some future ability to manage waste free of remainder: if we are not able to solve our waste or environment dilemmas today, they will no doubt become “technologically manageable” in the future. Continuously present in these model future dumps is the question of remainder. Remainder is present in the form of leftover electronic scraps, as well as the irreversible effects of pollution and the damaging disparities that can emerge through the unequal economies of waste handling and dumping.

As this tour through the circuits of electronic waste further attests, the dump is a “seemingly final” space of disposal in yet another sense, as the extended effects of commodities persist well beyond burial. Even when capped under the ground, these materials belch and leach and generate pollution and methane through their decomposition. The most fluid of proposals for the reintegration and recycling of waste still generates an intractable spread and persistence of pollution. Indeed, as the Basel
Action Network indicates, “About 70% of heavy metals (including mercury and cadmium) found in landfills come from electronic discards.”

Just as the production of electronics involves the release of numerous hazardous materials into the environment, so recycling and dumping of electronics unleashes a tide of pollutants, from lead and cadmium to mercury, brominated flame retardants, arsenic, and beryllium that spread through the soil and enter the groundwater. From manufacture to final decay, electronics seep into the aquifer and subsoil, settling into longer orders of time and more enduring chemical-material conditions.

When operable, electronics hardly seem to constitute a form of hazardous waste. Perhaps it is for this same reason that electronic waste is not always agreed on as a form of hazardous waste. Yet each of the materials listed in the preceding paragraph is known to have deleterious effects on humans and environments. The substances contained within electronics are precarious. They leak and spread, contaminating that which they touch. Yet another form of dematerialization, then, takes place with electronics, where the boundaries of objects break down, eroding and corroding other materials. At the same time, electronics perform another sort of rematerialization through pollution and through remainder. “Pollution surprises,” writes anthropologist Marilyn Strathern, “by its untoward nature, an unlooked for return; yet those involved in the activity of waste disposal know that one cannot dispose of waste, only convert it into something else within its own life.” It may be possible to recycle or transform materials such as electronics into raw materials, component parts, or adaptable architectures. But in these conversion and salvage practices, it is inevitable that pollution, residue, and remainder will persist. No amount of future reintegration or reuse can negate the present effects of waste.

The presence of waste and remainder suggest that we should direct our attention to the ways that things fall apart, the material textures of their decay, and what is left over. Only by turning to these processes of dematerialization, or demattering, is it possible to attend to the complex material effects of electronics. Analyzing the ways in which things—here, electronics—fall apart is critical for developing a more thorough understanding of their processes of materialization. In this respect, Buchli argues, “What is more important probably is not to study the materializations themselves but rather what was wasted towards these rapid and increasingly ephemeral materializations.” These processes of materialization extend to the “cultural work” that informs how objects
dematerialize and transform to rubbish. Through such a study of digital rubbish, it may be possible to capture material culture more fully—not as fixed and settled, but as contingent, ephemeral, and even wasting. As this chapter attempts to document, the wasting that occurs through these processes of materialization has a texture and remainder that cannot simply be erased from the material record. Electronic waste directs us toward these materializations and reminds us that irreversibility and remainder challenge the prevailing models of “waste management,” which do not account for remainder. This same remainder and irreversibility create a fossil record. These fossils, the record of transience that accretes and does not reintegrate into a renewed story of technological evolution, allow us to consider “what was wasted” in these materializations.

By picking through the dump and by expanding the scope of salvage practices, it is possible to observe all that was wasted. At the same time, such a formless mass can become something other than the guilt of discards, or fodder for renewed production. The dump, instead, gives rise to new imaginings. “The dump,” as architect Rem Koolhaas suggests, “has potential; it attracts scavengers.” This potential emerges from the apparent formlessness of the dump and its dirt, where objects become indistinct, even putrid. These objects have moved from form to formlessness, yet, as Douglas writes, “formlessness” becomes “an apt symbol of beginning and of growth as it is of decay.” The question Douglas poses from the rubbish is how “dirt, which is normally destructive, sometimes becomes creative.” But as this chapter suggests, such creativity and growth are not simple acts of reintegration and return to production and progress. Instead, the waste that surfaces here requires us to ask how remainder may “direct us” not to simplify things but, instead, to work through the complex layers and effects accreted through materializations. In this way, it may be possible to salvage not just these material relations but also the politics and poetics of matter. The conclusion that follows attempts to open up the possibilities of such an encounter with remainder.
Dismantling parts—electronic waste, China, 2007. (Photograph courtesy of Greenpeace / Natalie Behring-Chisholm.)
Worker strips wires—toxics e-waste documentation, China, 2005. (Photograph courtesy of Greenpeace / Natalie Behring-Chisholm.)